SESAR
DEPLOYMENT MANAGER

DEPLOYMENT PROGRAMME 2016

PROPOSAL FOR UPDATE

30th September 2016

LET'S DELIVER TOGETHER

Deployment Programme 2016

(DP 2016)

FPA MOVE/E2/2014-717/SESAR FPA
SGA MOVE/E2/SUB/2015-467/SI2.724359
Milestone M1.3

30th September 2016

Control

Approved by	**Massimo Garbini** Managing Director	**Date** 30/09/2016	**Signature** Signed
Reviewed by	**Nicolas Warinsko** Deputy Managing Director Director Technical and Operations	**Date** 30/09/2016	**Signature** Signed
Prepared by	**Mariagrazia La Piscopia** Deputy Director Technical and Operations DP Planning Manager	**Date** 30/09/2016	**Signature** Signed
	Heiko Teper DP Realisation Manager	**Date** 30/09/2016	**Signature** Signed
	Michel Gorog Head of Performance and Financial Systems	**Date** 30/09/2016	**Signature** Signed

Table of content

1. EXECUTIVE SUMMARY

1. Executive Summary

What is the Deployment Programme?

Following the **adoption by European Commission of the Regulation (EU) No. 716/2014, known as the Pilot Common Project (PCP)**, which mandates the implementation of 6 ATM Functionalities (AFs) within a specified geographical scope by specified dates, the **European ATM Community needed a unique, agreed and supported implementation plan by and for industry**, illustrating how to get organized to ensure synchronized, coordinated and timely deployment.

This plan is the **Deployment Programme (DP)**, as **issued by the SESAR Deployment Manager (SDM)** in its first release in 2015, building also on the **contributions from SESAR Joint Undertaking (SESAR JU)**, the **Network Manager (NM)** and the **European Defence Agency (EDA)**, and on the wide consultation of all SESAR stakeholders, in particular the operational stakeholders engaged through the **Stakeholders' Consultation Platform**.

For each of the **6 ATM functionalities** and **20 sub-functionalities** contained in the PCP, the DP lays down **families of Implementation Projects (IPs)**, flagging the implementation activities to be performed, indicating by which stakeholder, where, how and identifying the optimum time for their execution.

The DP represents the **blueprint for the ATM investment plans of all operational stakeholders impacted by the PCP regulation**. Considering the co-funding support to PCP implementation available through the CEF Framework, the DP constitutes the **main reference document** to **specify the priorities of the 2016 CEF Transport Calls for Proposals for the priority SES/SESAR/PCP**.

In order to provide the operational stakeholders with **the most up-to-date specification for every CEF Transport Calls for Proposals,** the **DP is updated yearly**, taking into account the Implementation Projects submitted and then awarded as a result from the previous calls. **This edition 2016 of the DP includes the Implementation Projects awarded as a result from the CEF Transport Calls 2015 and 2014**, narrowing down the scope of the implementation activities still to be performed for achieving the objectives and releasing the benefits of the PCP. **This 2016 edition of the DP**, after delivery to and approval by the European Commission, **will then be used as the main reference document to specify the priorities of the CEF Transport Calls 2016**.

The structure of Deployment Programme 2016

The "**Strategic view"** (Chapter 2) sets the scene where the DP is embedded, providing the guidelines that support the full understanding of the Programme from a strategic perspective.

It is followed by the **"Project view"** (Chapter 3), which constitutes instead the *operational* core of the document. In particular, it details at Family level the Implementation Projects that have been awarded through 2014 and 2015 CEF Transport Calls for Proposals, whilst also indicating the implementation initiatives that are still required to close the remaining gaps and achieve the full PCP implementation and the associated performance expectations.

The "**Performance view**", (Chapter 4) describes the SDM role in the overall SES performance framework and summarizes the Performance Assessment and CBA methodology applied by SDM. Furthermore, the initial performance gains expected from the implementation of the Deployment Programme through IPs resulting from 2014 CEF Call are presented, and the Cost Benefit Analysis of the Deployment Programme is introduced.

The "**Monitoring view**" (Chapter 5) reports the current implementation status of the PCP throughout Europe. Section 5.1 features the results of the dedicated SDM Monitoring Exercise for both ground stakeholders and airspace users' gaps, whilst section 5.2 is populated on the basis of the outcomes of the latest DP execution Progress Report, focusing on the Implementation Projects awarded in the 2014 CEF Call and coordinated by SDM. In this respect, section 5.3 presents the approach underlying all synchronization and monitoring activities performed by SDM, in cooperation with the Implementing Partners.

Strategic, project, performance and monitoring views result in the identification of the main risks associated to the execution of the DP, along with the related mitigation actions, either under SDM or other Stakeholders' remits, both described in Chapter 6 "**Risks and Mitigations**".

"**Future Evolutions of the DP**" (Chapter 7) concludes DP 2016, enclosing an overview of what to be expected in the future version of the Programme.

DP 2016 also includes four Annexes, here below listed:

- **Annex A – Project view: Projects details**, which features additional details with regard to projects awarded through 2014 and 2015 CEF Transport Calls;
- **Annex B – Standardisation and Regulation Roadmaps**, developed and updated with the ultimate goal of becoming the bridge between SJU and SDM and embodying the common reference for all Stakeholders involved in the industrialisation phase of SESAR;
- **Annex C – PCP Implementation Status by Member State**, detailing the current Pilot Common Project implementation status of the 48 Families in each Member State, and the list of the projects awarded through 2014 and 2015 CEF Calls within each State;
- **Annex D – Performance Assessment** and **Cost Benefit Analysis Methodology**, providing further details on the Performance Assessment and CBA methodology introduced in the "Performance View" of the Programme.

The added value of the Deployment Programme 2016

The DP 2016 represents a remarkable update and enhancement of the DP 2015. Although inspired by the same principles that underpinned the DP 2015, its development process took advantage of **the wider time span available**, of **the structured mechanisms established during the 2015's campaign** and of the **lessons learnt** from the past edition. In a nutshell, the DP 2016 is **not only an update**, but it also features **noteworthy improvements in all its contents and chapters**. In particular, the fruitful **cooperation between SDM and SJU** has supported the continuous **alignment between the DP 2016 and the European ATM Master Plan**, in order to ensure mutual consistency and provide a coherent SESAR planning and monitoring to all SESAR stakeholders.

Strategic View

The Strategic View sets the scene, presenting an overview of the main findings resulting from the development of the core chapters of the Programme. It includes in particular:

- the high level Work Breakdown Structure that sets the 48 families of IPs further detailed in the Project View;
- the overall implementation planning which drives the optimum sequencing of the 48 families and the performance policy of the SDM.

At the request of the European Commission, the updated Strategic View now also includes:

- an **Implementation Strategy for Data Link Services (DLS)** as the necessary step towards the deployment of AF6;
- an **Action Plan** organising the necessary framework for the relevant operational stakeholders to continue and amplify their activities towards definition and establishment of a **SWIM Governance**.
- the identification of those families which implementation could result into the **provision of a Common Service**, thus requiring a **specific approach in the planning of their deployment** and the identification of the implementation activities required.

Learning from previous DP 2015 – CEF Transport Calls 2015 sequence, the Strategic View now features **high-level principles to guide operational stakeholders** towards submission of candidate implementation projects through the upcoming CEF Transport Calls, making best use of all information laid down in the DP and maximize opportunities to access EU co-funding.

Lastly, the Strategic View features for the first time considerations on **SDM-FAA cooperation on SESAR-NextGen implementation and how this makes DP stronger on global interoperability**.

Project View

The expanded **Project view** of the Programme – **the "technical and operational" reference** – has undergone a complete review process, and now provides a **clearer, exhaustive and detailed overview of the technological and operational enablers associated to scope of the PCP**, aiming at supporting any potential candidate implementing Partners with all the information needed to submit a project in the framework of future CEF Transport Calls. The enhanced Project View in the DP 2016 also features a **more detailed outlook of the implementation gaps** still to be closed to achieve full deployment of the PCP, consequently supporting the relevant stakeholders into identifying the potential funding opportunities through future CEF Transport Calls.

The Project view of the DP has been **updated against the latest results of 2015 CEF Transport Calls**, in order to provide stakeholders with the **most focused view of what shall be submitted and by whom to next 2016 CEF Calls**. With this latest improvement, the Project view enables a **full top down approach** from PCP to gaps through the 48 families, and with **detailed enough gaps to trigger the required projects**.

Performance View

The updated **Performance View** features an overview of **SDM's role within the SES performance framework** together with SDM's **Performance Assessment and CBA Methodology**. As early results from this methodology, the DP 2016 reports on the **performance gains expected from the implementation of the DP and presents** the **DP Cost Benefit Analysis** (CBA).

Monitoring View

DP 2016 also features an enriched and widened **Monitoring View**, elaborated through two main processes:

- The **Monitoring Exercise** launched by SDM in March 2016, aiming at identifying for each Family those **implementation initiatives still needed to achieve full PCP implementation,** supporting the stakeholders in the identification of the implementation areas to be tackled by their investments, and sustained by the EU financial mechanisms;
- The **Synchronization and Monitoring activities** carried by SDM for the CEF-related projects, also feeding the DP Execution Progress Report[1].

Such complementary approaches result into a **clear and reliable picture of the current status of PCP implementation** throughout Europe, providing robust reference to all operational stakeholders and guiding their future investments and activities. Furthermore, in order to boost the short term and prepare the mid and longer terms, the **DP 2016 highlights the most urgent initiatives and activities** to be undertaken by SDM, any other SESAR deployment related body and the operational stakeholders.

Other chapters

Finally, the DP 2016 reviews the **risks regarding full and timely PCP implementation**, reporting on their criticality, their probability, the actions undertaken by SDM and other parties in order to mitigate them as well as the **future actions envisaged by SDM and suggested to other stakeholders** to further mitigate as needed.

[1] The **Deployment Programme Execution Progress Report** is elaborated by the SESAR Deployment Manager three times per year (4th of March, 31st of May and 30th September) and aims at highlighting the progress achieved by the implementation projects awarded as a result from the CEF Transport Calls. It provides detailed information concerning the progress of tasks, milestones, deliverables, risks, issues and costs, at Action level, at AF level and at project level.

2. STRATEGIC VIEW

2. Strategic View

The *Strategic view* is the connection between the Pilot Common Project – the business view which sets the frame for this Deployment Programme – and the detailed and operational "*Project view*" presented in the following chapter.

In particular, it provides for a high-level recap of the role of the Programme within the SESAR framework, presenting its structure, outlining the main new features of DP 2016 compared to DP 2015 and introducing an executive view on the technological improvements that need to be deployed in Europe in the upcoming years.

2.1 DP 2016 new features

DP 2016 provides for an update of the work breakdown structure already presented in DP 2015, where the 6 ATM functionalities and 20 sub-functionalities contained in the Pilot Common Project have now been turned into 48[2] Families of implementation projects enabling the full PCP implementation. Such update reflects the need of better illustrating the technological elements associated to each AF and building for coherent and clearly defined Family of implementation projects.

Still fulfilling its essential objective of providing a unique and consulted ATM technological implementation programme by and for the Aviation industry, DP 2016 has been improved and enhanced, as the following paragraphs summarize.

The **Strategic view,** which keeps its role as the junction between the PCP and the detailed *Project view*, has been further developed to include relevant changes in the Programme content such as the split of specific Families, the re-assessment of Families' readiness for implementation in the light of any recent relevant development in the upstream phases (i.e. development and validation by SJU, standardization, regulation and industrialization), as well as new graphical features like the introduction of an overall Gantt of all the Families of the Programme.

Moreover, the Strategic View has been complemented with the development of three new sections:

- **2.6 "DP Implementation Status";**
- **2.7 "Approach for an effective PCP deployment"**;
- **2.8 "Global interoperability".**

"DP Implementation Status" (2.6) provides a high-level overview of the current status of PCP deployment including in particular the strategic progress of the 84 projects awarded during the 2014 CEF Call and currently monitored and synchronized by SDM. Such section has been developed building both on the inputs gathered by operational stakeholders within the dedicated Monitoring Exercise (see section 5.1) and on the main

[2] Deployment Programme 2015 included 44 Families of implementation projects. The inclusion of additional families is further explained in the following paragraphs.

findings related to the DP Execution Progress Report, whose implementation details are reported in section 5.2.

"Approach for an effective PCP deployment" (2.7) is focused on those activities deemed as most urgent and critical in order to support an effective deployment of Pilot Common Project throughout Europe. It includes:

- an **Implementation Strategy for Data Link Services (DLS)** as the necessary step towards the deployment of AF6 (2.7.1);
- an **Action Plan** organising the necessary framework for the relevant operational stakeholders to continue and amplify their activities towards definition and establishment of a **SWIM Governance** (2.7.2).
- the identification of those families which implementation could result into the **provision of a Common Service**, thus requiring a **specific approach in the planning of their deployment** and the identification of the implementation activities required (2.7.3).
- **high-level principles to guide operational stakeholders** towards submission of candidate implementation projects through the upcoming CEF Transport Calls, making best use of all information laid down in the DP and maximizing opportunities to access EU co-funding (2.7.4).

"Global interoperability" (2.8) reports on SDM-FAA cooperation on SESAR-NextGen implementation and how this makes DP stronger on global interoperability.

The **Project view** presents the same structure of DP 2015, but it has been further improved in order to include inputs concerning respectively the current progress of 2015 CEF Transport Calls for Proposals. For all the Families, a complete review process has been also undertaken by SDM in order to further detail and better explain their content, without changing the technical capabilities stemming from the agreed DP 2015. Moreover, the WBSs for each Family has been enhanced and restructured, now including three branches, providing respectively information on the 2014 CEF Call awarded projects, on the 2015 CEF Call awarded projects and on the remaining existing gaps still to be covered (also with regard to the percentage of coverage still to be addressed and the associated funding opportunities).

The **Performance View** of DP 2016 represents a significant update from the DP 2015, now featuring the presentation of the performance gains expected from the DP implementation, as well as the results of the associated Deployment Programme Cost Benefit Analysis (CBA).

The **Monitoring View**, updated in its contents and format to include all the results of the current DP implementation status in Europe, includes important changes related to the Monitoring Exercise. As a matter of fact, the analysis, building on the inputs coming from different stakeholder categories involved in the implementation of the Pilot Common Project through ad-hoc templates and surveys developed by SDM (see section 5.1), now further details the status of deployment, through dedicated tables and charts.

In particular, for the ground monitoring, the charts include specific tables organized on a geographical scope basis, illustrating the feedback coming from different stakeholder categories involved in the implementation of each Family in a specific airport/country (e.g. ANSPs, Airport Operators, Military Authorities, MET providers, etc.), as well as the overall implementation status of the Family, identified by consolidating all stakeholders' views.

For the relevant Families, the Airspace Users monitoring section has been also enhanced and improved, including a more fleet-oriented approach, identifying the gaps' coverage percentage. In order to detect where further projects would be needed in order to deliver the PCP and to address the needs of the Airspace User community, the monitoring questionnaires developed for DP 2015 have been enhanced and fine-tuned: one on **PCP-related flight planning capabilities**, the other one on **aircraft capabilities** and airspace user's readiness to deploy the needed avionic functionalities. This network-centric approach, due to the nature of the AU stakeholders, aims at complementing the monitoring exercise of the ground stakeholders.

Both for the ground and for the Airspace Users gaps, a percentage of coverage of the gap itself is also included, taking into account the functions/enablers and milestones identified at Family level (see section 3 – Project View) and their current implementation status.

It is worth noting that SDM **monitoring exercise** represents a **living picture** of the current status of **SESAR deployment** in Europe and, as such, is to be constantly kept updated through SDM synchronization and monitoring of the Programme.

In this respect, the Monitoring View included in the DP 2016 provides for the current snapshot of the PCP implementation, starting from the input received through the monitoring exercise started on March 4th, 2016. Such view is expected to be constantly updated through future releases of the Programme.

2.2 Performance Policy

SESAR Deployment Manager (SDM), according to its regulatory framework set by Commission Implementing Regulations (EU) No 409/2013 and No 716/2014, **considers the performance driven deployment of the Pilot Common Project and any subsequent Common Project as a priority.**

SDM commitment is focused on a **constant improvement of the methodology** to assess the consistency with and level of contribution to European Union-wide performance targets[3] provided by technological investments.

Within the scope of its responsibilities, SDM's performance policy is to:

1. Guarantee **compliance to relevant regulations and adherence to the European ATM Master Plan as reference for operational changes** that are essential enablers to achieve the Single European Sky (SES) performance objectives;
2. Guarantee **full coordination with SJU, PRB, NM and EDA** on performance assessment;

[3] European Union-wide performance targets' means the targets referred to in Article 9 of Commission Implementing Regulation (EU) No 390/2013.

3. Guarantee the **consultation with the implementing partners on performance analysis** before they are published and within the consultation process defined for the Deployment Program;
4. Guarantee the **coordination of performance assessment with Military stakeholders** through EDA;
5. Provide the **assessment of implementing projects against SES performance targets** namely safety, capacity, environment and cost efficiency as part of the synchronisation effort of the Deployment Program;
6. Provide the **analysis of the costs and expected benefits of the PCP related implementation projects**;
7. Provide **the monitoring and the assessment of impact of implementing projects** on each performance target;
8. Promote the **use of good practices in the field of cost benefit analysis methodologies** and the **adoption of continuous improvement models**;
9. Guarantee that **all involved staff is aware of its role in the achievement of performance driven deployment**;
10. Develop and promote, at management and implementation levels of the SESAR Deployment Governance, a **performance driven culture**.

The "performance view" of the DP (chapter 4) further develops the above described performance policy.

2.3 Full PCP implementation

The Pilot Common Project, as laid down by Regulation (EU) 716/2014, combines coherent technological improvements aiming at enhancing the performance of the European Air Traffic Management system in the short to medium term. It focuses on those technological improvements deemed as mature enough to start and to be fully deployed in the 2014-2026 timeframe requiring a synchronized implementation among the key investors.

The Pilot Common Project also fosters the implementation of key ground-ground and air-ground infrastructural building blocks for the future Common Projects.

DP 2016 aims at providing the **project view for the full PCP implementation**: in particular, there are **48 Families of implementation projects underpinning the deployment of the 20 Sub-ATM Functionalities and therefore of the 6 ATM Functionalities in the PCP**, as illustrated in Fig. 1 included in next page.

Fig. 1 also illustrates, for each Family, the level of readiness for implementation and time wise urgency to be launched in order to pursue timely PCP implementation. Specifically, the **48** Families have been clustered into the following categories:

- **40 High Readiness Families**: ready for implementation Families, which need to be covered by projects to be submitted through 2016 Calls; these Families are mature for implementation and time wise the most urgent to be deployed in order to continue timely PCP implementation and early benefits delivery.
- **5 Medium Readiness Families**: ready for implementation Families, which could be covered by projects to be submitted through 2016 Calls; these Families are ready for implementation, although time wise they are less urgent to be deployed for PCP timely implementation.

– **3 Low Readiness Families**: not ready for implementation Families; these Families are not yet ready for implementation but will be re-considered when developing the future versions of the DP as their readiness for implementation is expected to improve in time.

The present categories have been identified in order to support the operational stakeholders in **sequencing the implementation activities towards the full PCP deployment** and the clustering has been performed **taking into account the technological maturity of the elements associated to each Family** (e.g. in terms of validation activities, availability of standards, deployment start, etc.). In detail, taking into account the aforementioned elements, the SDM experience of the current deployment initiatives throughout Europe and the comments received during the Consultation process, the level of readiness for implementation of the following Families has evolved from a "**Medium**" to a **"High**" level of readiness:

– **Family 2.1.4 Initial Airport Operations Plan (AOP)**
– **Family 2.4.1 A-SMGCS Routing and Planning Functions**
– **Family 4.1.2 STAM Phase 2**
– **Family 4.2.4 AOP/NOP Information Sharing**
– **Family 5.1.2 NewPENS: New Pan-European Network Service**
– **Family 5.2.2 Stakeholders SWIM Infrastructure Components**
– **Family 5.4.1 Upgrade / Implement Meteorological Information Exchange System / Service**

The increase of technological maturity and of readiness for implementation of the mentioned Families results in an **overall evolution of the Programme itself** vis-à-vis its 2015 edition, which featured 30 high-readiness Families, 10 medium-readiness Families and 4 low-readiness Families.

The number of Families in DP 2016 has increased to **48 Families** (starting from the 44 included in DP 2015), due to the **split of 3 of the Families included in the AF5** and to the **refinement of the AF6 structure**. Such split has been performed in order to increase the clarity of the technological elements included in the ATM Functionality, to separate technological elements ready to be implemented from still non-mature ones, and to guide the operational stakeholders in sequencing the implementation activities. More in detail, the following Families have been split:

– **Family 5.1.3 Common SWIM Infrastructure Components** has now been split in two Families, thus resulting in the addition of the new Family **5.1.4 – Common SWIM PKI and cyber security**;
– **Family 5.2.2 Stakeholders SWIM Infrastructure Components** has now been split in two Families, thus resulting in the addition of the new Family **5.2.3 – Stakeholders' SWIM PKI and cyber security**;
– **Family 5.6.1 Upgrade/Implement Flights Information Exchange System / Service** has now been split in two Families, thus resulting in Family 5.6.1 – **Upgrade / Implement Flights Information Exchange System / Service supported by Yellow Profile** and the new Family **5.6.2 - Upgrade / Implement Flights Information Exchange System / Service supported by Blue Profile**.

Furthermore, **AF6 structure** has now been **slightly re-organized**, considering the impacts of the **associated DLS implementation strategy** designed by SDM and taking into account the **outcomes stemming from the SJU/ELSA study**. In this respect, AF6 is now composed of the following 5 families:

- **Family 6.1.1 –ATN B1 based services in ATSP domain**
- **Family 6.1.2 –ATN B2 based services in ATSP domain**
- **Family 6.1.3 –A/G and G/G Multi Frequency DL Network in defined European Service Areas**
- **Family 6.1.4 – ATN B1 capability in Multi Frequency environment in aircraft domain**
- **Family 6.1.5 – Implementation of ATN B2 in Aircraft domain**

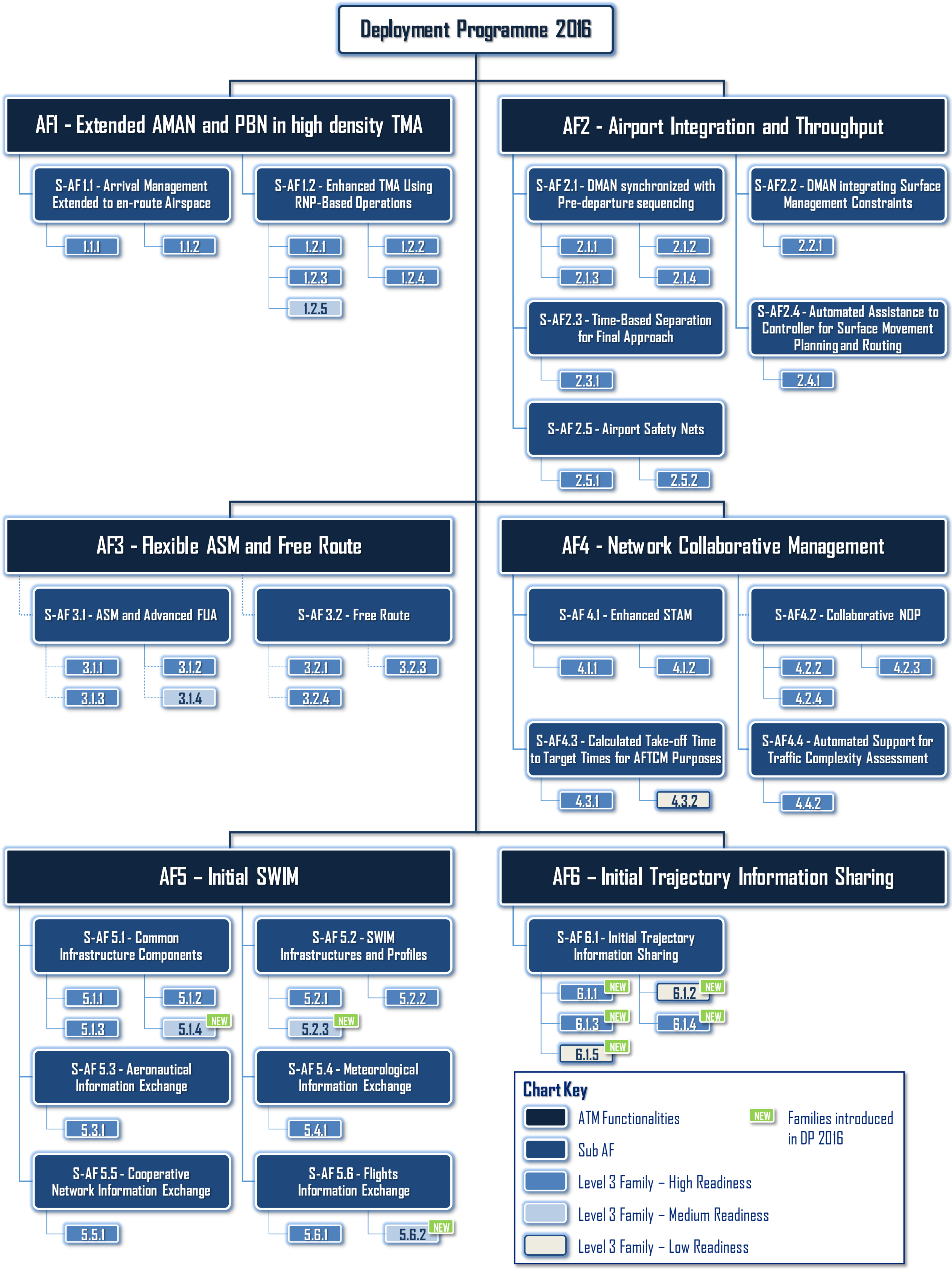


Fig. 1 – Overall Structure of the DP 2016

Here below the **full list of the 48 Families of the DP 2016** is reported.

AF1 – Extended Arrival Management and Performance Based Navigation in the High Density TMAs

- 1.1.1 Basic AMAN
- 1.1.2 AMAN Upgrade to include Extended Horizon function
- 1.2.1 RNP Approaches with vertical guidance
- 1.2.2 Geographic Database for Procedure Design
- 1.2.3 RNP 1 Operations in high density TMAs (ground capabilities)
- 1.2.4 RNP 1 Operations in high density TMAs (aircraft capabilities)
- 1.2.5 Advanced RNP routes below Flight Level 310

AF2 – Airport Integration and Throughput

- 2.1.1 Initial DMAN
- 2.1.2 Electronic Flight Strips (EFS)
- 2.1.3 Basic A-CDM
- 2.1.4 Initial Airport Operations Plan (AOP)
- 2.2.1 A-SMGCS Level 1 and 2
- 2.3.1 Time Based Separation (TBS)
- 2.4.1 A-SMGCS Routing and Planning Functions
- 2.5.1 Airport Safety Nets associated with A-SMGCS (Level 2)
- 2.5.2 Aircraft and vehicle systems contributing to Airport Safety Nets

AF3 – Flexible Airspace Management and Free Route

- 3.1.1 ASM Tool to support AFUA
- 3.1.2 ASM management of real time airspace data
- 3.1.3 Full rolling ASM/ATFCM process and ASM information sharing
- 3.1.4 Management of Dynamic Airspace configurations
- 3.2.1 Upgrade of ATM systems (NM, ANSPs, Aus) to support Direct Routings (DCTs) and Free Routing Airspace (FRA)
- 3.2.3 Implement Published Direct Routings (DCTs)
- 3.2.4 Implement Free Route Airspace

AF4 – Network Collaborative Management

- 4.1.1 STAM Phase 1
- 4.1.2 STAM Phase 2
- 4.2.2 Interactive Rolling NOP
- 4.2.3 Interface ATM systems to NM systems
- 4.2.4 AOP/NOP Information Sharing
- 4.3.1 Target times for ATFCM purposes
- 4.3.2 Reconciled Target Times for ATFCM and arrival sequencing
- 4.4.2 Traffic Complexity Tools

AF5 – Initial System Wide Information Management

- 5.1.1 PENS 1: Pan-European Network Service version 1
- 5.1.2 NewPENS: New Pan-European Network Service
- 5.1.3 Common SWIM Infrastructure Components

- 5.1.4 Common SWIM PKI and cyber security
- 5.2.1 Stakeholders Internet Protocol Compliance
- 5.2.2 Stakeholders SWIM Infrastructure Components
- 5.2.3 Stakeholders' SWIM PKI and cyber security
- 5.3.1 Upgrade/Implement Aeronautical Information Exchange System / Service
- 5.4.1 Upgrade/Implement Meteorological Information Exchange System / Service
- 5.5.1 Upgrade/Implement Cooperative Network Information Exchange System / Service
- 5.6.1 Upgrade/Implement Flight Information Exchange System / Service supported by Yellow Profile
- 5.6.2 Upgrade/Implement Flight Information Exchange System / Service supported by Blue Profile

AF6 – Initial Trajectory Information Sharing

- 6.1.1 – ATN B1 based services in ATSP domain
- 6.1.2 – ATN B2 based services in ATSP domain
- 6.1.3 – A/G and G/G Multi Frequency DL Network in defined European Service Areas
- 6.1.4 – ATN B1 capability in Multi Frequency environment in aircraft domain
- 6.1.5 – Implementation of ATN B2 in Aircraft domain

Whilst the technical content of each of the 48 aforementioned Families identifies the technological improvements that need to be deployed to fully implement the Pilot Common Project, the DP also aims at defining a common, consulted and agreed roadmap to ensure a synchronised, coordinated and timely PCP implementation. Such roadmap, which is reported in the following Gantt chart, has been defined taking into account the target dates for each ATM Functionality and Sub-ATM Functionality, as stated in the Regulation (EU) 716/2014, and identifies the expected start and end of deployment for each Family.

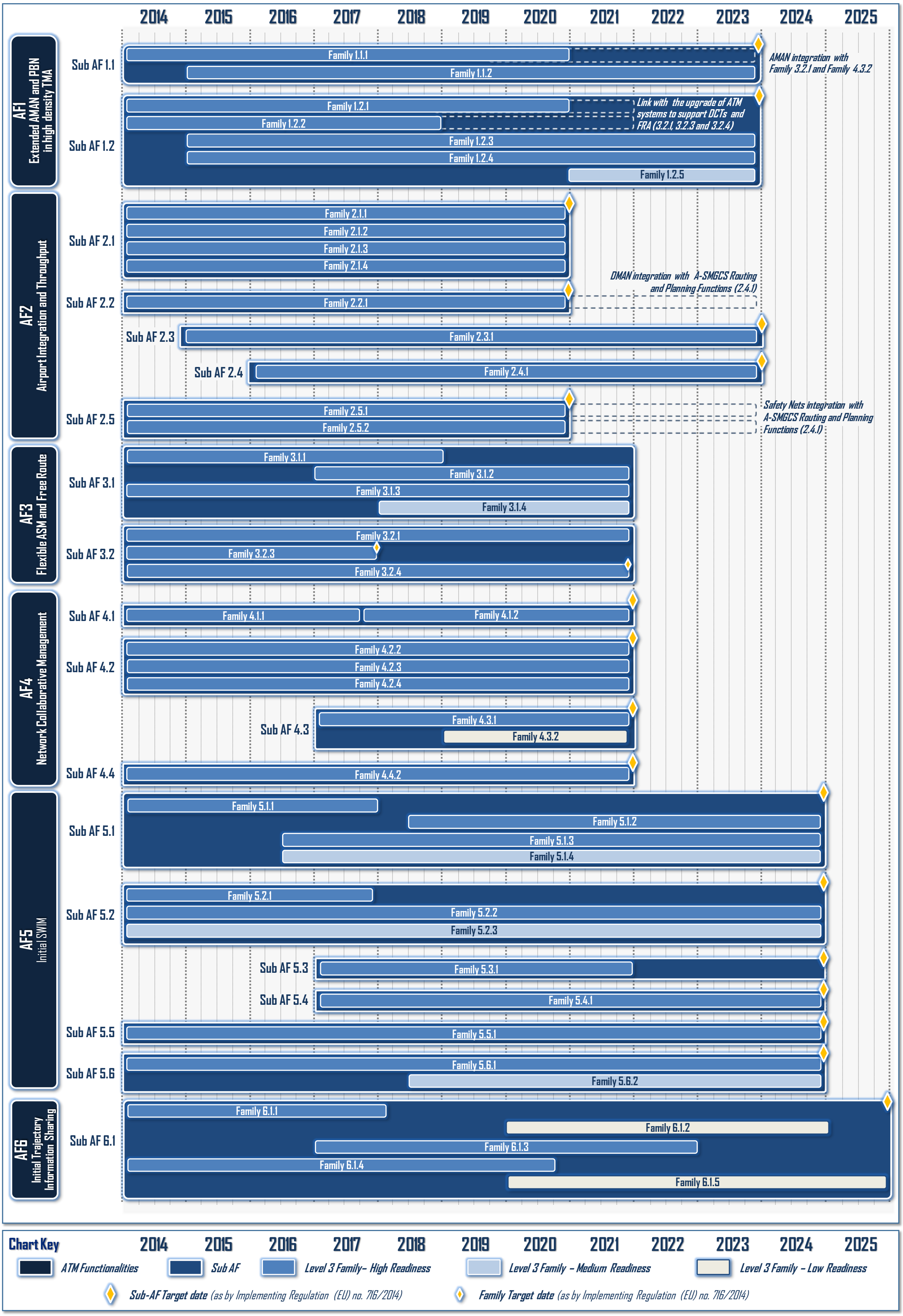


Fig. 2 – Overall Implementation Planning of DP 2016

2.4 DP and ATM Master Plan Alignment

The close cooperation between the SESAR Joint Undertaking and the SESAR Deployment Manager has resulted in a successful alignment between the PCP-related components of the 2016 Master Plan Level 2 and 3 and Deployment Programme 2016. Indeed, the alignment has been performed as far as possible considering that:

- the DP 2016 is the Project view of the PCP, itself a **subset of the most essential Operational Improvements included in the ATM Master Plan Ed. 2 (2012)**, which are required to be implemented on the basis of Regulation (EU) 716/2014;
- the DP 2016 applicability area **encompasses SES area** and reflects the commitment of SES operational stakeholders, whilst the **ATM Master Plan has an ECAC, thus broader, geographical coverage**, and reflects the plan of the ECAC Member States;

Due to the Deployment Programme's core objective to define an optimal and feasible deployment sequence of the PCP, some families have elements not explicitly mentioned in the Regulation (EU) n. 716/2014 but implicitly required as **essential to achieve the full and effective Pilot Common Project implementation** as they enable its full deployment in the context of the current ATM reality and – in some cases – are **required to access the full performance benefits associated to the PCP**. This is also the reason why in some families, alignment with the ATM Master Plan may present some slight differences.

2.5 Introduction to the Project View

Whereas section 2.3 provides an overview of the content of the Pilot Common Project and with a high-level planning for its implementation, this section focuses on **clearly explaining how each of the 48 Families is described and illustrated within the Project View** (Chapter 3) of the Programme.

The Project View is the **"technical and *operational*" view of the DP** itself and is the **core reference for proposals to be submitted under the "*Common projects*" category of the "Single European Sky – SESAR" priority in the framework of CEF Transport Calls for Proposals**. It includes all information and technical details to fulfil three key purposes:

- Provide an exhaustive and complete **view of the technical scope of each of the 48 Families of the Programme** (along with the most relevant links and references the ATM Master Plan, to Guidance material, Standards and Community Specifications, etc.); such thorough description supports the stakeholders in understanding the technological improvements required by the Pilot Common Project regulation, as well as the deployment approach to be followed;

- List all **Implementation Projects associated to the CEF Framework** (both 2014 CEF Transport Call awarded projects and 2015 CEF Transport Calls candidate projects), clustered on a Family-basis;

- Support the **identification of the existing gaps**, i.e. the **activities still deemed necessary to ensure the complete and timely implementation of the related**

Family, sub-AF, AF and then of the overall PCP. The identification of such gaps is developed thanks to a dedicated SDM Monitoring Exercise launched in March 2016 with the direct involvement of the operational stakeholders, on the basis *of ad-hoc* surveys as well as on the analysis of the planned deployment activities covered by CEF Transport Calls 2014 and 2015.
Such list of existing gaps per Family is also a tool at disposal of the operational stakeholders, with the twofold objective to:

- ease the **timely alignment of the ATM technological investment plans of the operational stakeholders with PCP implementation sequencing**;
- maximize **operational stakeholders' probability to access the available financial support through future CEF Transport Calls, especially when submitting projects targeting the full gap implementation.**

In order to summarize all abovementioned information, the **Work Breakdown Structure (WBS)** of each Family will be included in Chapter 3. A mock-up of the WBS is proposed in the figure hereafter for illustrative purposes. For the complete set of Gaps and information on the progress of implementation, stakeholders shall refer also to the Monitoring View in Chapter 5.

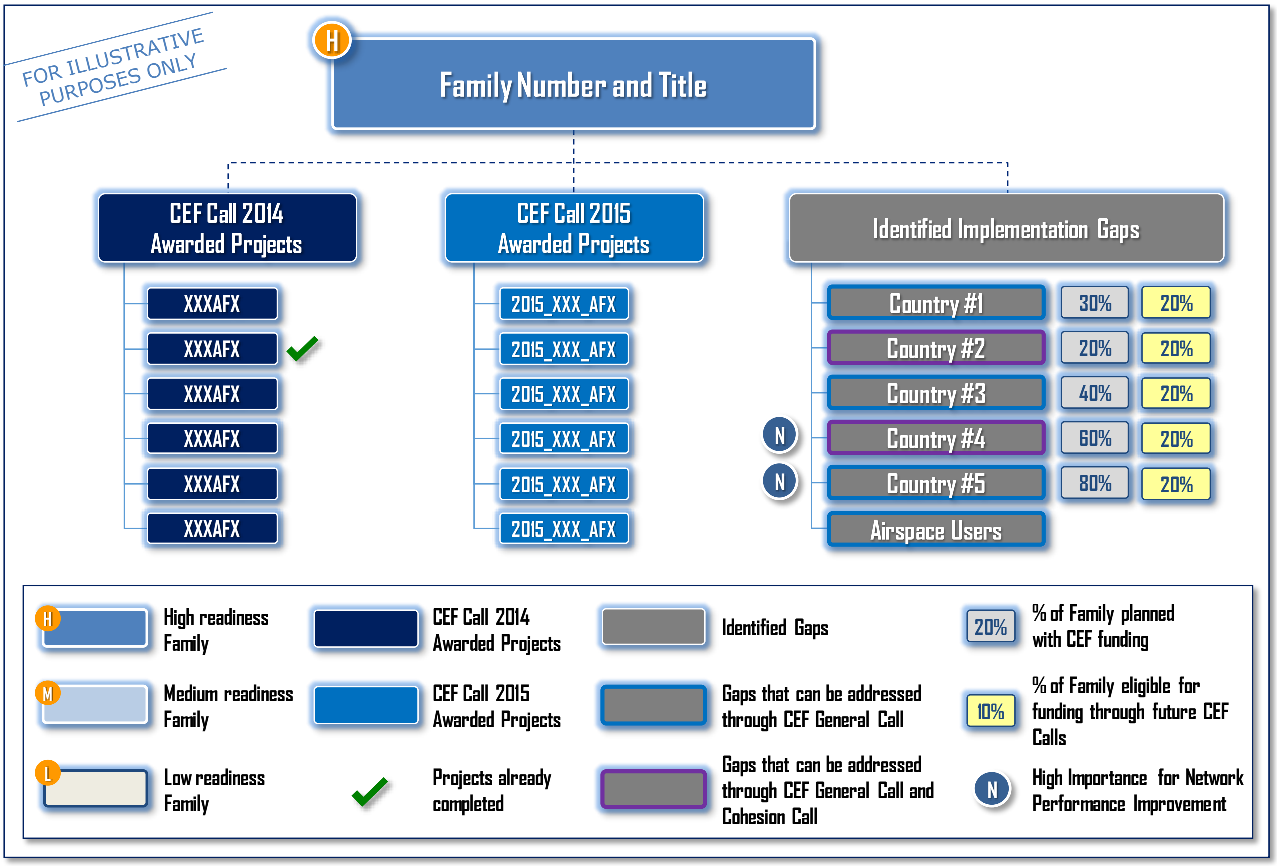
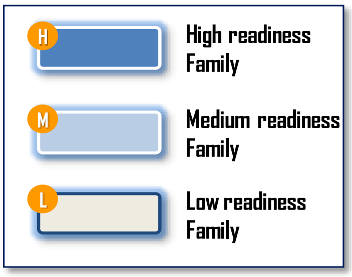


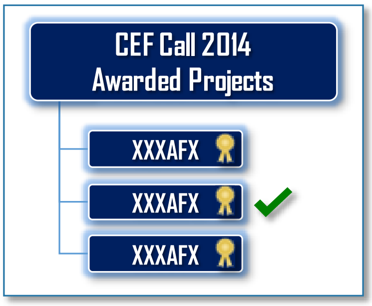
Fig. 3 – Mock-up of the Family WBS

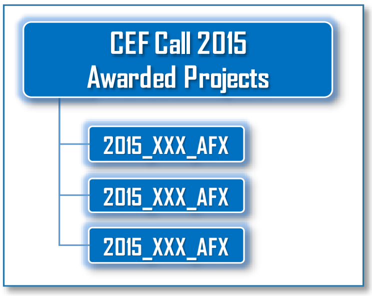
As detailed in the legend, the Work Breakdown Structure has been developed in order to report the following information:



The **readiness for implementation of the Family** (High/Medium/Low), as previously outlined in paragraph 2.3., and further explained within the technical description of the Family itself (Chapter 3).

The **Family-related Implementation Projects** that have been **awarded through the 2014 CEF Transport Call** are identified by the standard designator. Projects submitted under the CEF framework and already completed at the present date are clearly identified through a green check mark.





The **Family related Implementation projects awarded through the 2015 CEF Transport Calls** (both General and Cohesion calls), according to the INEA awarding process as identified by the standard designator.

The **Family-related implementation gaps**, which represent the implementation initiatives still needed to fully deploy the Family itself, as well as to support the achievement of the performance expectations. Such gaps are **identified on a geographical scope-basis** (i.e. by airport for AF1 and AF2 and by country for AF3, AF4, AF5 and AF6).

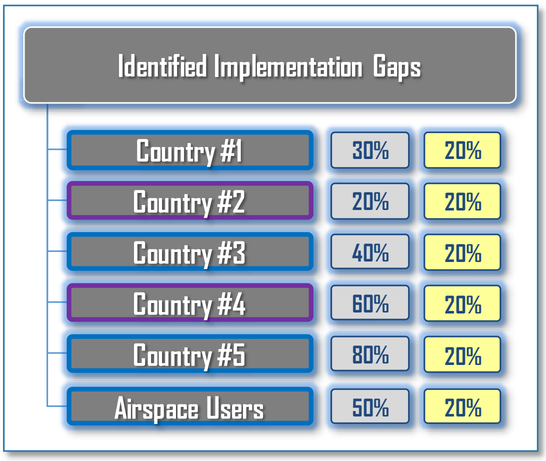


Fig. 4 – Overview of the Implementation Gaps

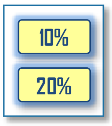
For specific Families, where Airspace Users are requested to invest by the PCP regulatory framework, a **dedicated "Airspace Users" gap** is also included.

In this perspective, for each identified gaps, the WBS also provides information concerning which **percentage of the gap is still expected to be covered** in order to achieve the full Family deployment. In order to outline a **harmonized and shared view per Family**, SDM has developed a matrix per each Family, associating the percentage of coverage of the Family with tailored milestones, also indicating the stakeholders' categories involved in their achievement. Such matrices have been considered as standard inputs for the *ad-hoc* surveys distributed among operational stakeholders, gathering inputs concerning the current status of implementation and future plans. Additional information on such surveys and the elaboration of their outcomes are included in Chapter 5.1.

More specifically, two percentages will be featured for each existing gap:

- **"grey" Implementation gaps -** Percentage of the gap which is being implemented through implementation projects, although not completed yet, to which CEF funding has been awarded and under SDM coordination;

- **"yellow" Implementation gaps - Percentage of the gap which has not been implemented yet**. From a planning perspective, yellow gaps represent **the "real gap"**, i.e. the gap to be closed either taking any upcoming CEF Transport Calls as funding opportunity or through relevant stakeholders' decision to fully fund the implementation projects required to close the gap. In both cases, the "yellow" gaps set the reference.



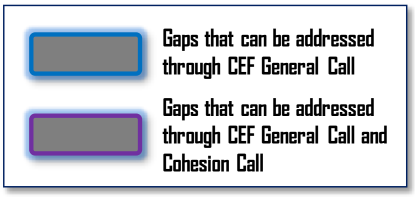
Following this approach, the 48 Families translate into **1168 existing Implementation gaps** (still open or already closed) out of which the "yellow" percentage is the target for next CEF Transport Calls. Furthermore, the following elements will be constantly monitored by the SESAR Deployment Manager:

- Strategic progress of the implementation from one DP yearly edition to another;
- Percentage of coverage of the identified gaps;
- Overall level of completion of Families' deployment;
- Overall outlook on the status of the Pilot Common Project implementation.

The view presented in the Project View (Chapter 3) is complemented by the information presented in the Monitoring View (Chapter 5); in fact, whereas the "Project view" drives the **opportunities to access co-funding** narrowing down through the "yellow gaps", i.e. what remains to be submitted for co-funding after each CEF call's results, the "monitoring view" reports on the **whole PCP implementation regardless implementation activities are co-funded and under SDM coordination or not** co-funded and outside SDM coordination.

In this perspective, **any implementation project submitted but not awarded will be kept in the yellow gaps** as long as the next CEF Transport Calls could still represent a co-funding opportunity consistent with the time window required for the family to which the project contributes. On the other hand, the **information** related to implementation carried out outside SDM coordination **is collected by SDM through its stakeholders' consultation platform** and through the dedicated Monitoring exercise. This view also includes implementation projects not awarded that the implementing partners decide to execute without co-funding.

The **implementation initiatives / gaps crucial for the improvement of the current performance at network level**, identified by the Network Manager in accordance with the European Network Operations Plan (NOP) 2016-2020 and with the European Route Network Improvement Plan (ERNIP) Database, labelled with an "N" symbol. The importance of these specific implementation gaps has been identified by applying a family-tailored approach, aiming at ascertaining which technological elements shall be deployed and where, in order to positively impact on the overall performance of the Network;



The indication whether each implementation project/initiative/gap, according to its geographical scope, could be **co-funded through CEF Transport Calls for Proposals or CEF Cohesion fund Calls for Proposals**.

2.6 DP Implementation Status

Building on inputs included within Chapter 5, this paragraph provides an executive recap of the current status of PCP deployment, as well as at reporting on the strategic progress of the 84 projects awarded during the 2014 CEF Call and currently coordinated and synchronized by SDM.

PCP implementation status across Europe – Overview

As reported in section 5.1, the implementation of the Pilot Common Project has successfully started, and is now progressively growing in its pace. Out of the overall **1165** gaps identified in the Programme, defined by matching the 48 families of the Programme and the airports / countries specified in the geographical scope of the Regulation, **143** are considered as already completely closed (around 12%).

Moreover, the implementation initiatives undertaken by Operational Stakeholders – either within or beyond the CEF framework – are currently addressing additional **270** gaps (around 23%); out of these 267 gaps, the current **IPs** that are benefitting from the public funding support are planned to fully close **62 gaps**.

It is worth noting that the deployment of PCP does not proceed at the same pace for all ATM functionalities and associated families, due to the different level of readiness for implementation of the technological elements to be deployed. More specifically, **AF1, AF2** are currently being **implemented at a faster rate than AF3, AF4, AF5 and AF6**.

More specifically, the **slower deployment of SWIM** (AF5) and of the **Initial Trajectory Information Sharing** (AF6) is highly dependent respectively from the current lack of a well-defined and **agreed SWIM Governance Framework** and from a **coordinated implementation of Data Link Services**; both streams of deployment are however expected to benefit from the key strategic tasks that the SDM is performing, on the basis of specific EC requirements (see section 2.7.1 and 2.7.2).

DP Execution Progress – Key findings

Based on the main outcomes related to the DP Execution Progress Report (see section 5.2), such section highlights the strategic implementation status of the Deployment programme, identifying the potential issues and risks for the DP future implementation.

Specifically, the analysis of such inputs shows that the **technical progress of the 84** (out of which 3 are split into two different parts due to application of different co-funding rates, making the total number of Implementation Projects rise to 87) **projects** awarded during the 2014 CEF Call, is **substantially in line with the planned progress**. Moreover, **no Implementation Project is expected to end beyond the timeframe of the related AF** as specified in the PCP, and **no implications are envisaged in terms of timely achievement of the expected operational targets** and benefits.

In a nutshell, it emerges that **13 of 87 Implementation Projects have been successfully completed** as outlined below:

- **3** Implementation Projects in **AF1**
- **8** Implementation Projects in **AF2**
- **2** Implementation Projects in **AF5**

Further details related to the operational progress of the Action are reported in section 5.2.

2.7 Approach for an effective PCP deployment

This sub-section aims at highlighting the most urgent activities undertaken by SDM, in cooperation with SJU and other SES bodies, in order to ensure an effective and synchronized deployment of PCP throughout Europe.

2.7.1 Data Link Services (DLS) Implementation Strategy towards Initial Trajectory Information Sharing

A dedicated strategy, developed by SDM following a specific EC request, aims at organizing and sequencing the deployment activities still required to implement first **Data Link Services in accordance with ELSA's recommendations** and, then, the whole AF6 throughout Europe. Following a targeted round of consultation with the most relevant operational and non-operational stakeholders, the DLS Implementation Strategy is included as an Addendum of the present Strategic View.

2.7.2 SWIM Governance Action Plan

In order to support and promote the highest level of buy-in and engagement of Operational Stakeholders for a **common and shared SWIM Governance Framework**, SDM has been tasked by European Commission to elaborate a tailored **Action Plan**, which include targeted actions to better organize and synchronize the whole AF5 implementation. The Swim Governance Action Plan is included as an Addendum of the present Strategic View.

2.7.3 Preliminary Identification of Common Services

SDM was tasked by European Commission to preliminarily identify **those families whose implementation would need or highly benefit from a specific approach in the planning of their deployment** (central, regional, multi-stakeholder), potentially resulting into the provision of a Common Service. As a result of the analysis, and especially in light of the inputs gathered through the third round of the consultation process, SDM has identified three main technological elements:

- **NewPENS** (Family 5.1.2), for which a dedicated multistakeholder implementation project has been awarded by EC in the framework of the 2015 CEF Call, engaging more than 20 operational stakeholders into the deployment of a Europe-wide IP service based Ground-Ground network. As reported in the Family description, any Operational Stakeholder is invited to join the initiative and become a NewPENS user, with the final goal of building a unique ATM network;
- A common **SWIM Governance** framework (covered in the DP through family 5.1.3 and 5.1.4) is needed to ensure a controlled evolution and a harmonized deployment of all SWIM elements. The aforementioned SWIM Governance Action Plan aims at representing a preliminary step towards the set up and operational deployment of a solid and agile SWIM Governance, able to facilitate a coordinated deployment for all AF5;
- The coordinated **deployment of Data Link Services** (a pre-requisite of the implementation of the whole AF6) is an essential enabler of a realistic path from today's state of play towards the full implementation of the Initial Trajectory Information Sharing by the deadlines set in the Pilot Common Project. The whole Strategy developed by the SDM underlines the opportunity to provide DLS as a common service, i.e. through a distributed provision of the service through a limited number of service areas under a single Governance.

2.7.4 High-level Principles towards next CEF Transport Calls

The DP 2016 has been designed by SDM with the overarching objective to provide all potential implementing partners with the best possible guide through the next CEF Transport Calls. In this direction and as explained in the previous sections, you will find here all what you need to submit PCP related implementation projects into the upcoming CEF Transport Calls.

However, past experiences have proven that:

- Some candidate implementation projects, even when obviously globally PCP related, do not go through the evaluation because their alignment with DP is not visible enough contents wise and time wise;

- Prioritization is the mean that SDM adopted to manage the significant overbooking in the 2015 CEF Transport General Call and this is only partially successful. Despite the obvious positive message that ATM industry forward with high volume of co-funding request about its willingness to deploy SESAR, too much overbooking appears detrimental to efficient PCP implementation management in so far it offers such a wide choice that final selection may not correspond to optimum implementation.

Therefore, learning from the above, the SDM recommends the potential implementing partners to define their candidate projects against all the information available in the DP, **but also**:

– **Addressing the gaps**
  The Monitoring view of the DP and the list of Gaps included in the Project View provide for an exhaustive outlook of the current status of deployment of the Pilot Common Project throughout Europe, as well as the list of implementation activities still to be undertaken in order to achieve the full PCP implementation. **It is expressly**

recommended to define projects starting from gaps identified in the DP, preferably focused on closing one specific gap instead of spreading the same project over several gaps without closing any and bringing together all stakeholders required to close this gap instead of unnecessary fragmentation.

- **Focusing on the right timing**
  In order to ensure a timely and effective PCP implementation as well as the achievement of earliest performance benefits, it appears essential to submit the "right project in the right call". The notion of "readiness for implementation" as well as the Gantt charts in the strategic and project views is there to determine your best timing. **It is recommended to focus the next investments – and the associated submissions for the upcoming CEF Transport Calls – to High Readiness Families in DP 2016 and in synchronization with the Gantt chart of these families.** The SDM will look into possibilities also to assess the readiness on the field of the local or regional stakeholders to invest in high or medium readiness families.

- **Targeting the improvement of the overall Network performance**
  By design of the PCP, all functionalities in the PCP contribute to improve the overall Network Performance, including the pure ground investment projects that enhance capacity and safety on airports. However, among all the gaps in the DP 2016, Network-critical gaps have been specifically identified in cooperation with the Network Manager and are aligned with the inputs coming from the latest version of the European Network Operations Plan (NOP) concerning the capacity constraints and from the European Route Network Improvement Plan (ERNIP) Database concerning the flight efficiency gaps. **It is recommended to focus on implementation initiatives crucial to resolve or mitigate the impacts of current performance (mainly capacity and flight efficiency) constraints and potential bottlenecks, which might hinder the overall performance at network level.**

- **De-fragmenting implementation**
  De-fragmentation of PCP implementation remains a room for improvement. Whereas the 2014 CEF Transport Call included about 10% of multi-stakeholder's projects, the 2015 CEF Transport Calls rose to 30% of multi-stakeholder's projects. In order to further progress in this direction, SDM paid special care to the identification of all stakeholders required to close every gap. **SDM recommends the systematic partnering of the stakeholders involved together in closing the same gap and SDM stands ready to act as a facilitator to ease such regrouping.** The support provided by SDM could be performed on the basis of local or regional compliance plans drafted by the implementing partners involved. These compliance plans could be used as the compass document for future monitoring, reporting and submission of projects._In this respect, when deemed beneficial for the overall objectives of the initiatives and for the achievement of the associated performance benefits, it is recommended to evaluate the opportunity of liaising between different stakeholders (both within the same stakeholder category and between different categories) in order for them to present joint proposals in the framework of upcoming Calls. The Families for which such approach is considered beneficial are clearly identified in Chapter 3 (*Recommendation for the IP proposal* field in the Family description template).

- **Fostering civil/military coordination**
  The timely involvement of military stakeholders in PCP implementation is paramount to achieving full PCP benefits. It is therefore recommended to civil and military stakeholders to improve and enhance the cooperation processes, particular when the DP 2016 identifies that military stakeholders are required to close a gap where others civil stakeholders are involved.

In the case where the volume of candidate implementation projects in the next CEF Transport Calls would require another prioritization exercise, the compliance of the candidate implementation projects with the above recommendations would be taken into consideration.

In addition to the afore-mentioned high level recommendations, dedicated recommendations based on the specific features of each Family are presented in the Project View, as a further support to stakeholders potentially interested in submitting projects in the upcoming CEF Transport Calls. Furthermore, the SESAR Deployment Manager remains fully available in providing its support to operational stakeholders for the elaboration of proposals to be submitted in the framework of future CEF Transport Calls.

2.8 Global interoperability

The analysis of the necessary harmonization of the main technological developments and evolution, as well as the necessary synchronization needs, is at the cornerstone of the SDM effort to contribute to global interoperability. Special reference was given in DP 2015 to the risk of lack of global interoperability[4], which was reported as a key concern of the airspace users in the SDM stakeholder consultation process 2015.

While many countries around the World are implementing ATM improvements, the US FAA's NextGen and EU's SESAR are the two largest ATM modernization programs currently under way. The cooperation between FAA and SDM was therefore identified as instrumental for SDMs contribution to global interoperability and to support harmonization of standards, technologies and procedures on deployment matters. The SDM commits to the need to work on a complete life cycle view (definition, development, deployment) of both NextGen and SESAR, confirming the importance of promoting SESAR as one project with definition, development and deployment fully covered. With respect to cooperation with the FAA and global harmonization the SDM works therefore closely with the SJU, ensuring a single SESAR view to the international stakeholders' community.

2.8.1 Framework and guidance from Policy Level

The international activities of SDM take place under the **oversight of the policy level led by the European Commission, which has delivered a specific mandate to SDM** to set the scope of the cooperation with the FAA.

[4] See DP 2015, final edition November 2015.

Regarding European cooperation with US/FAA, for **R&D purposes** the cooperation between SESAR JU and NextGen is taking place under the umbrella of the **MoC between the EU and US[5] with specific reference to Annex 1**. With respect to **deployment**, the SDM cooperation with the US/FAA is currently taking place under the umbrella of the **Letter of Intent (LoI), signed by FAA and EC in June 2015**.

Whilst cooperating with the FAA through 2 different frameworks, SDM and SJU are working closely together to ensure that **SESAR is perceived as a single project**.

2.8.2 Objectives

SDM activity on global interoperability and harmonization, including the cooperation with FAA, will make the **DP 2016 and upcoming editions more focused to avoid any extra burden to the (airspace) users on standards, procedures and equipment** due to non-alignment or late alignments on global interoperability.

With respect to SDMs work on global interoperability and cooperation with FAA **initial focus areas of cooperation have been identified and addressed in the 2016 work plans**, including but not limited to Data Comm, SWIM, AMAN/TBFM[6], with the aim to:

- gaining **understanding of NextGen and SDM deployment strategies**, implementation priorities, timelines and milestones associated;
- **identify potential gaps and needs**, discovered during implementation, in terms of industry standards;
- identify **risks to timely (Programme) implementation and risks on interoperability** and global harmonization, as well as sharing potential mitigation strategies[7];
- assessing the **feasibility and the need for US/EU synchronizing deployment activities** respectively synchronized risk mitigations actions;
- exchange on economic impact assessment and business cases;
- **sharing of lessons learnt and best practices**.

Furthermore, the results of the cooperation with FAA on deployment matters will also feed the SESAR input to the updates of ICAO GANP 2016 and 2019 to ensure the reflection on global perspective of the deployment aspects of ATM modernization programmes in Europe and the US. The cooperation will identify and address **topics and activities in the global** (ICAO) **context where information need to be shared** and subsequently where currently coordination is on-going or will be required. The DP 2016 contains the mapping of the DP with the ICAO GANP/ASBUs. A **mapping of ATM MP, DP, ICAO**

[5] Memorandum of Cooperation between the United States of America and the European Union, 3rd March 2011, published in the Official Journal on the European Union 5th April 2011 (MoC including Annex 1)

[6] TBFM = Time Based Flow Management and is part of NextGen Portfolio

[7] See also GAO Report (GAO-15-608) July 2015, Report to Congressional requesters, Next Generation Air Transport System. Improved Risk Analysis Could Strengthen FAA's Global Interoperability Efforts

ASBUs and NextGen is also planned and will be provided to the international stakeholder community when available.

2.8.3 Outlook to upcoming DP editions

As outlined above, it is foreseen to **incorporate outcomes from the SDM-FAA cooperation work** into each upcoming DP edition in order to complement it with a wider global perspective. With respect to ICAO SARPs and guidance material related to deployment, SDM will work closely with the relevant working groups at European level, under the guidance of EC and in close cooperation with SJU. SDM will further seek **co-operation of the manufacturing industry in this context** (especially airborne manufacturers but not limited too); this activity will take place under the framework of the Cooperative Arrangements with the manufacturing industry according to Regulation (EU) N°409/2014.

Eventually, the **international exchange on experiences on deployment execution**, lessons learnt and best practices in implementation are expected to contribute to SDMs capability to fulfill the tasks of synchronization and coordination for Common Projects implementation in accordance to Regulation (EU) N°409/2013.

2. STRATEGIC VIEW

SESAR
DEPLOYMENT MANAGER

Strategic View – Addendum 1
Data Link Services (DLS)
Implementation Strategy towards
Initial Trajectory Information Sharing

1. Overall context and objective of the note

European Commission requested SDM to develop a full DLS-AF6 implementation strategy as part of DP 2016 with the objective to set a realistic path from today's state of play up to Initial Trajectory Information Sharing (AF6) implementation by the deadlines set in the PCP, i.e. 1 January 2025 for ground and 1 January 2026 for airborne segment. Whilst EC's request came soon after SDM establishment through a letter from DG MOVE to SDM dated 25 February 2015 introducing SDM as "data link deployment project manager", it is by spring 2016 that SDM has been in position to develop such strategy considering the need to build consistently on ELSA's recommendations.
Pending ELSA's recommendations, SDM's preparatory action on data-link was the inclusion of a new family "Air Ground Data-Link" (Family 6.1.2) into the DP 2015 in order to stress the importance of this prerequisite for the whole AF6 implementation and ensure access to co-funding. Now, in full knowledge and consistency with SJU's DLS related studies[8] and other relevant findings from *New European Common Service Provision for PENS2 and DLS*, SDM benefits from useful guidance and essential technical indications that enabled this proposal for a realistic, pragmatic and – most important – ready to start implementation strategy through the next 2016 CEF Transport Calls.

The proposed strategy is structured in four main sections:

- **Background**;
- **Key Principles**;
- **Action Plan**;
- **SDM added value**.

2. Background

2.1 Importance of DLS

DLS is an essential prerequisite to business trajectory (Initial Trajectory Information Sharing) which is the backbone of SESAR operational concept. Therefore, benefits from a considerable portion of SESAR solutions would be severely inhibited unless AF6 delivers.

2.2 Regulatory Framework

The strategy has been defined considering the relevant regulatory framework which is set mainly through the 3 following regulations:

---

[8] VDL Mode 2 Capacity and Performance Analysis – 2015
VDL Mode 2 Measurement, Analysis and Simulation Campaign by the ELSA Consortium and Programme Partnership – 2016

- DLS IR (Reg. (EU) No 2015/310 amending Regulation (EC) No 29/2009), which define new deadlines for the implementation on February 2018 for ground domain and February 2020 for airborne segment. This regulation includes a specific reference **to EASA[9]'s recommendation that "implementation of the plan of actions be preferably performed by SDM";**
- PCP IR (Reg. (EU) No 716/2014) where AF6's deadline is 1 January 2025 on ground and 1 January 2026 airborne (although limited to 20% of the fleet; 45% of the flights). **This is the only deadline that falls under direct SDM's responsibility as per regulation, reinforcing the need for SDM to be specifically involved in the implementation of AF6 and its prerequisites, DLS in particular**.
- SESAR Deployment Governance IR (Reg. (EU) No 409/2013), in particular its article 9.2 which sets the tasks of the SDM.

2.3 Implementation status

ATN Data Link systems, based on VDL Mode 2, are already implemented in some areas of SES airspace.

In order to propose a realistic strategy, it was essential for SDM to build an accurate and reliable picture of the current status of DLS in Europe. In complement to SDM's natural monitoring function of PCP implementation, SDM has launched a specific ground and airborne DLS survey, from 17 to 28 June 2016. The main findings of the survey are reported in this chapter. Some still missing data will be captured in the framework of future interactions with operational stakeholders. Further information on the different VDL operating models is provided at the end of the present Addendum.

With regard to the Airborne domain, the following chart recaps the status of implementation of the family 6.1.4, related to the *ATN B1 capability in Multi Frequency environment in aircraft domain*, on the basis of the inputs provided by the Airspace Users (headquartered in EU):

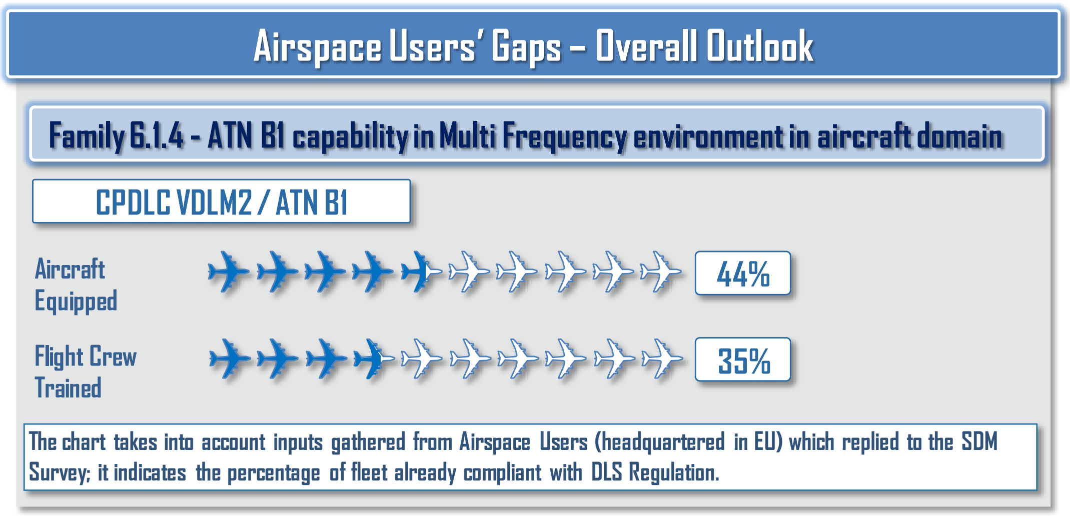
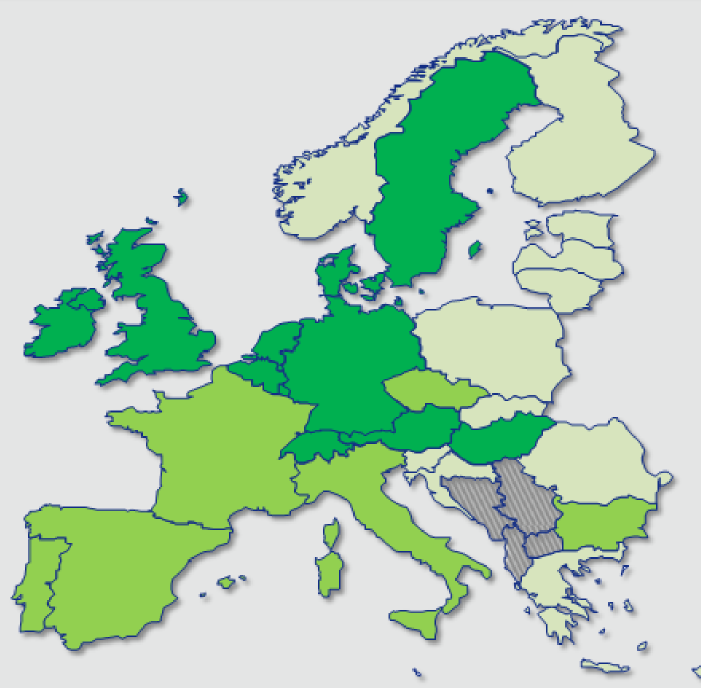


Fig. 4 – DLS Implementation Status – Airborne Capabilities

[9] EASA Report on *Technical issues in the implementation of Regulation (EC) No 29/2009 (Data Link)*

With regard to the Ground segment, the following chart recaps the current status of implementation of Data Link Services throughout Europe, on the basis of the inputs provided by the Air Navigation Service Providers through the dedicated DLS Survey:

Data Link Services Implementation Status



Due to the new structure of AF6, this picture of the current status of implementation of Data Link Services throughout Europe supports the identification of the main gaps associated to Family 6.1.1 and 6.1.3

Overall Implementation Status – June 2016

The chart reflects the inputs gathered from the responses to the dedicated DLS Survey, issued by SDM in June and distributed to all European Air Navigation Service Providers

- Data Link Services currently in operations
- Data Link Services partially implemented or not yet in operations (A/G VDLM2 Network in place)
- No A/G VDLM2 Network in place
- Not applicable

NB. The present picture and the following table have been prepared only by consolidating the information provided by the recipients of the DLS survey, without any direct cross-check of the feedback from SDM

Country	Air Navigation Service Provider	DLS in operations	ATM Systems Upgrade			At least one VDL M2 A/G comm. Network in place	Updated ATC Procedures	ATCO training completed	Starting Model**
			Front End Processor	FDP System	HMI Interface				
Austria	Austro Control		✓	✓	✓	✓	✓	✓	Model A
Bulgaria	BULATSA	By 2017	✓	✓	✓	✓	✓	✓	Model A
Croatia	Croatia Control	By 2017	✓	✓	✓				No implementation yet
Cyprus	DCAC	No date available							No implementation yet
Czech Republic	ANS CR	No date available	✓	✓	✓	✓			Model A
Denmark	Naviair		✓	✓	✓	✓	✓	✓	Model A
Estonia	EANS	By 2018	✓	✓	✓				No implementation yet
Finland	Finavia	By 2019	✓	✓	✓				No implementation yet
France	DSNA*	By 2019	✓	✓	✓	✓	✓	✓	Model A
Germany	DFS		✓	✓	✓	✓	✓	✓	Model A
Greece	HCAA	No date available							No implementation yet
Hungary	Hungaro Control		✓	✓	✓	✓	✓	✓	Model A
Ireland	IAA		✓	✓	✓	✓	✓	✓	Model A
Italy	ENAV	By 2016	✓	✓	✓	✓	✓		Model C
Latvia	LGS	By 2018		✓	✓				No implementation yet
Lithuania	Oro Navigacija	By 2018							No implementation yet
Malta	MATS	No date available							No implementation yet
MUAC Region	MUAC		✓	✓	✓	✓	✓	✓	Model A
Norway	Avinor	By 2020							No implementation yet
Poland	PANSA	By 2018							No implementation yet
Portugal	NAV Portugal*	No date available	✓	✓	✓	✓			Model A
Romania	ROMATSA	By 2017							No implementation yet
Slovak Republic	LPS	By 2018							No implementation yet
Slovenia	Slovenia Control	By 2018							No implementation yet
Spain	ENAIRE	No date available	✓	✓	✓	✓			Model A
Sweden	LFV		✓	✓	✓	✓	✓	✓	Model A
Switzerland	skyguide		✓	✓	✓	✓	✓	✓	Model A
United Kingdom	NATS		✓	✓	✓	✓	✓	✓	Model A

*NB. According to their feedback, DSNA and Nav Portugal are currently providing only a subset of Data Link Services (respectively DLIC, AMC and ACM for France and DLIC Logon for Portugal)
**NB. Assumptions by SDM on the basis of the feedbacks provided by the ANSPs through the DLS Surveys

Fig. 5 – DLS Overall Implementation Status – Ground Network

2.4 Technical status

Considering that performance issues (provider and users aborts) have been experienced during the operational use of ATN B1 services making it difficult to continue to use them in the current configuration, EC requested:

- a technical investigation to EASA, resulting in the elaboration of a specific Report on *Technical Issues in the implementation of Regulation EC 29/2009* which identifies the causes of the current DLS issues;
- technical studies to SESAR JU:
  - *VDL Mode 2 Capacity and Performance Analysis*, which identifies the time horizon within which VDL Mode 2 is expected to reach its operational limits in Europe;
  - *VDL Mode 2 Measurement, Analysis and Simulation Campaign* elaborated by the ELSA Consortium and programme partnership in order to analyse the causes of the current DLS issues and identify solutions.

Appendix A summarizes the main findings of these activities that SDM used as a basis for the proposed strategy.

3. Key principles

3.1 Implementation focused

In accordance to the mandate received by EC the SDM has drawn its DLS implementation strategy, considering the current regulatory framework and the results and findings deriving from ELSA study.

The approach followed is **implementation focused** and builds on what ELSA's recommendations put forward as the immediately ready for deployment technology, i.e. ATN B1 Multi Frequency over VDL Mode 2 network in order to re-launch, on a sound basis, DLS implementation in Europe since the next CEF Transport Calls, presumably before end 2016. However, beyond the short term implementation of the reference technology, the proposed strategy also includes the following implementation steps with the evolution from ATN B1 to ATN B2 and possibly ATN B3 as well as some other technologies to be implemented in complement to VDL Mode 2. With such an end to end vision, SDM ambition is to demonstrate that a sound path exists from today's situation until AF6 implementation and that the short term approach proposed, in particular through the upcoming 2016 CEF Transport Calls, is **a major step in the right direction**.

In this perspective, according to ELSA study, the definition and implementation of an effective datalink end-to-end system certification process, including both ground and air components, is expected to be established by relevant Bodies/*empowered Functions*.

The proposed strategy does **not** consider:

- the development, validations and demonstrations that might still be required for the further evolutions of the *reference technology* (i.e. ATN B2 and ATN B3 which will be required at later stage, in particular to meet Initial Trajectory Information Sharing capacity needs);

- the development, validations and demonstrations still required by complementary technologies that should come along the *reference technology* at some point in time and mitigate limitations of the *reference technology*;
- the development, validations and demonstrations still required by a future generation of technologies that would take over from the *reference technology* at some point in time, addressing in particular the interoperability issue between EU and US, left pending by the *reference technology*;
- the establishment of the future DLS service provision governance;
- the activities required to elaborate standards, guidance material, regulatory documents. The responsibilities to produce such kind of documentation remain with the European Standardization and Regulatory bodies.

3.2 Distributed service provision and single governance

Despite the implementation focused nature of the proposed strategy, there is a close interrelation between how to implement DLS and how to organise the service provision.

For the time being, there is no agreement on how DLS provision will be organised. On the other hand, an implementation strategy "broad enough" to cover any service provision scenario would dilute its driving strength among an endless list of assumptions.

Considering that major studies have already highlighted that the European wide nature of **DLS makes it a perfect candidate to be provided as a common service**, i.e. distributed provision of the service through a limited number of service areas, based on common and interoperable infrastructures (e.g. PENS/NewPENS), under a single governance, SDM decided to base the proposed strategy on a distributed service provision with a single governance.

3.3 VDL Mode 2 lifespan

Any DLS CBA is closely connected with the potential lifespan of the VDL Mode 2 technology into which many stakeholders have already invested and will be required to further invest as a consequence of the proposed strategy. More lifespan means more time to accumulate benefits after the breakeven point. Also, the capacity study by the SJU[10] has demonstrated that the lifespan of the VDL Mode 2 technology is a direct function of its ability to accommodate data traffic for both AOC and ATS according to their respective required performances.

In this context, the option to complement VDL Mode 2 technology with other complementary technologies (ground or space based, airports or en route continental) when the data traffic demand of AOC and ATS together would come close to VDL Mode 2 only capacity (e.g. as a result of Initial Trajectory Information Sharing/EPP introduction by 2025) is essential[11]. In accordance with existing studies, the proposed strategy assumes that smartly and timely complemented, the VDL Mode 2 technology could last at least until 2030.

---

[10] VDL Mode 2 Capacity and Performance Analysis
[11] E.g. SATCOM, AeroMACS

3.4 Cost Benefit Analysis

In order to demonstrate the overall benefits to be drawn from the investments already made and those still required to ensure DLS provision based through VDL Mode 2, SDM will include a **revised DLS CBA view** in the DP2017. Starting from existing DLS CBA, it will provide an update, mainly to reflect the new costs stemming from ELSA's recommendations. As DLS is not included in the PCP, the DLS CBA is outside the PCP CBA.

With regards to additional costs and potential additional benefits stemming from the introduction of **complementary technologies**[12], their analysis and further incorporation into the overall DLS CBA will require specific studies by SDM together with the most relevant stakeholders, in particular the SESAR JU, in order to set the operational concept, the services and their associated benefits that could result from the combination of VDL Mode 2 with such complementary technologies.

4. Action Plan

The **SDM DLS Implementation Action Plan** is a **realistic recovery plan** which aims at addressing the remaining challenges on the ground and airborne sides.

In this perspective, taking into consideration:

- the technological upgrades required by the ground and airborne side in order to enable DLS provision in accordance with ELSA recommendations;
- the CEF framework and processes; and
- the current DLS implementation status;

The SDM has elaborated the "most probable and realistic scenario", having as main driver the target dates fixed by the PCP for AF6 Initial Trajectory Information Sharing. **It is worth saying that notwithstanding the compliance to the IR (EU) 310/2015 deadlines has been considered as the main driver, due to the above mentioned technological upgrades, a drifting of the deployment deadlines is highly possible**.

The proposed Action Plan bridges between current implementation status AF6 implementation, taking advantage of the specific SDM skills like:

- acknowledged centre of expertise reinforced by strong connections with all types of ATM stakeholders;
- specific relations with SESAR Joint Undertaking and Network Manager;
- planning combination with CEF framework to translate regulatory constraints into IPs co-funded by EU, coordinated and monitored by SDM.

Taking into consideration the high level principles concerning the DLS implementation outlined in the present note, as well as the outcomes of the ELSA study, the Action plan has been elaborated, with an overall deployment perspective, in order to identify the effective paths/steps needed to be undertaken in the ground and airborne domain in order to achieve, in the right sequence, a synchronized DLS deployment in Europe.

[12] E.g. SATCOM, AeroMACS

Airborne domain

The SDM strategy has duly taken in consideration also the airborne domain in order to ensure an effective and overall enhancement of the ATS VDL2 performance. According to ELSA study (see Appendix A), the availability of different avionics with related different performance levels has a strong impact on DLS operation with high level technical disconnections. Moreover, the current avionics are not compliant with the ATS performance requirements, therefore the harmonization of avionics performance is needed in order to improve the network performance.

In this perspective, one of the outcomes of ELSA study was a set of avionic configurations, the "best in class", that were tested and demonstrated as sufficient to comply with the ATN/VDL2 performance expectations in multi-frequency (MF) environment.

Moreover, ELSA identified the need to continue testing efforts beyond the lifespan of the study itself to cover both newly emerging avionic configurations as well as other existing configurations that were not covered in the ELSA study. **ELSA proposed that ultimately, an effective end to end certification process for both ground and air components should be defined and implemented.**

The SDM strategy aims at incentivizing the upgrade to the "best in class" avionics configurations which are considered as the set of airborne equipment necessary and sufficient to comply with the ATN/VDL2 performance expectations.

Ground domain

According to the results of DLS survey (Fig. 2), the European current situation can be represented by the following starting points for the transition towards the "Model D" that is considered as the target solution (See Appendix A):

- **"Model A":** a country/region with a multiple VDL M2 networks implemented in the same airspace, using a One-GSIF system on common frequencies;
- **"Model C":** a country/region with a single VDL M2 networks implemented in the same airspace, using a Two-GSIF4 system on reserved frequencies;
- **No implementation yet**: a country/region that has not implemented any ATN COM infrastructure.

The following table outlines the main technical characteristics of the DLS Models:

Model	VDL RF operating Networks	VDL RF Frequency Use	GSIF on each Frequency announced by each Network	Existing today	Note
A	MULTIPLE	COMMON	ONE	YES	Current Central EU model
B[13]	MULTIPLE	RESERVED	ONE	NO	**Target Short term evolution for central EU**
C	SINGLE	RESERVED	TWO	YES	Current model deployed in a limited area[14]
D	SINGLE	RESERVED	TWO	NO	**Target Long term model for EU VDL network evolution**

Fig. 6 – DLS Model Description

[13] To implement the Model B in a way suitable to meet the requirements, it is necessary to have at least five frequencies available in the high traffic area, considering the current situation of two operating CSPs. (Considering that only four frequencies are currently assigned to VDL Mode 2, ICAO FMG is currently working to make available also the fifth frequency. A decision on this topic is expected by 2016).

[14] Currently deployed by ENAV in Italian airspace

In the light of above, the following picture highlights the potential paths envisaged for the transition towards the target solution:

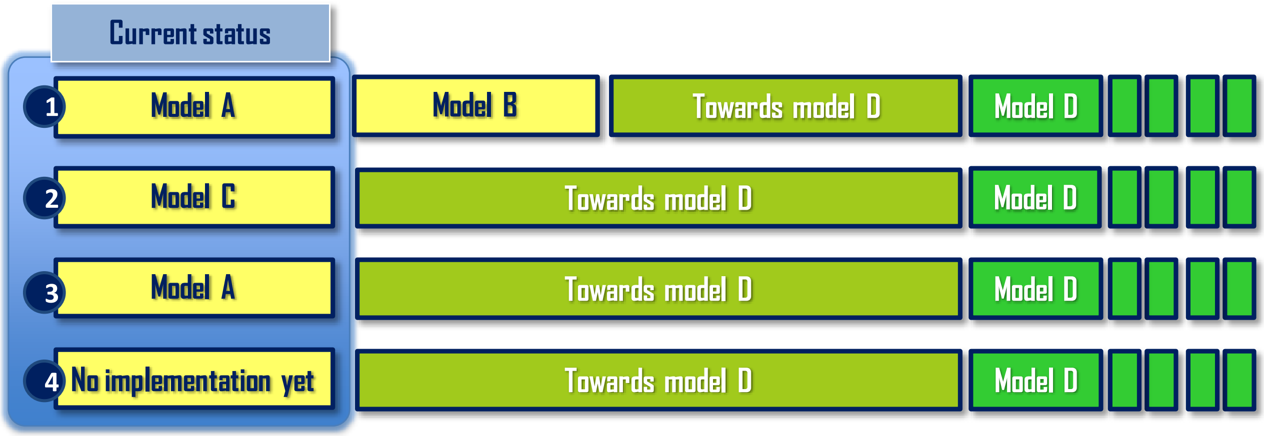


Fig. 7 –Ground Network – Potential paths towards Model D

Considering the current status of implementation in Europe, the SDM strategy aims at incentivizing each operational stakeholder into the most relevant and effective path **towards the achievement of Model D**.

Action Plan development

In the light of above, the SDM Action Plan has been developed and structured in four main streams:

- **Stream 1 – Overall Setup and Coordination,** which aims at further analysing the current status of play and possible RF network improvements, identifying the Service Areas and designing the system architecture at Service Area and European level. Stream 1 is led by SDM, in strict cooperation with Network Manager, EASA and SJU, if needed.
- **Stream 2 – Implementation of intermediate step towards Model D,** which aims at performing the detailed design and deployment of the system architecture of an intermediate step (Model B or Model C with MF) at Country / region level, towards the targeting of Model D. Stream 2 is performed by the implementing partners supported by SDM.
- **Stream 3 – Model D implementation,** which aims at designing and deploying the integrated system architecture, at Country/region, Service Area and EU level, ensuring the full achievement of the target solution. Stream 3 is performed by the implementing partners supported by SDM.
- **Stream 4 – Avionics upgrade,** which aims at upgrading Avionics, including the upgrade to "best in class" configurations according to the requirement described in ELSA. Stream 4 is performed by the implementing partners supported by SDM.

It is worth noting that, although the Action Plan outlines activities to be performed up to the full deployment of target solution by 2022, complementary technologies [15] are envisaged as from 2025, taking over part of the increased data traffic out of VDL Mode 2 and Extending VDL Mode 2 lifespan.

[15] SATCOM, AEROMACS

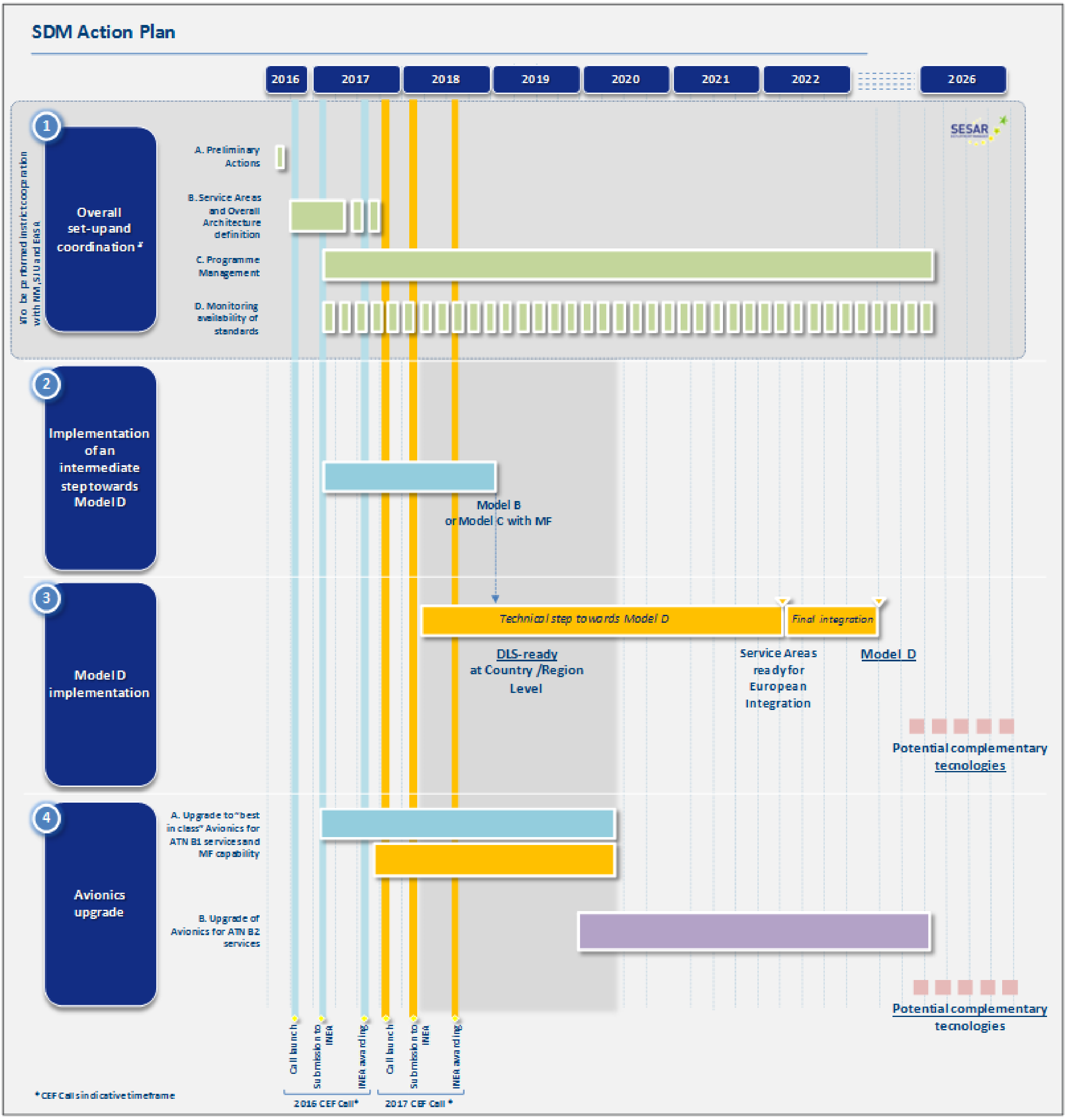


Fig. 8 – SDM Action Plan

Specifically, the phases and related steps envisaged within each stream are outlined below:

4.1. Stream 1 - Overall Setup and Coordination

Stream 1 consists in the following phases **under SDM steering and** in coordination with Network Manager, EASA and SJU, if needed:

A. Preliminary actions, including an effective and exhaustive state of play analysis on the current infrastructure/service models adopted within each State and possible RF network improvements, on the basis of the results of the DLS Survey launched by SDM towards the ANSPs on 17th June and the following consultation period. On the basis of such analysis, preliminary high level principles are elaborated to guide the civil and military operational Stakeholders in the submission of IP proposal for the 2016 CEF Transport Calls.

B. Service Areas and overall architecture definition, including the following steps:

- **Identification of Service Areas:** on the basis of the results of the analysis performed in the previous phase and the evaluation of further criteria stemming from ELSA study, SDM identifies homogeneous Service Areas - i.e. groups of neighboring Countries/regions which are in a similar operational environment and with similar state of play - in order to achieve together a common target model.
- **Guidelines definition for system design at Service Area and European Level:** in accordance with the SDM DL Strategy and the applicable ELSA recommendations, SDM provides guidelines to design DL target architecture on a Service Area basis, with full cross-border consideration, in order to ensure the complete DLS implementation at European Level.
- **Service Area level architecture design:** such step aims at defining the technical architecture at Service Area level in terms of components, interfaces and exchanged data on the basis of the SDM DL Strategy and the ELSA study results, in full cooperation with the local involved stakeholders.
- **European level architecture design:** such step aims at defining the overall technical architecture at European Level, including the functional design of the interfaces among the identified Service Areas, in full cooperation with the local involved stakeholders.

C. Programme Management, including coordination and monitoring of DLS implementation initiatives in order to ensure their effective, timely and synchronized deployment, as well as high accuracy, compliance with applicable standards and improvement of the overall performance, targeting the final achievement of Model D (i.e. the target model).

D. **Monitoring availability of standards**, including continuous and constant monitoring of the standardization/regulatory processes and activities, performed by the relevant competent Bodies, in order to facilitate and increase the implementation of technical standards, maximizing interoperability, safety and quality.

The above mentioned activities need a close cooperation with the Network Manager in order to take in consideration all the relevant technical aspects and the performance monitoring needs.

This stream also requires close coordination between SDM and the Regulator – European Commission and EASA – in order to define and apply a process through which SDM proposals regarding the service areas, their respective technical architectures and the overall technical architecture at European level would be agreed after due stakeholders' consultation.

4.2. Stream 2 – Implementation of an intermediate step towards Model D

Stream 2 consists in the local design and deployment of an intermediate step - Model B or Model C with MF – at Country/region level, towards the achievement of the Model D. In this perspective, the Stream 2 has to be followed by the Stream 3 as a consequent step to ensure the targeting of Model D implementation.

The stream addresses the following cases:

- Countries/Regions in Model A status or want to start from Model A;
- Countries/Regions in Model C status or want to start from Model C.

For these cases, in accordance with the SDM guidelines defined in Stream 1, each respective Country/region is expected to detail, respectively:

- the **design of the system at local level** (including the G/G – A/G netw**o**rk and the interfaces with legacy systems) and, then, **deploy the Model B** (first path of Figure 3),
- or **the design of the system at local level** (including the G/G – A/G netw**o**rk and the interfaces with legacy systems) and, then, **deploy the Model C with MF** (second path of Figure 3).

With regard to both cases, such deployment is expected to be achieved within 2018, ensuring the operational transition from the current situation.

In order to facilitate the early integration among involved stakeholders, the submission of multi-stakeholder/cross country projects for the 2016 CEF Transport Calls is suggested.

The Communication Service Providers are expected to be fully involved in the preparation of project proposal, possibly as Project Contributors.

4.3. Stream 3 – Model D implementation

The stream encompasses the following activities:

A. **Intra Service Area integration design & deployment:** such phase entails the necessary steps to ensure, within each Service Area, the systems integration among Countries/regions which have implemented a *"technical step towards Model D"*, consisting in local deployment to ensure the DLS provision at Country/Region level (DLS ready at Country/region level).
Such "technical step towards Model D" has to be considered as a first step to enable the implementation of such model within Service Area. It is worth noting that the Service Areas are identified by the SDM within Stream 1 and Countries/regions are expected to interact and cooperate, also through the submission of multi-stakeholder projects, to ensure the effective integration of the respective systems within each Service Area.
B. **Inter Service Area integration:** such phase includes the steps needed to ensure the system integration among all the identified Service areas, so as to enable the full achievement of European Model D by 2022.

It is worth noting that Stream 3 has taken into consideration the potential availability of Complementary technologies, taking over part of the increased data traffic out of VDL Mode 2 and Extending VDL Mode 2 lifespan.

4.4. Stream 4 – Avionics upgrade

The stream identifies the following phases:

A. **Upgrade to "best in class" Avionics for ATN B1 services and MF capability:** includes the upgrade of the avionics to the "best in class" versions, when available.
B. **Upgrade of Avionics for ATN B2 services:** aims at adapting aircraft systems to receive and process a ground initiated ADS-C Contract Request for EPP using either VDL2 and/or complementary technologies.

It is worth noting that Stream 4 has taken into consideration the potential availability of Complementary technologies, taking over part of the increased data traffic out of VDL Mode 2 and Extending VDL Mode 2 lifespan.

5. SDM added value

5.1. The natural role of SDM

<u>It is SDM natural role to lead the execution of the above action plan as "DLS implementation project manager", in full cooperation with Network Manager, EASA, and SJU.</u>

This approach is in line with:

- Regulation (EU) 409/2013, article 9;
- Regulation (EU) 2015/310, recital (4);
- DG MOVE's letter to SDM on 25 February 2015 where DG MOVE stated: "SDM can and should be tasked with a project management role in data link deployment".

SDM will act "in substitution" of a Technical Service of a potential future DLS Governance as long as not ready to take over. The following actions/tasks have been identified:

- **<u>As architect</u>**: overall set-up, steering and coordination:
    - Identification of homogeneous service area starting from thorough analysis of the current situation in EU States;
    - Definition of the target ground architecture per service area in cooperation with the local stakeholders;
    - Interconnection of sub-networks within each service area to achieve a European distributed network and a European common approach;
- **<u>As facilitator:</u>** proactive and direct engagement of all required stakeholders, in particular Communication Service Providers to ensure timely upgrade and optimisation of ground network in accordance with target architecture, promoting access to EU co-funding as leverage.
- **<u>As precursor:</u>** stimulate establishment of a single European DLS governance taking advantage of SDA model.

5.2. Connecting strategy with co-funding opportunities in 2016 CEF Transport Calls

It is an essential SDM added value to enable immediate connection between the above action plan and upcoming co-funding opportunities:

- **Providing strong guidance to the stakeholders required to implement regarding what to submit, with whom, to which call and with which timeline; whilst**
- **demonstrating to the European Commission that submitted projects form all together a significant step towards the agreed objective into which it is worth investing public EU money.**

With respect to the Airborne Domain, it is expected that implementation projects submitted for 2016 CEF Transport Calls will be focused on the Avionics upgrade to the "best in class" Avionics for ATN B1 Services and MF capability, including those projects related to the upgrade of Avionics for ATN B1 Services that will be included in the best class, after a successful testing certified by relevant Bodies.

The following table, focused on the implementation activities within the Stream 4 of the Action Plan, provides a recap of the expected IP proposal to be submitted for the 2016 CEF Transport Calls, with reference to the airborne domain:

Focus on IP proposal expected for the next CEF Transport Calls - Airborne domain

	What	When
IP proposals expected for 2016 CEF Transport Calls	Upgrade to ATN B1 multi frequency avionic successfully assessed "best in class" by ELSA study	By 2020
	Upgrade to ATN B1 multi frequency avionic not tested against "best in class" criteria in ELSA, subject to demonstration of equivalent minimum level of performance as part of the proposal or commitment to demonstrate equivalent minimum level of performance prior to implementation	By 2020

Fig. 9 – IP proposal expected for the next CEF Transport Calls –Airborne domain

With respect to the Ground Domain, it is expected that implementation projects submitted for 2016 CEF Transport Calls will be focused on the deployment/upgrade towards multi-frequency networks at Country/region level.

The following table is focused on the implementation activities within the Stream 2 of the Action Plan and provides a recap of the expected IP proposals for the 2016 CEF Transport Calls:

Focus on IP proposal expected for the next CEF Transport Calls - Ground domain

	Starting Current Model	What	When
IP proposals expected for 2016 CEF Transport Calls	Model A	**Model B,** as intermediate step towards Model D*	By 2018
	Model C	**Model C with MF,** as intermediate step towards Model D*	

Fig. 10 – IP proposal expected for the next CEF Transport Calls – Ground domain

Consequently, for 2016 CEF Transport Calls the **SDM strongly encourages** the submission of implementation projects **targeting:**

- **Either the transition from Model A to Model B; or**
- **The transition from Model C to Model C with MF by December 2018.**

In addition, SDM strongly recommends the preparation of the IPs on multi-stakeholder basis, i.e.:

- at Country level jointly submitted by all the involved stakeholders (i.e. ANSP and CSPs);
- at Regional level involving neighboring countries.

In the case where CSPs would access **co-funding** to facilitate and accelerate upgrade and optimisation of their networks, the SDM shall also consider how to ensure that the financial support should translate into reduced service fees paid by ANSPs to the CSPs, and consequently not double invoiced amounts through the charging fees paid by the airlines.

Data Link Services (DLS) Implementation Strategy towards Initial Trajectory Information Sharing Appendix A – Main findings from EASA and ELSA reports

This Appendix summarizes the main recommendations and conclusions by EASA and SJU from which SDM has drawn the proposed strategy. For more details, please refer directly to the relevant reports.

EASA Report

The EASA Report clearly identified some potential causes of the technical problems. Among them, in particular it was identified that:

- **the use of a single frequency (the CSC channel alone, used for AOC as well as ATS data) was one of the most important root causes of the technical problems**. So, the needs to meet the ATS performances have led the aeronautical community to consider **upgrading the current single frequency VDL M2 networks by developing and deploying multi-frequency infrastructures**, also in accordance to what requested by ICAO standards (also the SJU "VDL Mode 2 Capacity and Performance Analysis" confirmed the single frequency saturation in core Europe starting from 2015);
- **the avionics currently having a high level of disconnections and already capable of operating in multi frequency environment should be assessed in a multi-frequency environment.**

ELSA Report

In order to address such issues, the ELSA study has analysed the causes and provided recommendations regarding the Avionics and Ground Networks domains.

AVIONICS Domain

Starting from the EASA report, the following Avionics recommendations have been elaborated by ELSA:

- Harmonise avionics' performance, especially MF capability:
  - Upgrade of avionics to the "best in class" performance, showing no operational issues in the extensive validation described in Annex C of ELSA D11 Final Report, and supporting MF operations, especially FSL (Frequency Support List)-based, GRAIHO (Ground Requested Air Initiated Hand-Off) and Autotune handovers.
  - Update flight crew operational procedures which had been introduced for older avionics, to avoid unnecessary avionics resets.

With reference to the first point, ELSA Study performed interoperability testing (including MF functionality) in combination with in-service monitoring of AIRBUS, Honeywell and Rockwell configurations that have resulted in the identification of "best in class" products. These configurations passed the interoperability tests and have demonstrated a significant improvement in terms of performance during in-service monitoring (more details in ELSA D11 Final Report). In addition to these bench tests, the "best in class" performances have been confirmed by the actual operational behaviour observed on equipped commercial flights indicated by:

1) The PA rate as monitored by EUROCONTROL (below 5 PAs per 100 flight hours being identified as an operation trigger);
2) The mean timeframe on one VGS (above 5-10 minutes in most of cases). The Mean Timeframe on One VGS is the mean time spent by each aircraft on an individual VGS.

The current airborne routers and VHF Data Radio already labelled as "best in class" in the frame of the ELSA project are listed below:

1) **Data Link Management Units** (airborne routers)

- AIRBUS FANS B+ ATSU CSB8
- HONEYWELL
  - MkII+ CMU upgrade from -501 and -521 to -522
  - EPIC CMF upgrade to Block 3.xx or later
  - B787 CMF upgrade to BPV3
  - B777 CMF upgrade to BPv17A BLE
- Rockwell Collins CMU-900 operators should upgrade to CMU Core software 815-5679-505 (refer to CMU-900 Service Information Letter 15-1) in order to fix a software bug impacting the VDL2 Multi-Frequency operations.

2) On board VDR (VHF Data Radio)

- Honeywell
  - RTA-50D PN 965-1696-0F1
  - RTA-44D PN 064-50000-2052 or with service bulletin SB23-1570 installed
  - EPIC avionics fitted with mod D or greater for the VDR element.
- Rockwell Collins
  - VHF-920: P/N 822-1250-002w/SB16 or 822-1250-020w/SB17
  - VHF-2100: P/N 822-1287-101/180w/SB7 or 822-1287-121/141

Finally, the following actions have been indicated by ELSA:

- upgrade of the avionics to the "best in class" versions, when available. This requires that "best in class" versions are being determined for all providers.
- apply the methodology used by ELSA to identify "best in class" performance as a major input to the associated Standards-01 recommendation (define and implement an effective datalink end-to-end system certification process (including both ground and air components) and reference material for the ground network infrastructure (MOPS-like)) meaning, in order to determine the "best in class" versions for all providers, the test bench has to be implemented first.

GROUND Networks

Starting from the EASA report, the following Ground Network recommendations have been elaborated by ELSA:

- improve the VHF Ground Station (VGS) network and fix the ground system issues:
    - use a dedicated channel for transmissions at the airport in regions with high traffic levels in en-route;
    - use alternative communication means for AOC in the airport domain (e.g., Wi-Fi, cellular, AeroMACS) to off-load the frequencies used for CPDLC;
    - progressively implement additional VDL2 frequencies in accordance with the traffic level;
    - optimise the en-route VGS network coverage;
    - ensure the availability of a fifth VDL2 frequency (at a minimum);
    - use the CSC as common control channel only, unless traffic level is very low;
    - implement ELSA recommended protocol optimisation: limit AVLC frame size;
    - fix the ELSA identified ground system problem;

- start implementing the transition roadmap to the MF VDL2 target technical solution: introduction of alternate channels using reserved frequencies, addition of frequencies, and transition to one managed MF VDL2 network per Service area.

With reference to the last point, ELSA Study, after a technical assessment of the various MF deployment identified options, concluded that the best model for MF deployment in Europe is a model comprising a number of Service Areas, where all VDL M2 Ground Stations (VGS) operating on VDL frequencies in a given Service Area work together under one unique frequency licensee responsible for managing the traffic on the RF network. Thus the European architecture is based on a "Service Areas" approach that, from a pure technical point of view, means an European distributed architecture.

Such model – named **Model D - represents the target high level architecture solution for the ATN COM** infrastructure outlined in the following picture:

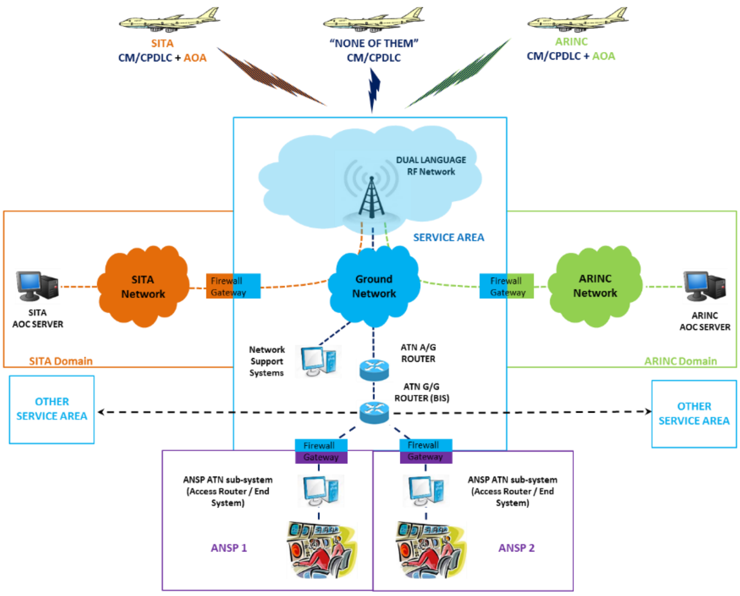


Fig. 11 - Target high level architecture solution for the ATN COM infrastructure

"Model D" description:

As outlined in the previous figure, the model D consists of a European distributed architecture based on Service Areas.

For each Service Area, the following components are included:

- RF network: MF VDL M2 VGS implementing Dual Language16 technology
- Ground network: IP network for internal and external components connections (the AOC transport is not considered in the family scope)
- ATN Ground Network: composed by ATN A/G and G/G routers in a dedicated ATN domain
- Network support systems: monitoring, recording, billing and network management systems
- Network interfaces: Firewall/Gateways for external interfaces

It is worth noting that, at European Level, Network Support Systems should be envisaged to ensure an overall monitoring supporting the Common DL Service provision.

One of the most important element of the Model D is its scalability, that means the possibility to add new frequencies, also only one, each time the available bandwidth becomes insufficient in the Service Area as well as in the Country/Region within the Service Area (the number of frequencies "linearly" grows with the traffic increase). The Model D, with the adequate capacity, shall support AF6 PCP requirements.

Regarding to the ground networking (Ground Network and ATN Ground Network), a possible common approach is to implement the G/G network ATN rationalization for DLS based on PENS use and considering also the Service Area approach as defined in the TEN-T study "New European Common Service Provision for PENS 2 and DLS".

Towards "Model D":

1) Starting point for the transition

Having defined the European target solution architecture for the ATN COM infrastructure, also the transition from the current situation to the target solution has been studied by ELSA. The European current situation can be represented by three different statuses which can be assumed as starting points for the transition:

- **"Model A":** a country/region with a multiple VDL M2 networks implemented in the same airspace, using a One-GSIF[17] system on common frequencies;
- **"Model C":** a country/region with a single VDL M2 network implemented in the same airspace, using a Two-GSIF system on reserved frequencies;
- **No implementation yet**: a country/region that has not implemented any ATN COM infrastructure.

Due to the need to consider:

- the existing infrastructure;

[17] "Single Language" means that any VGS broadcasts the ID (Identifier) of only one (Single) Digital Service Providers . "Dual Language" means that any VGS broadcasts the IDs (Identifier) of multiple (Dual) Digital Service Providers in its Ground Station Information Frames (GSIF) on the RF channel.

- the time required to move forward the technical target solution (assuming that some of the current infrastructures are in operation;)

a transition model, named "Model B", has been introduced.

2) "Model B" description:

Model B consists in a **Multiple VDL M2 networks implemented in the same airspace using a One-GSIF system on reserved frequencies with MF implementation.**

To make possible to implement the Model B in a way suitable to meet the requirements, it is necessary to have at least five frequencies available in the high traffic area, considering the current situation of two operating CSPs. (EUR ICAO FMG is currently working on this topic). **The Model B has to be considered as a temporary step to reach the Model D.**

The following table recaps the Models described above:

Model	VDL RF operating Networks	VDL RF Frequency Use	GSIF on each Frequency announced by each Network	Existing today	Note
A	MULTIPLE	COMMON	ONE	YES	Current Central EU model
B	MULTIPLE	RESERVED	ONE	NO	**Target Short term evolution for central EU**
C	SINGLE	RESERVED	TWO	YES	Current model deployed in a limited area[18]
D	SINGLE	RESERVED	TWO	NO	**Target Long term model for EU VDL network evolution**

Fig. 12 – DLS Model Description

The following picture outlines the ELSA transition roadmap, taking in consideration the models described above:

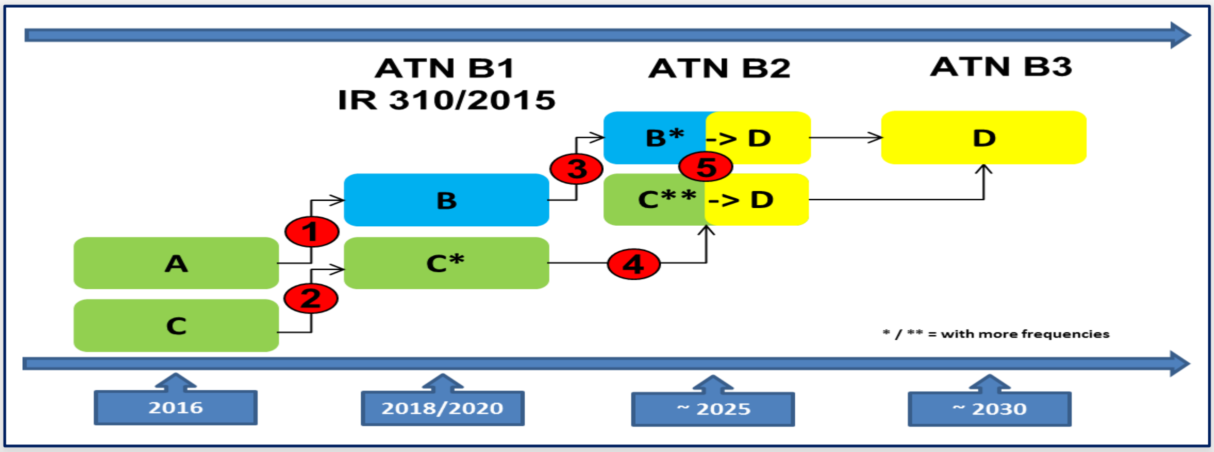


Fig. 13 – ELSA Transition Roadmap

[18] Currently deployed by ENAV in Italian airspace.

2. STRATEGIC VIEW

SESAR
DEPLOYMENT MANAGER

Strategic View – Addendum 2
SWIM Governance Action Plan

1. Overall context and objective of the note

The Commission Implementing Regulation (EU) No 716/2014 states that "*SWIM comprises standards, infrastructure and **governance** enabling the management of information and its exchange between operational stakeholders via interoperable services*".

SWIM Governance is needed to ensure a common starting point and a controlled evolution of all elements related to SWIM. SWIM Governance means all the processes that coordinate and control the SWIM foundation material, SWIM standards and guidance material, the execution of the service lifecycle, the compliance framework and the SWIM common components. It is established to enable the seamless exchange of data through standardized processes.

The European Commission has tasked the SDM to define a SWIM Governance deployment action plan as a mitigation action with regards to the high level risk N°8 – late definition/failure to establish SWIM governance – as identified in the DP 2015 and reiterated in the DP 2016.

As SWIM Governance aims at defining a common approach for SWIM deployment, the SDM has started to work with all the relevant operational stakeholders, and in particular the SJU, the NM and the project leader of the Implementation Project on SWIM Governance – *SWIM Governance Deployment*[19] – leading to the Action Plan for the implementation of a structured and appropriate governance framework for SWIM.

The main conclusions of this work in framing SDM's activity have been:

- Identifying the main principles according to which the SWIM Governance should be organized and managed on the basis of previous studies, requirements and experiences from the SESAR1 project 08.01.01, but also looking at results and role models like the NewPENS organization and existing platforms like the change control boards for the AIRM, FIXM, WXXM and AIXM (part 1);
- Defining an Action Plan for setting-up a solid and agile SWIM Governance, agreed between the concerned operational stakeholders[20] and able to facilitate the coordinated deployment of SWIM in the framework of the PCP implementation (part 2).

[19] "*SWIM Governance Deployment*" is an implementation project proposed to the 2015 CEF Transport General Call by 8 ANSPs, EUROCONTROL, Aéroport de Paris and Lufthansa. The project was presented in the framework of the CEF 2015 but was not awarded by the European Commission and will not be executed.
[20] Whenever the term "operational stakeholders" is used, it refers to civil and military organizations alike.

2. Background

2.1. Importance of SWIM Governance

The main objective of SWIM governance is to ensure a stable implementation and controlled evolution of SWIM standards, guidance material, foundation material, common components, the SWIM service lifecycle including service definitions and the compliance framework. The concept of 'System Wide Information Management' - SWIM - covers a complete change in paradigm of how information is managed and exchanged along its full lifecycle, involving stakeholders from across the whole European ATM network and beyond.

SWIM is SESAR's enabler for assuring that the right information will be available with the right quality to the right person at the right time. It covers all ATM information to be exchanged between Operational Stakeholders, including aeronautical, flight, aerodrome, meteorological, and air traffic flow information.

SWIM Governance encompasses the following aspects:

- Ensuring the development, formalization and maintenance of common SWIM policies, processes and functions to support the implementation of all aspects of SWIM;
- Expediting the SWIM standards development and evolution as well as influencing those standards in the name of the SWIM users, which SWIM Governance represents. For this reason a formalised collaboration between the independent standardisation organisations and the SWIM Governance needs to be established in a way that ensures that the will of the SWIM Users is appropriately taken into account.
- Improving interoperability with an appropriate level of security among systems by promoting a common set of semantic and structural artefacts and promulgating them through the SWIM policies and processes as well as the communities of stakeholders;
- Ensuring the provision of a collaborative platform for the communication and collaboration between all SWIM stakeholders on all matters of SWIM Governance;
- Ensuring a commonly agreed definition of the SWIM services mandated by the PCP [21] and a common set of SWIM services to be deployed, leading to the interoperability that the PCP demands[22].

In short, the establishment of SWIM Governance is an essential **facilitator for the coordinated deployment of SWIM** allowing the full achievement of the **SESAR operational/economic benefits associated with ATM Functionality N°5 (AF5) and the other ATM functionalities, for which SWIM is an enabler**. The lack of SWIM Governance will highly increase the risk on SWIM Deployment as it is intended and mandated by the PCP and will most likely compromise the required interoperability between ATM stakeholders.

---

[21] Note that the service provision itself is the full and sole responsibility of the provider.
[22] The concrete role of the SWIM Governance in the service definitions needs to be defined.

2.2. Deployment focus

This note is focused on deployment by defining an Action Plan to be undertaken by SDM and the relevant stakeholders leading to operationally deployed SWIM Governance[23]. The purpose of the action plan is twofold: on the one hand it aims at raising the readiness for deployment of SWIM Governance; on the other hand it is assumed to pave the floor for another SWIM Governance Deployment implementation project to be submitted to the 2016 CEF Transport Call. Subject to EC's award decision, this project could then start in time by July 2017, to set up and run the resulting SWIM Governance framework.

3. SWIM Governance Structure

As this note addresses the necessary future arrangements related to the Governance of SWIM during the PCP deployment phase, it is important to take into consideration the main results coming from previous activities on SWIM Governance, in particular the SJU work through the SESAR1 project 08.01.01–"Operational Requirements & Demands concerning organization of the ATM Information Management within the scope of the European ATM Enterprise Architecture "- on the SWIM Governance for the deployment of iSWIM. Inspiration can also be taken from other governance frameworks.

Considering the results of the above mentioned references, the necessary SWIM Governance approach to be defined, shall take in consideration the following two main aspects:

- **SWIM Elements**: All items belonging to the deployment of SWIM that are defined, controlled or at least influenced by the SWIM Governance.

- **SWIM Governance structure:** structures, bodies and roles that are needed to conduct governance processes.

3.1. What are the SWIM Elements to be governed?

SWIM Governance is required to establish the trust of the SWIM stakeholders regarding the quality of provided services. In other words, SWIM Governance aims at ensuring the interoperability and security of information exchanges via SWIM services as demanded by the PCP and the SWIM compliance of these services: *[SWIM enables] the management of information and its exchange between operational stakeholders via interoperable services.*

The main elements to be governed by SWIM Governance are defined within specific types of documents which can be grouped in the following categories:

---

[23] For this reason, the SESAR 2020 R&D program run by SJU is regarded as another stakeholder of SWIM Governance. It can provide inputs and change proposals to SWIM Elements.

- the **SWIM Foundation** provides a coherent set of *principles, rules and recommendations* for establishing SWIM standards related to information, information services, technical infrastructure and governance;
- a **SWIM Standard** is a specification relating to SWIM provided by SWIM stakeholders which was adopted by a recognized standardization body or community of interest for repeated or continuous application. Even if the SWIM Governance is not in charge to develop the SWIM Standards, it should encourage the SWIM Standards developments when needed, participate in the development process and thereafter expedite and promote their implementation;
- the **SWIM Guidance Material** is typically developed to accompany the SWIM Foundation and SWIM Standards in order to provide additional explanation to assist their use and to help illustrate the meaning of technical specifications and requirements. Guidance material is thus used to support the realisation of SWIM. Typically guidance material includes guidance documents, technical manuals (e.g. for tools), handbooks & tools.

Information Management (IM) Functions are fundamental elements of the SWIM Governance, needed for the operation and evolution of SWIM. The IM Functions are carried out by the SWIM Governance. This concept has been introduced by SESAR 1 project 08.01.01 in deliverable D47**Error! Reference source not found.**.

The IM functions can be grouped as follows:

- **Steering IM Functions:** functions to steer and guide the SWIM evolution, covering also the actual overall SWIM Governance process. They have a direct impact on the other two IM Functions;
- **Policy Management IM Functions:** to make policies for the areas covered by SWIM Governance (financial, compliance, etc.) in support of SWIM deployment and SWIM operation;
- **Governed IM Functions:** functions impacted or "driven" by the Steering and Policy management functions.

It is worth noting that the actual implementation of IM Functions can be tailored and refined by SWIM Governance to best meet the needs of the SWIM evolution and SWIM deployment. The level of governance for a specific IM Function will be determined in the corresponding rulebooks and guidelines, which will be derived from the policy documents.

The IM Functions will be assigned to the appropriate SWIM Governance bodies, responsible to govern and execute the IM Functions, according to their role and responsibilities defined in the agreed SWIM Governance structure.

Within the framework of the above-mentioned SWIM Elements, SWIM Governance processes define the operation of SWIM Governance, thus realizing the IM Functions.

Processes are required to carry out a number of activities – either by the SWIM Governance or by the operational stakeholders – that are essential for SWIM Governance, for example

- The change control of SWIM Elements;
- The assessment of compliance to SWIM standards;
- Etc.

The exact list of required processes needs to be identified by the SWIM Governance taking into consideration the IM Functions that need to be fulfilled. One process can contribute to several IM Functions, while in turn one IM Function might require several processes for its realization.

It is worth noting that – as in every organization - the SWIM Governance processes are at the basis of a high-performing SWIM Governance and serve as a reference for the implementing stakeholders. Complementing the above mentioned governance functions the governance covering SWIM service definitions will be tailored to its specific context. The SWIM service definition governance shall adapt to aspects like SWIM Service lifespan, business criticality, community of interest etc.

3.2. How should SWIM Governance be organized?

An effective and efficient SWIM Governance requires an appropriate organizational structure, answering on "who" are the appropriate governance bodies – organizational instances composed of people from different companies or organizations working together either temporarily or permanently – required to execute the SWIM Governance. SESAR1 project 08.01.01 has proposed an initial version of a governance structure in its deliverable D47 **Error! Reference source not found.**, which will be used as input.

SDM recommends the SWIM Governance structure to be inspired by successful role models of governance like the one for NewPENS, or the governance (through Change Control Boards) of the exchange models AIRM, AIXM, WXXM, FIXM etc. Likewise examples and inputs from other regions of the world, e.g. the US, and from ICAO should be considered.

It is fundamental to define the role of each governance body in a clear and comprehensive way, highlighting all the potential relationship among different bodies involved and avoiding multiple links and heavy processes: Fit for purpose and tailored to the needs of the operational stakeholders of SWIM

The establishment of comprehensive Terms of Reference (TORs) for the SWIM Governance Bodies will be essential to define the roles, tasks and relationship between the governance bodies as well as a description of input and outputs artefacts. The trust of the stakeholders in a robust and agile SWIM Governance is one key of the SWIM implementation success.

4. Towards a SWIM Governance – Action Plan

Taking on board the requirements and lessons learned from the SESAR1 Project 08.01.01 – "Operational Requirements & Demands concerning organisation of the ATM Information Management within the scope of the European ATM Enterprise Architecture" - by the SJU and inspired by other governance arrangements like NewPENS, and the information models' change control boards (CCB), it is now fundamental to define an Action plan, detailing the phases and actions needed for the establishment of robust and agile SWIM Governance. The action plan provides a framework on HOW to achieve the SWIM Governance; the WHAT, i.e. the concrete structures, processes etc. will have to be defined by the operational stakeholders.

In this perspective, SWIM Governance shall be set up in such a way that definitions of the SWIM services mandated by the PCP for deployment can be agreed by the applicable community of interest. Likewise a commonly agreed set of policies, functions and processes is required, leading to the interoperability that the PCP demands. Specifically, Family 5.1.3 of DP 2016, which includes SWIM Governance, is the foundation for deploying all other families in AF5 and those families in the other AFs that make use of SWIM. From this it is clear that SWIM Governance needs to be operational within a short timeframe – best before the main wave of SWIM-related deployment projects realizing the PCP start their execution or as soon as possible thereafter. This is necessary in order to enable the SWIM Governance to effectively conduct its enabling role for the deployment of SWIM.

Taking advantage of the studies mentioned in the previous sections of the document, the SDM Action plan aims at identifying the main steps needed to define and deploy a well-structured and reliable governance framework for SWIM operations.

4.1. Roadmap towards SWIM Governance implementation

SWIM Governance is a prerequisite for a coordinated deployment of SWIM and for realizing the intended interoperability. In this respect, there will be three evolutionary steps towards a full SWIM Governance:

- **Refinement of the SWIM Governance specifications** developed during SESAR 1 and anticipated in the CEF Call 2015 non-awarded IP 2015 065 AF5. This comprises the elaboration of the Terms of Reference of the relevant governance bodies, the specification of the main processes of governance, the specification of the compliance framework etc. Extensive stakeholder consultation forms an integral part of this stage. During this stakeholders can raise any concern with the proposed arrangements, suggest changes etc. The ultimate goal is to arrive at SWIM Governance arrangements that are widely accepted by the stakeholder community and are ready for deployment in the next step.
- **Initial execution of SWIM Governance**: During this step the SWIM Governance will be in operation, although not all processes and functions will be executed from the beginning. Processes and functions will be added to the operation as they mature and are required; likewise, SWIM Governance policies will be adapted.
- **Full execution of SWIM Governance**: This is the final, steady-state during which SWIM Governance will be fully operational. Final legal agreements for SWIM Governance are expected to be clarified (and in place when needed) and a mechanism for financing the SWIM Governance (if applicable) is expected to be functional.

Starting from this situation, SDM recommends the following deployment approach to avoid any delay in the necessary setting-up of SWIM Governance.

4.1.1. Stream 1 – SDM-supported preparation of SWIM Governance deployment

Considering the work already performed by the multi-stakeholder project 2015_065_AF5 "SWIM Governance Deployment", its deployment priority and roadmap aligned with the SDM need to timely deploy AF5 and the related PCP functionalities, and considering as well INEA's decision of not awarding it, **SDM will support the implementing partners towards the continuation of the activities detailed above. In particular, SDM**

recommends that the partners of the IP 2015_065_AF5 "*SWIM Governance Deployment"***:**

- **Cooperate on refining the proposed governance structure and processes;**
- **Set up the first phase of SWIM Governance operation as defined above**
- **Either directly or indirectly via their respective representing organizations involve as many stakeholders as possible and practical stemming from the following stakeholders' groups: Air Navigation Service Providers, Airspace Users, Airports, MET Service Providers, NM and Military;**
- **Stick as closely as possible to the action plan priorities and deadlines;**
- **Cooperate in preparing a new IP in the framework of CEF Calls 2016 with more Stakeholders.**

As a prerequisite to widening the stakeholder involvement in the undertaking SDM strongly recommends to launch an information initiative, which aims at bringing all stakeholders to the same level of knowledge regarding SWIM Governance. In particular the results of SESAR 1 in this area as well as the work performed by the project 2015_065_AF5 "SWIM Governance Deployment" should be made available.

SDM will support these operational stakeholders' activities in the role of a project sponsor also funding the relevant resources while at the same time monitoring the progress and the results of the actions.

4.1.2. Stream 2 – Implementation Project in CEF Call 2016 for SWIM Governance deployment

For this second stream of activity, SDM will support the operational stakeholders to submit an implementation project for SWIM Governance deployment in CEF Call 2016. This project shall have a wider stakeholder base, i.e. as far as possible incorporating further stakeholders' category representatives while at the same time keeping a manageable size.

Besides this enlargement of the number of participants, the project should follow the same model of the project proposed in CEF Call 2015, i.e. by and large adopt the same objectives and work-breakdown structure as well as the associated timeline.

SDM is convinced that the described approach is an efficient way to mitigate the risk identified in the DP 2015 and will avoid any disruption in the setting-up of the SWIM Governance necessary for the deployment of the PCP AFs to which SWIM is a prerequisite.

4.2. Required SWIM Governance Arrangements and Activities

Realizing the deployment approach laid out in the previous section the main actions to achieve an operational SWIM Governance will be:

- **Prepare SWIM Governance deployment (by a group of operational stakeholders until September 2017; supported by SDM)**
    - Refine the SWIM Governance structure and processes
    - Setup the governance organisation
    - Contribute to the SWIM standardization of SESAR's SWIM output for deployment

- Produce Compliance Assessment Guidance Material
- Specify the Lifecycle Management for Services
- Establish a wide consultation mechanism with the stakeholders' communities in order to achieve agreement on the main principles of the governance structures and functions.
- Monitor and coordinate the other relevant SESAR deployment projects related to SWIM Common Components (implementation projects in DP Families 5.1.3 and 5.1.4).

- **Deploy SWIM Governance (by a group of operational stakeholders from July 2017 until December 2018; in the framework of a future implementation project to be submitted to 2016 CEF Transport Calls,)**
  - Manage and execute SWIM Governance
  - Apply the consultation mechanism with the stakeholders' communities
  - Develop the relevant policies, related – amongst others – to legal and financial aspects, for the implementation to support a sustainable implementation of SWIM Governance.

These main actions are shown in the following Gantt chart before being further detailed below:

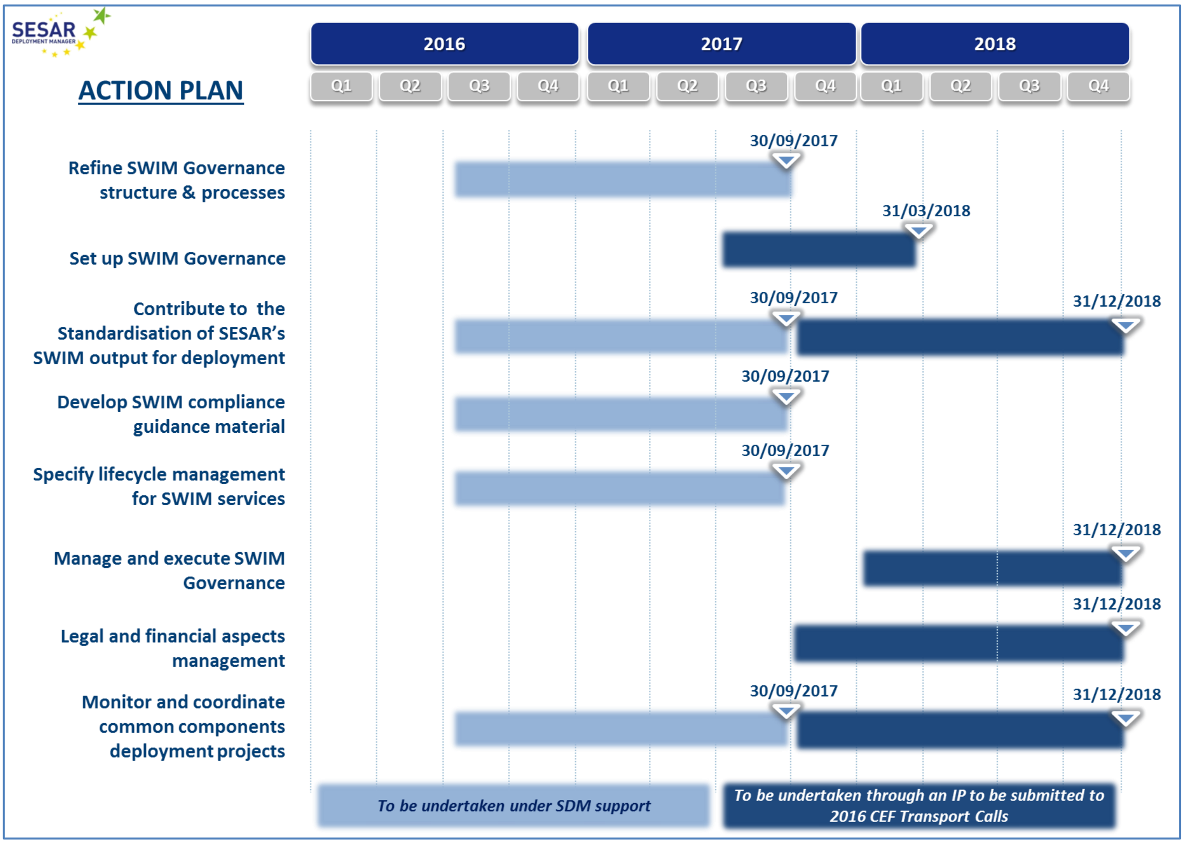


Fig. 14 – SWIM Action Plan[24]

[24] SDM acknowledges the challenge of this tight schedule, which is driven by the need to have SWIM Governance in place, when the bulk of SWIM deployment activities will be carried out. It

Actions by a group of operational stakeholders supported by SDM to prepare SWIM governance deployment	Actions by a group of operational stakeholders in the framework of a future implementation project to be submitted to 2016 CEF Transport Calls to deploy SWIM Governance
Refine SWIM Governance structure and processes On the basis of the work performed in SESAR1 Project 08.01.01 – "Operational Requirements & Demands concerning organization of the ATM Information Management within the scope of the European ATM Enterprise Architecture" the scoping of SWIM Elements to be governed needs to be refined. Naturally, this involves also the development of the first set of policies, governance processes and IM functions. Furthermore, also based on the SESAR1 work and inspired by the experience of NewPENS governance and the governance of international standards like AIXM, FIXM etc., the SWIM Governance structure must be defined in terms of roles, responsibilities and relationships among the several governance bodies involved. The entire refinement and definition shall be performed including a wide consultation and supported by the buy-in of the potential involved Stakeholders. **Contribute to the standardization of SESAR's SWIM output for deployment** In alignment with a recommendation by the European ATM standardization coordination group (EASCG) several standardization organizations have initiated the work to develop the SWIM standards that are required for deployment, for example the SWIM TI Yellow Profile specification. While the development of these standards and their maintenance is in the remits of the respective standardization organization, the SWIM Governance shall have an observer role in the EASCG and indirectly contribute to the production of the standards thus representing stakeholder interests. **Develop SWIM compliance guidance**	**Set up SWIM Governance** Once the SWIM Governance structure and the processes are defined and accepted by the involved stakeholders, the governance bodies need to be set up. **Contribute to the standardization of SESAR's SWIM output for deployment** continuation of previous action **Manage and execute SWIM Governance** Perform the management and the execution of the defined governance, such as the contribution to standards development for the implementation of SWIM, the management of the registry, the ensuring of the availability of supporting documents (e.g. templates, guidelines...). **Legal and financial aspects management** Identify legal issues related to SWIM Governance and – if applicable – define the charging and funding scheme to be applied to operate the SWIM Governance in preparation of a regular operation of SWIM Governance beyond the initial deployment. **Monitor and coordinate the other Common Components deployment projects** continuation of previous action

is up to the proposed CEF Call 2016 project to provide a deviating schedule if deemed necessary and feasible.

Actions by a group of operational stakeholders supported by SDM to prepare SWIM governance deployment	Actions by a group of operational stakeholders in the framework of a future implementation project to be submitted to 2016 CEF Transport Calls to deploy SWIM Governance
material SWIM Governance shall refine the SWIM compliance framework and develop the guidance material for assessing the SWIM compliance of implementation projects, including tools and their configuration for assessing the services, as well as the compliance process and making them available in a common way. **Specify the lifecycle management for SWIM services** SWIM Governance must identify the main aspects of the service lifecycle (states, ground rules, requirements for the Service Lifecycle Processes), taking into account that different levels of governance might be required depending on the type of service and the related community of interest and that service definitions should be produced according to the SWIM Principles and Standards. The agreed service definitions will need to be shared between the affected stakeholders. Further tasks are to define the processes for change control of services, the coordination of the registry with the service lifecycle and the coordination of compliance assessments with the service lifecycle. **Monitor and coordinate the other Common Components deployment projects** Provide coordination to the other SESAR deployment projects dealing with SWIM Common Components and monitor their progress and results in order to ensure that the objectives in the interest of the community are met.	

SWIM Governance Action Plan
Appendix B – Glossary

SWIM Element: All items belonging to the deployment of SWIM that are defined, controlled or at least influenced by the SWIM Governance. The SWIM Elements include

- SWIM Foundation, SWIM Standards and SWIM Guidance Material
- Information Management Function definitions
- SWIM Governance Process definitions
- SWIM Governance Policy definitions

To this end SWIM Element is a placeholder term used to refer, in a generic way, to SWIM-related documents, standards, technical means, etc.

SWIM Foundation: A coherent set of principles, rules and recommendations for establishing SWIM standards related to information, information service, technical infrastructure and governance.

SWIM Standard: A specification related to SWIM for repeated or continuous application. A SWIM Standard is either developed by the SWIM Governance itself or with a contribution of the SWIM Governance.

SWIM Guidance Material: Additional explanation to assist the application of the SWIM Foundation and the SWIM Standards.

Information Management Functions (IM Functions): Basic functions needed for the operation and evolution of SWIM. Thus IM Functions are the main activities to be undertaken by the governance bodies.

SWIM Governance: SWIM Governance is about establishing policies and continuous monitoring their proper implementation to ensure a stable operation and controlled evolution of SWIM. SWIM Governance means all the processes that coordinate and control all resources and actions of a pan-European SWIM implementation.

SWIM Governance Processes: Processes to be executed by the SWIM Governance bodies. SWIM Governance Processes realize one or more IM Functions. Specifically, SWIM compliance assessment and SWIM service lifecycle management are two of the most fundamental SWIM Governance processes.

SWIM Governance Policies: A SWIM Governance Policy groups a coherent set of rules and principles on certain cases of governance to steer decisions and achieve rational outcome. Thereby it makes the operation of the SWIM Governance deterministic. It sets the framework, in which the SWIM Governance Processes are defined.

NewPENS: New Pan European Network Service is an international ground/ground communications infrastructure to exchange information based on Internet Protocol, which is jointly implemented by the European air navigation service providers (ANSPs), EUROCONTROL and other involved operational stakeholders in order to meet existing and future air traffic communication requirements. It will replace PENS1 terminating in June 2018.

References

[1] DEL08.01.01-D47-SWIM IM Functions, April 2016.
[2] DEL08.01.01-D47-SWIM Governance Structure, April 2016.

3. PROJECT VIEW

SESAR
DEPLOYMENT MANAGER

3. Project view

As anticipated in Section 2.4, the "Project view" is to be considered as the core "operational" part of the Deployment Programme, fully consistent with the "Strategic view", providing a detailed and comprehensive description of each of the Programme Families, and including a complete view over the implementation level. The main objective of the Chapter 3 is to support the Operational Stakeholders in their implementation activities, providing them with the detailed picture of what has already been addressed and where the main focus has to be directed in order to guarantee the timely and synchronized implementation of the PCP.

As such, the content of the Project view includes the full list of all Implementation Initiatives awarded both within the 2014 CEF Transport Calls for Proposal and within the 2015 CEF Transport Calls for Proposal, as well as the implementation priorities that still need to be fulfilled in order to achieve the deployment of each Family. A more exhaustive description of each of the awarded IPs is presented within Annex A of the Programme.

In order to define the clearest "*operational*" picture of the Pilot Common Project and to provide involved stakeholders with all required information, the tables describing the main features and characteristics of each Family have been enhanced and re-organized in their structure. The tables now include the following information:

- **Family Number and Title**;
- **Main Sub-AF**;
- **Readiness for Implementation**, which indicates both the readiness for deployment of the Family and the time-wise urgency to be launched of the related implementation initiatives (High/Medium/Low, see also section 0)
- **Initial Operational Capability**, to clearly identify the start of the deployment[25];
- **Full Operational Capability**, to clearly identify the expected end of deployment[26];
- **Description and Scope**;
- **Interdependencies**, outlining other Families (or Sub-AFs) whose implementation is strictly connected to the Family's deployment;
- **Synchronization Needs**, which highlights the need for a coordinated deployment and for synchronizing the implementation activities in order to fully achieve the performance benefits; such synchronization efforts might involve several stakeholders, as well as different stakeholder categories;
- **Civil/Military Coordination**;
- **Stakeholders considered as gaps**, which identifies – in accordance to what is presented in the Monitoring view (section 5.1) – those stakeholder categories that

[25] Start deployment date for a Family is driven by the start of the first implementation of at least one of the operational improvements/one of the enablers associated with this Family at least in one place with PCP geographical scope. As a consequence, it could happen that a Family has already started to be implemented (Start date = before 2014) whilst not all associated operational improvements/enablers are ready for implementation yet.

[26] End deployment date for a Family occurs when all the operational improvements/enablers associated to this Family have been implemented and put into operational use everywhere within the Pilot Common Project's geographical scope. End deployment date of a Family is expected to occur at the latest by the deadline set by the Regulation (EU) 716/2014 for the associated sub-AF.

are requested by the PCP regulatory framework to invest in order to fill in the gaps and therefore are potentially eligible for co-funding under upcoming CEF Transport Calls;

- **Other stakeholders involved in the Family deployment**, which identifies stakeholder categories which have to be considered as contributors for the full operational deployment of the Family itself, without being necessarily requested by the PCP framework to invest;
- **Links to ICAO Global Navigation Plan ASBUs,** which outlines the links to Aviation System Block Upgrades (ASBU) included in the latest edition of the Global Air Navigation Plan
- **ATM Master Plan References**, which identifies the link to the latest edition of the ATM Master Plan, referring both to Level 2 and to Level 3;
- **SESAR Solutions and Very Large Scale Demonstrations**, which lists all related operational and technological improvements developed by SESAR members and the validation activities performed in real operational environments;
- **Guidance Material / Specifications / Standards**[27];
- **Means of Compliance and / or Certifications**;
- **Regulations**;
- **Cybersecurity Requirements**, which – for relevant Families – reports on the identified requirements to be considered in the deployment of the Family, having specific regard to the potential cyber-threats linked to the increased connectivity associated to the full PCP deployment;
- **Recommendation for IPs proposals**, which – in accordance to section 2.7.2 and to the outcomes of the Monitoring Exercise (included within Chapter 5) –list the main recommendations to operational stakeholders which aim at launching implementation initiatives linked to the Family.
- **Deployment Approach**, which aims at illustrating to potential candidate implementing Partners the suggested approach to be followed in order to deploy the Family. This field will present and describe the key milestones towards the Family implementation, trying to identify what activities shall be performed by each of the involved Stakeholder categories. Such milestones have been also used during the monitoring exercise launched on March 4th 2016, aiming at identifying the current status of implementation of the PCP throughout Europe.

[27] Guidance material/Specification/Standards can be considered as appropriate and recommended for support to implementation. They can also be referenced in Means of compliance or Regulation. Means of compliance listed in tables are non-binding standards adopted by EASA or ESOs to illustrate means to establish compliance with regulations and implementing rules. However, alternative means for compliance can be applied if accepted by the relevant National Supervisory Authority (NSA). Regulations listed in the tables are binding instruments considered as relevant for the family implementation

AF #1– Extended AMAN and PBN in high density TMA

The ATM Functionality #1 includes Extended Arrival Management (XMAN) and Performance Based Navigation (PBN) in high density Terminal Manoeuvring Areas. Extended Arrival management (XMAN) and Performance Based Navigation (PBN) in high density Terminal Manoeuvring Areas (TMAs) will improve the precision of the approach trajectory and facilitates air traffic sequencing at an earlier stage.

More in detail, Extended AMAN supports the extension of the planning horizon out to a minimum of 180-200 Nautical Miles, up to and including the Top of Descent of arrival flights. PBN in high density TMAs covers the development and implementation of fuel efficient and/or environmentally friendly procedures for Arrival and Departure RNP1 (Required Navigation Performance 1) Standard Instrument Departures (RNP 1 SIDs), Standard Arrival Routes (STARs), and RNP approach with vertical guidance (RNP APCH).

Accordingly, AF1 is structured in two Sub-AFs, including respectively two and five Families, as follows:

Sub-AF 1.1 – Arrival Management extended to en-route Airspace

- Family 1.1.1: Basic AMAN
- Family 1.1.2: AMAN upgrade to include Extended Horizon function

Sub-AF 1.2 – Enhanced Terminal Airspace using RNP-Based Operations

- Family 1.2.1: RNP approaches with vertical guidance
- Family 1.2.2: Geographic Database for procedure design
- Family 1.2.3: RNP 1 operations in high density TMAs (ground capabilities)
- Family 1.2.4: RNP 1 operations in high density TMAs (aircraft capabilities)
- Family 1.2.5: Advanced RNP routes below Flight Level 310

The following chart highlights the overall structure of the ATM Functionality #1, namely its SUB AFs, Families and their relevant Implementation initiatives related to both 2014 CEF Call awarded projects and 2015 CEF Call candidate projects.

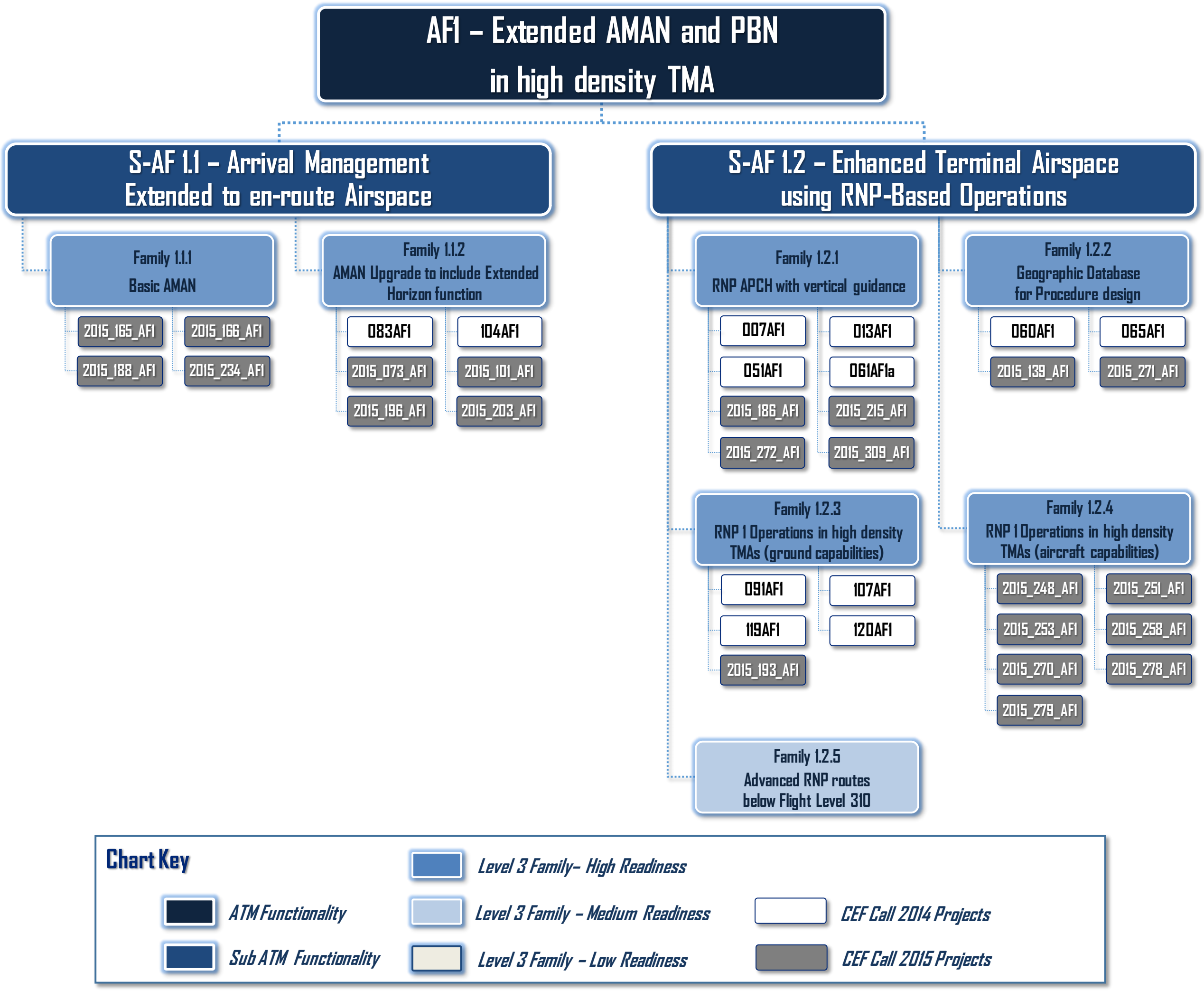


Fig. 15 – AF #1 Structure

The following Gantt chart shows the implementation roadmap for each Family included in AF1 in terms of start and end date of deployment, and it has been defined taking into account the target dates for each ATM Functionality and Sub-ATM Functionality, as stated in Regulation (EU) No 716/2014.

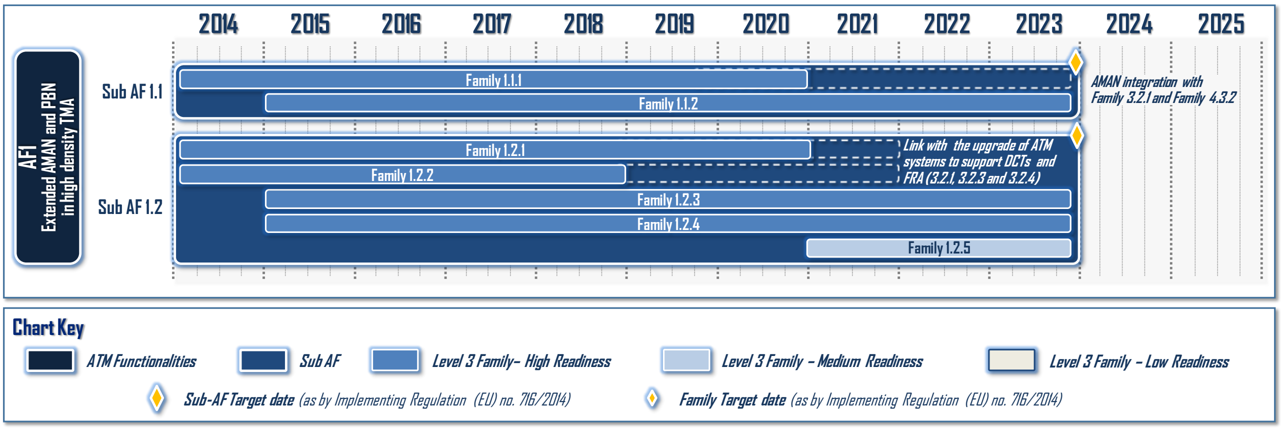


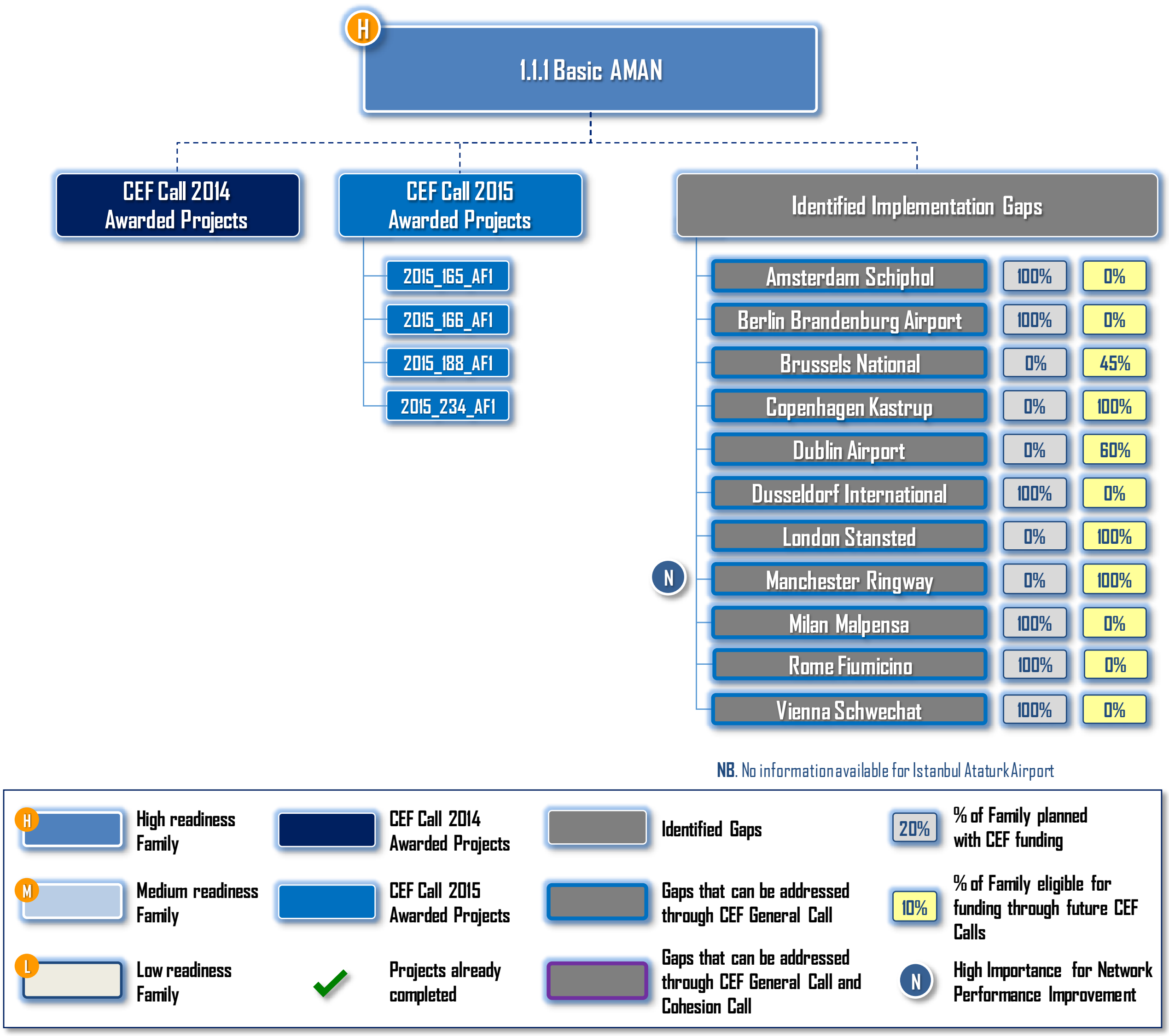
Fig. 16 – AF #1 Implementation Timeline

Family 1.1.1 – Basic AMAN

1.1.1 – Basic AMAN			
Main Sub-AF	S-AF 1.1 Arrival Management Extended to en-route Airspace		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2020
Description and Scope			
Implement Basic AMAN to support traffic synchronization in high density TMAs. Basic AMAN shall: - improve sequencing and metering of arrival aircraft in selected TMAs and airports; - continuously calculate arrival sequences and times for flights, taking into account the locally defined landing rate, the required spacing for flights arriving to the runway and other criteria; - provide automated decision support for sequencing and metering of traffic arriving to an airport; and - provide to ATCO as a minimum, simple Time To Lose / Time To Gain - TTL/TTG – information.			
Interdependencies			
Family 1.1.2: Basic AMAN (1.1.1) can serve as an intermediate step towards Extended AMAN (1.1.2). Family 2.1.2: Integration of AMAN information in the Electronic Flight Strip (EFS). Family 2.3.1: Integration of Time Based Separation (TBS) with AMAN.			
Synchronization Needs			
Ex-ante synchronization requirements, to be further assessed at the level of Local Implementation Projects. Integration with local ATM systems is necessary to process the flight plan and radar data, which requires defined interfaces to respective ATM system components (FDP, CWP, SDP)			
Civil / Military Coordination			
Coordination with military authorities (AU, ANSP, AD regulator) as required.			
Stakeholders considered as gaps	ANSPs		
Other stakeholders involved in the Family deployment	Airport Operators		

Links to ICAO GANP ASBUs	B0-RSEQ (Improved Traffic Flow through Sequencing (AMAN/DMAN)	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	TS-0102 Available
	ATM Master Plan Level 3 (Edition 2016)	ATC07.1
SESAR Solutions	N/A	
Very Large Scale Demonstrations	N/A	
Guidance Material / Specifications / Standards	Arrival Manager - Implementation Guidelines and Lessons Learned; Edition 0.1, 17/12/2010	
Means of compliance and / or Certification	None	
Regulations	None	
Cyber security requirements	None	
Recommendation for IPs proposal	Where deemed necessary for operational or organizational reasons, Basic AMAN may be implemented as an intermediate step towards Extended AMAN. It is recommended to take into consideration the results of Gap Analysis, as reported in the following WBS and within section 5.1	
Deployment Approach	The implementation of the Family would require the upgrade of the existing system and/or the installation of an AMAN planning tool supporting applicable sequencing procedures. Such installation would require a final acceptance of the tool and the integration with other existing systems **(MM1 – Installation and Integration)**.The applicable concept of operations shall also be broken down into documented and approved work procedures **(MM2 – Procedures available)**. The elaboration of such operational procedures could also require that the airspace structure and adjacent airports are taken into duly consideration. Before the start of the operational use of the AMAN planning tool, a safety assessment shall be performed successfully **(MM3 – Safety Assessment)** and all operational/technical staff involved shall be duly trained **(MM4 – Training)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM5 – Implementation completed)**.	

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



A dedicated table within Annex A encompasses the list of implementation initiatives associated to Family 1.1.1 awarded in the framework of 2015 CEF Call, along with a more detailed description of each Implementation Project. No Implementation Project associated to this Family has been awarded in 2014 CEF Call.

Family 1.1.2 – AMAN upgrade to include Extended Horizon function

1.1.2 – AMAN Upgrade to include Extended Horizon function			
Main Sub-AF	S-AF 1.1 Arrival Management Extended to en-route Airspace		
Readiness for implementation	High		
Initial Operational Capability	01/01/2015	**Full Operational Capability**	01/01/2024

Description and Scope

Implementation of arrival management extended to en-route airspaces at high density TMAs and its associated adjacent ATSUs.

Arrival Management extended to en-route Airspace extends the AMAN horizon from the 100-120 nautical miles to 180-200 nautical miles from the arrival airport. Traffic sequencing/metering may be conducted in the en-route before top-of-decent, thus allowing the flight crew to optimise the flight profile.

Extending the AMAN horizon may affect the airspace design, and it is therefore essential that all stakeholders, including military authorities are consulted.

Air Traffic Control (ATC) services in the TMAs implementing AMAN operations shall coordinate with Air Traffic Services (ATS) units responsible for adjacent en-route sectors. Input data to Extended AMAN need to be provided by the most accurate trajectory prediction information available (including EFD, CPR, etc.).

It should be noted that "AMAN upgrade to include Extended Horizon function" includes aspects such as:

- In order to facilitate a timely implementation of the arrival sequence, a sector receiving arrival messages must display information for the controller.
- An ATSU operating an "Extended AMAN" should be able to generate arrival messages to adjacent sectors providing advisories to be implemented on aircraft outside its own sectors.
- ATM systems must be upgraded in order to be able to generate, communicate, receive, acknowledge and display arrival management information (e.g. AMA, B2B).
- Bilateral agreements must be established between the sectors involved that very well can be in different ATC units and also in different countries.
- Network Manager will be part of the Extended AMAN data exchanges, as required, for the overall network impact assessment and relevant network optimisations.
- Extended AMAN processes addressing multiple airports needs to be coordinated. Overall network performance must be considered.
- Integration of departing traffic from airports within the extended planning horizon destined to arrive at the Extended AMAN airport.

If Basic AMAN (Family 1.1.1) is already implemented, it might be necessary to upgrade the functionality or consider replacement to meet the requirements and/or to prepare for the automatic coordination with adjacent ACCs as required for AMAN with extended horizon.

Interdependencies

Family 1.1.1: Basic AMAN is a facilitator.

Family 1.2.5: Advanced RNP routes below FL 310 facilitates stable and efficient sequencing through the whole arrival phase. Family 2.1.2: Integration of Extended AMAN information in the Electronic Flight Strips. Family 2.3.1: Integration of Time Based Separation (TBS) with Extended AMAN. Family 3.2.1: Upgrade of ATM systems (NM, ANSPs, AUs) to support Direct Routings (DCTs) and Free Routing Airspace (FRA). Family 4.3.2: Reconciled Target Times for ATFCM and arrival sequencing. AF 5: Where iSWIM functionality is available, data exchange concerning Extended AMAN shall be implemented using SWIM services. AF 6: Downlinked trajectory information, where available, shall be used by the Extended AMAN.	
Synchronization Needs	
When extending the AMAN horizon, synchronization must be made with all affected sectors and Network Manager. Synchronization is also needed to adjust/upgrade the ATM-systems of the adjacent ACC/UACs to process the arrival message provided by Extended AMAN (SW-change, test, integration, and implementation). Family 1.1.2 may be implemented either as a horizon extension of a pre-existing Basic AMAN (1.1.1) or through a fresh implementation from the scratch.	
Civil / Military Coordination	
Airspace design and procedural changes must be coordinated with military authorities when affected	

Stakeholders considered as gaps	ANSPs, Network Manager,	
Other stakeholders involved in the Family deployment	Airport Operators, Military Authorities	
Links to ICAO GANP ASBUs	B0-RSEQ Improved Traffic Flow through Sequencing (AMAN/DMAN) B1-RSEQ Improved Airport Operations through Departure, Surface and Arrival Management	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	TS-0305 Available TS-0305-A Available (SESAR Release 4)
	ATM Master Plan Level 3 (Edition 2016)	ATC15.1, ATC15.2
SESAR Solutions	#05 "Extended Arrival Management (AMAN) horizon"	
Very Large Scale Demonstrations	**Release 7**: PJ.25; PJ.31 **Release 8**: PJ.25; PJ.31 **Release 9**: PJ.25; PJ.31	

Guidance Material / Specifications / Standards	ICAO Guidance Manual on Airport Traffic Synchronisation (2018) ICAO Doc 9426 Air Traffic Services Planning Manual (2018) EUROCAE Standard covering the Extended horizon AMAN upstream coordination service (AMAN SWIM Service) (2017) AMAN Information Extension to En Route Sectors - Concept of Operations; Edition 1.0, 5/06/2009 Eurocontrol Concept of Operations for Network Manager Support to Advanced Arrival Management Edition 1.0; Edition date: 24/10/2014 ECTL AMAN implementation guidance documentation (2018) ECTL Specifications On-Line Data Interchange (OLDI) Ed. 4.2.
Means of compliance and / or Certification	None
Regulations	None
Cyber security requirements	None
Recommendation for IPs proposal	It is recommended that Extended AMAN is implemented directly, although Basic AMAN can be deployed as an intermediate step. Upstream ATS units are obliged to support the Extended AMAN functionality for the airports within the PCP geographical scope. It is recommended that these upstream ATS units participate in the relevant deployment projects to ensure an effective operation. It is recommended to take into consideration the results of Gap Analysis.
Deployment Approach	The implementation of the Family would require the upgrade of the existing system and/or installation of an Extended AMAN planning tool, supporting applicable sequencing procedures. Such installation would require a final acceptance of the tool and the integration with other existing systems. If applicable, data exchange with the Network Manager is envisaged and local coordination with the Military Authority should be performed, whether necessary **(MM1 – Installation and integration completed including information exchange)**. The applicable concept of operations shall also be broken down into documented and approved work procedures, also considering the proper coordination with Network Manager **(MM2 – Procedures Available)**. The elaboration of such operational procedures could also require that the airspace structure and adjacent airports are taken into duly consideration. Adjacent ATSUs within the Extended horizon shall implement appropriate functionality in their systems, deploy training and develop procedures to fully support extended arrival management in their sectors **(MM3 – Upstream ATSU Implementation completed).** Before the start of the operational use of the Extended AMAN planning tool, a safety assessment shall be performed successfully **(MM4 – Safety Assessment)** and all operational/technical staff involved shall be duly trained **(MM5 – Training)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM6 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.

Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 1.1.2 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 1.2.1 – RNP APCH with vertical guidance

1.2.1 – RNP APCH with vertical guidance			
Main Sub-AF	S-AF 1.2 Enhanced Terminal Airspace using RNP-Based Operations		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2021

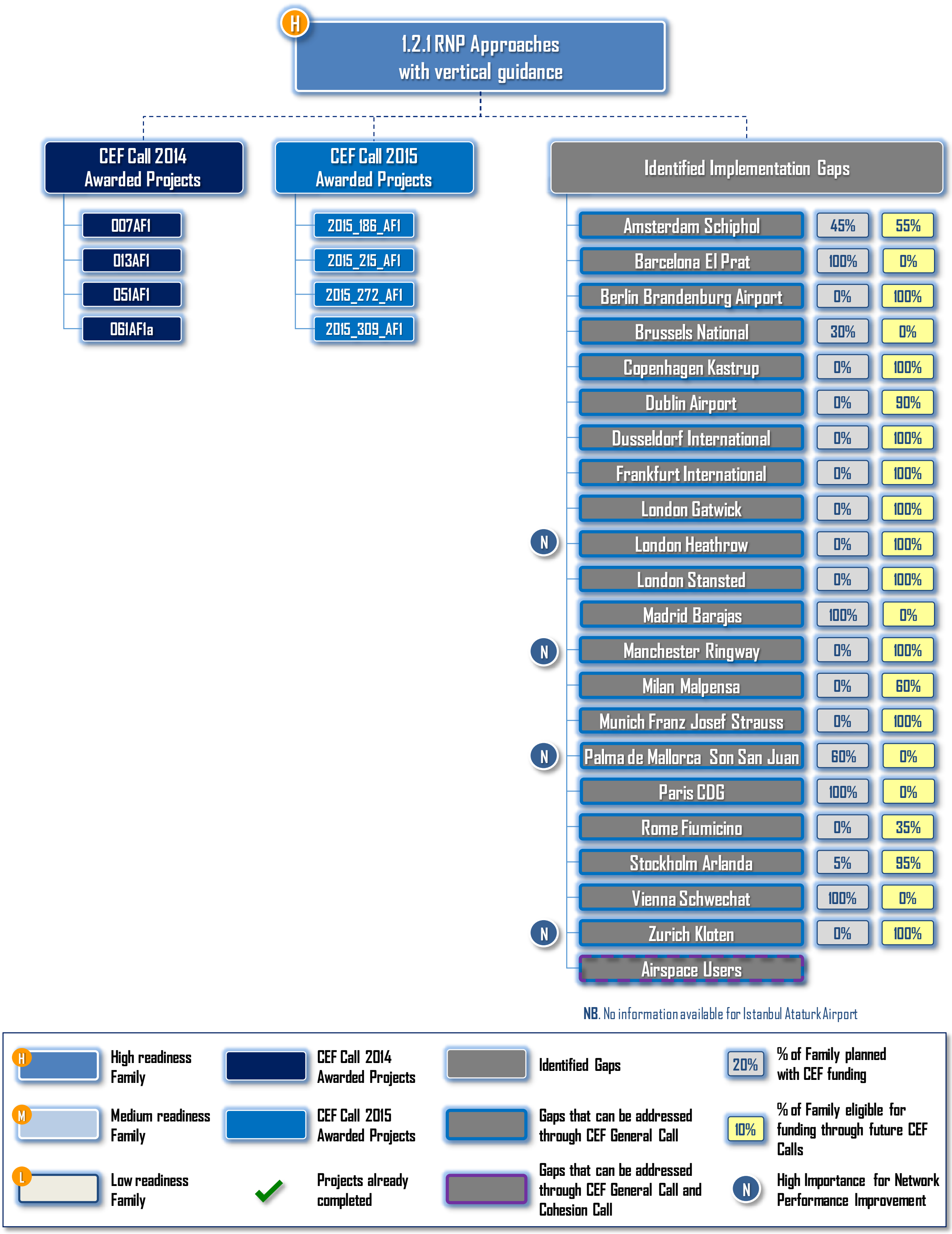
Description and Scope
Implementation of environmentally friendly procedures (noise and GHG emissions) for approach using PBN in high-density TMAs, as specified in RNP APCH (Lateral Navigation/Vertical Navigation (LNAV/VNAV) and Localizer Performance with Vertical guidance (LPV) minima). Implement approach procedures with vertical guidance APV/Baro and/or APV/SBAS. For RNP APCH, the Lateral and Longitudinal Total System Error (TSE) shall be +/− 0,3 nautical mile for at least 95 % of flight time for the Final Approach Segment and on-board performance monitoring, alerting capability and high integrity navigation databases are required. RNP APCH capability requires inputs from Global Navigation Satellite System (GNSS). Vertical Navigation in support of APV may be provided by GNSS Satellite Based Augmentation System (SBAS), by barometric altitude sensors or by alternative technical performance based equivalent means particularly for State aircraft where the appropriate certification processes are available. Flight Crew training may be required for operational approval. If mixed mode of operation (RNP APCH procedures together with conventional APCH procedures) is offered, harmonized and best-practise procedures for non-equipped RNP-APCH aircraft across the PCP applicability area should be considered in order to minimize controller workload, aircrew training burden and standardize airport controllers training.
Interdependencies
Family 1.2.2: Geographical database
Synchronization Needs
There is the need to coordinate/synchronise efforts (operational procedures, ground infrastructure and aircraft capabilities) between ANSPs and Airspace users to ensure the return of investment and/or the start of operational benefits. Coordination of deployment of PBN procedures is a local issue and must include all affected parties (ANSPs, airports, AUs and military authorities).
Civil / Military Coordination
Coordination with military authorities (AU, ANSP, AD regulator) as required.

Stakeholders considered as gaps	ANSPs, Airport Operators, Airspace Users, Military Authorities (AU)

Other stakeholders involved in the Family deployment	None	
Links to ICAO GANP ASBUs	B0-APTA Optimization of Approach Procedures including Vertical Guidance	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AOM-0602 Available AOM-0604 Available AOM-0605 SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	NAV10
SESAR Solutions	#09 "Enhanced terminal operations with automatic RNP transition to ILS/GLS" #51 "Enhanced terminal operations with LPV procedures"	
Very Large Scale Demonstrations	**Release 7**: N/A **Release 8**: N/A **Release 9**: N/A	
Guidance Material / Specifications / Standards	ICAO Doc 9613 Performance-based Navigation Manual edition 4 ICAO Doc 9992 - Manual on the use of PBN in Airspace Design NOP 2014-2018/2019 ICAO Doc 8168 (PANS-OPS Vol. 1 & 2)	
Means of compliance and / or Certification	EASA RMT.0519 - Provision of requirements for airworthiness approval in support of global PBN operations in CS-ACNS EASA RMT.0445 - Technical requirement aSBASnd operation procedures for Airspace design including procedure design EASA AMC 20-28 (EGNOS) EASA AMC 20-27 (APV Baro)	
Regulations	PBN Regulation – EASA Opinion No 10/2016	
Cyber security requirements	None	
Recommendation for IPs proposal	Where RNP APCH procedures with vertical guidance are deployed, existing non-precision approach procedures should be considered for withdrawal. RNP Approach shall be implemented to all standard landing runways at airports within the PCP geographical scope. It is recommended to take into consideration the results of Gap Analysis.	
Deployment Approach	The implementation of the Family would require the design of RNP APCH procedures for all landing runways at the airport, also be taken into consideration that the coordination with the Military Authority should be performed, if deemed necessary **(MM1 – RNP APCH Procedure Design)**.	

	Such procedures shall then be duly validated, a safety assessment shall be performed and the Aeronautical Information System published **(MM2 – RNP APCH Procedure Validation, safety assessment and AIS publication)**. Once the public consultation has been finalised in accordance to the local regulation **(MM3 – Public Consultation)**, all operational and technical staff involved shall be duly trained **(MM4 – Training)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM5 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 1.2.1 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 1.2.2 – Geographic Database for Procedure design

1.2.2 – Geographic Database for Procedure design			
Main Sub-AF	S-AF 1.2 Enhanced Terminal Airspace using RNP-Based Operations		
Readiness for implementation	High		
Initial Operational Capability	01/01/2014	**Full Operational Capability**	01/01/2019

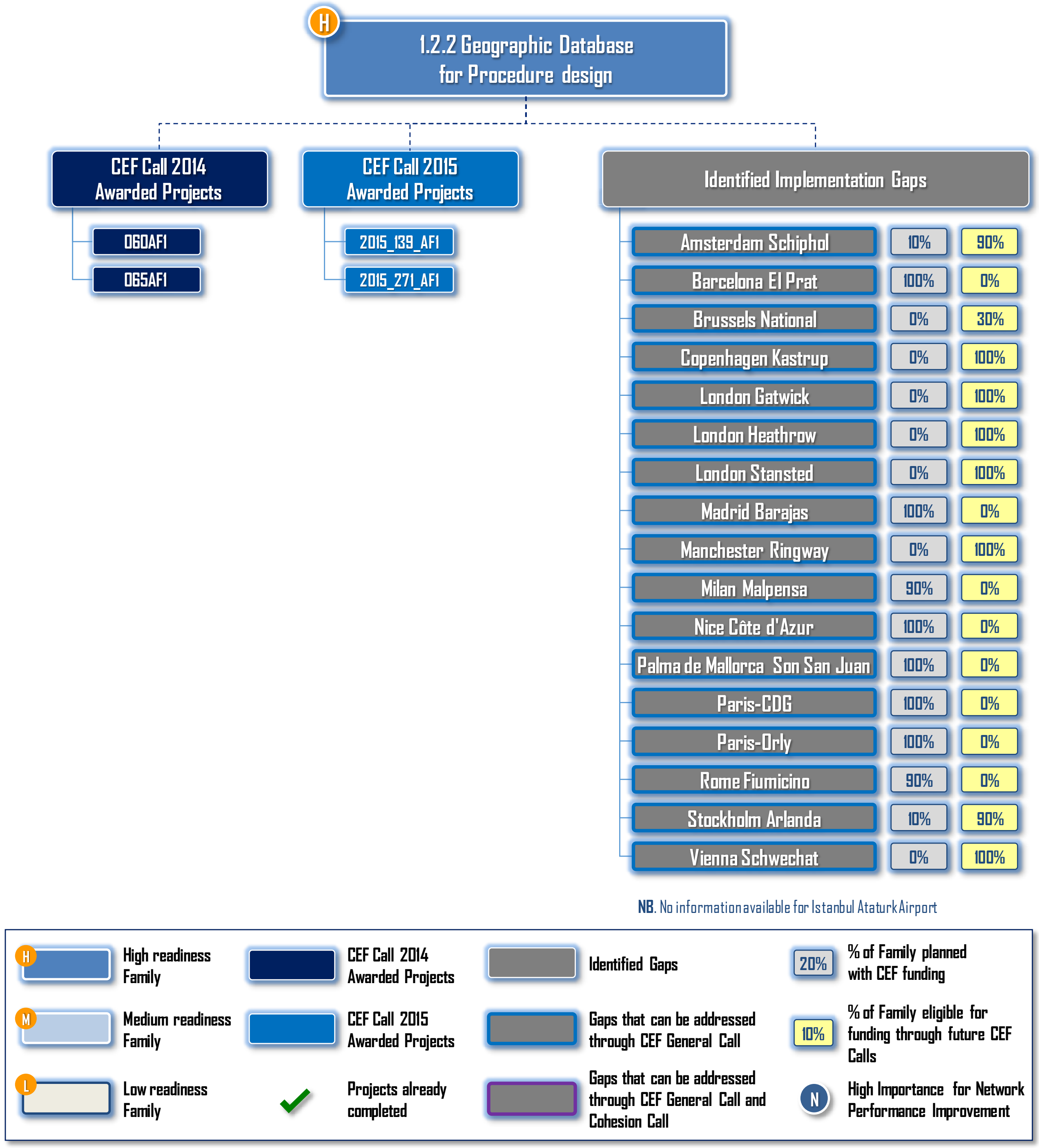
Description and Scope
Procurement/provision of geographic database to support procedure design including obstacle data as part of AIM. The availability of an up-to-date and quality assured geographic database (including the obstacle items) of each TMA is a prerequisite to design new procedures such as RNP approaches. Geographical databases could be used by AUs to validate procedures with regards to performance for different aircraft types. PBN is in most cases based upon procedures including geographical positions expressed in latitude and longitude and not on radio beacons placed on ground, thus a geographical point will have a direct impact on safety and quality of navigation. A geographical point expressed in latitude and longitude can consist of up to 19 characters and the highest risk of introducing errors is when humans are handling this kind of information manually. Procedures and functions must be in place to ensure that the full chain from the originator of the information (land surveyor) to the database in the procedure design tools, the AIM databases and the on-board navigation databases is such that no errors are introduced. Implementation of support procedures and functions to detect errors is one component in order to maintain the origin of the data and the quality attributes, but also secure means for communicating the geographical data is fundamental. Handling of latitude/longitude and other navigation data manually is not an option as the risk of introduction of errors is too high.
Interdependencies
Exchange of geographical data is included in AIM that is supposed to be a service within SWIM (AF5).
Synchronization Needs
Prerequisite for 1.2.1, 1.2.3 and 1.2.4.
Civil / Military Coordination
Coordination with military as required.

Stakeholders considered as gaps	ANSPs, Airport Operators

Other stakeholders involved in the Family deployment	Military Authorities	
Links to ICAO GANP ASBUs	B0-APTA Optimization of Approach Procedures including Vertical Guidance	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AOM-0602 Available AOM-0604 Available
	ATM Master Plan Level 3 (Edition 2016)	NAV10
SESAR Solutions	N/A	
Very Large Scale Demonstrations	N/A	
Guidance Material / Specifications / Standards	ICAO Doc 9613 Performance-based Navigation Manual ed. 4 ICAO Doc 9906 Quality assurance manual for flight procedure design ICAO Doc 9888 Noise Abatement Procedures ICAO Doc 9997 PBN Operational Approval Manual ICAO Doc 9992 Manual on the use of PBN in Airspace Design EUROCAE ED-76 / DO-200B ICAO Doc 8168 (PANS-OPS Vol. 1 & 2)	
Means of compliance and / or Certification	EASA Terrain Avoidance and Warning System (ETSO-C151B) EASA AMC/GM 2014/012R EASA RMT. 0477 - Technical requirements and operational procedures for aeronautical information services and aeronautical information management (2017)	
Regulations	EASA Opinion 02/2015, Technical requirements and operating procedures for the provision of data to airspace users for the purpose of air navigation Commission Regulation (EU). 73/2010 (ADQ IR) as amended by Commission Implementing Regulation (EU) 1029/2014 Commission Regulation (EU) No 139/2014 laying down requirements and administrative procedures related to aerodromes pursuant to Regulation (EC) No 216/2008	
Cyber security requirements	None	
Recommendation for IPs proposal	It is recommended to take into consideration the results of Gap Analysis.	
Deployment Approach	The implementation of the Family would require the upgrade of the existing system and/or installation of the Database tool, which would also need the data exchange functions to be	

	available. Such installation would require a final acceptance of the tool itself and the integration with other existing systems **(MM1 – Database tool created including data exchange functions)**, also taking into consideration that duly coordination with the Military Authority should be performed, as required. The Geographic Database shall be populated with the available geographical data, duly considering all the parameters to assure the quality of the data to be transferred **(MM2 – Database populated with quality assured data)**. Before the start of the operational use of the database, a safety assessment report shall be elaborated, delivered and approved **(MM3 – Safety Assessment)**, work procedures established and all the relevant staff shall be duly trained **(MM4 – Operational procedures established including training of staff)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM5 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 1.2.2 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 1.2.3 – RNP1 Operations in high density TMAs (ground capabilities)

1.2.3 – RNP 1 Operations in high density TMAs (ground capabilities)			
Main Sub-AF	S-AF 1.2 Enhanced Terminal Airspace using RNP-Based Operations		
Readiness for implementation	High		
Initial Operational Capability	01/01/2015	**Full Operational Capability**	01/01/2024

Description and Scope

Implementation of flexible and environmentally friendly procedures (noise and GHG emissions) for departure, arrival and initial approach using PBN/RNP in high density TMAs, as specified in RNP 1 specification with the use of the Radius to Fix (RF) path terminator for SIDs, STARs and transitions where benefits are evident for noise exposure, emissions and/or flight efficiency.

Required Navigation Performance (RNP) is a type of Performance Based Navigation (PBN) that allows an aircraft to fly a specific path between two 3D-defined points in space.

Enhance arrival/departure procedures in high-density TMAs to include RNP 1 defined SIDs, STARs providing higher efficiency and transitions with the use of the Radius to Fix (RF) attachment where there are opportunities to enhance flight efficiency, reduce noise exposure and/or emissions.

RNP 1 operations require the Lateral and Longitudinal Total System Error (TSE) to, be within +/− 1 nautical mile for at least 95 % of flight time and on-board performance monitoring, alerting capability and high integrity navigation databases. RNP 1 capability requires inputs from Global Navigation Satellite System (GNSS).

A redesign of TMA airspace may be required to take full advantage of the new flexible RNP based procedures independent of ground navigation aids.

Similarly, ATM systems upgrades should be considered for controller support tools such as MTCD, CDT, CORA etc, and safety nets like STCA, APW etc.

Where continuity of conventional navigation means is required alongside RNP1, issues related to mixed mode of operation (could include military/state aircraft, non-equipped aircraft) must be taken into account.

Interdependencies

Capability of ground systems and services should be synchronised with capability of aircraft and airspace users including military. PBN operations require availability of quality assured and accurate geographical data. See AF1 Family 1.2.2.

The implementation of PBN/RNP in High-Density TMAs should be coordinated as needed with implementation of PBN/RNP in adjacent airspace covered by Extended AMAN supporting stable and efficient sequencing. See Families 1.1.2 and 1.2.5.

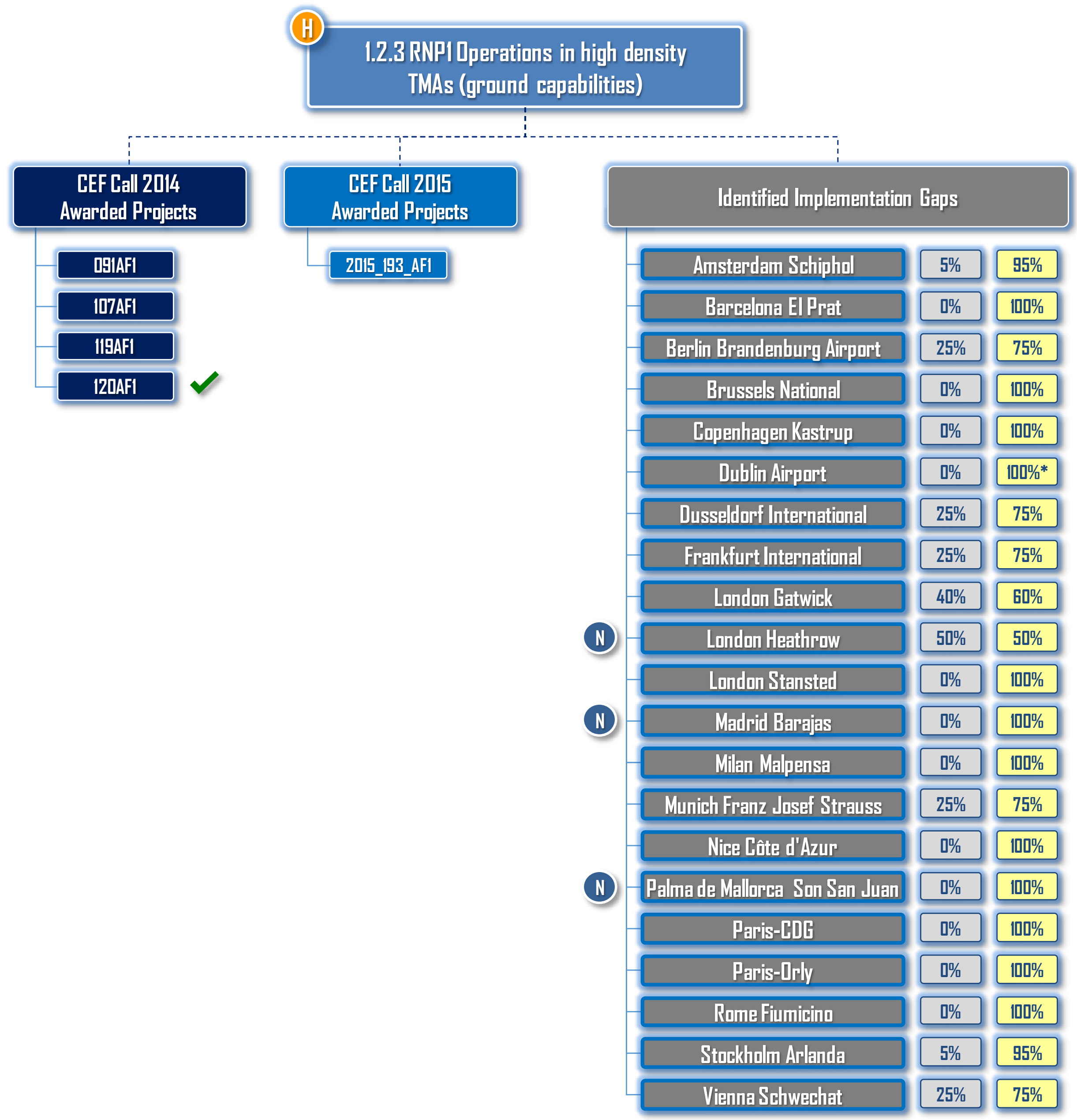
Synchronization Needs

The deployment of PBN in high density TMAs shall be synchronized due to the potential network performance impact of delayed implementation in the airports within the geographical scope of PCP. Synchronization of deployment is a local issue and must

include all affected parties (ANSPs, airports, AUs and military). From a technical perspective, the adjustment/upgrade of ATM systems and procedural changes shall be synchronized with civil and military aircraft capabilities in order to ensure that the performance objectives are met. The synchronization of investments shall involve multiple airport operators ANSP and airspace users. 1.2.3, 1.2.4 and 1.2.5 should be coordinated and synchronised.		
Civil / Military Coordination		
Coordination with military authorities as required.		
Stakeholders considered as gaps	ANSPs, Airport Operators	
Other stakeholders involved in the Family deployment	Military Authorities	
Links to ICAO GANP ASBUs	B0-FRTO Improved Operations through Enhanced En-route Trajectories B1-FRTO Improved Operations through Optimized ATS Routing B1-RSEQ Improved Airport Operations through Departure, Surface and Arrival Management	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AOM-0603 SESAR Release 2 AOM-0605 SESAR Release 5 AOM-0602 Available AOM-0601 Available
	ATM Master Plan Level 3 (Edition 2016)	NAV03
SESAR Solutions	#62 "P-RNAV in a complex TMA" #09 "Enhanced terminal operations with automatic RNP transition to ILS/GLS" #51 "Enhanced terminal operations with LPV procedures"	
Very Large Scale Demonstrations	**Release 7:** N/A **Release 8:** N/A **Release 9:** N/A	
Guidance Material / Specifications / Standards	ICAO Doc 9613 - Performance-based Navigation Manual ed. 4 ICAO Doc 9992 Manual on the use of PBN in Airspace Design ICAO Doc 8168 (PANS-OPS Vol. 1 & 2)	

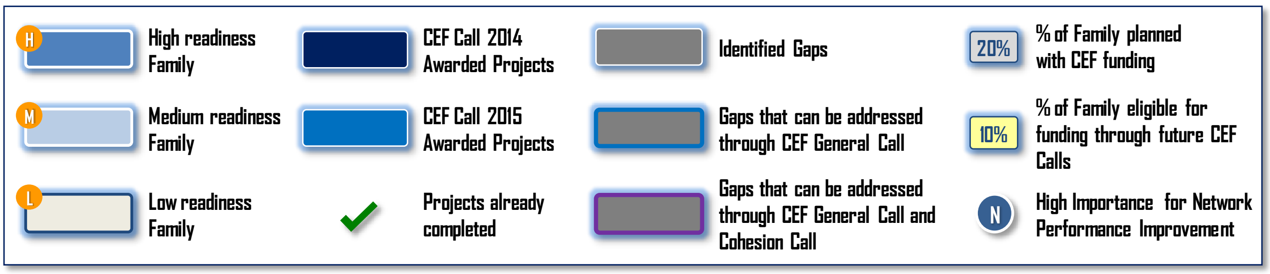
	ECTL European Airspace Concept Handbook for PBN Implementation; Edition 3.0 EUROCAE ED-76A / DO-200B ICAO Guidance Manual on Airport Traffic Synchronisation (2018) ICAO Doc 9426 Air Traffic Services Planning Manual ICAO Doc 9689 Manual on Airspace Planning Methodology for the Determination of Separation Minima ICAO Doc 4444 PANS ATM, PBN Separation Standards (2018)
Means of compliance and / or Certification	EASA RMT.0445 - Technical requirement and operation procedures for Airspace design including procedure design
Regulations	PBN Regulation – EASA Opinion No 10/2016
Cyber security requirements	None
Recommendation for IPs proposal	It is recommended that implementation projects involve all major stakeholders concerning design, validation and public consultation of RNP1 procedures to achieve the full benefits. It is recommended to take into consideration the results of Gap Analysis.
Deployment Approach	The implementation of the Family would require the upgrade of the existing ATM systems and/or their installation. Such systems – Safety Nets being MTCD, STCA, CDT, CORA, etc – would also require the provision of their final acceptance and the integration with other existing systems considering that some of these components are included in Family 3.2.1 **(MM1 – ATM systems upgrade)**. Moreover, RNP1 routes to and from all landing and departure runways shall be designed, duly validated and their safety appropriately assessed **(MM2 – RNP Procedure Design and validation and safety assessment)**. While performing such activities, it should be taken into consideration that the the proper coordination with the Military Authority shall be performed, as required. RNP1 Procedures shall then be published for all runways **(MM3 – RNP AIS Implementation (publication))**, and, once the public consultation has been finalised in accordance to the local regulation **(MM4 – Public consultation)**, all operational and technical staff shall be appropriately trained **(MM5 – Training)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM6 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



(*) The gap is considered closed for the Airport Operator.

NB. No information available for Istanbul Ataturk Airport



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 1.2.3 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 1.2.4 – RNP1 operations in high density TMAs (aircraft capabilities)

1.2.4 – RNP 1 Operations in high density TMAs (aircraft capabilities)			
Main Sub-AF	S-AF 1.2 Enhanced Terminal Airspace using RNP-Based Operations		
Readiness for implementation	High		
Initial Operational Capability	01/01/2015	**Full Operational Capability**	01/01/2024

Description and Scope

Implementation of flexible and environmentally friendly procedures (noise and GHG emissions) for departure, arrival and initial approach using PBN/RNP in high density TMAs, as specified in RNP 1 specification with the use of the Radius to Fix (RF) path terminator for SIDs, STARs and transitions where benefits are evident for noise exposure, emissions and/or flight efficiency.

Required Navigation Performance (RNP) is a type of Performance Based Navigation (PBN) that allows an aircraft to fly a specific path between two 3D-defined points in space.

Enhance arrival/departure procedures in high-density TMAs to include RNP defined SIDs, STARs providing higher efficiency and transitions, and where benefits are evident with regards to noise exposure, flight efficiency and/or capacity, with the use of the Radius to Fix (RF) attachment.

RNP 1 operations require the lateral and longitudinal Total System Error (TSE) to, be within +/− 1 nautical mile for at least 95 % of flight time and on-board performance monitoring, alerting capability and high integrity navigation databases. RNP 1 capability requires inputs from Global Navigation Satellite System (GNSS).

Most new transport aircraft delivered today are PBN/RNP capable, but operational approval requires flight crew training and qualification/approval. To gain expected benefits from PBN/RNP procedures, a certain level of equipage/compliance rate is required amongst the majority of aircraft operating in a TMA and at an airport, subject to local considerations.

Retrofitting of transport-type military/state aircraft (including surveillance aircraft) and other RNP 1 non-compliant aircraft might be required or incentivised, subject to positive CBA and their contribution to performance targets. Alternative military technical performance based equivalent means should also be considered where the appropriate certification processes are available.

Interdependencies

Capability of ground systems and services should be synchronised with capability of the satellite based navigation function as required for aircraft and airspace users including military. PBN operations require availability of quality assured and accurate geographical data. See AF1, 1.2.2.

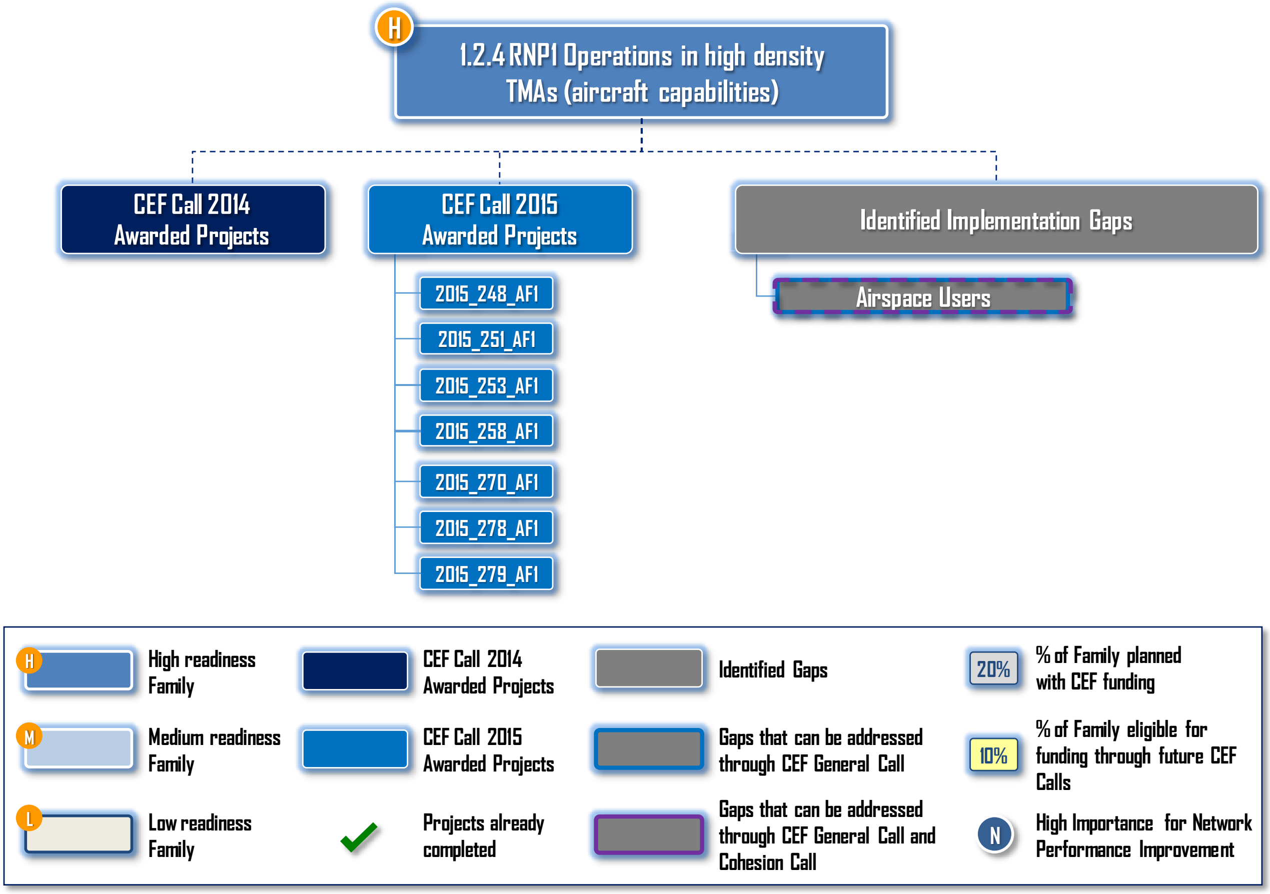
Synchronization Needs

The deployment of PBN in high density TMAs shall be coordinated due to the potential network performance impact of delayed implementation in the airports referred to in the geographical scope of PCP. Coordination of deployment of PBN procedures is a local

issue and must include all affected parties (ANSPs, airports, AUs and military). From a technical perspective, the adjustment/upgrade of ATM systems and procedural changes shall be synchronized with aircraft capabilities in order to ensure that the performance objectives are timely met. The synchronization of investments shall involve multiple airport operators ANSP and airspace users.		
Civil / Military Coordination		
N/A		
Stakeholders considered as gaps	Airspace Users, Military Authorities (AUs role)	
Other stakeholders involved in the Family deployment	None	
Links to ICAO GANP ASBUs	B0-FRTO Improved Operations through Enhanced En-route Trajectories B1-FRTO Improved Operations through Optimized ATS Routing B1-RSEQ Improved Airport Operations through Departure, Surface and Arrival Management	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AOM-0603 SESAR Release 2 AOM-0605 SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	NAV03
SESAR Solutions	#62 "P-RNAV in a complex TMA" #09 "Enhanced terminal operations with automatic RNP transition to ILS/GLS" #51 "Enhanced terminal operations with LPV procedures"	
Very Large Scale Demonstrations	**Release 7:** N/A **Release 8:** N/A **Release 9:** N/A	
Guidance Material / Specifications / Standards	ICAO 9613 Performance-based Navigation Manual edition 4 EUROCAE ED-76A / DO-200B	
Means of compliance and / or Certification	EASA RMT.0519 - Provision of requirements for airworthiness approval in support of global PBN operations in CS-ACNS	
Regulations	PBN Regulation – EASA Opinion No 10/2016	

Cyber security requirements	None
Recommendation for IPs proposal	It is recommended to take into consideration the results of Gap Analysis.
Deployment Approach	The implementation of the Family would require the commercial availability of a certified technical solution **(MM1 – Availability of technical solutions for aircraft types in operation)**. Procurement of suitable equipment for the aircraft shall be completed **(MM2 – Equipment procurement)**. Aircraft shall be equipped and flight crew shall be duly trained **(MM3 – Aircraft equipped and training of pilots)**. The execution of such activities is expected to lead the start of permanent operational use **(MM4 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



A dedicated table within Annex A encompasses the list of implementation initiatives associated to Family 1.2.4 awarded in the framework of 2015 CEF Call, along with a more detailed description of each Implementation Project. No Implementation Project associated to this Family has been awarded in 2014 CEF Call.

Family 1.2.5 – Advanced RNP routes below FL 310

1.2.5 – Advanced RNP routes below Flight Level 310			
Main Sub-AF	S-AF 1.2 Enhanced TMA using RNP-Based Operations		
Readiness for implementation	Medium		
Initial Operational Capability	01/01/2021	**Full Operational Capability**	01/01/2024

Description and Scope
Connectivity between Free Route Airspace and TMAs through the implementation of Advanced RNP routes below FL 310. In case Free route is not implemented below flight level 310, the implementation of PBN routes covered by Advanced RNP specification should be considered to link the TMAs with the lower limit of the FRA in those areas where it can provide increased performance benefits (safety, capacity, environmental impact, cost effectiveness, etc). The intention is to provide consistent navigation from en-route to landing. The most appropriate PBN type and navigation application/accuracy should be chosen depending on the actual local situation. Aircraft and crew need to be Advanced RNP en-route capable and approved. Aircraft capabilities may require upgrades either as retro-fit or forward fit. Retrofitting of non RNP capable aircraft might be required or incentivised, subject to positive CBA. For military/state aircraft, compliance with RNP may also be based on alternative technical performance based equivalent means. In a PBN environment, procedures shall be in place to handle non equipped aircraft where the appropriate certification processes are available. PBN routes structure below FL 310 should be properly coordinated with NM according to the standard process for CACD database validation. Note: Advanced RNP is a recent addition to PBN and may undergo further evolution; this family will be updated accordingly once the PBN Manual Edition 5 has been published.
Interdependencies
Family 1.1.2: AMAN upgrade to include Extended Horizon function Family 1.2.3: RNP 1 Operations in high density TMAs (ground capabilities) Family 1.2.4: RNP 1 Operations in high density TMAs (aircraft capabilities) Family 3.2.1: Upgrade of ATM systems (NM, ANSPs, AUs) to support Direct Routings (DCTs) and Free Routing Airspace (FRA) Family 3.2.4: Free Route Airspace
Synchronization Needs
Implementation must be coordinated/synchronised between ground (PBN routes, operational procedures and upgrade of ATM systems as necessary), NM and aircraft capabilities to ensure optimum return of investment and realisation of operational benefits.
Civil / Military Coordination
Coordination with military authorities (AU, ANSP, AD regulator) as required.

Stakeholders considered as gaps	ANSPs, Network Manager, Military Authorities	
Other stakeholders involved in the Family deployment	None	
Links to ICAO GANP ASBUs	B0-FRTO Improved Operations through Enhanced En-route Trajectories B1-FRTO Improved Operations through Optimized ATS Routing	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AOM-0603 SESAR Release 2 AOM-0404 SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	NAV03 – Pending developments of the PBN Implementing Regulation
SESAR Solutions	#62 "P-RNAV in a complex TMA" #10 Optimised Route Network using Advanced RNP	
Very Large Scale Demonstrations	**Release 7:** N/A **Release 8:** N/A **Release 9:** N/A	
Guidance Material / Specifications / Standards	Network Strategy Plan (NSP): SO 3/2 and SO 3/3 ICAO Doc 9613 Performance-based Navigation Manual edition 4 ICAO PANS ATM for RNAV/RNP, BRNAV ICAO Doc 9992 Manual on the use of PBN in Airspace Design ICAO Doc 8168 (PANS-OPS Vol. 1 & 2) EUROCAE ED-76A / DO-200B ICAO Doc 9426 Air Traffic Services Planning Manual ICAO Doc 9689 Manual on Airspace Planning methodology for the Determination of Separation Minima ICAO Doc 4444 PANS ATM, PBN Separation Standards (2018)	
Means of compliance and / or Certification	EASA RMT.0445 - Technical requirement and operation procedures for Airspace design including procedure design EASA RMT.0519 - Provision of requirements for airworthiness approval in support of global PBN operations in CS-ACNS	
Regulations	PBN Regulation – EASA Opinion No 10/2016	
Cyber security requirements	None	

Recommendation for IPs proposal	It is recommended to take into consideration the results of Gap Analysis.
Deployment Approach	The implementation of the Family would require the upgrade of the existing ATM systems and/or their installation. Such systems – Safety Nets being MTCD, STCA, CDT, CORA, APW, MSAW and FDP and CWP, etc – would also require the provision of their final acceptance and the integration with other existing systems, also considering that some of these components are included in Family 3.2.1 **(MM1 – ATM systems upgrade)**. Advanced RNP routes below Flight Level 310 shall be designed, duly validated and their safety appropriately assessed, also coordinating such activities with the Military Authority, as required **(MM2 – RNP Procedure Design and validation and safety assessment)**. In this respect, in order to accommodate a vertical profile, consideration should be given to the performance of representative aircraft and the effects produced by winds. Advanced RNP AIS procedures, including routes to and from all TMA entry/exit points, shall be published **(MM3 – RNP AIS Implementation (publication))** and all operational and technical staff shall be appropriately trained **(MM4 – Training)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM5 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.

M

1.2.5 Implement Advanced RNP routes below Flight Level 310

CEF Call 2014 Awarded Projects

CEF Call 2015 Awarded Projects

Identified Implementation Gaps

	Amsterdam Schiphol	20%	80%
	Barcelona El Prat	0%	100%
	Berlin Brandenburg Airport	20%	80%
	Brussels National	0%	100%
	Copenhagen Kastrup	0%	100%
	Dusseldorf International	20%	80%
	Frankfurt International	20%	80%
	London Gatwick	-	-
N	London Heathrow	-	-
	London Stansted	-	-
N	Madrid Barajas	0%	100%
N	Manchester Ringway	-	-
	Milan Malpensa	0%	100%
	Munich Franz Josef Strauss	20%	80%
	Nice Côte d'Azur	0%	100%
	Oslo Gardermoen	0%	100%
N	Palma de Mallorca Son San Juan	0%	100%
	Paris-CDG	0%	100%
	Paris-Orly	0%	100%
	Rome Fiumicino	0%	100%
	Stockholm Arlanda	0%	100%
	Vienna Schwechat	0%	100%
N	Zurich Kloten	0%	100%
	Network Manager	0%	65%

NB. No information available for Istanbul Ataturk Airport

H High readiness Family	CEF Call 2014 Awarded Projects	Identified Gaps	20% % of Family planned with CEF funding
M Medium readiness Family	CEF Call 2015 Awarded Projects	Gaps that can be addressed through CEF General Call	10% % of Family eligible for funding through future CEF Calls
L Low readiness Family	✓ Projects already completed	Gaps that can be addressed through CEF General Call and Cohesion Call	N High Importance for Network Performance Improvement

AF #2 – Airport Integration and Throughput

Airports are the nodes of the air-traffic network in Europe. It is therefore of great importance to achieve a seamless integration of airports in the pan-European network management and to ensure that airports do not become bottlenecks, limiting the capacity of the European ATM-system.

The Pilot Common Project, set forth in Regulation (EU) No 716/2014, identifies 25 airports that are critical to the network, either because they play a significant role for the air-transport in their region or because they are located in a high-density Terminal Manoeuvring Area (TMA).

The ATM Functionality #2 was created to ensure that these airports and TMAs will be able to manage the growing traffic demand of the future in a safe and efficient manner, whilst taking on-board environmental aspects and guaranteeing a maximum degree of interoperability for airspace users.

Together with aspects from other AFs (mainly AF1– Extended AMAN and PBN in high density TMA, AF4 – Network Collaborative Management, and AF5 – Initial SWIM), the objectives of AF2 shall be achieved through the following Sub-AFs and related Families:

<u>Sub-AF 2.1 Departure Management synchronised with Pre-Departure Sequencing</u>

- Family 2.1.1 – Initial DMAN
- Family 2.1.2 – Electronic Flight Strips (EFS)
- Family 2.1.3 – Basic A-CDM
- Family 2.1.4 – Initial Airport Operations Plan (AOP)

<u>Sub-AF 2.2 Departure Management integrating Surface Management Constraints</u>

- Family 2.2.1 – A-SMGCS Level 1 and 2

<u>Sub-AF 2.3 Time Based Separation for Final Approach</u>

- Family 2.3.1 – Time Based Separation (TBS)

<u>Sub-AF 2.4 Automated Assistance to Controller for Surface Movement Planning and Routing</u>

- Family 2.4.1 – A-SMGCS Routing and Planning Functions

<u>Sub-AF 2.5 Airport Safety Nets</u>

- Family 2.5.1 – Airport Safety Nets associated with A-SMGCS (Level 2)
- Family 2.5.2 – Vehicle and aircraft systems contributing to Airport Safety Nets

The following chart highlights the overall structure of the ATM Functionality #2, namely its SUB AFs, Families and their relevant Implementation initiatives related to both 2014 CEF Call awarded projects and 2015 CEF Call candidate projects.

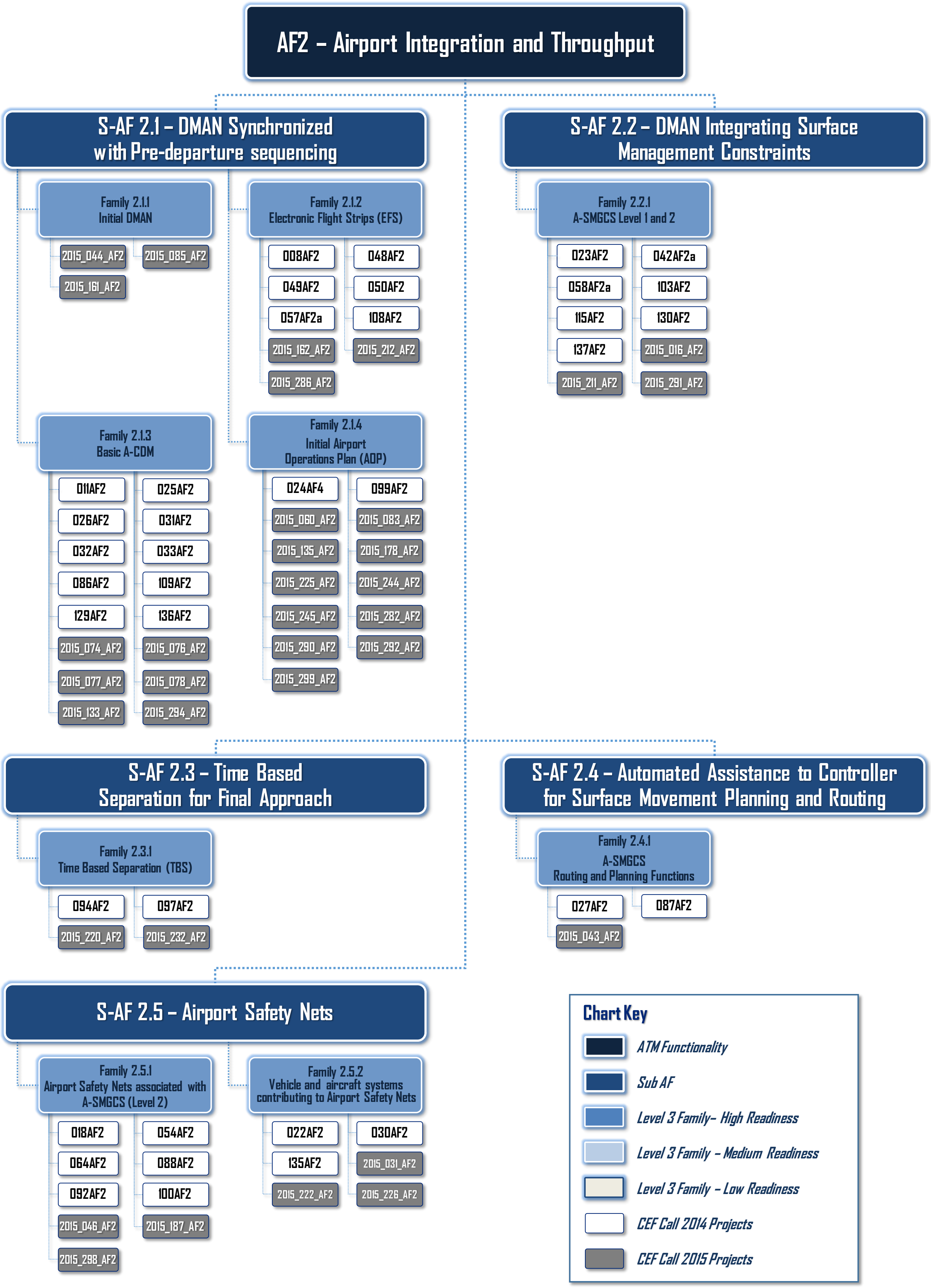


Fig. 17 – AF #2 Structure

The following Gantt chart shows the implementation roadmap for each Family included in AF2 in terms of start and end date of deployment, and it has been defined taking into account the target dates for each ATM Functionality and Sub-ATM Functionality, as stated in Regulation (EU) No 716/2014.

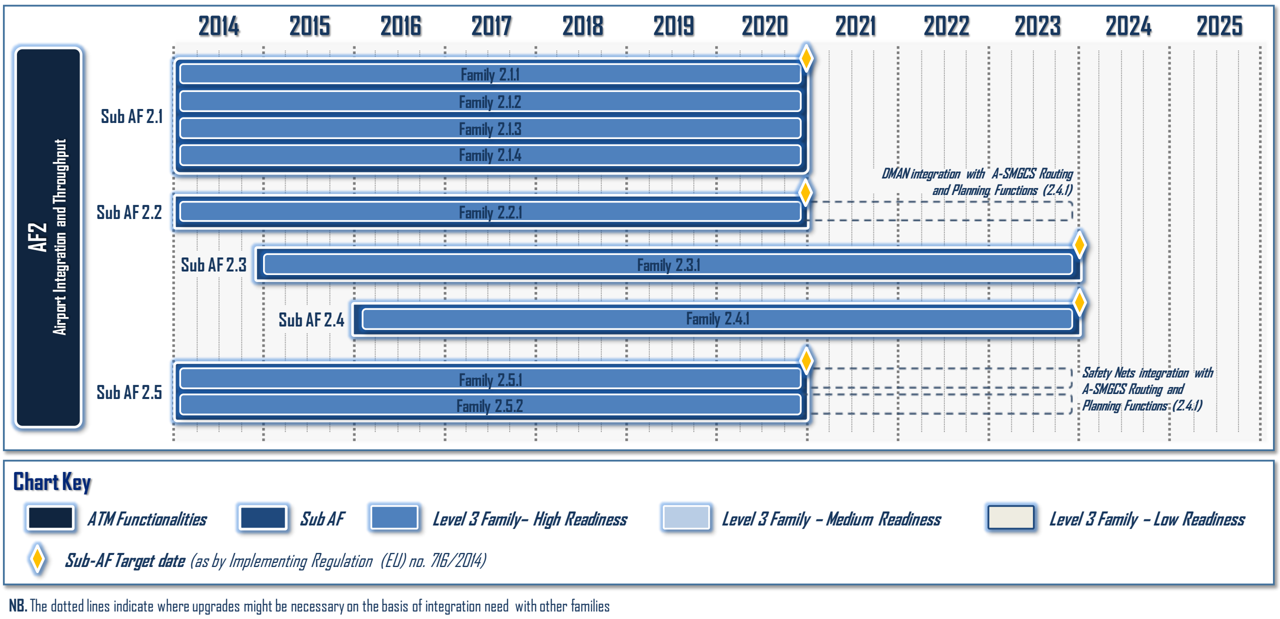


Fig. 18 – AF #2 Implementation Timeline

Family 2.1.1 – Initial DMAN

2.1.1 – Initial DMAN			
Main Sub-AF	S-AF 2.1 Departure Management Synchronised with Pre-departure sequencing		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2021

Description and Scope

The aim of this Family is to implement Basic Departure Management (DMAN) functionalities to:

- ensure an efficient usage of the runway take off capacity by providing an optimum and context dependent queue at the holding points;
- improve the departure flows at airports;
- increase the predictability;
- calculate Target Take Off Times (TTOT) and the Target Start-up Approval Times (TSAT) taking into account multiple constraints and preferences out of the A-CDM processes;
- provide a planned departure sequence;
- reduce queuing at holding point and distribute the information to various stakeholders at the airport.

Operational stakeholders involved in A-CDM shall jointly establish pre-departure sequences, taking into account agreed principles to be applied for specific reasons, such as: runway holding time, slot adherence, departure routes, airspace user preferences, night curfew, evacuation of stand/gate for arriving aircraft, adverse conditions including de-icing, actual taxi/runway capacity, current constraints, inbound flights information, ...

The departure sequence at the runway shall be optimised according to the real traffic situation reflecting any relevant change off-gate or during taxi to the runway. DMAN systems shall take account of variable and updated taxi times (ref Family 2.4.1) to calculate the TTOT and TSAT.

Interdependencies

Family 2.1.2 EFS

Family 2.1.3 A-CDM

Family 2.1.4 iAOP

Family 2.2.1 A-SMGCS level 1-2

Family 2.4.1 A-SMGCS Routing and Planning Functions

Synchronization Needs

ANSPs, Airport Operators, Ground Handling Companies and Airspace Users.

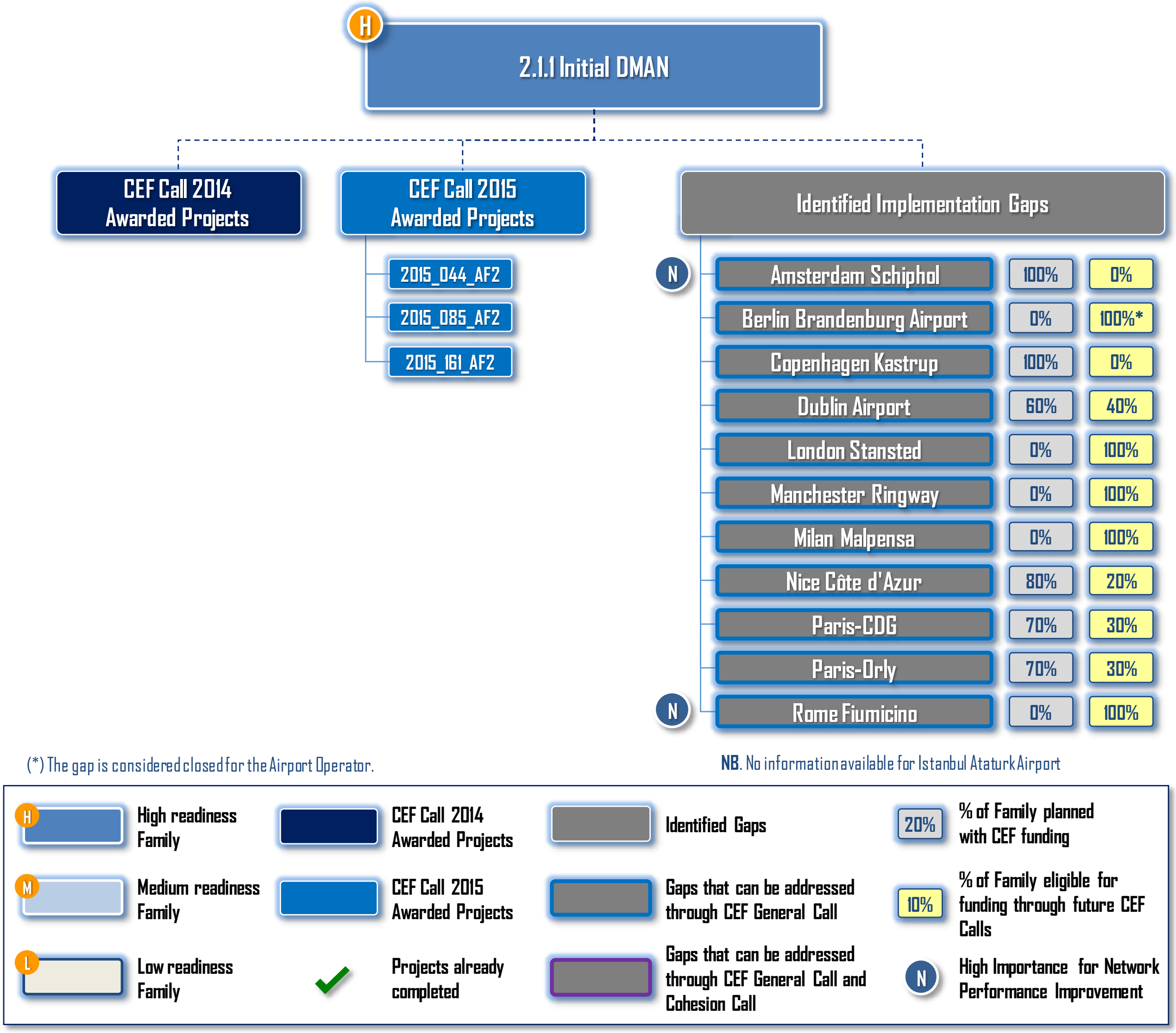
Civil / Military Coordination

Applicable to those airports open to civil and military operations

Stakeholders considered as gaps	ANSPs, Airport Operators	
Other stakeholders involved in the Family deployment	Airspace Users, Military Authorities, Ground Handling Companies	
Links to ICAO GANP ASBUs	B0-RSEQ (Improved Traffic Flow through Sequencing (AMAN/DMAN) B1-RSEQ Improved Airport Operations through Departure, Surface and Arrival Management	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AOM-0602 Available
	ATM Master Plan Level 3 (Edition 2016)	AOP05
SESAR Solutions	N/A	
Very Large Scale Demonstrations	N/A	
Guidance Material / Specifications / Standards	ED-141 Minimum Technical Specification for the Airport Collaborative Decision Making (Airport-CDM) ED-145 Airport-CDM Interface Specification ICAO Guidance Manual on Airport Traffic Synchronisation (2018) ICAO Doc 9426 Air Traffic Services Planning Manual (2018) ICAO Doc 9830 Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual (2018) Updated ECTL Airport CDM Manual (2017) ECTL Airport CDM Implementation Manual Version 4	
Means of compliance and / or Certification	ETSI EN 303 212 (CS on A-CDM) ETSI Communication 2010/C168/04 A-CDM Community Specification Update on EN 303 212 v.1.1.1 (2019)	
Regulations	None	
Cyber security requirements	None	
Recommendation for IPs proposal	It is recommended to take into consideration the three following elements of S-AF2.1: Family 2.1.1, Family 2.1.3 and Family 2.1.4 which are necessary to achieve the "Departure Management Synchronised with Pre-departure sequencing". It is further recommended to take into consideration the results of Gap Analysis.	

Deployment Approach	The implementation of the Family would require the DMAN system to implement Target Take Off Time (TTOT) & Target Startup Approval Time (TSAT) **(MM1 – System implemented for TTOT and TSAT)** according to PDS principles, also taking into consideration all necessary constraints (such as runway holding time, slot adherence, departure routes, airspace user preferences, night curfew, evacuation of stand/gate for arriving aircraft, adverse conditions including de-icing, actual taxi/runway capacity, current constraints, inbound flights information, etc.). Such system shall then be integrated in the local environment with the Electronic Flight Strip systems, updated as well in order to properly support the DMAN **(MM2 – Integration in local environment with EFS)**. Before the start of the operational use, DMAN operational procedures shall be elaborated and then published **(MM3 – Operational Procedures)**, all relevant staff shall be duly trained **(MM4 – Training)**, a safety assessment successfully performed and contextual report shall be made available **(MM5 – Safety assessment)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM6 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



A dedicated table within Annex A encompasses the list of implementation initiatives associated to Family 2.1.1 awarded in the framework of 2015 CEF Call, along with a more detailed description of each Implementation Project. No Implementation Project associated to this Family has been awarded in 2014 CEF Call.

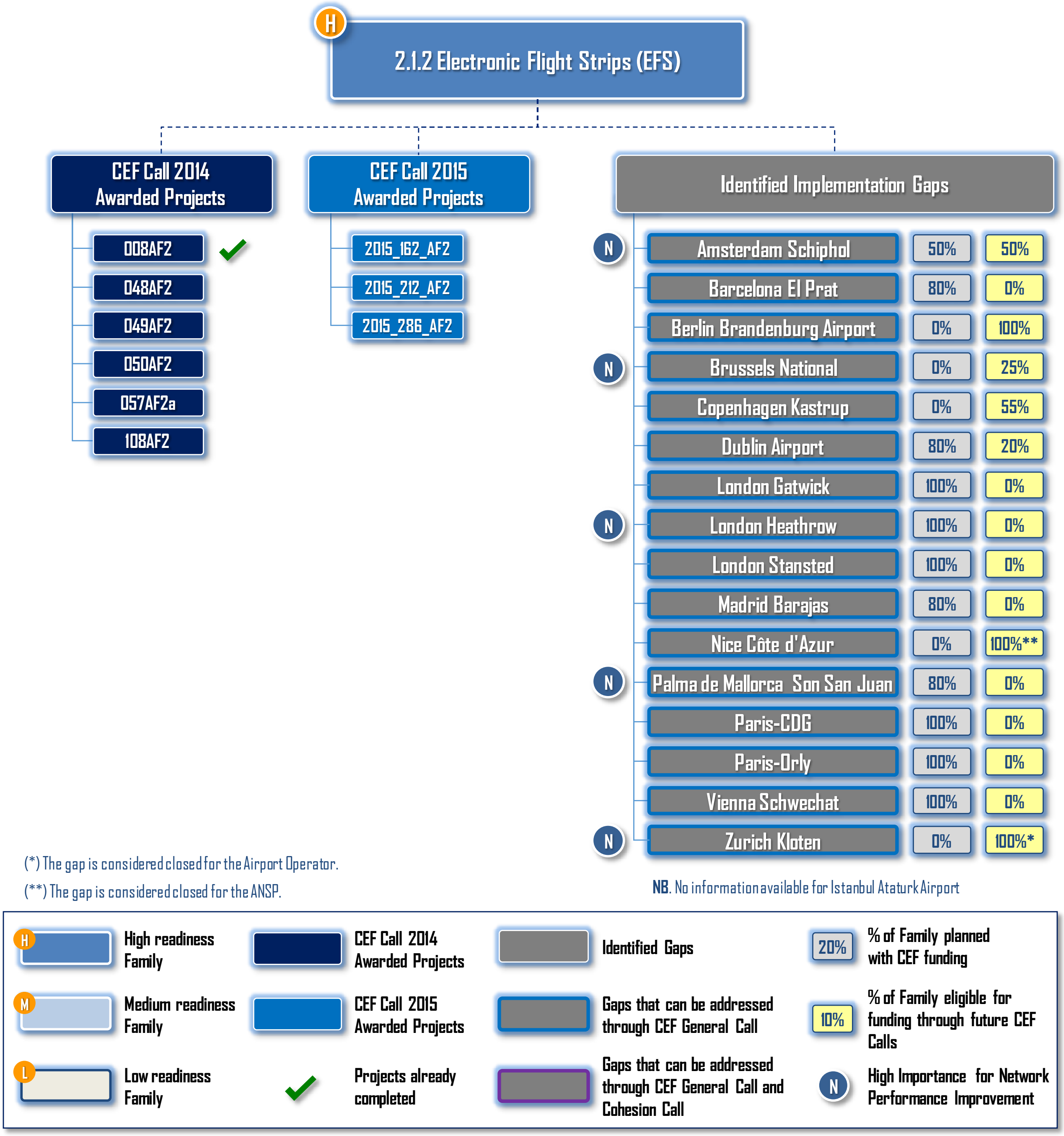
Family 2.1.2 – Electronic Flight Strips (EFS)

2.1.2 – Electronic Flight Strips (EFS)			
Main Sub-AF	S-AF2.1 Departure Management Synchronised with Pre-departure sequencing		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2021

Description and Scope
The operational context of Electronic Flight Strips (EFS) is the automated assistance to tower controller and where appropriate also approach and ground controller as well as the automated information exchange within and between these units. The system permits controllers to conduct screen to screen coordination within their unit and with "neighbouring" units in the process chain reducing workload associated with coordination, integration and identification tasks. The system supports coordination dialogue between controllers and transfer of flights between units or different locations within one unit (e.g. multiple Ground Control Towers at big airports), and facilitates early resolution of conflicts through automated coordination. EFS shall integrate the instructions given by the air traffic controller with other data such as flight plan, surveillance, routing, published rules and procedures. EFS can support the controller to manage constraints related to the surface route trajectories using A-SMGCS. EFS can support the necessary electronic exchange of information between the Tower Runway Control, the Final Approach Control and the TBS support tool. EFS shall support Airport Safety Nets.
Interdependencies
Family 2.1.1 Initial DMAN Family 2.1.3 Basic A-CDM Family 2.2.1 A-SMGCS Level 1 and 2 Family 2.3.1 Time Based Separation (TBS) Family 2.4.1 A-SMGCS Planning and Routing Functions Family 2.5.1 Airport Safety Nets associated with A-SMGCS (Level 2) Family 1.1.1 Basic AMAN Family 1.1.2 AMAN Upgrade to include Extended Horizon function
Synchronization Needs
ANSPs, Airport Operators.
Civil / Military Coordination
Applicable to those airports open to civil and military operations

Stakeholders considered as gaps	ANSPs, Airport Operators	
Other stakeholders involved in the Family deployment	Military Authorities	
Links to ICAO GANP ASBUs	None	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AO-0201 (only AERODROME-ATC-36 enabler) Available
	ATM Master Plan Level 3 (Edition 2016)	AOP12
SESAR Solutions	N/A	
Very Large Scale Demonstrations	N/A	
Guidance Material / Specifications / Standards	None	
Means of compliance and / or Certification	None	
Regulations	None	
Cyber security requirements	None	
Recommendation for IPs proposal	This Family 2.1.2 is a pre-requisite for Families 2.4.1, 2.5.1 & 2.5.2, and could be seen as an enabler for Families 2.2.1 and 2.3.1. It is recommended to take into consideration the results of Gap Analysis.	
Deployment Approach	The deployment of the Family would require the implementation of the Electronic Flight Strips (EFS) in the tower; dedicated EFS shall also be installed in the apron and approach positions for the relevant airports **(MM1 – System support to basic procedures)**. In order for the system to be properly implemented, EFS Operational Procedures shall be elaborated and subsequently published **(MM2 – Operational Procedures)**, all relevant staff shall be duly trained **(MM3 – Training)**, a safety assessment shall be successfully performed and contextual report shall be made available **(MM4 – Safety assessment)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM5 – Implementation completed)**.	

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 2.1.2 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 2.1.3 – Basic A-CDM

2.1.3 – Basic A-CDM			
Main Sub-AF	S-AF 2.1 Departure Management Synchronised with Pre-departure sequencing		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2021

Description and Scope

A-CDM is the concept, which aims at improving operational efficiency at airports and improves their integration into the Air Traffic Flow and Capacity Management (ATFCM) by increasing information sharing and improving cooperation between all relevant stakeholders (local ANSP, airport operator, aircraft operators, NM, other airport service providers). Those elements allow the airport partners to achieve a common situational awareness and improve traffic event predictability.

The Airport CDM concept is built on the following elements:

- Information Sharing The Information Sharing CDM element defines the sharing of accurate and timely information between the Airport CDM Partners
- Milestone Approach. The Milestone Approach CDM element describes the progress of a flight from the initial planning to the take off by defining key Milestones to enable close monitoring of significant events.
- Variable Taxi Time. The Variable Taxi Time element consists of calculating and distributing to the Airport CDM partners accurate estimates of taxi-in and taxi-out times to improve the estimates of in-block and take off times and thus to increase the quality of the departure sequence.
- Adverse conditions management allows improving the resilience of airports. An Initial Airport Operations Centre can be implemented to support these elements to reinforce the collaborative decision making process with all stakeholders. The Initial Airport Operations Centre assesses the global performance of the airport, and facilitates the Demand and Capacity Balancing monitoring.
- Once A-CDM has been implemented locally, airport shall implement flight update messages (FUM) and Departure Planning Information (DPI). . This last A-CDM element strengthens the link with the ATMN, facilitates the flow and capacity management and increases predictability as well as increases efficiency at the network level.

Interdependencies

Family 2.1.1 Initial DMAN
Family 2.1.2 EFS
Family 2.1.4 Initial AOP
Family 2.2.1 A-SMGCS L1 and L2
Family 4.2.4 AOP/NOP Information Sharing
Family 5.5.1 Upgrade / Implement Cooperative Network Information Exchange System / Service
Family 5.6.1 Flight Information System / Service in support of A-CDM and iAOP.

Synchronization Needs		
ANSPs, Airport Operators, Network Manager		
Civil / Military Coordination		
Applicable to those airports open to civil and military operations		
Stakeholders considered as gaps	ANSPs, Airport Operators	
Other stakeholders involved in the Family deployment	Airspace Users, Network Manager, Military Authorities, Ground Handling Companies	
Links to ICAO GANP ASBUs	B0-ACDM Improved Airport Operations through Airport-CDM B1-ACDM Optimized Airport Operations through A-CDM Total Airport Management B1-AMET Enhanced Operational Decisions through Integrated Meteorological Information (Planning and Near-term Service)	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AO-0501 Available AO-0601 Available AO-0602 Available AO-0603 Available
	ATM Master Plan Level 3 (Edition 2016)	AOP05
SESAR Solutions	N/A	
Very Large Scale Demonstrations	N/A	
Guidance Material / Specifications / Standards	ED-141 Minimum Technical Specification for Airport-CDM ED-145 Airport CDM Interface Specification ED-146 Guidelines for Test and Validation related to A-CDM interoperability ECTL Airport CDM Implementation Manual Version 4 Updated ECTL CDM Manual ICAO Doc 9971 - Manual on Collaborative Air Traffic Flow Management (CDM part) ECTL Aeronautical Information Exchange Model v.5.1 FIXM 3.0 (Flight Information Exchange Model) ICAO Meteorological Information Exchange Model (IWXXM)	

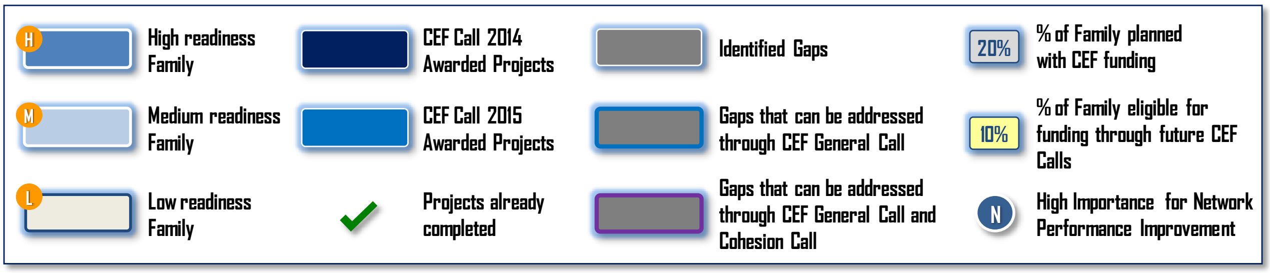
	ICAO Doc 9971 - Manual on Collaborative Air Traffic Flow Management (3rd Part Airport CDM (2018) ICAO Doc 10003 - Manual on the digital exchange of aeronautical information ICAO Doc 8896 - Manual of Aeronautical Meteorological Practice ICAO Doc 9328 - Manual of Runway Visual Range Observing and Reporting Practices ICAO Doc 9377 - Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services ICAO Doc 9817 - Manual on Low-level Wind Shear ICAO Doc 9837 - Manual on Automatic Meteorological Observing Systems at Aerodromes
Means of compliance and / or Certification	ETSI EN 303 212 (CS on A-CDM) ETSI Communication 2010/C168/04 A-CDM Community Specification Update on EN 303 212 v1.1.1 (2019
Regulations	None
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them
Recommendation for IPs proposal	It is recommended to take into consideration the three following elements of S-AF2.1: F211, F213 and F214 which are necessary to achieve the "Departure Management Synchronised with Pre-departure sequencing". SDM therefore strongly recommends that all projects related to Basic A-CDM shall be completed as early as possible before the defined FOC Date of the Sub-AF to allow for the deployment of subsequent solutions. It is recommended to implement Family 2.1.3 as soon as possible since Airport CDM is part of the critical initiatives to resolve and mitigate the impacts of current capacity constraints and potential bottlenecks, which might hinder the overall performance at network level. It is recommended liaising between different stakeholders (both within the same stakeholder category and between different categories) to draft and present joint proposals in the framework of upcoming Calls. It is recommended to take into consideration the results of Gap Analysis.
Deployment Approach	The implementation of the Family would require to conduct an information sharing process in order to allow the airport and local partners to achieve a common situational awareness **(MM1 – Information sharing)**. Basic A-CDM implementation shall further be supported by the execution of all the elements of the A-CDM "Milestone Approach" described in the CDM Manual **(MM2**

	– A-CDM "Milestone Approach"), in conjunction with the fulfilment of all the elements of the "variabtimes", described in the A-CDM Manual as well **(MM3 – Variable taxi-times implementation)**. Furthermore, all measures whose implementation allows the mitigation of adverse situations (initial APOC, CDM cell, etc) shall be put into use **(MM4 – Adverse conditions implementation)**. Following the implementation of all elements of the "Flight Update Message" described in the CDM Manual and the FUM Implementation Guide **(MM5 – FUM Implementation)**, the application of all elements of the "Departure Planning Information" messages reported on the CDM Manual and the DPI Implementation Guide shall be performed **(MM6 – DPI Implementation)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM7 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.

(*) The gap is considered closed for the Airport Operator.

NB. No information available for Istanbul Ataturk Airport



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 2.1.3 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 2.1.4 – Initial Airport Operational Plan (AOP)

<table>
<tr><th colspan="4">2.1.4 – Initial Airport Operations Plan (AOP)</th></tr>
<tr><td>Main Sub-AF</td><td colspan="3">S-AF 2.1 Departure Management Synchronised with Pre-departure sequencing</td></tr>
<tr><td>Readiness for implementation</td><td colspan="3">High</td></tr>
<tr><td>Initial Operational Capability</td><td>Before 2014</td><td>Full Operational Capability</td><td>01/01/2021</td></tr>
<tr><td colspan="4"></td></tr>
<tr><th colspan="4">Description and Scope</th></tr>
<tr><td colspan="4">The Airport element that reflects the operational status of the Airport and therefore facilitates Demand and Capacity Balancing is the Airport Operations Plan (AOP). The AOP connects the relevant stakeholders, notably the Airspace Users' Flight Operations Centre (FOC). It contains data and information relating to the different status of planning phases and is in the format of a rolling plan, which naturally evolves over time.

The AOP is 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. The ATM stakeholders' planning processes and working methods are included in the AOP.

The AOP contains elements such as KPIs and alerts, which allow monitoring and assessing the performance of A-CDM operations. Most of the data involved in the AOP implementation is currently shared among local stakeholders and where available, through the A-CDM process.

The initial AOP is the local airport part of the AOP. The following data have to be implemented:
- Flight trajectory data: Information sharing related to Flight Progress Information Elements of an Inbound/Outbound/airport transit Trajectory to/from/at Airport.
- Airport Resources data: Airside and landside resources such as runway capacity & configuration, or parking stands.
- Local weather data: Information sharing related to MET Information Elements of airport.

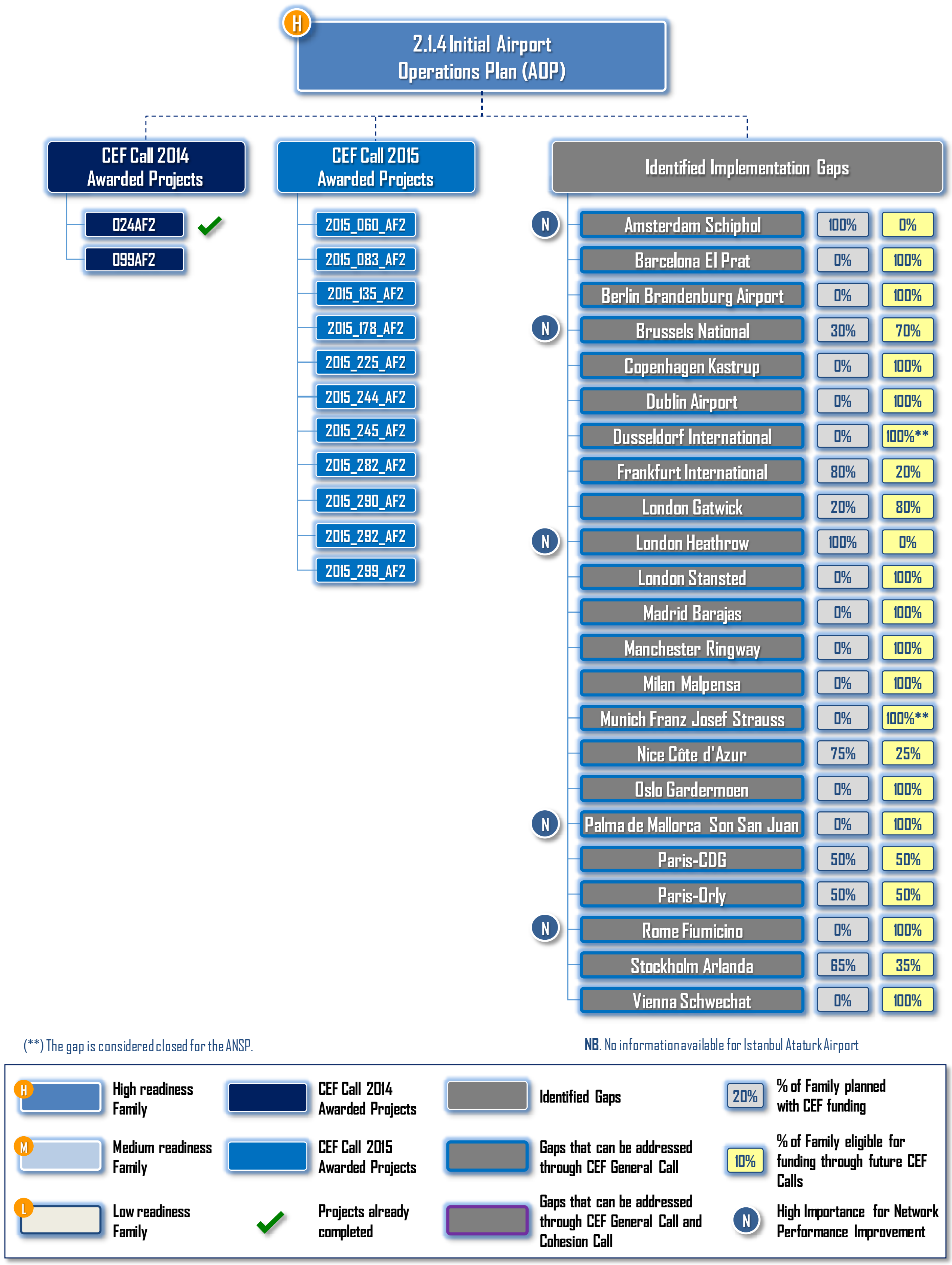
There are also strong interdependencies with S-AF4.2 Collaborative NOP as well as with S-AF5.5 Cooperative Network Information Exchange.
The initial AOP shares information with the NOP which provides a rolling picture of the network situation used by stakeholders to prepare their plans and their inputs to the network CDM processes (e.g. negotiation of airspace configurations). NM Information will be freely exchanged by Operational stakeholders by means of defined cooperative network information services, using the yellow SWIM TI Profile.</td></tr>
<tr><th colspan="4">Interdependencies</th></tr>
<tr><td colspan="4">Family 2.1.1 Initial DMAN
Family 2.1.3 Basic A-CDM
Family 4.2.4 AOP/NOP Information Sharing
The full AOP implementation requires synchronisation with the NOP (see AF4 "interactive</td></tr>
</table>

<table>
<tr><td colspan="3">Rolling NOP"). The implementation of this synchronisation is targeted by Family 4.2.4 "AOP/NOP information sharing".
Family 5.3.1 Aeronautical Information Exchange / Service in support of A-CDM and iAOP
Family 5.4.1 Upgrade / Implement Meteorological Information Exchange System / Service
Family 5.5.1 Interface and data Requirements of AF4 NOP and of A-CDM and iAOP
Family 5.6.1 Flight Information System / Service in support of A-CDM and iAOP</td></tr>
<tr><td colspan="3">Synchronization Needs</td></tr>
<tr><td colspan="3">ANSPs, Airport Operators.</td></tr>
<tr><td colspan="3">Civil / Military Coordination</td></tr>
<tr><td colspan="3">Applicable to those airports open to civil and military operations.</td></tr>
<tr><td>Stakeholders considered as gaps</td><td colspan="2">ANSPs, Airport Operators</td></tr>
<tr><td>Other stakeholders involved in the Family deployment</td><td colspan="2">Airspace Users, Military Authorities, Network Manager, MET Service Providers</td></tr>
<tr><td>Links to ICAO GANP ASBUs</td><td colspan="2">B1-ACDM
Optimized Airport Operations through A-CDM Total Airport Management
B1-AMET
Enhanced Operational Decisions through Integrated Meteorological Information (Planning and Near-term Service)
B1-RSEQ
Improved Airport Operations through Departure, Surface and Arrival Management</td></tr>
<tr><td rowspan="2">ATM Master Plan References</td><td>ATM Master Plan Level 2 (Dataset 16)</td><td>AO-0801-A (AIRPORT-03)
SESAR Release 5</td></tr>
<tr><td>ATM Master Plan Level 3 (Edition 2016)</td><td>AOP11</td></tr>
<tr><td>SESAR Solutions</td><td colspan="2">#21 Airport Operations Plan and AOP-NOP Seamless Integration</td></tr>
<tr><td>Very Large Scale Demonstrations</td><td colspan="2">Release 7: PJ. 28
Release 8: PJ. 28
Release 9: PJ. 28</td></tr>
<tr><td>Guidance Material / Specifications / Standards</td><td colspan="2">Updated ECTL Airport CDM Manual (2017)
ECTL Airport CDM Implementation Manual Version 4
ICAO Guidance Manual on Airport Traffic Synchronisation (2018)
ICAO Doc 9426 Air Traffic Services Planning Manual (2018)
ICAO Doc 9830 Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual (2018)
ECTL Aeronautical Information Exchange Model v5.1</td></tr>
</table>

	FIXM 3.0 Flight Information Exchange Model ICAO Meteorological Information Exchange Model (IWXXM) ICAO Doc 9971 Manual on Collaborative Air Traffic Flow Management (3rd Airport CDM) (2018) ICAO Doc 10003 Manual on the digital exchange of aeronautical information ICAO Doc 8896 Manual of Aeronautical Meteorological Practice ICAO Doc 9328 Manual of Runway Visual Range Observing and Reporting Practices ICAO Doc 9377 Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services ICAO Doc 9817 Manual on Low-level Wind Shear ICAO Doc 9837 Manual on Automatic Meteorological Observing Systems at Aerodromes
Means of compliance and / or Certification	ETSI EN 303 212 (CS on A-CDM) ETSI Communication 2010/C168/04 A-CDM Community Specification Update on EN 303 212 v1.1.1 (2019
Regulations	None
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them
Recommendation for IPs proposal	Family 2.1.4 can be considered as pre-requisite to Family 4.2.4, hence should be implemented as soon as possible not waiting for Family 4.2.4 to be ready/completed. Family 2.1.4 can also be seen as an extension of the Airport Operational Database. It is recommended to take into consideration the three following elements of S-AF2.1: F211, F213 and F214 which are necessary to achieve the "Departure Management Synchronised with Pre-departure sequencing". It is recommended to implement Family 2.1.4 as soon as possible since Initial AOP is part of the critical initiatives to resolve and mitigate the impacts of current capacity constraints and potential bottlenecks, which might hinder the overall performance at network level. It is recommended liaising between different stakeholders (both within the same stakeholder category and between different categories) to draft and present joint proposals in the framework of upcoming Calls. It is recommended to take into consideration the results of Gap Analysis.
Deployment Approach	The implementation of the Family would require the process of information sharing related to Flight Progress Information

	Elements of an inbound / outbound airport transit Trajectory to / from / at the airport, as described in the OFA 05.01.01 document **(MM1 – Flight trajectory data implementation)**. The Initial Airport Operations Plan (AOP) deployment would also need the installation of the necessary airside and landside resources, such as runway capacity, runway configuration and parking stands **(MM2 – Airport resources data implementation)**. Moreover, and information sharing process related to MET Information Elements of Airport, as outlined in the OFA 05.01.01 document, shall be duly performed **(MM3 – Local weather data implementation)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM4 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 2.1.4 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 2.2.1 – A-SMGCS level 1 and 2

2.2.1 – A-SMGCS Level 1 and 2			
Main Sub-AF	S-AF 2.2 DMAN Integrating Surface Management Constraints		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2021

Description and Scope

Advanced Surface Movement Guidance and Control System (A-SMGCS) is providing aerodrome surveillance as well as planning, routing and guidance for the control of aircraft and vehicles in order to maintain the declared surface movement rate under all weather conditions within the aerodrome visibility operational level (AVOL) while maintaining the required level of safety.

A-SMGCS level 1 provides ATC with the position and identity of:

- All relevant aircraft within the movement area;
- All relevant vehicles within the manoeuvring area.

Traffic will be controlled through the use of appropriate procedures allowing the issuance of information and clearances to traffic on the basis of A-SMGCS level 1 surveillance data. A-SMGCS level 2 is a level 1 system complemented by the A-SMGCS function to detect potential conflicts on runways, taxiways and intrusions into restricted areas and provide the controllers with appropriate alerts.

A-SMGCS integrates all surface information sources enhancing situational awareness. A-SMGCS level 1 is a prerequisite for A-SMGCS level 2 and all higher A-SMGCS functions.

Interdependencies

Family 2.1.1 Initial DMAN

Family 2.1.2 Electronic Flight Strips (EFS)

Family 2.1.3 Basic A-CDM

S-AF 2.4 A-SMGCS Level 1 is a pre-requisite for Family 2.4.1

- Airport Conformance Monitoring shall integrate A-SMGCS Surveillance data (Family 2.2.1), Surface Movement Routing and Planning (Family 2.4.1) and controller routing clearances.
- When relevant, A-SMGCS shall include the advanced routing and planning function referred to in Sub AF 2.4 to enable conformance monitoring alerts.
- A-SMGCS shall provide -optimized taxi-time and improve predictability of take-off times by monitoring of real surface traffic and by considering updated taxi times in departure management regardless of meteorological or other impacting conditions.

S-AF 2.5 A-SMGCS Level 1 and 2 is a pre-requisite for Family 2.5.1

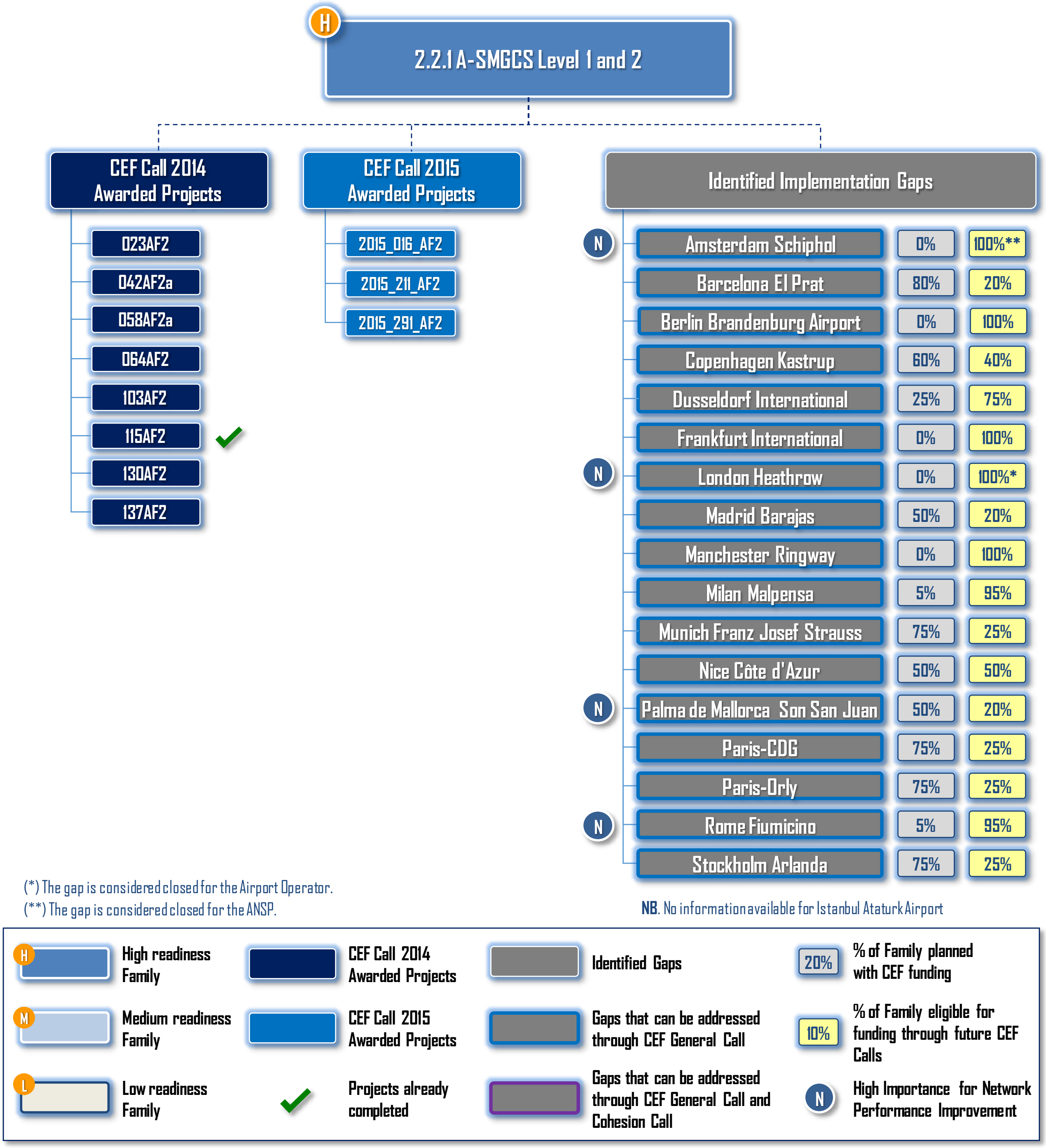
- Airport Conformance Monitoring shall integrate A-SMGCS Surveillance data (Family 2.2.1), Surface Movement Routing and Planning (Family 2.4.1) and controller routing clearances.
- A-SMGCS shall include a function to generate and distribute the appropriate alerts. These alerts shall be implemented as an additional layer on top of the existing A-SMGCS level 2 alerts and not as a replacement of them.

Synchronization Needs		
ANSPs and Airport Operators.		
Civil / Military Coordination		
Applicable to those airports open to civil and military operations		
Stakeholders considered as gaps	ANSPs, Airport Operators	
Other stakeholders involved in the Family deployment	Military Authorities	
Links to ICAO GANP ASBUs	B0-ASUR Initial Capability for Ground Surveillance B0-SURF Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2) B1-RSEQ Improved Airport Operations through Departure, Surface and Arrival Management	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AO-0201 Available AO-0102 Available
	ATM Master Plan Level 3 (Edition 2016)	AOP04.1, AOP04.2
SESAR Solutions	N/A	
Very Large Scale Demonstrations	N/A	
Guidance Material / Specifications / Standards	ED-87C EUROCAE A-SMGCS MASPS EUROCAE Update of ED-87C to include the new functions routing and planning and additional safety nets ED-87D (2017) EUROCAE ED-117A MOPS for MLAT EUROCAE ED 116-A MOPS for Surface Movement Radar Sensor Systems for Use in A-SMGCS (2019) EUROCAE ED 128-A Guidelines for Surveillance Data Fusion in A-SMGCS (2018) Updated ECTL A-SMGCS Manual ICAO Doc 9830 A-SMGCS Manual, First Edition ICAO Guidance Manual on Airport Traffic Synchronisation (2018) ICAO Doc 9426 Air Traffic Services Planning Manual (2018)	

	ICAO Doc 9830 Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual (2018) ED-102A/DO-260B MOPS for 1090 MHz Extended Squitter Automatic Dependent Surveillance – Broadcast (ADS-B) and Traffic Information Services – Broadcast (TIS-B) ICAO Doc 9871 Technical Provisions for Mode S Services and Extended Squitter EUROCAE ED-163 Safety, Performance and Interoperability Requirements document for ADS-B Airport Surface surveillance application (ADS-B APT) ICAO Doc 7030/5 (EUR/NAT) Regional Supplementary Procedures, Section 6.5.6 and 6.5.7 ICAO Doc 9924 Aeronautical Surveillance Manual
Means of compliance and / or Certification	A-SMGCS; Part 1: Community Specification (EN 303 213-1-1) Update of EN 303 213-1 Part 1 on the basis of the EUROCAE A-SMGCS MASPS (ED-87C) (2017) Update of EN 303 213-1 Part 1 on the basis of the EUROCAE A-SMGCS MASPS (ED-87D) (2019-2020) A-SMGCS; Part 2: Community Specification (EN 303 213-2-2) Update of EN 303 213-1 Part 2 on the basis of the EUROCAE A-SMGCS MASPS (ED-87C) (2017) Update of EN 303 213-1 Part 2 on the basis of the EUROCAE A-SMGCS MASPS (ED-87D) (2019-2020) A-SMGCS; Part 3: Community Specification for a deployed cooperative sensor including its interfaces (EN 303 213-3) A-SMGCS; Part 4: Community Specification for a deployed non-cooperative sensor including its interfaces; Sub-part 1: Generic requirements for non-cooperative sensor (EN 303 213-4-1) A-SMGCS; Part 4: Community Specification for a deployed non-cooperative sensor including its interfaces; Sub-part 2: Specific requirements for a deployed Surface Movement Radar sensor (EN 303 213-4-2) A-SMGCS; Part 5: Harmonized EN covering the essential requirements of article 3.2 of the Directive 2014/53/EU for multilateration equipment; Sub-part 1: receivers and interrogators (EN 303 213-5-1) (2017) A-SMGCS; Part 5: Harmonized EN covering the essential requirements of article 3.2 of the Directive 2014/53/EU for multilateration equipment; Sub-part 2: reference and vehicle transmitters (EN 303 213-5-2) (2017) A-SMGCS; Part 6: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive for deployed surface movement radar sensors; Sub-part 1: X-band sensors using pulsed signals and transmitting power up to 100 kW (EN 303 213-6-1)

Regulations	None
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them
Recommendation for IPs proposal	Family 2.2.1 is a pre-requisite for further deployment, especially in Sub-AF 2.4 and 2.5. SDM therefore strongly recommends that all projects related to A-SMGCS Level 1 and 2 shall be completed as early as possible before the defined FOC Date of the Sub-AF to allow for the deployment of subsequent solutions. It is recommended to take into consideration the results of Gap Analysis.
Deployment Approach	The implementation of the Family would require the installation of the A-SMGCS Level 1 background systems (e.g. surface movement radar(s), multilateration, etc.) **(MM1 – A-SMGCS Level 1 installation)**, which shall be complemented by the set up of the A-SMGCS Level 2 system, the RIMCAS, also including the equipage of the relevant vehicles with transponders **(MM2 – A-SMGCS Level 2 installation)**. Before the start of the operational use, A-SMGCS Level 1 and 2 Operational Procedures shall be elaborated and then published **(MM3 – Operational Procedures)**, all relevant staff shall be duly trained **(MM4 – Training)**, a safety assessment shall be successfully performed and contextual report shall be made available **(MM5 – Safety Assessment)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM6 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 2.2.1 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 2.3.1 – Time Based Separation (TBS)

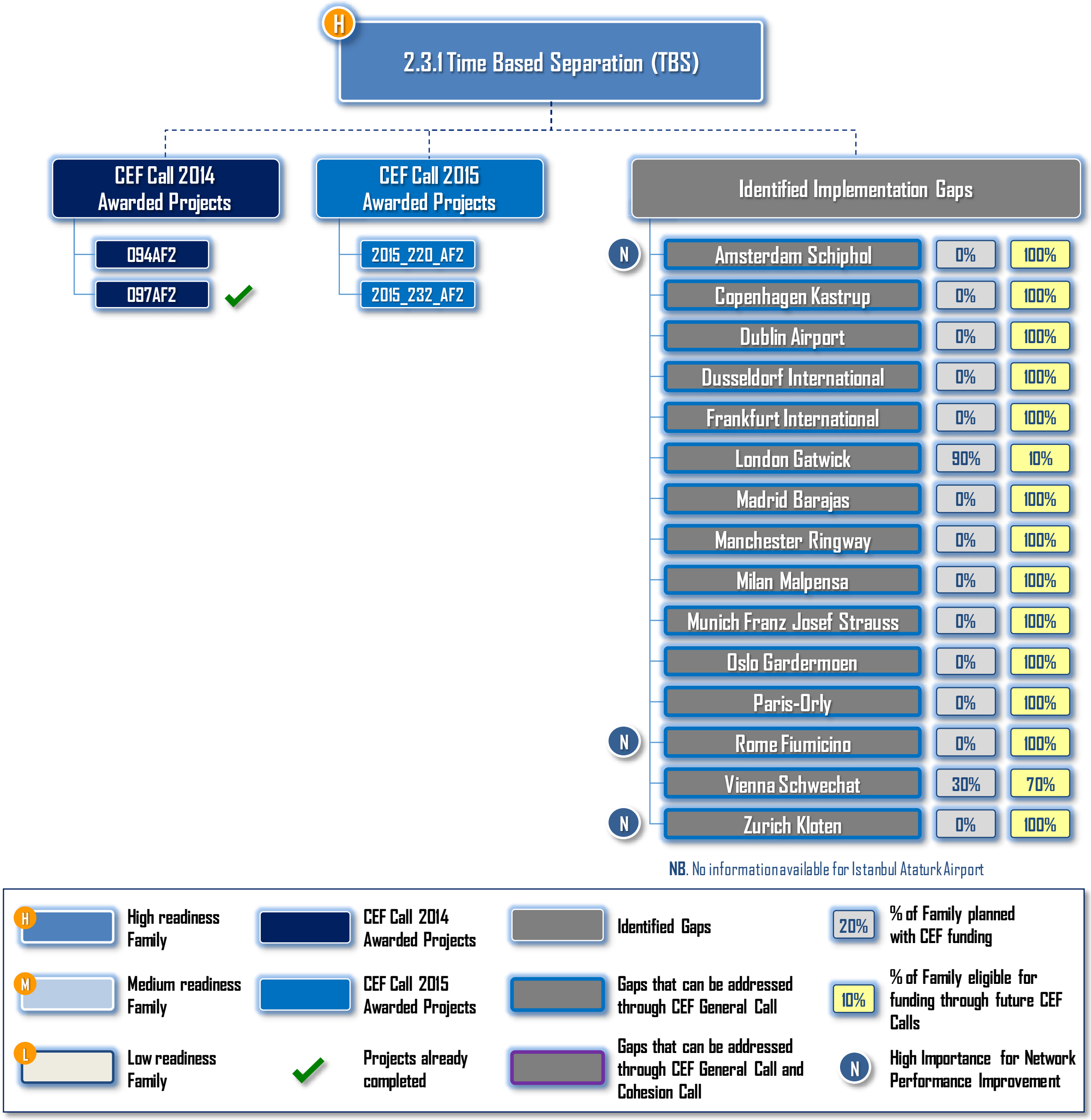
2.3.1 – Time Based Separation (TBS)			
Main Sub-AF	S-AF2.3 Time Based Separation for Final Approach		
Readiness for implementation	High		
Initial Operational Capability	01/01/2015	**Full Operational Capability**	01/01/2024

Description and Scope
Time Based Separation (TBS) consists in the separation of aircraft in sequence on the approach to a runway using time intervals instead of distances. It may be applied during final approach by allowing equivalent distance information to be displayed to the controller taking account of prevailing wind conditions. Radar separation minima and Wake Turbulence Separation parameters shall be integrated in a TBS support tool providing guidance to the air traffic controller to enable time-based spacing of aircraft during final approach that considers the effect of the headwind. The TBS support tool shall integrate an automatic monitoring and alerting of separation infringement safety net. The objective is to recover loss in airport arrival capacity currently experienced in headwind conditions on final approach under distance-based wake turbulence radar separation rules. By using time-based parameters, this loss is mitigated, having a positive effect on runway throughput and runway queuing delays. Minimum radar separation is not affected. Whilst TBS operations are not exclusive to a headwind on final approach, the current deployment proposal is specifically targeted at realizing the potential capacity benefits in these currently constraining conditions. Radar separation minimum and new wake-vortex separation standards (such as RECAT) shall be integrated in the Time Based Separation support tool that provide guidance to the controller to achieve the time proposed spacing to counter the effect of the headwind.
Interdependencies
Family 1.1.1 Basic AMAN. Family 1.1.2 AMAN Upgrade to include Extended Horizon Function. Family 2.1.2 EFS can help support the necessary electronic exchange of information between the Tower Runway Control, the Final Approach Control and the TBS support tool. Families 5.4.1 and/or 2.1.4, for Meteorological Information.
Synchronization Needs
Aircraft operators, ANSPs and Airport Operators.
Civil / Military Coordination
Applicable to those airports open to civil and military operations

Stakeholders considered as gaps	ANSPs, Airport Operators	
Other stakeholders involved in the Family deployment	Airspace Users, Military Authorities	
Links to ICAO GANP ASBUs	B1-AMET Enhanced Operational Decisions through Integrated Meteorological Information (Planning and Near-term Service) B2-WAKE Advanced Wake Turbulence Separation (Time-based)	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AO-0303 SESAR Release 2
	ATM Master Plan Level 3 (Edition 2016)	AOP10
SESAR Solutions	#64 "Time Based Separation"	
Very Large Scale Demonstrations	**Release 7:** PJ.28 **Release 8:** PJ.28 **Release 9:** PJ.28	
Guidance Material / Specifications / Standards	ECTL Time Based Operation (TBS) Specification for Final Approach ICAO Meteorological Information Exchange Model (IWXXM) ICAO Doc 10003 Manual on the digital exchange of aeronautical information ICAO Doc 8896 Manual of Aeronautical Meteorological Practice ICAO Doc 9328 Manual of Runway Visual Range Observing and Reporting Practices ICAO Doc 9377 Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services ICAO Doc 9817 Manual on Low-level Wind Shear ICAO Doc 9837 Manual on Automatic Meteorological Observing Systems at Aerodromes	
Means of compliance and / or Certification	None	
Regulations	None	
Cyber security requirements	None	

Recommendation for IPs proposal	It is recommended to implement Family 2.3.1 as soon as possible since TBS is part of the critical initiatives to resolve and mitigate the impacts of current capacity constraints and potential bottlenecks, which might hinder the overall performance at network level. It is recommended liaising between different stakeholders (both within the same stakeholder category and between different categories) to draft and present joint proposals in the framework of upcoming Calls. It is recommended to take into consideration the results of Gap Analysis.
Deployment Approach	The implementation of the Family would require the integration of the Time Based Separation (TBS) tool in the local environment (including necessary upgrades for other systems, e.g. AMAN, EFS, etc.). The AMAN system compatibility with the TBS support tool shall be ensured; CWP shall be modified in order to integrate the tool with the safety net; wind conditions shall be provided to the tool as well as automatic monitoring and alerting **(MM1 – Integration in local environment)**. Before the start of operational use of the tool, TBS Operational Procedures shall be elaborated and subsequently published **(MM2 – Operational Procedures)**, Air Traffic Controller and Flight Crews shall be duly trained **(MM3 – Training)**, a safety assessment shall be successfully performed and contextual report shall be made available **(MM4 – Safety Assessment)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM5 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 2.3.1 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 2.4.1 – A-SMGCS Routing and Planning Functions

2.4.1 – A-SMGCS Routing and Planning Functions			
Main Sub-AF	S-AF 2.4 Automated Assistance to Controller for Surface Movement Planning and Routing		
Readiness for implementation	High		
Initial Operational Capability	01/01/2016	**Full Operational Capability**	01/01/2024

Description and Scope

Advanced Surface Movement Guidance and Control System (A-SMGCS) is providing aerodrome surveillance as well as routing and planning, guidance for the control of aircraft and vehicles in order to maintain the declared surface movement rate under all weather conditions within the aerodrome visibility operational level (AVOL) while maintaining the required level of safety. A-SMGCS Routing and Planning Functions provide ATC with:

- Optimised route designation for each aircraft or vehicle within the movement area;
- The detection of all route conflicts on the movement area as well as improved routing and planning for use by controllers.

Traffic will be controlled through the use of appropriate procedures allowing the issuance of information and clearances to traffic.

A-SMGCS Level 1 is a prerequisite to A-SMGCS Routing and Planning Functions.

Ref S-AF 2.2, 2.4 and 2.5:

- Interfaces between DMAN and A-SMGCS shall be developed with the purpose to integrate departure sequencing and routing computation.
- Electronic Flight Strips (EFSs), with an advanced A-SMGCS routing function, shall be integrated into the flight data processing system.
- The routing and planning functions of A-SMGCS shall provide the automatic generation of taxi routes, with the corresponding estimated taxi time and management of potential conflicts. Taxi routes may be manually modified by the air traffic controller before being assigned to aircraft and vehicles. These routes shall be available in the flight data processing system.
- The A-SMGCS routing and planning function shall calculate the most operationally relevant route as free as possible of conflicts which permits the aircraft to go from stand to runway, from runway to stand or any other surface movement. The controller working position shall allow the air traffic controller to manage surface route trajectories. The flight data processing system shall be able to receive planned and cleared routes assigned to aircraft and vehicles and manage the status of the route for all concerned aircraft and vehicles.
- A-SMGCS Routing and Planning Functions shall integrate all surface information sources, enhance situational awareness and provide the controllers with appropriate alerts.
- Digital systems, such as EFSs, shall integrate the instructions given by the air traffic controller with other data such as flight plan, surveillance, routing, published rules and procedures.

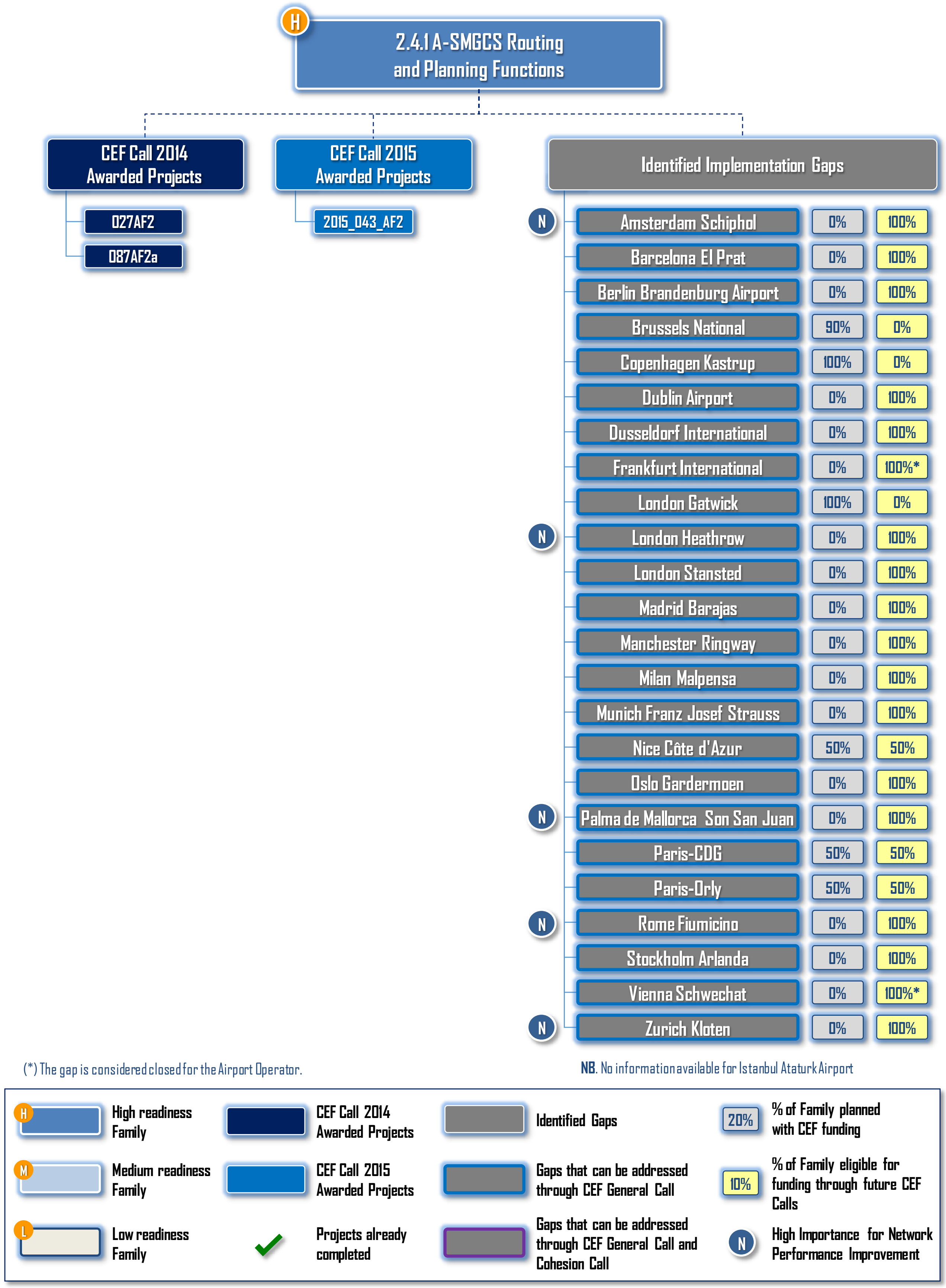
A-SMGCS shall include the advanced routing and planning function to enable conformance monitoring alerts.

Interdependencies
Family 2.1.1, Implementation of Initial DMAN and Family 2.5.2 Implementation of vehicle and aircraft systems contributing to airport safety nets, shall contribute to Family 2.4.1 Family 2.1.2, EFS Family 2.2.1, A-SMGCS Level 1 and airport safety nets associated with A-SMGCS Level 2 are pre-requisites for Family 2.4.1
Synchronization Needs
Aircraft Operators, Ground Handling Companies, ANSPs and Airport Operators.
Civil / Military Coordination
Applicable to those airports open to civil and military operations

Stakeholders considered as gaps	ANSPs, Airport Operators	
Other stakeholders involved in the Family deployment	Ground Handling Companies, Aircraft Operators, Military Authorities	
Links to ICAO GANP ASBUs	B1-RSEQ Improved Airport Operations through Departure, Surface and Arrival Management B2-SURF Optimized Surface Routing and Safety Benefits (A-SMGCS Level 3-4 and SVS)	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AO-0205 SESAR Release 5 TS-0202 SESAR Release 4 TS-0203 SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	AOP13
SESAR Solutions	#22 Automated Assistance to Controller for Surface Movement Planning and Routing #106 DMAN Baseline for integrated AMAN DMAN #53 Pre-Departure Sequencing supported by Route Planning #14 Departure Management integrating Surface Management constraints	
Very Large Scale Demonstrations	**Release 7:** PJ. 28 **Release 8:** PJ. 28 **Release 9:** PJ. 28	

Guidance Material / Specifications / Standards	Updated ECTL Airport CDM Manual (2017) ECTL Updated A-SMGCS specification EUROCAE ED-87C A-SMGCS MASPS EUROCAE Update of ED-87C to include the new functions: routing & planning and additional safety nets ED-87D (2017) ICAO Guidance Manual on Airport Traffic Synchronisation (2018) ICAO Doc 9426 Air Traffic Services Planning Manual (2018) Doc 9830, Advanced Surface Movement Guidance and Control Systems (A-SMGCS) (2018)
Means of compliance and / or Certification	Update of ETSI EN 303 213-1 and -2 on the basis of the EUROCAE A-SMGCS MASPS (ED-87 C) (2017) Update of ETSI EN 303 213-1 and -2 on the basis of the EUROCAE A-SMGCS MASPS (ED-87 D) (2019) A-SMGCS; Part 1: Community Specification (EN 303 213-1-1) A-SMGCS; Part 2: Community Specification (EN 303 213-2-2)
Regulations	None
Cyber security requirements	None
Recommendation for IPs proposal	Some functionalities of Families 2.5.1 and 2.5.2 depend on the implementation of A-SMGCS Routing and Planning Functions (Family 2.4.1) which has a later FOC date (01/01/2024). Where necessary it is therefore recommended to synchronise Families 2.5.1 and 2.5.2 with Family 2.4.1 or to integrate those relevant functionalities in the respective 2.4.1 IP. It is recommended liaising between different stakeholders (both within the same stakeholder category and between different categories) to draft and present joint proposals in the framework of upcoming Calls. It is recommended to take into consideration the results of Gap Analysis.
Deployment Approach	The implementation of the Family would require the upgrade of the A-SMGCS routing and planning functions in order to support taxi route clearance modified by ATCOs (Sub-AF 2.4); the interface between DMAN and A-SMGCS routing functions shall be developed and also the identification of mobiles (aircraft and vehicles) shall be ensured **(MM1 – Installation and integration in local environment with A-SMGCS, EFS and DMAN)**. Before the start of the operational use, A-SMGCS Planning and Routing Operational Procedures shall be elaborated and then published **(MM2 – Operational Procedures)**, all relevant staff shall be duly trained **(MM3 – Training)**, a safety assessment shall be successfully performed and contextual report shall be made available **(MM4 – Safety Assessment)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM5 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 2.4.1 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 2.5.1 – Airport Safety Nets associated with A-SMGCS level 2

2.5.1 – Airport Safety Nets associated with A-SMGCS (Level 2)			
Main Sub-AF	S-AF 2.5 Airport Safety Nets		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2021

Description and Scope

Airport safety nets consist of the detection and alerting of conflicting ATC clearances to aircraft and deviation of vehicles and aircraft from their instructions, procedures or routing which may potentially put the vehicles and aircraft at risk of a collision.

The scope of this sub-functionality includes the Runway and Airfield Surface Movement area. ATC support tools at the aerodrome shall provide the detection of Conflicting ATC Clearances as well as deviations from ATC instructions, procedures or routes. This shall be performed by the ATC system based on the knowledge of data including the clearances given to aircraft and vehicles by the air traffic controller, the assigned runway and holding point. The air traffic controller shall input all clearances given to aircraft or vehicles into the ATC system using a digital system, such as the EFS (Family 2.1.2). Different types of conflicting clearances shall be identified (for example Line-Up vs. Take-Off). Some may only be based on the air traffic controller input; others may in addition use other data such as A-SMGCS surveillance data.

Airport Safety Nets tool shall alert when aircraft and vehicles deviate from ATC instructions, procedures or routes. The detection of Conflicting ATC Clearances shall aim to provide an early prediction of situations that if not corrected would end up in hazardous situations that would be detected by the runway incursion monitoring system (RIMS) if in operation.

Airport Safety Nets tool could be linked to equipment for vehicle drivers to improve situational awareness, reduce the risks of runway incursion, runway and taxiway confusions and thus contribute to the overall airport safety net for high-density airports.

Interdependencies

Family 2.1.2 EFS is a pre-requisite for Family 2.5.1

Family 2.2.1 A-SMGCS Level 1 is a pre-requisite for A-SMGCS Level 2, and A-SMGCS Level 2 is a pre-requisite for Family 2.5.1

Family 2.4.1 A-SMGCS Planning and Routing Functions can be foreseen as a pre-requisite for Families 2.5.1 and 2.5.2

Synchronization Needs

ANSPs and Airport Operators.

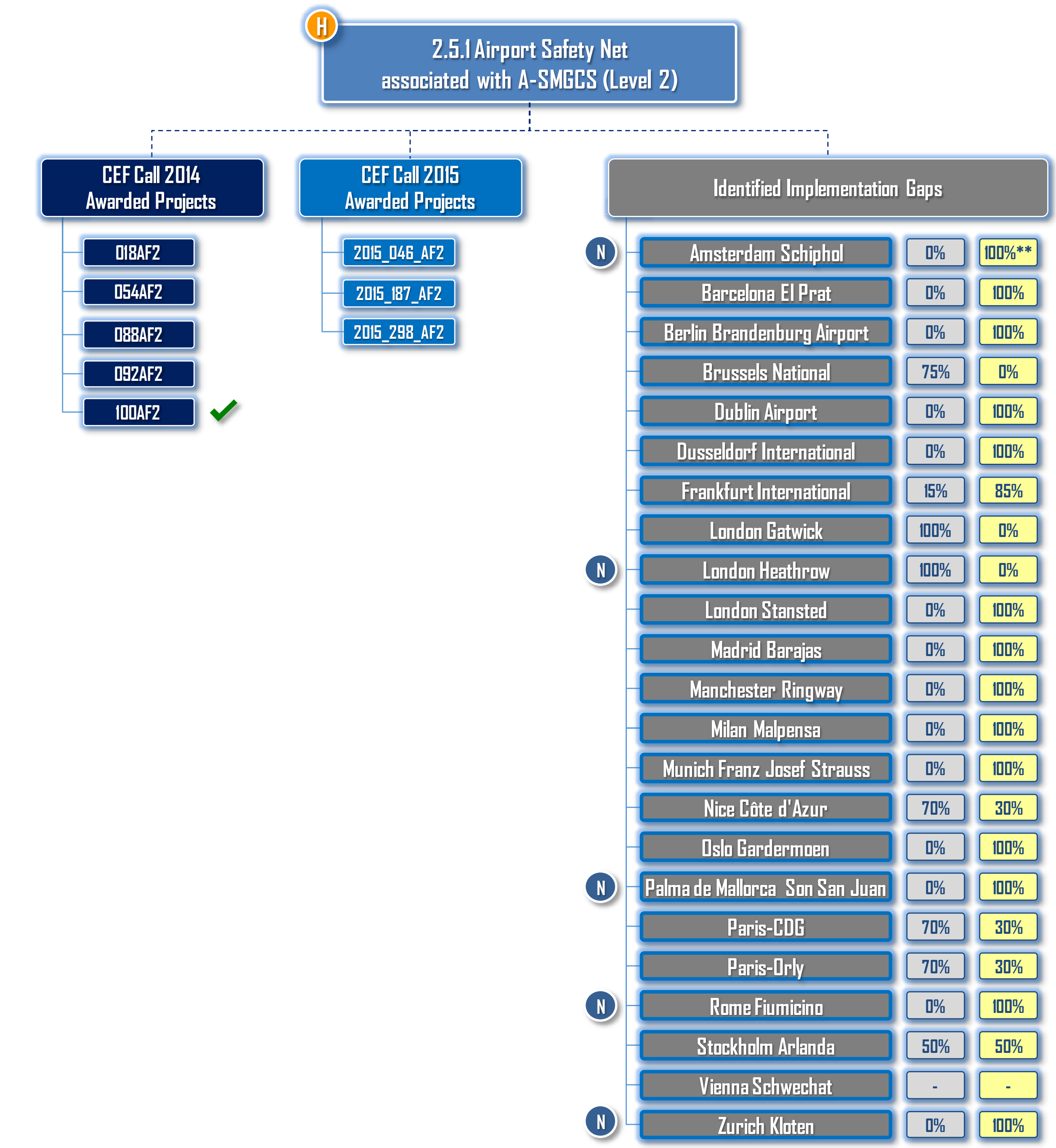
Civil / Military Coordination

Applicable to those airports open to civil and military operations

Stakeholders considered as gaps	ANSPs, Airport Operators	
Other stakeholders involved in the Family deployment	Military Authorities	
Links to ICAO GANP ASBUs	B0-SURF Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2) B1-RSEQ Improved Airport Operations through Departure, Surface and Arrival Management	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AO-0104-A SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	AOP12
SESAR Solutions	#02 "Airport Safety Nets for controllers: conformance monitoring alerts and detection of conflicting ATC clearances"	
Very Large Scale Demonstrations	**Release 7:** PJ.28 **Release 8:** PJ.28 **Release 9:** PJ.28	
Guidance Material / Specifications / Standards	EUROCAE ED-87-C A-SMGCS MASPS EUROCAE Update of ED-87C to include the new functions: routing & planning and additional safety nets ED-87D (2017) ECTL Specifications for A-SMGCS (2017) ICAO Guidance Manual on Airport Traffic Synchronisation (2018) ICAO Doc 9426 Air Traffic Services Planning Manual (2018) ICAO Doc 9830 Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual (2018) EUROCAE ED-163 Safety, Performance and Interoperability Requirements document for ADS-B Airport Surface surveillance application (ADS-B APT) Avionics standards developed by RTCA SC-186/EUROCAE WG-51 for ADS-B ICAO Doc 7030/5 (EUR/NAT) Regional Supplementary Procedures, Section 6.5.6 and 6.5.7 ICAO Doc 9830 Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual	

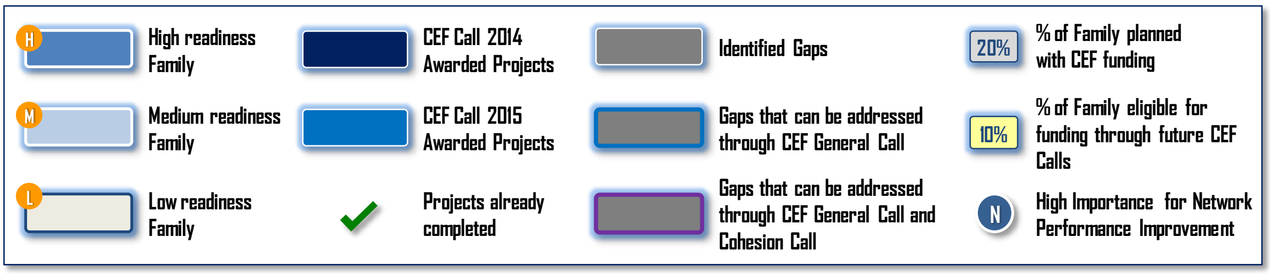
	ICAO Doc 9871 Technical Provisions for Mode S Services and Extended Squitter ICAO Doc 9924 Aeronautical Surveillance Manual
Means of compliance and / or Certification	A-SMGCS; Part 2: Community Specification (EN 303 213-2-2) Update of ETSI EN 303 213-1 and -2 on the basis of the EUROCAE A-SMGCS MASPS (ED-87 C) (2017) Update of ETSI EN 303 213-1 and -2 on the basis of the EUROCAE A-SMGCS MASPS (ED-87 D) (2019)
Regulations	None
Cyber security requirements	None
Recommendation for IPs proposal	Some functionalities of this Family depend on the implementation of A-SMGCS Routing and Planning Functions (Family 2.4.1) which has a later FOC date (01/01/2024). Where necessary it is therefore recommended to synchronise with Family 2.4.1 or to integrate those functionalities in the respective 2.4.1 IP. It is recommended liaising between different stakeholders (both within the same stakeholder category and between different categories) to draft and present joint proposals in the framework of upcoming Calls. It is recommended to take into consideration the results of Gap Analysis.
Deployment Approach	The implementation of the Family would require the upgrade of the existing ATC systems and their integration in the local environment, in order to support the Airport Safety Nets (Sub-AF 2.5), systems that shall also be integrated with A-SMGCS and EFS **(MM1 – Installation and integration in local environment with A-SMGCS and EFS)**. Before the start of the operational use, the Airport Safety Nets Operational Procedures associated to A-SMGCS Level 2 shall be elaborated and subsequently published **(MM2 – Operational Procedures)**, all relevant staff shall be duly trained **(MM3 – Training)**, a safety assessment shall be successfully performed and contextual report shall be made available **(MM4 – Safety Assessment)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM5 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



(**) The gap is considered closed for the ANSP.

NB. No information available for Istanbul Ataturk Airport



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 2.5.1 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 2.5.2 – Vehicle and aircraft systems contributing to Airport Safety Nets

2.5.2 – Vehicle and aircraft systems contributing to Airport Safety Nets			
Main Sub-AF	S-AF 2.5 Airport Safety Nets		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2021

Description and Scope

This Family represents an enabler and a facilitator to the safety-focused PCP deployment. The objective is to equip aircraft and vehicles operating in the manoeuvring area of airports with safety related systems to improve situational awareness, reduce the risks of runway incursion, runway confusion and runway excursions and thus contribute to the overall airport safety net for high-density airports.

Airport safety nets consist of the detection and alerting of conflicting ATC clearances to aircraft and deviation of vehicles and aircraft from their instructions, procedures or routing which may potentially put the vehicles and aircraft at risk of a collision.

The scope of this Family includes:

- aircraft technology in the scope of avionic or electronic flight bag based systems with the objective to conclude the ground based airport safety net with specific airborne systems and technology;
- on-board vehicle displays including on-board vehicle safety nets, including alerting functions, with the objective to support the ground based airport safety net with specific vehicle systems and technology;
- under Family 2.5.2, it is not foreseen to provide the complete "aircraft picture" to the "Air Traffic Controller", nor to provide the complete "Air Traffic Controller picture" to the cockpit.

This leads to an improved situational awareness and thus improves the quality of the overall safety net. The main benefit is related to the increase of runway usage awareness, and consequently an increase of runway safety and of the whole airport manoeuvring area. On-board aircraft and vehicle systems and technology uses airport data coupled with on-board aircraft sensors to monitor the movement of aircraft and vehicles on the airport surface and provide relevant information to the drivers, the flight crew and the ATC. The on-board aircraft and vehicle systems detect potential and actual risk of collision with other traffic on the manoeuvring area and provide the drivers and the flight crew with the appropriate alert.

An aircraft on-board airport safety net will improve safety in runway operations, mostly at airports where no safety net is provided to controllers. It should be noted that not all vehicles may need to be equipped. For instance during snow removal, it would probably be enough to only equip the lead and end vehicle.

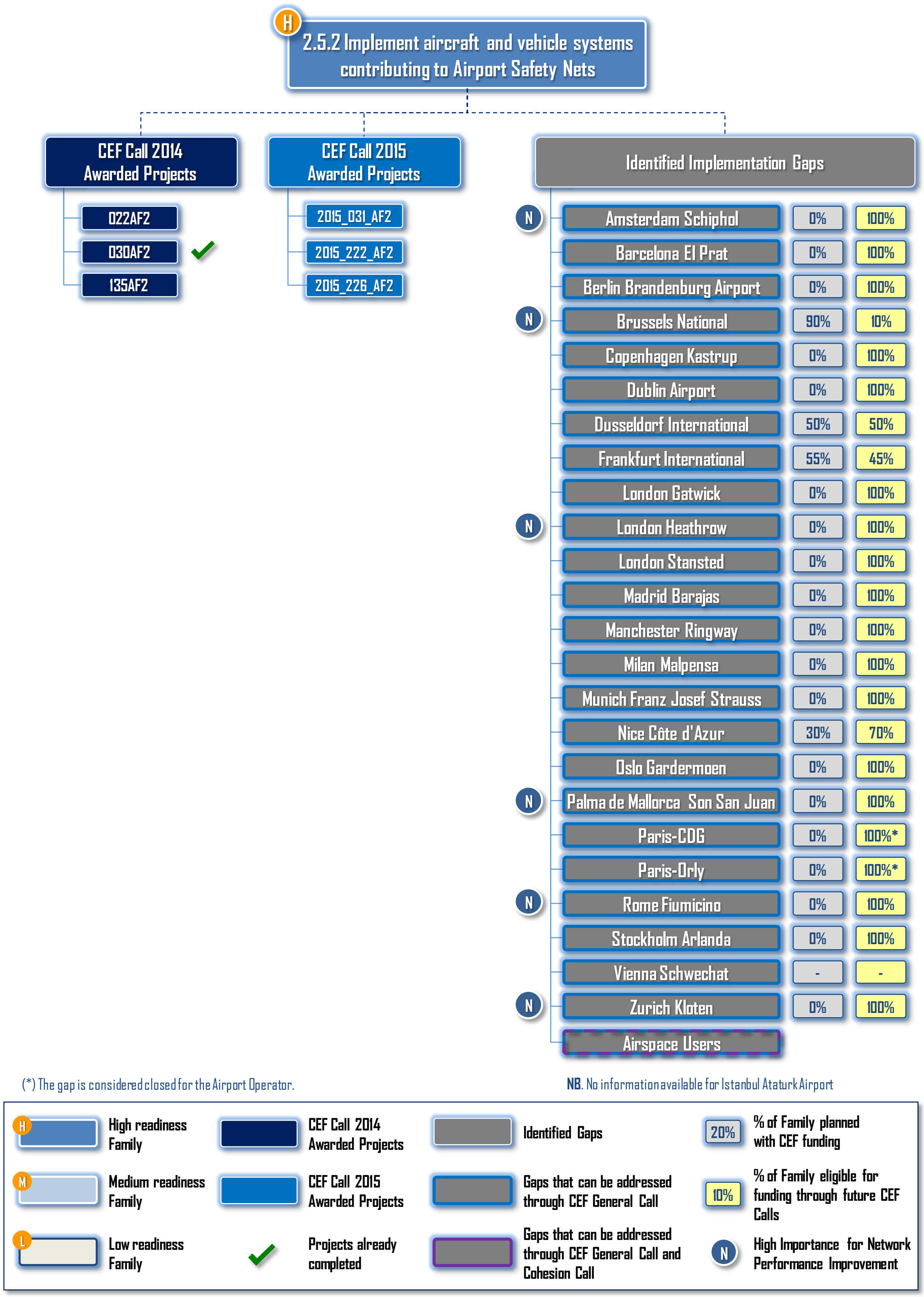
Interdependencies

Family 2.2.1 A-SMGCS Level 1 is a pre-requisite for A-SMGCS Level 2, and A-SMGCS Level 2 is a pre-requisite for Family 2.5.2

Family 2.4.1 A-SMGCS Planning and Routing Functions can be foreseen as a pre-requisite for Family 2.5.2 Family 2.5.1 is a pre-requisite for Family 2.5.2 to ensure full safety performance is achieved		
Synchronization Needs		
Aircraft operators, ANSPs and Airport Operators.		
Civil / Military Coordination		
Applicable to those airports open to civil and military operations		
Stakeholders considered as gaps	ANSPs, Airport Operators, Airspace Users	
Other stakeholders involved in the Family deployment	Military Authorities	
Links to ICAO GANP ASBUs	B1-SURF Enhanced Safety and Efficiency of Surface Operations – SURF, SURF-IA and Enhanced Vision Systems (EVS) B2-SURF Optimized Surface Routing and Safety Benefits (A-SMGCS Level 3-4 and SVS)	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AO-0104-A SESAR Release 5 AO-0105 SESAR Release 5 AO-0204 SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	AOP04.1
SESAR Solutions	#02 "Airport Safety Nets for controllers: conformance monitoring alerts and detection of conflicting ATC clearances" #04 "Enhanced Traffic Situational Awareness and Airport Safety Nets for the vehicle drivers"	
Very Large Scale Demonstrations	**Release 7:** PJ.28 **Release 8:** PJ.28 **Release 9:** PJ.28	
Guidance Material / Specifications / Standards	EUROCAE Update of ED-87C to include the new functions: routing & planning and additional safety nets ED-87D (2017) EUROCAE ED-179B/DO-315B MASPS for Enhanced Vision Systems, Synthetic Vision Systems, Combined Vision Systems and Enhanced Flight Vision Systems EUROCAE ED-194A/DO-317A, MOPS for Aircraft Surveillance Applications (ASA) System	

	EUROCAE ED-165 / DO-322 Safety, Performance and Interoperability Requirements Document For ATSA-SURF Application ICAO Doc 9994 Manual on Airborne Surveillance Applications (Edition 1) (SURF) ICAO Doc 8168 PANS OPS (SURF IA)
Means of compliance and / or Certification	Update of ETSI EN 303 213-2 on the basis of the EUROCAE A-SMGCS MASPS (ED-87 D) (Vehicles only) (2019)
Regulations	None
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them
Recommendation for IPs proposal	Some functionalities of this Family depend on the implementation of A-SMGCS Routing and Planning Functions (Family 2.4.1) which has a later FOC date (01/01/2024). Where necessary it is therefore recommended to synchronise with Family 2.4.1 or to integrate those functionalities in the respective 2.4.1 IP. It is recommended liaising between different stakeholders (both within the same stakeholder category and between different categories) to draft and present joint proposals in the framework of upcoming Calls. It is recommended to take into consideration the results of Gap Analysis.
Deployment Approach	The implementation of the Family would require to relevant equipment for vehicles and aircraft to be delivered and implemented in order to be integrated in the local environment. ATC systems shall be concurrently upgraded and installed in order to support Airport Safety Nets (Sub-AF 2.5) **(MM1 – Installation and integration)**. Before the start of the operational use, Operational Procedures related to such systems shall be elaborated and subsequently published **(MM2 – Operational Procedures)**, all relevant staff shall be duly trained **(MM3 – Training)**, a safety assessment shall be successfully performed and contextual report shall be made available **(MM4 – Safety Assessment)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM5 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 2.5.2 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

AF #3 – Flexible ASM and Free Route

The management of airspace in terms of advanced flexibility and free route is the future for the optimization of its utilization. The main aims of the ATM Functionality #3 are to produce most benefits to the environment, in terms of emissions reduction, as well as to the airspace users, with respect to the desired trajectories.

These objectives may be achieved by combining the following operations:

- Implementation of ASM management systems, tools, airspace structure, and procedure that support an advanced Flexible Use of Airspace. The aim is to ease, safely and flexibly, segregations and reservations of portions of airspace when needed, for exclusive usage, providing, at the same time, minimum impact on other airspace users.
- Implementation of harmonized DCTs and Free Route Airspace throughout Europe, with necessary support by system upgrades and tools, that enable flights to be conducted taking into account, as much as possible, their preferred route, without the typical constraints of fixed route network and rigid airspace structure.

For this reason, AF3 is structured in two Sub-AFs with their related Families:

S-AF3.1 – Airspace Management and Advanced Flexible Use of Airspace, requiring close coordination and cooperative decision making among all stakeholders (civil and military), ASM tools, real time data management, and exchange for most flexible airspace use and configuration for best adaptation to users' needs.

- Family 3.1.1 – ASM Tool to support AFUA
- Family 3.1.2 – ASM management of real time airspace data
- Family 3.1.3 – Full rolling ASM/ATFCM process and ASM information sharing
- Family 3.1.4 – Management of Dynamic Airspace Configurations

S-AF3.2 – Free Route, requiring important changes in airspace structure and significant upgrade of all stakeholders' systems to support DCTs and Free Route implementation operations, in a synchronized European scenario, regardless of border limitations.

- Family 3.2.1 – Upgrade of ATM Systems (NM, ANSPs, AUs) to support Direct Routings (DCTs) and Free Route Airspace (FRA)
- Family 3.2.3 – Implement Published Direct Routings (DCTs)
- Family 3.2.4 – Implement Free Route Airspace

The following chart highlights the overall structure of the ATM Functionality #3, namely its SUB AFs, Families and their relevant Implementation initiatives related to both 2014 CEF Call awarded projects and 2015 CEF Call candidate projects.

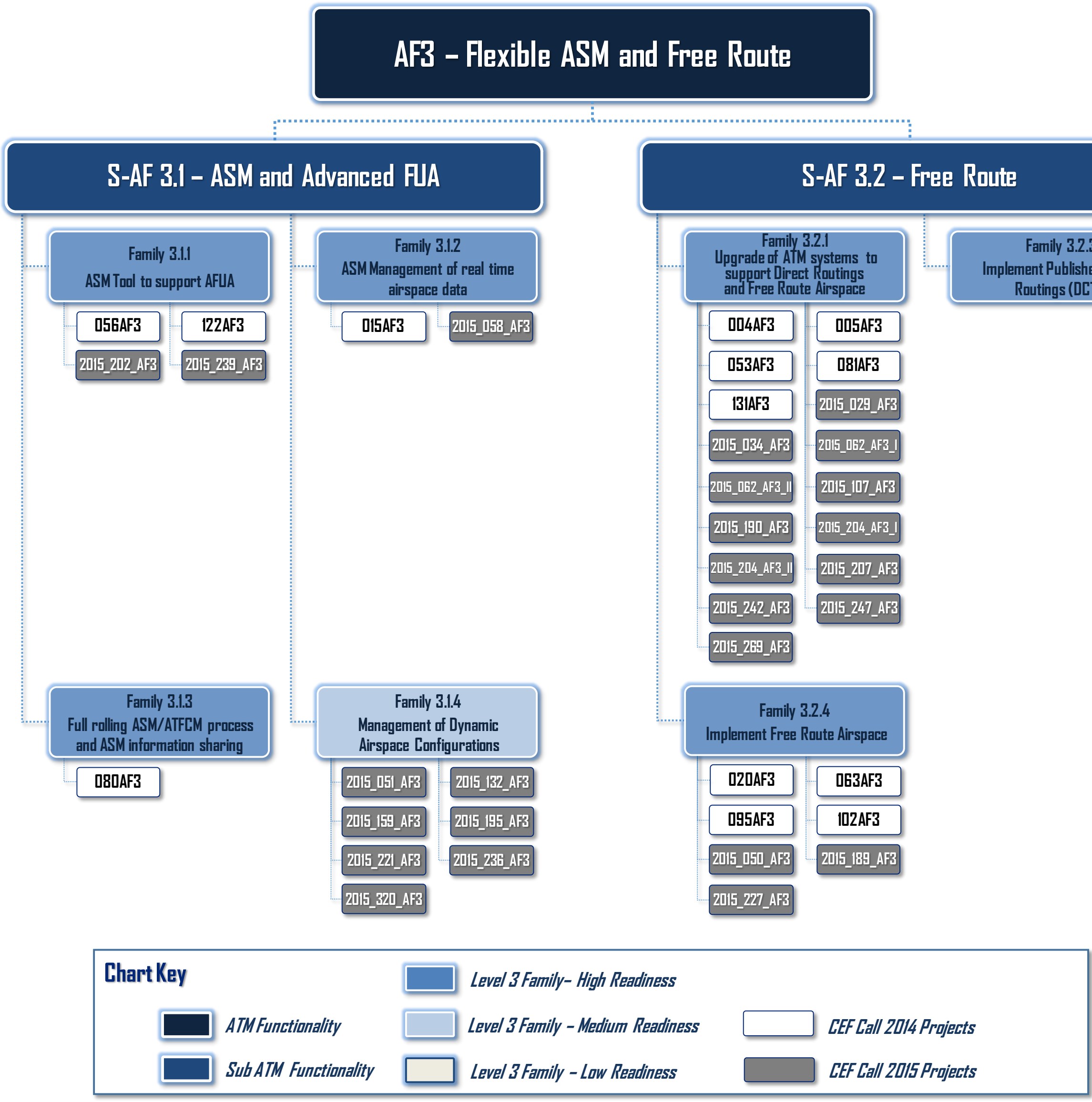


Fig. 19 – AF #3 Structure

The following Gantt chart shows the implementation roadmap for each Family included in AF3 in terms of start and end date of deployment, and it has been defined taking into account the target dates for each ATM Functionality and Sub-ATM Functionality, as stated in Regulation (EU) No 716/2014.

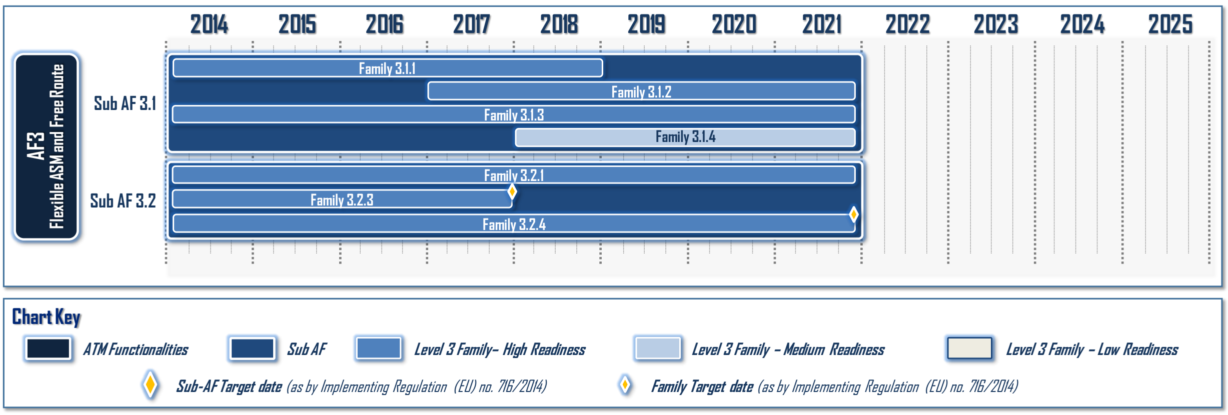


Fig. 20 – AF #3 Implementation Timeline

Family 3.1.1 – ASM tool to support AFUA

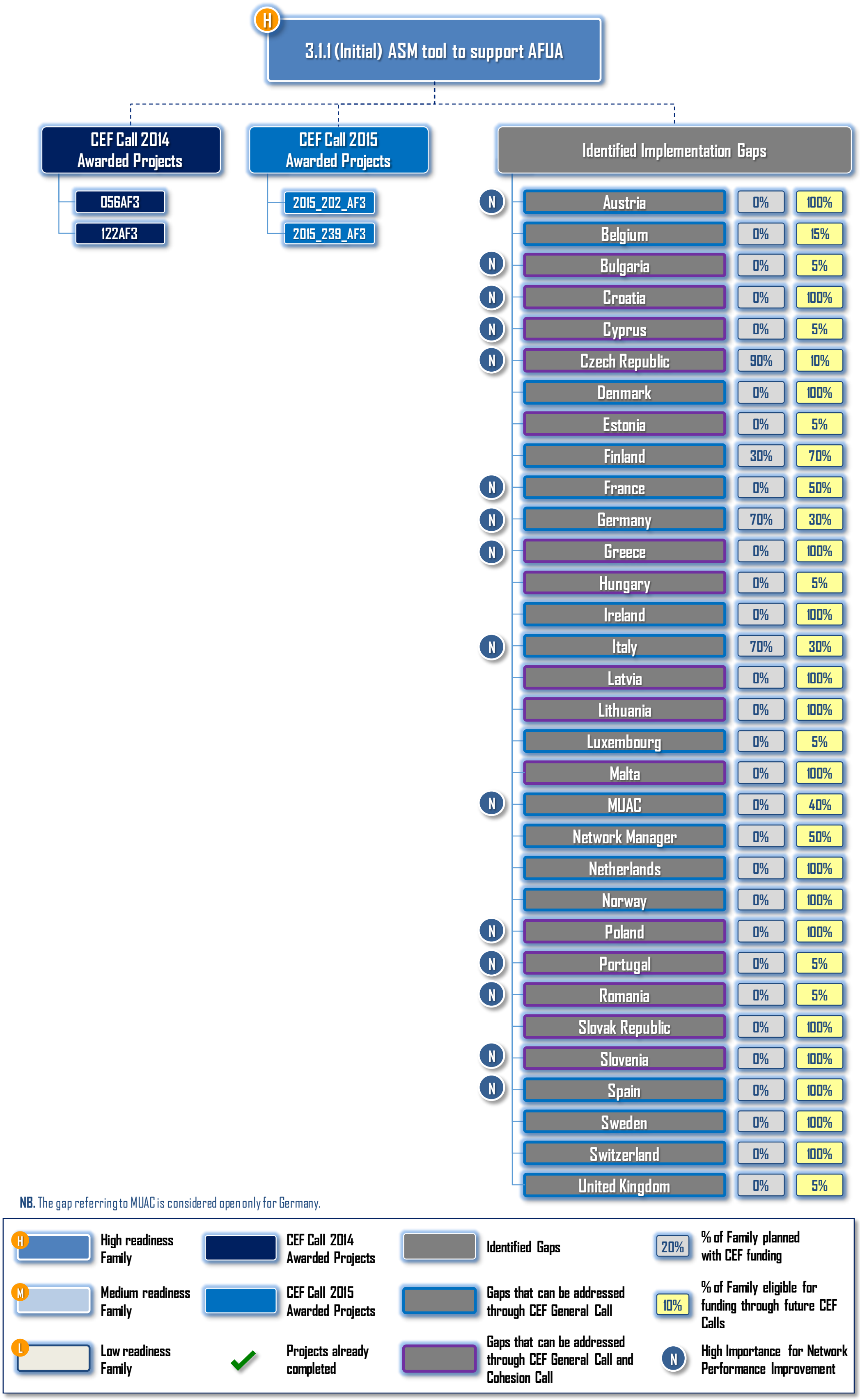
3.1.1 – ASM Tool to support AFUA			
Main Sub-AF	S-AF 3.1 Airspace Management and Advanced Flexible Use of Airspace		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2019

Description and Scope
Deployment of automated ASM systems and their interoperability with NM systems and neighbouring ASM systems, to manage ARES, resulting from civil-military co-ordination, more flexibly according to airspace users' needs. Automated ASM support system shall: - improve airspace management processes and flexible airspace planning including time horizon specifications in all flight phases (strategic, pre-tactical and tactical time horizon) by providing mutual visibility on civil and military requirements; - Support a flexible airspace planning according to civil and military ANSPs and airspace user requirements, extended also to permit cross border and use of segregated areas operations regardless of national boundaries; - Support dynamic airspace management and flexible sector configurations; - Address the strategic/long term, pre-tactical planning and tactical operations; - Be compatible and ensure uninterrupted data flow with NM system and neighbouring ASM systems between the pre-tactical planning and real time airspace status; - Possibly provide data for impact assessment and share results of impact evaluation of different airspace configurations on the network; - Be interoperable with NM systems and neighbouring ASM systems
Interdependencies
Prerequisite for: Fam. 3.1.2 ASM management of real time airspace data Fam. 3.1.3. Full rolling ASM/ATFCM process and ASM information sharing Interdependency with: S-AF 5.3 Aeronautical information exchange S-AF 5.5 Cooperative Network Information Exchange
Synchronization Needs
Operational and technical synchronisation between NM, National Airspace Management Cells, Civil-Military AUs and Civil-Military ANSPs is required
Civil / Military Coordination
A civil-military coordination is beneficial for procedural and operational purposes as well as for systems in order to process ARES Status data.

Enablers for civ-mil coordination are support systems and procedures to share ASM information and manage ASM level 2. This initiative is to deploy local ASM support systems meeting a baseline definition to manage airspace locally based on civil – military coordination. Military Air Planning entities should have an interface with ASM support system.		
Stakeholders considered as gaps	Civil-Military ANSPs, Network Manager and Military AUs	
Other stakeholders involved in the Family deployment	None	
Links to ICAO GANP ASBUs	B0-FRTO Improved Operations through Enhanced En-route Trajectories	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AOM-0202 Available
	ATM Master Plan Level 3 (Edition 2016)	AOM19.1
SESAR Solutions	N/A	
Very Large Scale Demonstrations	N/A	
Guidance Material / Specifications / Standards	Network Strategy Plan (NSP): SO 3/2 and SO 3/3 ERNIP Part 3 - Handbook for Airspace Management - Guidelines for Airspace Management; (Nov. 2015) ECTL LARA Local and sub-Regional Airspace Management Support System: edition 23/01/2015 ECTL Advanced FUA Concept edition 1.0 24/07/2015 ECTL Aeronautical Information Exchange Model v5.1	
Means of compliance and / or Certification	Communication 2009/C 2196/05 Community Specifications for the application of the Flexible Use of Airspace (FUA)	
Regulations	Commission Regulation (EC) 2150/2005 Commission Regulation (EC) 677/2011 as amended by Commission Implementing Regulation (EU) 970/2014	
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them.	

Recommendation for IPs proposal	ASM tool implementation allows data exchange with NM and neighbouring ANSPs in support of ARES coordination and it covers the pre-requisite for 3.1.2 and 3.1.3. It is recommended to take into consideration the results of Gap Analysis.
Deployment Approach	The implementation of the Family requires the successful installation of the ASM Tool, as an enabler for the proper support of the civil - military coordination **(MM1 – ASM tool installation)**. Monitoring and operational validation activities shall be completed in order for the ASM Tool to ensure interoperability (via B2B) (**MM2 – ASM tool integration**). Before the start of operational use of the ASM Tool, procedures for operational and technical use of the system shall be provided (**MM3 – Procedures available**), all safety assessments required shall be duly executed and all the output documents shall be then timely released (**MM4 – Safety assessment**). The execution of such activities is expected to lead to the start of permanent operational use (**MM5 – Implementation completed**).

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 3.1.1 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 3.1.2 – ASM Management of real time airspace data

3.1.2 – ASM Management of real time airspace data			
Main Sub-AF	S-AF 3.1 Airspace Management and Advanced Flexible Use of Airspace		
Readiness for implementation	High		
Initial Operational Capability	01/01/2017	**Full Operational Capability**	01/01/2022

Description and Scope

The airspace management (ASM) is enhanced by automated exchange services of ASM data during the tactical execution phases continuously in real time. ASM information (real-time ARES status) are shared between ASM systems, civil and military ATS units/systems and communicated to NM in the tactical and execution phases. These data, consisting of pre-notification of activation, notification of activation, de-activation, modification and release, are collected, saved and processed, with the need to be exchanged between ASM stakeholders and made available by the NM system, to ATM actors and all airspace users not involved in ASM process but concerned by these data.

The scope of this family encompasses:

- Procedural and system upgrades (ASM, ATM, NM and Civil-Military AU systems-i.e. CFSP) for exchange of real time airspace status data where required;
- Integration and management of ASM real-time data into ANSPs ATM systems and into AUs (CFSP, etc.) flight planning systems where required.
- Full sharing of real time airspace status updates in planning and/or execution phases, in order to take early advantage of possible opportunities and/or to achieve real time awareness of airspace features.

Interdependencies

Pre-requisite for this family is family 3.1.1 - ASM tool to support AFUA

Other dependencies:

Family 3.1.3 - Full rolling ASM/ATFCM process and ASM information sharing

S-AF 5.3 - Aeronautical information exchange

S-AF 5.5 - Cooperative Network Information Exchange

Synchronization Needs

Operational and technical synchronisation between NM, National Airspace Management Cells, Military AUs and Civil-Military ANSPs is required

Civil / Military Coordination

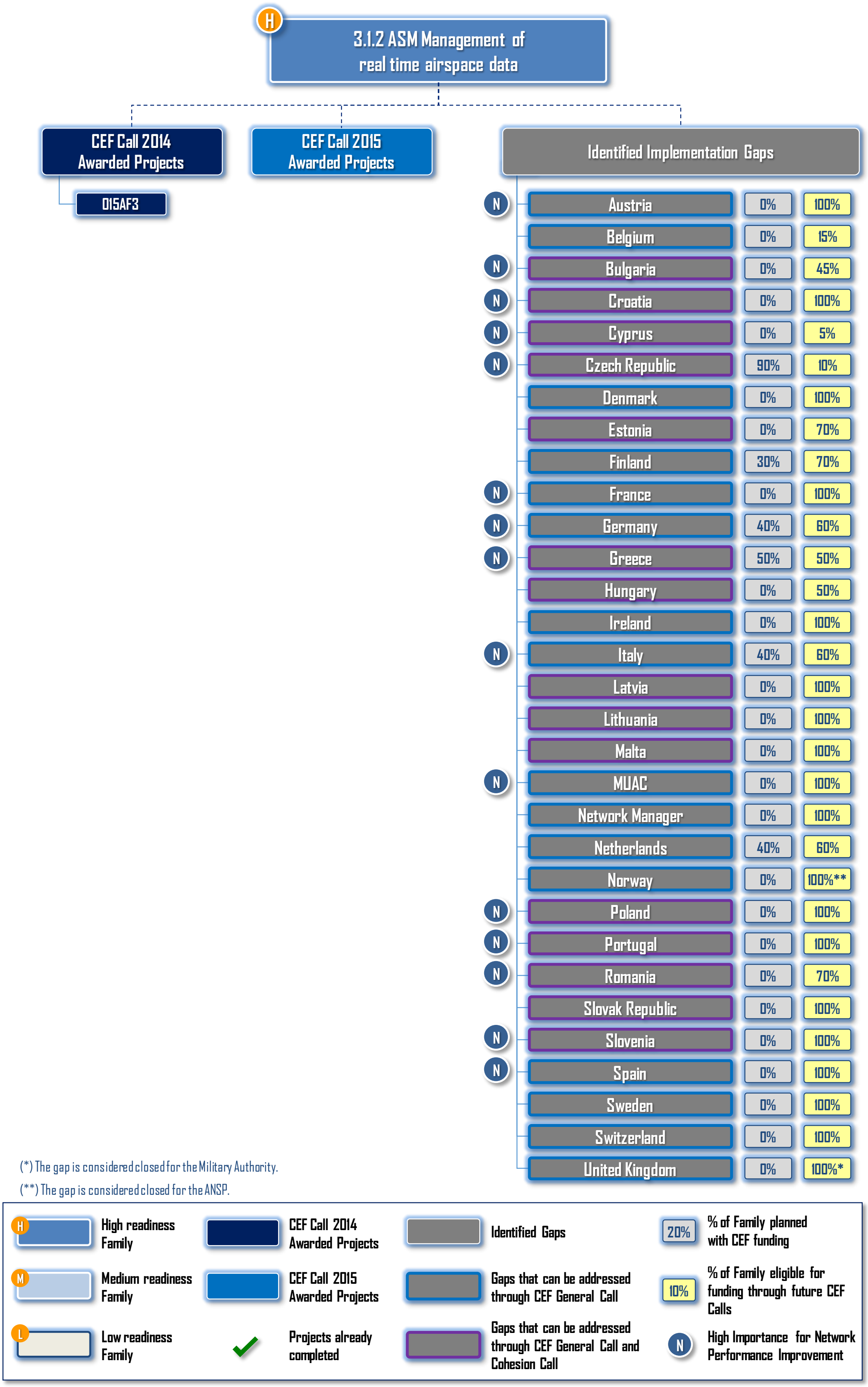
A civil-military coordination is beneficial for procedural and operational purposes as well as for systems in order to process ARES Status data.

Enablers for civ-mil coordination are support systems and procedures to share real time ASM information and manage ASM level 3. This initiative is to upgrade the local ASM support systems or implement other means to meet the requirements of civil military coordination at level 3.

Stakeholders considered as gaps	Civil-Military ANSPs, Network Manager, Military AUs	
Other stakeholders involved in the Family deployment	Airspace Users (CFSPs)	
Links to ICAO GANP ASBUs	B0-FRTO Improved Operations through Enhanced En-route Trajectories	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AOM-0206-A SESAR Release 5 AOM-0202-A SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	AOM19.2
SESAR Solutions	#31 "Variable profile military reserved areas and enhanced (further automated) civil-military collaboration"	
Very Large Scale Demonstrations	**Release 7:** N/A **Release 8:** N/A **Release 9:** N/A	
Guidance Material / Specifications / Standards	Network Strategy Plan (NSP): SO 3/2 and SO 3/3 Directions of work for enhancing the ASM/ATFCM/ATS processing in the short and medium term 2012-2017 - Edition 1.0 (Date: 14/11/11) ECTL Specification for ASM Systems Interfaces Supporting Advanced Flexible Use of Airspace ECTL LARA Local and sub-Regional Airspace Management Support System: edition 23/01/2015 ECTL Advanced FUA Concept edition 1.0 24/07/2015 ERNIP Part 3 - Handbook for Airspace Management - Guidelines for Airspace Management; November 2015 Aeronautical Information Exchange Model (AIXM) v5.1	
Means of compliance and / or Certification	Communication 2009/C 2196/05 Community Specifications for the application of the Flexible Use of Airspace (FUA)	
Regulations	Commission Regulation (EC) 2150/2005 Commission Regulation (EC) 677/2011 as amended by Commission Implementing Regulation (EU) 970/2014	
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some	

	components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them
Recommendation for IPs proposal	The scope of this family might require changes in ATM systems, AU systems and NM systems, which need to be undertaken after the deployment of ASM tools in support of real time airspace status updates, in planning and execution phase. It is recommended to take into consideration the results of Gap Analysis
Deployment Approach	The implementation of the Family requires the successful upgrade of the ASM tool **(MM1 – Upgrade of ASM tool)**, to support a continuous real time data exchange during the tactical phase and thus in order to manage airspace data and airspace status **(MM2 – System updates for the exchange of real time airspace data)**. All the relevant data shall be integrated into the ATM Systems, the interoperability with the Network Manager system and with other ASM systems shall be carefully monitored and verified **(MM3 – Systems integration with ATM, ASM and NM systems)**. Before the start of operational use of the ASM System, procedures for operational and technical use of the system shall be provided **(MM4 – Procedures available)**, all safety assessments required shall be duly executed and all the output documents shall be then timely released **(MM5 – Safety assessment)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM6 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 3.1.2 awarded in 2014 CEF Call, along with a more detailed description of each Implementation Project. No IP has been awarded in 2015 CEF Call.

Family 3.1.3 – Full rolling ASM/ATFCM process and ASM information sharing

3.1.3 – Full rolling ASM/ATFCM process and ASM information sharing			
Main Sub-AF	S-AF 3.1 Airspace Management and Advanced Flexible Use of Airspace		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2022

Description and Scope

This process focuses on airspace planning improvements and to ensure a continuous, seamless and reiterative planning, allocation and operational deployment of optimum airspace configurations, based on airspace request at any time period within strategical level 1, pre-tactical level 2 and tactical level 3. It will result in a rolling process, supporting the enhancement of the daily Network Operations Plan. This will allow airspace users to better take benefit from changes in airspace structures in real-time.

This will be supported by the sharing of military airspace and civil data and by continuously updating Airspace Reservation information and other civil demand information among the authorized users and approved agencies in order to enhance the coordination of Cross Border Operations including Cross Border Area, and to optimise the whole network operations based on the richest and most correct information.

ASM information sharing addresses the required system support improvements able to ensure a seamless data flow and their management in the frame of the enhanced CDM process. It includes requirements aiming to improve the notification to airspace users based on automation of data exchange.

The scope of this family encompasses:

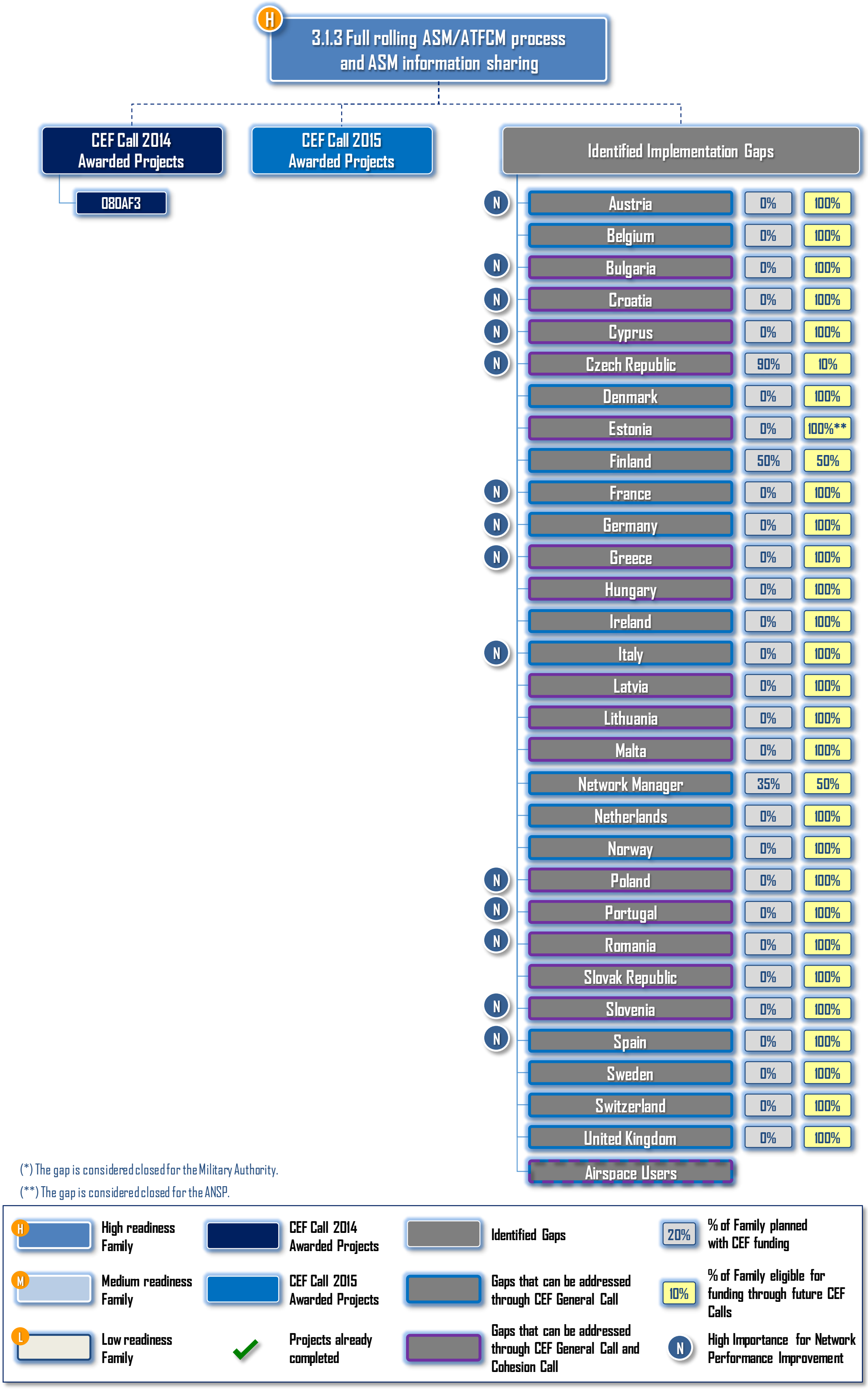
- Process/system upgrade supporting a full rolling ASM/ATFCM and dynamic ASM/ATFCM process allowing data sharing to all operational stakeholders, although some States with limited airspace booking needs may fully rely on NM system capabilities
- Technical changes supporting Rolling AUP
- Rolling UUP for procedure 3
- Initial implementation of FUA/EU restriction and FBZ in NM system and local/regional ASM systems
- Full implementation of new AUP template
- Define AIXM coding for the AUP changes introduced
- Process/System changes for full management of Airspace structure taking into account AUP/UUP information
- Process/System changes for initial CDM
- Process/System changes relevant to CDM for FRA impact assessment on network
- Harmonise cross border CDRs notifications
- Harmonisation of ARES notifications
- Implement Graphical display of AUP/UUP on NOP Portal (with lateral/vertical limits indication)

- Process/system improvements supporting sharing of information of airspace configuration via AUP/UUP - ASM management and data sharing shall be addressed also to an environment where airspace is managed dynamically with no fixed-route network - ASM systems adapted to continuously exchange ASM information. - AU system upgrades for ASM data sharing	
Interdependencies	
Fam. 3.1.1 – ASM tool to support AFUA (prerequisite) Fam. 3.1.2 – ASM management of real-time data Fam. 3.1.4 - Management of dynamic airspace configurations S-AF 5.3 - Aeronautical Information Exchange S-AF 5.5 – Cooperative Network Information Exchange Family supports –as stated in the PCP IR – the introduction of DCT and FRA	
Synchronization Needs	
Operational and technical synchronisation between NM, National Airspace Management Cells, AUs and Civil-Military ANSPs is required	
Civil / Military Coordination	
A civil-military coordination is beneficial for procedural and operational purposes as well as for systems in order to process ARES Status data.	

Stakeholders considered as gaps	Civil-Military ANSPs, Civil-Military AUs (CFSPs), Network Manager	
Other stakeholders involved in the Family deployment	None	
Links to ICAO GANP ASBUs	B0-FRTO Improved Operations through Enhanced En-route Trajectories	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AOM-0202-A SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	AOM19.3
SESAR Solutions	#31 “Variable profile military reserved areas and enhanced (further automated) civil-military collaboration”	
Very Large Scale Demonstrations	**Release 7:** N/A **Release 8:** N/A **Release 9:** N/A	
Guidance Material / Specifications / Standards	ECTL Specification for ASM Systems Interfaces Supporting Advanced Flexible Use of Airspace Network Strategy Plan (NSP): SO 3/2 and SO 3/3 ERNIP Part 3 - Handbook for Airspace Management - Guidelines	

	for Airspace Management; November 2015 NOP User Guide; Edition:19.0-92 Date:25/03/2015 Responsibilities Document for the application of Air Traffic Flow Management (ATFM); Edition 1.0; Edition Date: 25/10/2012 ECTL Advanced FUA Concept edition 1.0 24/07/2015 ECTL Aeronautical Information Exchange Model v5.1
Means of compliance and / or Certification	Communication 2009/C 2196/05 Community Specifications for the application of the Flexible Use of Airspace (FUA)
Regulations	Commission Regulation (EC) 2150/2005 Commission Regulation (EC) 677/2011 as amended by Commission Implementing Regulation (EU) 970/2014
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them
Recommendation for IPs proposal	This family is a key feature for the European airspace planning process and the continuous update of information about: ARES via AUP/UUP, traffic demand and necessary data among all stakeholders in a full rolling process. All involved stakeholders should submit proposals for process/systems updates in order to achieve full management of shared information. It is recommended to take into consideration the results of Gap Analysis.
Deployment Approach	The implementation of the Family would require the systems to be upgraded in order to include technical changes needed for rolling AUP, rolling UUP Procedure 3, new AUP Template, CDM impacting FRA, graphical display areas on NOP, management and data sharing also referred to FRA airspace **(MM1 – System updates for the full rolling ASM/ATFCM process and ASM information sharing)**. All Stakeholders Systems, being ASM Systems, AU Systems and NM Systems, shall be integrated for information and data sharing, which shall then be properly monitored and verified **(MM2 – Integration completed)**. Before the start of operational use of the system, procedures for its operational and technical use shall be provided **(MM3 – Procedures available)**, all safety assessments required shall be duly executed and all the output documents shall be then timely released **(MM4 – Safety assessment)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM5 – Implementation completed)**.

Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 3.1.2 awarded in 2014 CEF Call, along with a more detailed description of each Implementation Project. No IP has been awarded in 2015 CEF Call.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 3.1.3 awarded in 2014 CEF Call, along with a more detailed description of each Implementation Project. No IP has been awarded in 2015 CEF Call.

Family 3.1.4 – Management of dynamic airspace configurations

3.1.4 – Management of Dynamic Airspace Configurations			
Main Sub-AF	S-AF 3.1 Airspace Management and Advanced Flexible Use of Airspace		
Readiness for implementation	Medium		
Initial Operational Capability	01/01/2018	**Full Operational Capability**	01/01/2022

Description and Scope

The ASM solutions process is aimed at delivering ASM options that can help alleviate capacity problems identified in any particular area of European airspace as well as improve flight efficiency assessing impact on capacity and ensuring synchronised availability of optimized airspace structures based on traffic demand and dynamic sectors management.

The Airspace configurations are pre-defined and coordinated airspace structures (based on CDRs, DCTs, FRA, including ARES, VPA/DMA and so on) and ATC dynamic sectorisation, to meet airspace needs in terms of capacity and/or flight efficiency. Airspace configurations and ATC flexible sectors configuration are already used when the flows and constraints can be predicted well in advance (e.g. weekend routes or seasonal flows of traffic). A more efficient and dynamic process involving the NM, ATFCM, ATC and military would require new functionalities and procedures and well defined collaborative decision making processes at pre-tactical level.

Dynamic Airspace Configuration focuses on defining a reference to Dynamic Airspace Configuration concept, including roles and responsibilities in an advanced CDM process.

The ASM performance analysis should assess the flight efficiency gains resulting from the rolling ASM/ATFCM process implementation. The Capacity aspects need also to be addressed.

The scope of this family encompasses:

- Improved ASM solution process.
- Process/System changes for predefined airspace configurations including DCTs and FRA.
- ASM/ATFCM and ATM systems should support the full sharing of the dynamic airspace configuration inputs and outputs via specific B2B services. The notification of Airspace Configurations will be based on automatic flows of information between the different stakeholders provided by the Network Manager.
- System improvements supporting the management of dynamic airspace configuration including DCTs and FRA (included implementation of ATM VoIP communications enabling dynamic airspace configuration).
- Implement supporting tools for ASM performance analysis.

Interdependencies

Pre-requisite: Fam. 3.1.3 – Full rolling ASM/ATFCM process and ASM information sharing

Fam. 3.1.2 ASM Management of real time airspace data

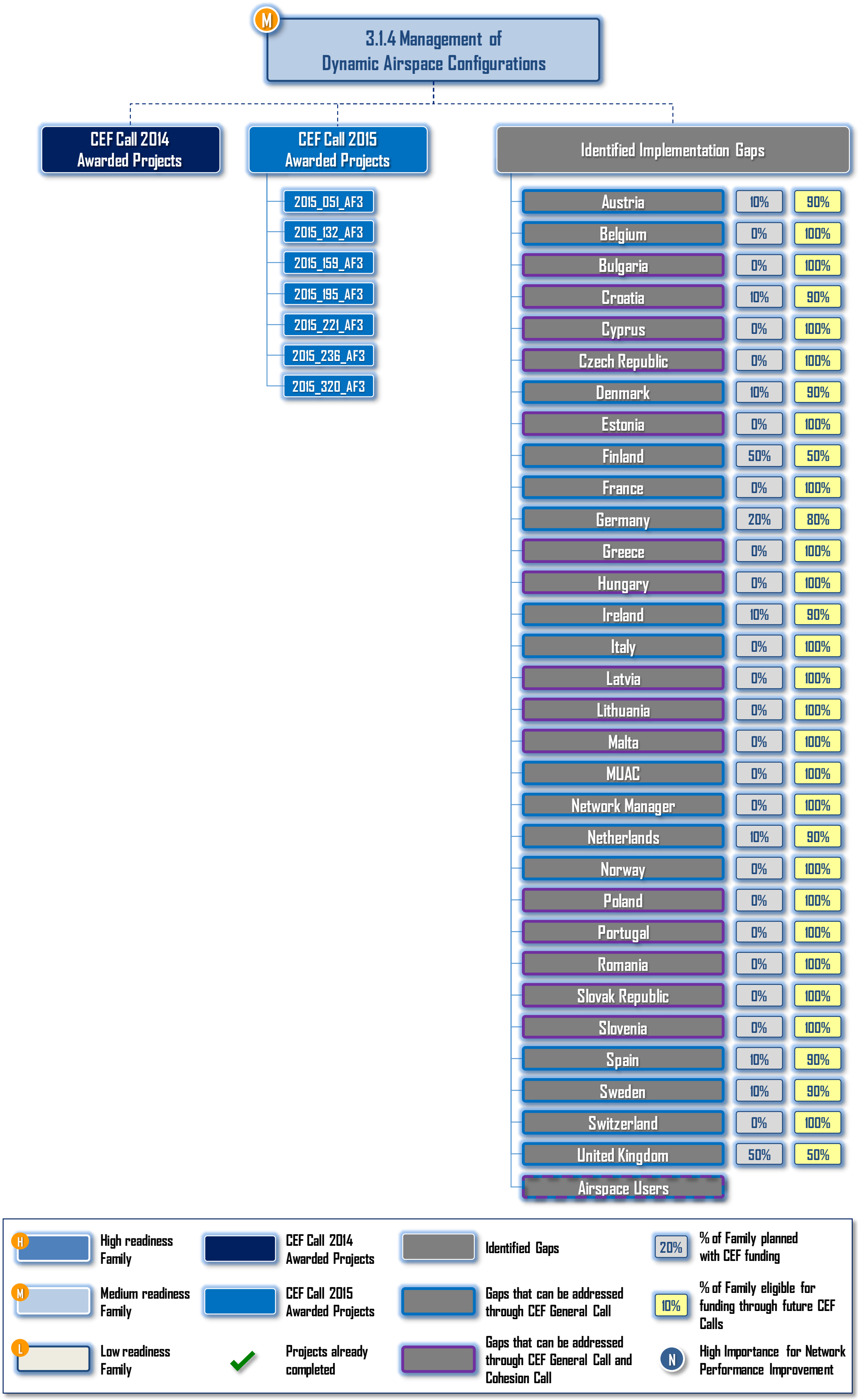
S-AF 5.3 - Aeronautical Information Exchange

S-AF 5.5 – Cooperative Network Information Exchange

Synchronization Needs		
Operational and technical synchronisation between NM, National Airspace Management Cells, Civil and Military AUs and Civil-Military ANSPs is required.		
Civil / Military Coordination		
A civil-military coordination is beneficial for procedural and operational purposes as well as for systems in order to process ARES Status data.		
Stakeholders considered as gaps	Civil-Military ANSPs, Network Manager	
Other stakeholders involved in the Family deployment	Military Authorities	
Links to ICAO GANP ASBUs	B0-FRTO Improved Operations through Enhanced En-route Trajectories	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	CM-0102-A SESAR Release 2 AOM-0805 SESAR 2020 Second Wave AOM-0809 SESAR 2020 Second Wave
	ATM Master Plan Level 3 (Edition 2016)	AOM19.4
SESAR Solutions	#66 "Automated Support for Dynamic Sectorisation" PJ.08-01 "Management of Dynamic Airspace configurations"	
Very Large Scale Demonstrations	**Release 7:** N/A **Release 8:** N/A **Release 9:** N/A	
Guidance Material / Specifications / Standards	EUROCAE ED-136 VoIP ATM System Operational and Technical Requirements EUROCAE ED-137B Interop. Standards for VoIP ATM Components Update of ED-137B Part 2 Network Design Guideline EUROCAE ED-138 VoIP Network Requirements and Performance for VoIP ATM Systems Network Strategy Plan (NSP): SO 3/2 and SO 3/3 ECTL Advanced FUA Concept edition 1.0 24/07/2015 ERNIP Part 3 - Handbook for Airspace Management - Guidelines for Airspace Management; November 2015	
Means of compliance and / or Certification	None	

Regulations	Commission Regulation (EC) No 2150/2005
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them.
Recommendation for IPs proposal	The deployment of predefined airspace configuration could start from the beginning of 2018 onwards. IP proposals should be focused on concept and study of ASM solutions achieving a more efficient process (included new system functionalities, if envisaged) supporting optimized airspace structure and availability, ATC dynamic sectors management, to enhance flight efficiency and alleviate capacity problems with reference to predefined airspace configurations. It is recommended to take into consideration the results of Gap Analysis.
Deployment Approach	The implementation of the Family would require the definition of a pre-defined airspace configuration concept, providing deliverables such as CONOPS, while also sharing roles and responsibilities in an advanced CDM perspective **(MM1 – Pre-defined airspace configuration concept definition)**. ATM systems shall be subsequently upgraded, with particular reference to the ANSP and NM System, including VoIP communications in support of airspace structure availability and its dynamic configuration management, addressed also to DCTs and FRA environment **(MM2 – ATM systems upgrade)**. The installation of new software and/or tools shall be successfully completed **(MM3 – SW/Tools installation)** and the ANSP-NM integration of such SWs/Tools among all Stakeholders systems shall be closely monitored and verified **(MM4 – SW/Tools integration)**. Before the start of operational use of the system, procedures for its operational and technical use shall be provided **(MM5 – Procedures available)**, all safety assessments required shall be duly executed and all the output documents shall be then timely released **(MM6 – Safety assessment)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM7 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



A dedicated table within Annex A encompasses the list of implementation initiatives associated to Family 3.1.4 awarded in 2015 CEF Call, along with a more detailed description of each Implementation Project. No Implementation Project associated to this Family has been awarded in 2014 CEF Call.

Family 3.2.1 – Upgrade of ATM systems (NM, ANSPs, AUs) to support Direct Routings (DCTs) and Free Routing Airspace (FRA)

3.2.1 – Upgrade of ATM systems (NM, ANSPs, AUs) to support Direct Routings (DCTs) and Free Route Airspace (FRA)			
Main Sub-AF	S-AF 3.2 Free Route		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2022

Description and Scope

NM systems have been upgraded to support Free Route operations that can be done by means of published DCTs (initial step) or directly FRA. Only some corrections and tuning are required for DCTs. The NM system upgrades related to dynamic re-routing, ATFCM planning and execution and traffic load management are part of AF 4 families, namely 4.1.2 and 4.4.2.

The AU flight plan filing systems (CFSP) should be upgraded (e.g. to support long DCT segments and handling of LAT/LONG, if required). Specific attention should be given to the management of any ASM/ATFCM constraint in a FRA environment, and to the necessary standardisation of free route implementation concerning the flight planning requirements. The ANSP system upgrades include the FDPS (e.g. management of FPL trajectories including LAT/LONG management, if required), the Controller Working Position (CWP) and the HMI which need to support DCTs/FRA. ATC systems may also be upgraded, for example, with CPDLC messages handling LAT/LONG, CPDLC reception and use data from aircraft coming from ADS-C EPP when these data link services are implemented. Although the above mentioned requirements do not make a direct reference to Multi-Sector Planner/Extended ATC Planner (MSP/EAP) function, the indirect links do exist and MSP/EAP deployment in the context of DCTs/FRA should be considered. The system upgrades can be clustered in 3 points:

1. For State/Regional (e.g. cross-border) DCTs they shall encompass:
   - NM systems:
     - FPL processing and checking
     - Dynamic rerouting
     - Calculation and management of traffic load
   - AU systems:
     - FPL route planning for a complete flight taking into account the differences of implementation and limitations (e.g. in terms of opening time and/or flight level constraints) throughout the entire flight.
     - Long DCT with or without calculated intermediate points.
   - ATC systems:
     - FDPS supporting airspace structure managing trajectories according to flight planning
     - CWP and HMI supporting appropriate display and functions as required by operational needs
2. For State/Regional (e.g. cross-border) FRA deployment they shall encompass the upgrades listed in point 1) plus:

- NM systems:
  - IFPS routing proposal
  - Specific ASM improvements for FRA
  - Network impact assessment for FRA
  - CACD adaptations for FRA national deployment
- AU systems:
  - Capability to take into account the different constraints, e.g.: ATS, DCT/FRA, RAD, scenarios, FL constraints on part of the route only, etc,
  - FPL route planning for a complete flight taking into account the differences of implementation (DCT, FRA with or without partial implementation) throughout the entire flight.
- ATC systems:
  - FDP to calculate ground 4D trajectories within AoI and editing function for 4D trajectories including Cross AoR Points (COP management)
  - ASM/ATFCM for FRA management
  - MTCD (detecting conflicts between A/C and A/C)
  - CORA (conflict probe and passive conflict resolution advisor)
  - MONA (conformance monitoring aids)
  - ATC clearances beyond AoR
  - ATC to ATC Flight Data Exchange (Basic OLDI and SYSCO)
  - Dynamic sectorization and constraint management
  - Dynamic Area Proximity Warning (APW) - Integration with ASM tools
  - Provision/integration of FP and real time data related to the FRA traffic to the Military ATS units
  - Depending on traffic load and complexity, besides MTCD and CORA, ANSPs should consider the deployment of Conflict Detection Tools which include the Tactical Controller Tool (TCT), using the tactical trajectory and managing the clearances along that trajectory

3. For Pan-European FRA deployment they shall encompass the upgrades listed in point 2) plus:
   - NM systems:
     - CACD environmental database adaptations for FRA cross-border operations
     - B2B data exchange for cross border FRA
   - ATC systems:
     - COP management for FRA supporting Cross Border COP handling
     - Tactical Controller Tool (TCT), managing the Cross Border clearances
   - AU systems:
     - optimisation of free routing trajectory taking into account the ATM constraints including possible differences of FRA lower limit implementations throughout the flight

Interdependencies

Enabler for:

- 3.2.3 – Implement published Direct Routings
- 3.2.4 - Implement Free Route Airspace

Linked with:

- 4.1.2 STAM phase 2
- 4.4.2 Traffic Complexity tools

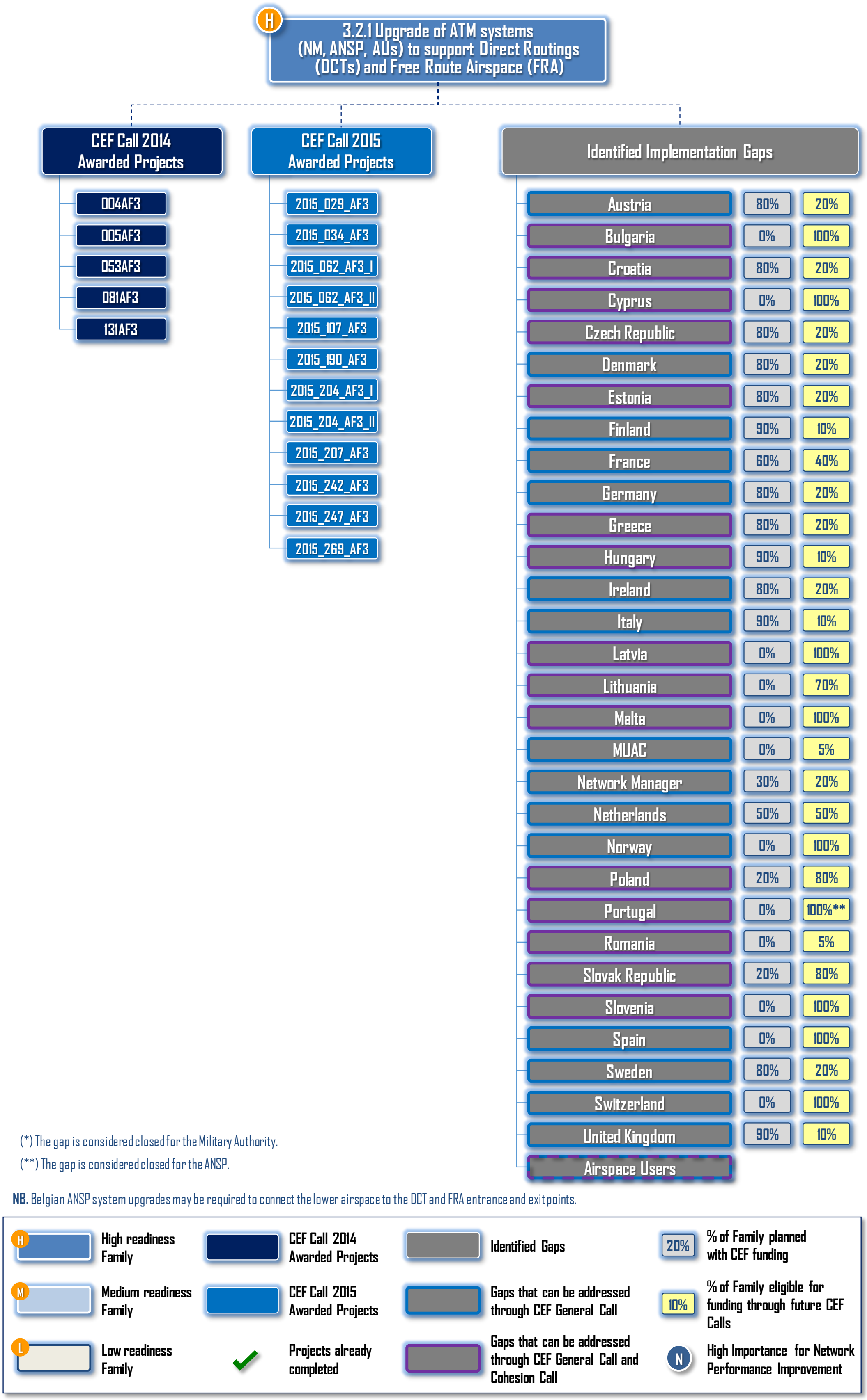
For some modifications (including MSP) linked with:

- Sub AF 1.1 Arrival management extended to en-route airspace - Sub AF 1.2 Enhanced Terminal Airspace using RNP Based Operations Interdependencies with G/G data communications as specified in AF5 and A/G Datalink capability as specified in AF6 are facilitators for the full FRA implementation.		
Synchronization Needs		
Synchronisation between NM, AU and ANSPs is required.		
Civil / Military Coordination		
Civil-military Coordination is beneficial for, i.e. Basic Flight Data (BFD) and Change Flight Data (CFD), other. Military ATC Systems shall be capable to process all DCT Information.		
Stakeholders considered as gaps	Civil-military ANSPs, Civil-Military AUs (CFSPs) Network Manager	
Other stakeholders involved in the Family deployment	None	
Links to ICAO GANP ASBUs	B1-FRTO Improved Operations through Optimized ATS Routing	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	CM-0202 Available CM-0203 Available AOM-0500 SESAR Release 5 AOM-0501 SESAR Release 5 AOM-0505 SESAR Release 8 CM-0102-A SESAR Release 2
	ATM Master Plan Level 3 (Edition 2016)	AOM21.1, AOM21.2, ATC02.8, ATC12.1, ATC17, ITY-COTR
SESAR Solutions	#32 "Free Route through the use of Direct Routing" #65 "User Preferred Routing" #33 "Free Route through Free Routing for Flights both in cruise and vertically evolving above a specified Flight Level" PJ.06-01 "Optimized traffic management to enable Free Routing in high and very high complexity environments" #66 "Automated Support for Dynamic Sectorisation"	
Very Large Scale Demonstrations	**Release 7:** N/A **Release 8:** N/A **Release 9:** N/A	

Guidance Material / Specifications / Standards	Updated ECTL Extended MTCD Specifications (2017) Updated ECTL Monitoring Aids (MONA) Specification ECTL Trajectory Prediction Specification ECTL Area Proximity Warning (APW) Guidelines Network Strategy Plan (NSP): SO 3/1 SO 4/1 NM IFPS Users Manual Edition:19.0.1 (20/03/2015) ICAO Doc 9426 Air Traffic Services Planning Manual ICAO Doc 4444 PANS ATM PBN Separation Standards (2018)
Means of compliance and / or Certification	Community Specifications for On-Line Data Interchange (OLDI) edition 4.2
Regulations	Commission Regulation (EC)No 2150/2005 Commission Regulation (EU) No 677/2011, as amended by Commission Implementing Regulation (EU) No 970/2014
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them
Recommendation for IPs proposal	It is recommendable that ANSPs, NM and AUs submit IPs for procurement/upgrade of their systems for DCT/FRA operations. The stakeholders that deployed the system upgrades related to DCT/FRA should be encouraged to consider further upgrades related to cross-border, National/Regional and Pan-European deployment, in the perspective that large scale deployments (e.g.: at FAB level, 24h, with minimum entry/exit conditions/constraints) are recommendable as producing most benefits, and that these would be maximized with future Pan-European deployment. It is recommended to take into consideration the results of Gap Analysis.
Deployment Approach	The implementation of the Family would require the definition of CONOPS for the system/functions **(MM1 – Concept of the new system/functions definition)**, the preparation of the related technical and operational specifications **(MM2 – Operational and technical requirements preparation)** and the signature of the contract(s) for the supplying, installation and integration of such system/functions (**MM3 – Procurement of new system/functions**). In order for the system/functions to be set for operational use, the Factory as well as the Site acceptance test and validation

	shall be successfully performed **(MM4 – Factory Acceptance Test for new system/functions, MM5 – Site Acceptance Test for new system/functions)**, both illustrated in the Family description. Such updated systems shall then be installed **(MM6 – Systems installation)** and their integration, in particular ANSP-ANSP for OLDI and SYSCO, NM-ANSP for FRA airspace definition and NM-CFSP for flight planning requirements, shall be carefully monitored and verified **(MM7 – Systems integration)**. Further activities shall be performed to make such systems available and, more in detail, tailored procedures shall be established and provided for the operational/technical use of the new SWs/tools **(MM8 – Procedures available)**, all safety assessments required shall be duly executed and all the output documents shall then be timely released **(MM9 – Safety assessment)**, all relevant personnel involved shall be appropriately trained **(MM10 – Training of personnel)**, the transition plan prepared and the related transition phase initiated **(MM11 – Transition from legacy system to new one)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM12 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



(*) The gap is considered closed for the Military Authority.

(**) The gap is considered closed for the ANSP.

NB. Belgian ANSP system upgrades may be required to connect the lower airspace to the DCT and FRA entrance and exit points.

Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 3.2.1 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 3.2.3 – Implement Published Direct Routings (DCTs)

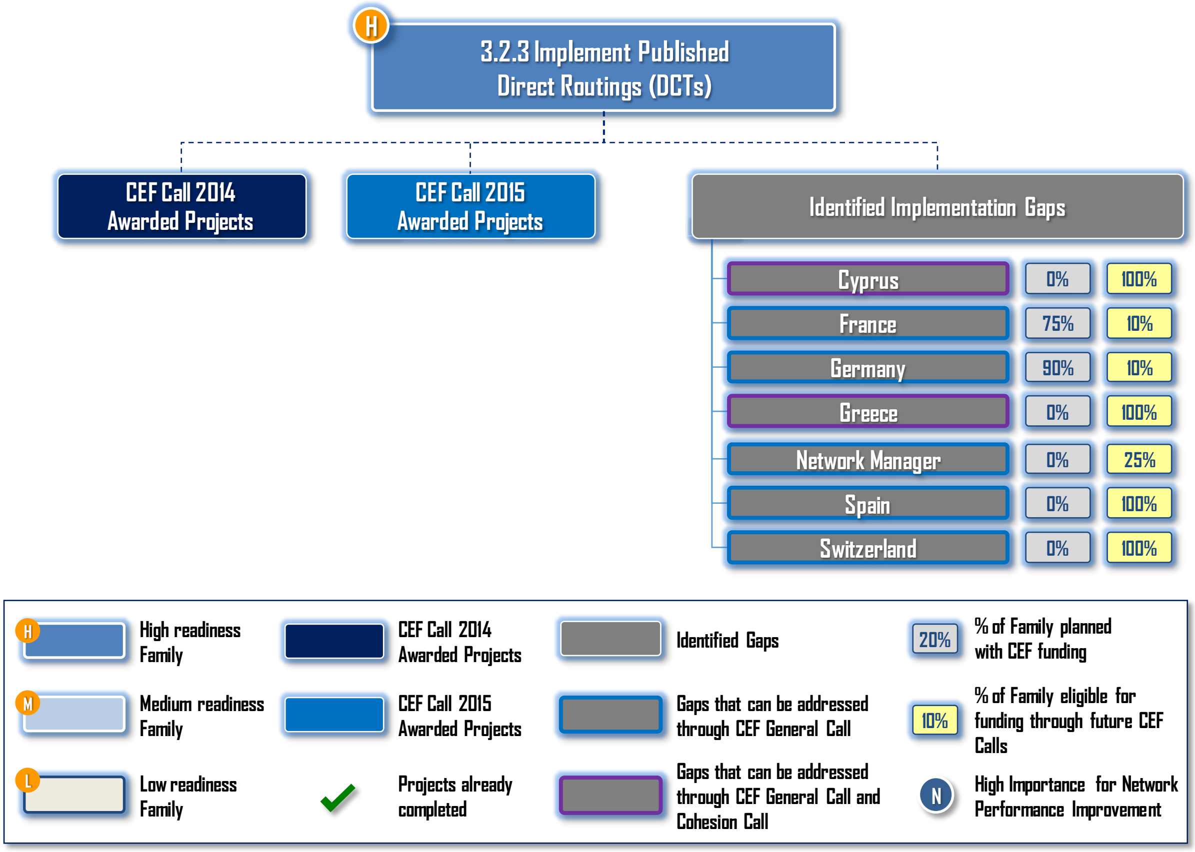
3.2.3 – Implement Published Direct Routings (DCTs)			
Main Sub-AF	S-AF 3.2 Free Route		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2018

Description and Scope
Implementation of Direct Routings(DCTs) is mandated by 01 January 2018; however the publication of flight plannable DCTs within 01 January 2018 represents an initial step toward Free Route Airspace implementation in a moment where full deployment of FRA, especially in high complexity environment, may not be the best solution in terms of performances. Therefore, Stakeholders may or may not deploy DCT's as an intermediate step. DCTs may be implemented within a State or between States on a cross border basis. Within this airspace, flights remain subject to air traffic control. DCTs shall be published in aeronautical publications as described in the European Route Network Improvement Plan (ERNIP) of the Network Manager. To facilitate early implementation before the target deployment date, DCTs could be implemented in a limited way e.g.: - Time constraint (fixed or depending on traffic/availability) - Traffic Constraint (based on flow and/or level of traffic) - Flight level - Lateral Constraints - Entry/exit conditions
Interdependencies
The implementation of DCTs is often dependent on airspace design and in particular airspace reservations involving civil/military coordination, including OAT (OATTS-like) routes. S-AF-3.1 ASM and Advanced FUA Fam. 3.2.1 - Upgrade of ATM systems (NM, ANSPs, AUs) to support DCTs and FRA (Prerequisite)
Synchronization Needs
There is the need to coordinate/synchronize efforts (operational procedures) between ANSPs, NM and Airspace users to ensure the return of investment and/or the start of operational benefits. Coordinated activities for cross-border DCT implementation at FAB and inter-FAB level are required. The implementation of DCTs is harmonized through the NM European Route Network Improvement Plan (ERNIP) and the Network Operations Plan following the Strategic Objectives and Targets set in the Network Strategic Plan and in the Network Manager Performance Plan.

Civil / Military Coordination		
Civil-Military Coordination is beneficial for correct publication of the routes, to have ARES data available as soon as possible for planning and navigation purposes, for interfaces upgrade and full interoperability.		
Stakeholders considered as gaps	Civil-Military ANSPs, Network Manager	
Other stakeholders involved in the Family deployment	Civil-Military AUs	
Links to ICAO GANP ASBUs	B1-FRTO Improved Operations through Optimized ATS Routing	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AOM-0500 SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	AOM21.1
SESAR Solutions	#32 "Free Route through the use of Direct Routing" #65 "User Preferred Routing"	
Very Large Scale Demonstrations	**Release 7:** N/A **Release 8:** N/A **Release 9:** N/A	
Guidance Material / Specifications / Standards	Network Strategy Plan (NSP): SO 3/1 European Route Network Improvement Plan (ERNIP) Part 1 Edition June 2015 European Route Network Improvement Plan (ERNIP) Part 2 - European ATS Route Network - Edition June 2015 European Route Network Improvement Plan (ERNIP) Part 4 - Route Availability Document User's Manual; (11/2014) NM European Airspace Design Methodology – Guidelines (06/2015) ICAO Doc 9426 Air Traffic Services Planning Manual ICAO Doc 4444 PANS ATM PBN Separation Standards (2018)	
Means of compliance and / or Certification	None	
Regulations	Commission Regulation (EC) 2150/2005 Commission Regulation (EC) 677/2011 as amended by 970/2014	
Cyber security requirements	None	

Recommendation for IPs proposal	DCTs deadline is 1 January 2018 since it is considered being an intermediate step (not mandatory) towards FRA implementation. Only stakeholders that haven't already deployed or are not currently deploying FRA should submit IPs for this family. It is recommended to take into consideration the results of Gap Analysis.
Deployment Approach	The implementation of the Family would require the definition of features and operational use of the airspace where the DCTs are going to be implemented, also taking into consideration that local coordination with the Military Authority shall be performed **(MM1 – DCT airspace definition)**; fast and real time simulations shall be executed, if required, and later, whether its involvement is envisaged, NM could validate such simulations **(MM2 – Fast and Realtime Simulation)**. Operational procedures shall be provided **(MM3 – Procedures available)** and Direct Routings shall be published into the relevant aeronautical documents **(MM4 – Publication of Direct Routings)**, all safety assessments required shall be duly executed and all the output documents shall be then timely released **(MM5 – Safety assessment)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM6 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Family 3.2.4 – Implement Free Route Airspace

3.2.4 – Implement Free Route Airspace			
Main Sub-AF	S-AF 3.2 Free Route		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2022

Description and Scope
Free Route is an operational concept that enables airspace users to fly as close as possible to what they consider the optimal trajectory without the constraints of fixed route network structure. Free Route Airspace (FRA) is a specified airspace within which users may freely plan a route between defined FRA entry points and defined FRA exit points, with the possibility to route via intermediate (published or unpublished) waypoints, without reference to the ATS route network, subject to airspace availability. Within this airspace, flights remain subject to air traffic control. Reg. 716/2014 requires FRA deployment at and above FL310 within the end of 2021. To facilitate early implementations before the target deployment date, FRA may be implemented through intermediate steps (Fam. 3.2.3 - DCTs implementation is considered one of them) that allow best performances before full readiness for FRA implementation as specified in PCP. This may be done by with some limitations, for example: - laterally and vertically; - during specific periods; - with a set of entry/exit conditions - with initial system upgrades - etc. FRA shall be published in aeronautical publications as described in the European Route Network Improvement Plan of the Network Manager. FRA deployment may be deployed at national level, progressing to FAB Regional level and expressing most benefits at Pan-European level deployment. The implementation of FRA operations should be based on performance indicators.

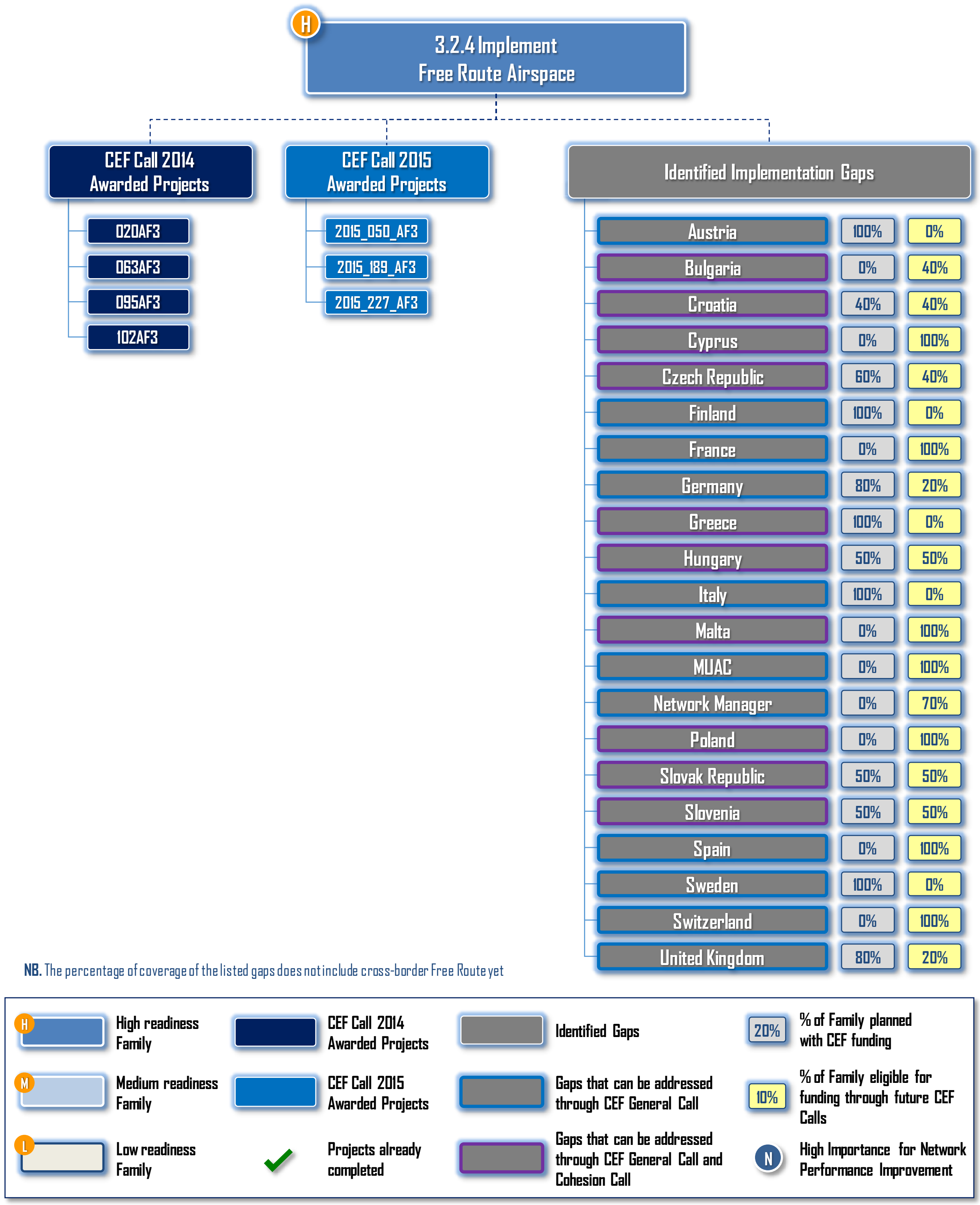
Interdependencies
The implementation of FRA is dependent on airspace design and in particular airspace reservations involving civil/military coordination including OAT (OATTS-like) routes. S-AF-3.1 – ASM and Advanced FUA Fam. 3.2.1 - Upgrade of ATM systems (NM, ANSPs, AUs) to support DCTs and FRA (Prerequisite)

Synchronization Needs
There is the need to coordinate/synchronize efforts (operational procedure and aircraft capabilities) between ANSPs, NM, Military and Airspace Users to ensure the return of

investment and/or the start of operational benefits. Coordinated activities and implementation at State, FAB, Regional and Pan-European level are required. The implementation of FRA is harmonized through the NM European Route Network Improvement Plan (ERNIP) and the Network Operations Plan following the Strategic Objectives and Targets set in the Network Strategic Plan and in the Network Manager Performance Plan. Free Route implementation strategy is a local decision coordinated at Network, FAB and Regional level.		
Civil / Military Coordination		
Civil-Military Coordination is beneficial for, i.e. Basic Flight Data (BFD) and Change Flight Data (CFD), other. Military ATC Systems shall be capable to process all required FRA Information.		
Stakeholders considered as gaps	Civil-Military ANSPs, Network Manager	
Other stakeholders involved in the Family deployment	Civil-Military AUs	
Links to ICAO GANP ASBUs	B1-FRTO Improved Operations through Optimized ATS Routing	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AOM-0501 SESAR Release 5 AOM-0500 SESAR Release 5 AOM-0505 SESAR Release 8
	ATM Master Plan Level 3 (Edition 2016)	AOM21.2
SESAR Solutions	#33 "Free Route through Free Routing for Flights both in cruise and vertically evolving above a specified Flight Level" #65 "User Preferred Routing" PJ.06-01 "Optimized traffic management to enable Free Routing in high and very high complexity environments"	
Very Large Scale Demonstrations	**Release 7:** N/A **Release 8:** N/A **Release 9:** N/A	
Guidance Material / Specifications / Standards	Network Strategy Plan (NSP): SO 3/1 European Route Network Improvement Plan (ERNIP) Part 1 dition June 2015 European Route Network Improvement Plan (ERNIP) Part 2 - European ATS Route Network - Edition June 2015 European Route Network Improvement Plan (ERNIP) Part 4 - Route Availability Document User's Manual; Edition Nov. 2014	

	NM European Airspace Design Methodology - Guidelines; Edition June 2015 ICAO Doc 9426 Air Traffic Services Planning Manual ICAO Doc 4444 PANS ATM PBN Separation Standards (2018)
Means of compliance and / or Certification	None
Regulations	Commission Regulation (EC) 2150/2005 Commission Regulation (EC) 677/2011 as amended by 970/2014
Cyber security requirements	None
Recommendation for IPs proposal	FRA deployment is mandatory above FL305. Large scale deployments (e.g.: at FAB level, 24h, with minimum entry/exit conditions/constraints) are recommendable as producing most benefits that would be maximized considering future Pan-European FRA deployment. It is recommended to take into consideration the results of Gap Analysis
Deployment Approach	The implementation of the Family would require the definition of features and operational concepts of airspace at least above FL305, where FRA is going to be implemented, also ensuring that local coordination with the military needs to be performed **(MM1 – Free Route Airspace definition)**. In this respect, the initial implementation (FRA deployment with limitations e.g. in respect of FL, lateral dimension or timing) shall be planned, but the FRA CONOPS should address the PCP full scope and requirements. In order for the Free Route Airspace to be implemented, fast and real time simulations shall be executed, if required, and later, whether its involvement is envisaged, NM shall validate such simulations **(MM2 – Fast and Realtime Simulation)**. Operational procedures shall be provided **(MM3 – Procedures available)** and Free Route Airspace shall be published into the relevant aeronautical documents **(MM4 – Publication of Free Route Airspace)**, all safety assessments required shall be duly executed and all the output documents shall be then timely released **(MM5 – Safety assessment)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM6 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 3.2.4 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

AF #4 – Network Collaborative Management

The ATM Functionality #4, Network Collaborative Management, has the objective of enhancing the European ATM network performance, notably capacity and flight efficiency, through the exchange, modification and management of aircraft trajectory information. Flow Management shall move to a Cooperative Traffic Management (CTM) environment, optimizing the delivery of traffic into sectors and airports whilst acknowledging the requirement for Air Traffic Flow and Capacity Management (ATFCM) measures.

AF4 is structured in four Sub-AFs with their related Families, as follows:

Sub-AF4.1 – Enhanced Short Term ATFCM Measures

- Family 4.1.1 – STAM Phase 1 (mainly related to what already exists)
- Family 4.1.2 – STAM Phase 2 (with coordination between local entities – such as ANSP, Airport and AU – and NM tools)

Sub-AF4.2 – Collaborative NOP, which is about the exchange of information between Stakeholders via a central repository

- Family 4.2.2 – Interactive Rolling NOP (NM platform and its usage)
- Family 4.2.3 – Interface ATM Systems to NM Systems (information exchange between ANSP, AU and NM)
- Family 4.2.4 – AOP/NOP Information Sharing (information exchange between Airports – see Family 2.1.4 for AOP – and NM)

Sub-AF4.3 – Calculated Take-off Time to Target Times for ATFCM purposes

- Family 4.3.1 – Target Time for ATFCM purposes (including the validated part)
- Family 4.3.2 – Reconciled Target Times for ATFCM and arrival sequencing(including a more ambitious yet still to be fully validated concept)

Sub-AF4.4 – Automated Support for Traffic Complexity Assessment

- Family 4.4.2 – Traffic Complexity Tools

The following chart highlights the overall structure of the ATM Functionality #4, namely its SUB AFs, Families and their relevant Implementation initiatives related to both 2014 CEF Call awarded projects and 2015 CEF Call candidate projects.

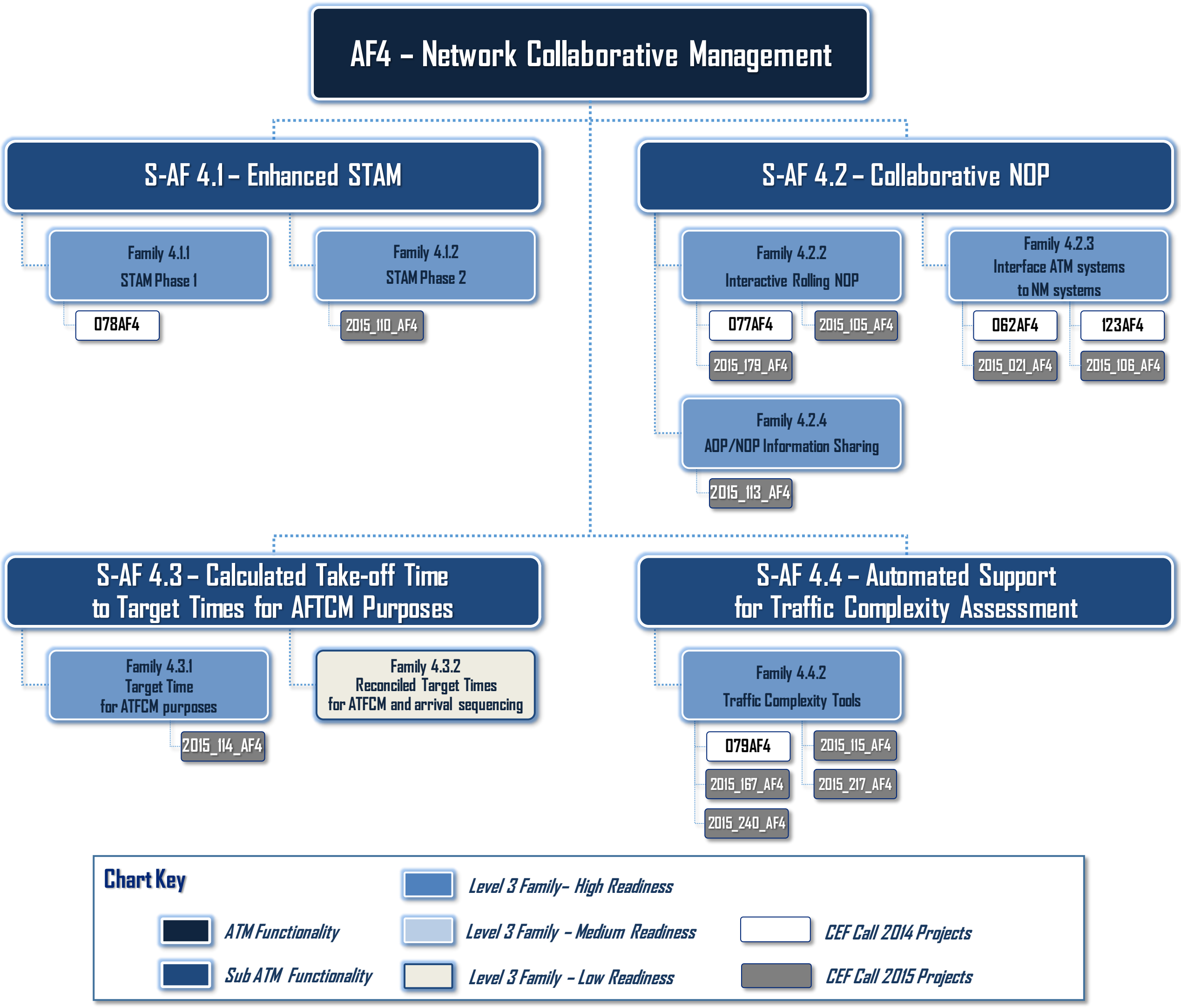


Fig. 21 – AF #4 Structure

The following Gantt chart shows the implementation roadmap for each Family included in AF4 in terms of start and end date of deployment, and it has been defined taking into account the target dates for each ATM Functionality and Sub-ATM Functionality, as stated in Regulation (EU) No 716/2014.

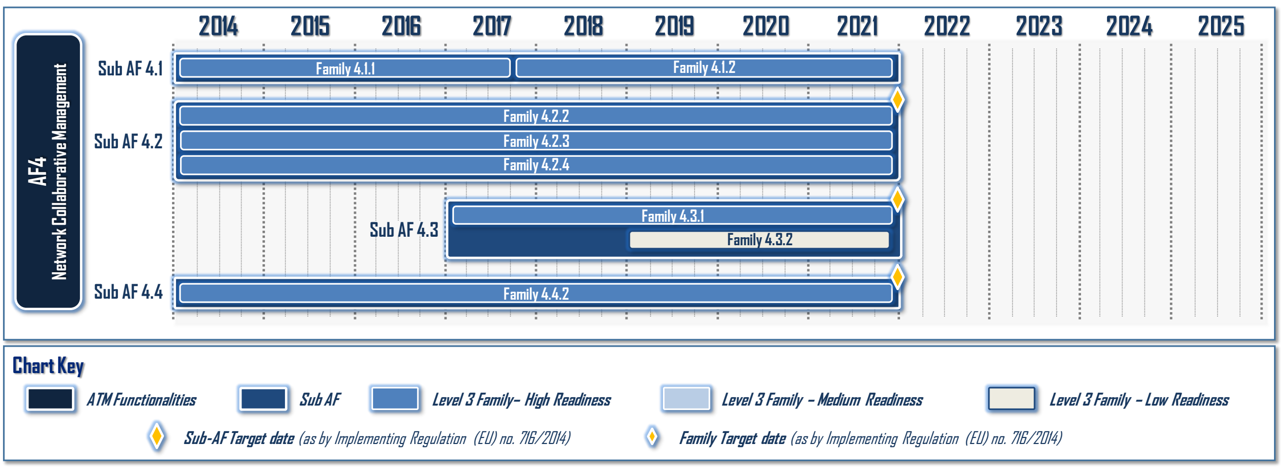


Fig. 22 – AF #4 Implementation Timeline

Family 4.1.1 – STAM phase 1

4.1.1 – STAM Phase 1			
Main Sub-AF	S-AF 4.1 Enhanced Short Term ATFCM measures		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/11/2017

Description and Scope

The rigid application of ATFM regulations based on standard capacity thresholds as the pre-dominant tactical capacity measure needs to be replaced by a close working relationship between ANSP/FMP, NM and AU, which would monitor both the real demand, the effective capacity of sectors and their dynamic management by mean of different suitable configurations having taken into account the complexity of expected traffic situation.

In order to close the gap between ATC and ATFCM, local operational procedures need to be developed. The aim is to improve the efficiency of the system using flow management techniques close to the real time operations with direct impact on tactical capacity management, occupancy counts and tactical action on traffic. The target of the Short Term ATFCM Measures (STAM) phase 1 is to replace En Route CASA regulations for situations when imbalances are manageable via STAM phase 1.
STAM phase 1 is mainly procedural implementation using the occupancy counts instead of entry counts for a better evaluation of overload, hot spot detection, limitation a need for regulations and implementation of STAM measure at local level. Each FMP needs to develop the STAM FCM procedure.

Additional tasks relevant to the STAM phase 1 scope shall encompass:

- development of consolidated STAM phase 1 concept of operation
- development of operational guidance documentation
- development of training package
- development of harmonised operational procedures

Interdependencies

STAM phase 1 is a predecessor of STAM phase 2, but the deployment of STAM phase 1 is not a mandatory task due to the fact that STAM phase 2 focuses on network workflow procedures and STAM phase 1 is more locally focussed.

Fam. 4.4.2 - Traffic Complexity tools

Synchronization Needs

Completed from NM side, STAM phase 1 is available to all FMPs via CHMI.

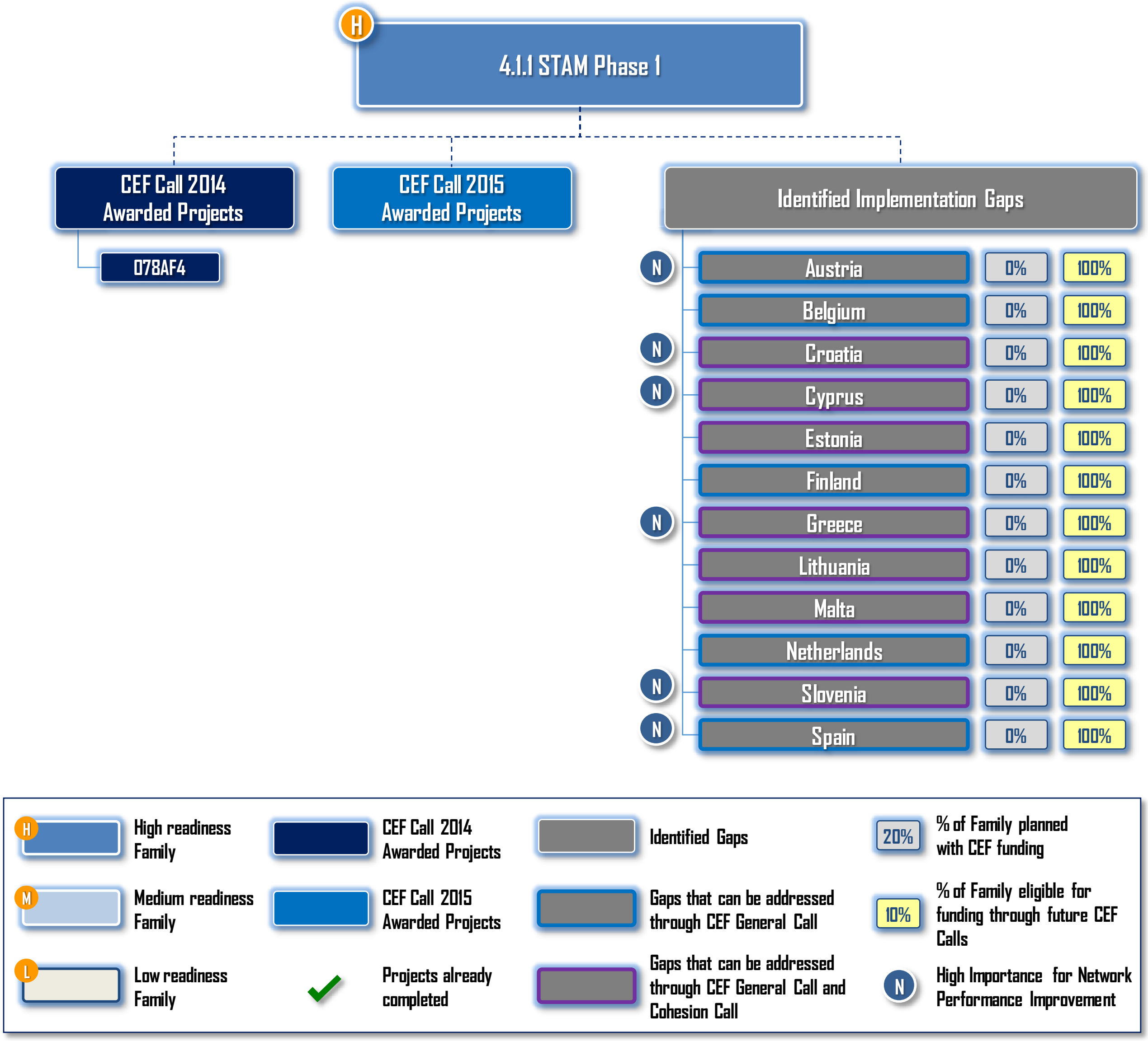
Civil / Military Coordination

Yes, depending on the civil-military ATS organisation

Stakeholders considered as gaps	ANSPs, Network Manager

Other stakeholders involved in the Family deployment	Airspace Users, Airports, Military Authorities	
Links to ICAO GANP ASBUs	B0-NOPS Improved Flow Performance through Planning based on a Network-wide view	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	DCB-0205 Available
	ATM Master Plan Level 3 (Edition 2016)	FCM04.1
SESAR Solutions	N/A	
Very Large Scale Demonstrations	N/A	
Guidance Material / Specifications / Standards	Network Strategy Plan (NSP): SO 4/3 SO 5/4 NM ATFCM Operations Manual; Edition 19,1 (29/04/2015) ICAO Doc 9971 Manual on Collaborative Air Traffic Flow Management (ATFM part)	
Means of compliance and / or Certification	None	
Regulations	None	
Cyber security requirements	None	
Recommendation for IPs proposal	STAM Phase 1 would deliver additional capacity just relying on better utilisation of the available resources by moving from the hourly sector capacity rates to the occupancy counts. However, STAM phase 1 is not a mandatory step towards STAM phase 2. It is recommended to take into consideration the results of Gap Analysis.	
Deployment Approach	The implementation of the Family would require the development of the STAM phase 1 concept of operations, including the identification of local measures. Such development will potentially include the use of occupancy from NM tool (including the definition of OTMV), to be performed in coordination with Network Manager **(MM1 – STAM phase 1 concept of operations development).** Following the concept of operations development, local procedures shall be developed and made available for operational use; such activity could be performed in coordination with neighbouring ACC and/or NM **(MM2 – Procedures available)**. The local operational documentation shall also be developed **(MM3 – Operational guidance documentation development)**. All operational personnel shall be duly trained **(MM4 – Training)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM5 – Implementation completed)**.	

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



A dedicated table within Annex A encompasses the list of implementation initiatives associated to Family 1.1.1 awarded in 2014 CEF Call, along with a more detailed description of each Implementation Project. No Implementation Project associated to this Family has been awarded in 2015 CEF Call.

Family 4.1.2 – STAM Phase 2

4.1.2 – STAM Phase 2			
Main Sub-AF	S-AF 4.1 Enhanced Short Term ATFCM measures		
Readiness for implementation	High		
Initial Operational Capability	01/11/2017	**Full Operational Capability**	01/01/2022

Description and Scope

Tactical capacity management using STAM phase 2 requires the deployment of additional tool and procedures in order to ensure a close and efficient working relationship between NM, FMP and airspace users. STAM phase 2 tool should include occupancy traffic monitoring values (OTMV), hotspot detection and coordination tool. The enhancements shall mainly focus on:

- Enhanced monitoring techniques (including hotspot management and complexity indicators)
- Coordination systems (including B2B with local tools)
- What-if function (local measures, flight based, flow based and multiple measure alternative)
- Network impact assessment

Additional tasks relevant to the STAM Phase 2 scope shall encompass:

- Development of consolidated STAM phase 2 concept of operation;
- Development of operational guidance documentation;
- development of training package;
- development of harmonised operational procedures

ANSPs and AUs shall deploy:

- interface between local STAM support systems (including AU trajectory optimisation) and the NM systems
- and/or the STAM phase 2 application and services developed by NM
- apply harmonised operational procedures, taking into account the STAM Phase 2 pre-requisites such as the traffic information and flight predictability.

Interdependencies

NM system readiness is a prerequisite for ANSP/AUs STAM phase 2 deployment. STAM phase 1 is a predecessor of STAM phase 2, but the deployment of STAM phase 1 is not a mandatory task due to the fact that STAM phase 2 focuses on the network STAM workflow procedures where STAM phase 1 focuses on local STAM procedures.

Fam. 3.2.1 Upgrade of ATM systems (NM, ANSPs, AUs) to support DCT and Free Route.

Synchronization Needs

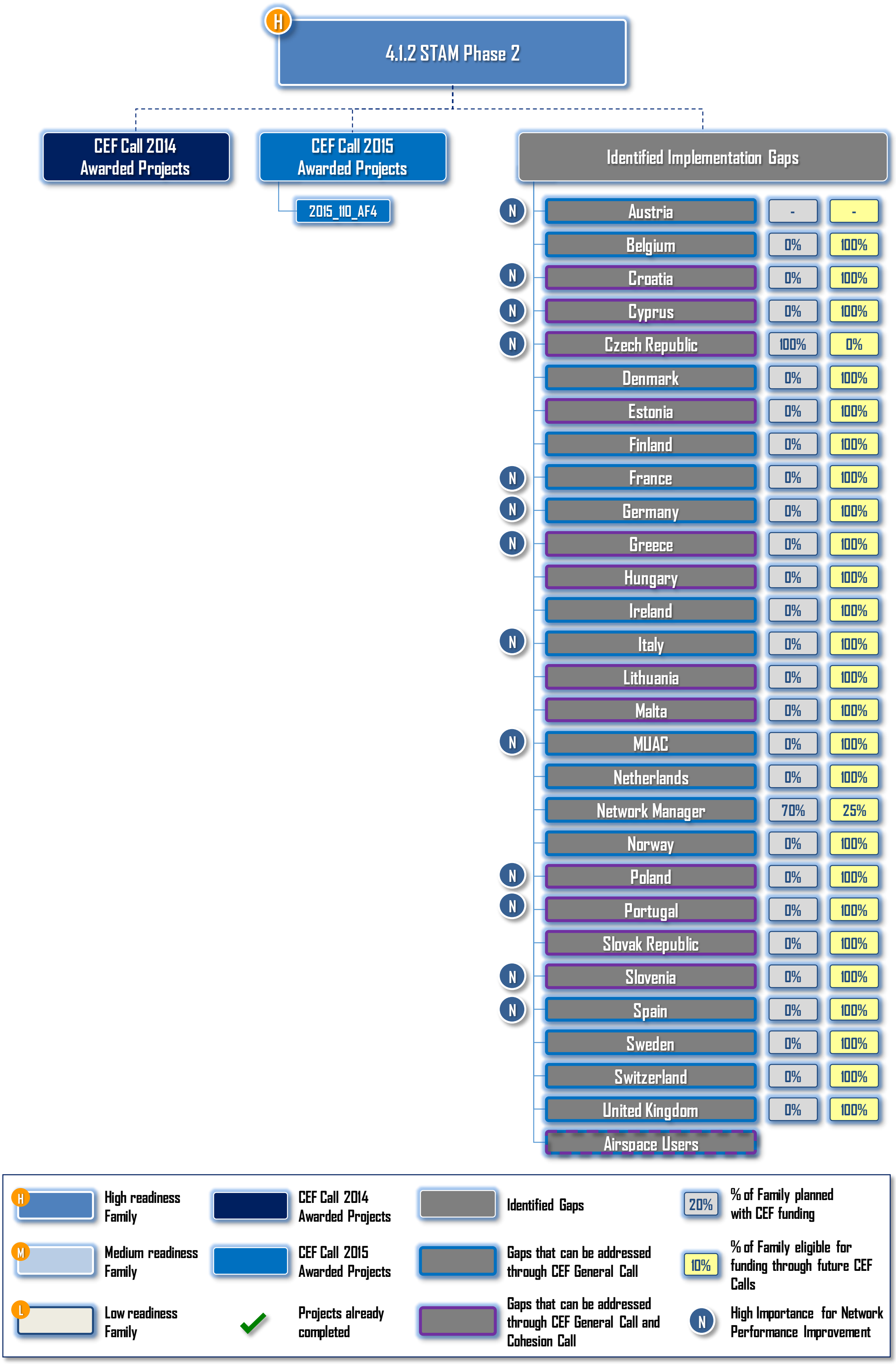
Upgrade of NM systems is required for STAM phase 2.

Synchronisation is necessary between neighbouring ACCs.

Civil / Military Coordination		
Yes, depending on civil/military organization		
Stakeholders considered as gaps	Network Manager, ANSPs, Airport Operators, Airspace Users (CFSP)	
Other stakeholders involved in the Family deployment	Military Authorities	
Links to ICAO GANP ASBUs	B1-NOPS Enhanced Flow Performance through Network Operational Planning	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	DCB-0308 SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	FCM04.2
SESAR Solutions	#17 "Advanced Short ATFCM Measures (STAM)"	
Very Large Scale Demonstrations	**Release 7:** PJ.24 **Release 8:** PJ.24 **Release 9:** PJ.24	
Guidance Material / Specifications / Standards	NM Enhanced Short Term ATFCM guidance material Network Strategy Plan (NSP): SO 4/3; SO 5/4 ICAO Doc 9971 Manual on Collaborative Air Traffic Flow Management (ATFM part)	
Means of compliance and / or Certification	None	
Regulations	None	
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them	
Recommendation for IPs proposal	The proposal should refer to the further NM developments for STAM phase 2. ANSPs and eventually AUs should consider submitting proposals for STAM phase 2 deployments (local tool and/or NM tool utilisation). It is recommended to take into consideration the results of Gap Analysis.	

Deployment Approach	The implementation of the Family would require the development of the STAM phase 2 concept of operations, including the definition of roles and responsibilities of all actors, as well as the identification of the overall process. If required, local coordination with the military and/or with the airport should be performed **(MM1 – STAM phase 2 concept of operations development)**. The Network Manager should implement system improvements based on operational requirements in order to facilitate the coordination with local stakeholders **(MM2 – Upgrade of NM-systems)**. ANSPs shall install local tools capable to support STAM measure or to ensure the local implementation of the NM STAM stool. Military and airports could be involved in such installation **(MM3 – Installation of STAM support tool)**. ANSPs shall then issue local/sub regional procedures for the use of the local tool, in coordination with NM (and - if required - Airport and Military) **(MM4 – Local/sub regional procedures available)**. Network Manager shall define common procedure for coordination and consequentially develop operational guidance documentation for this purpose **(MM5 – Development of operational guidance documentation for coordination)**. ANSPs and NM shall adapt and integrate their systems in order to allow the required data exchange and functionalities; it is worth noting that such activities are not required if NM tool is used **(MM6 – Integration of local STAM support systems with NM)**. All involved operational staff from ANSPs and NM shall be duly trained **(MM7 – Training)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM8 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



A dedicated table within Annex A encompasses the list of implementation initiatives associated to Family 4.1.2 awarded in 2015 CEF Call, along with a more detailed description of each Implementation Project. No Implementation Project associated to this Family has been awarded in 2014 CEF Call.

Family 4.2.2 – Interactive Rolling NOP

4.2.2 – Interactive Rolling NOP			
Main Sub-AF	S-AF 4.2 Collaborative NOP		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2022

Description and Scope
Network operations are driven by enhanced stakeholders' participation in a rolling cooperative process (Civil & Military airspace users, ANSPs, Airports, NM, outside EUR interfaces). By continuously sharing latest flight intentions resulting in demand and available capacity, defining measures in the network operations plan, realising the plan as a target by all actors taking into account operational updates, evaluating operations against performance targets and updating the plan. This rolling view of the network situation (rolling NOP) and the support to the collaborative processes is based on an information management platform, accessible online by all stakeholders for consultation,(not only passive but including dialogue opportunities for sharing of evaluations and issues) and update as and when needed, in a secure and tailored way. An initial implementation of the Interactive Rolling NOP was achieved through the deployment of the NOP Portal, providing a limited initial view of the Network Situation, with very limited collaboration and tailoring capabilities. The scope of this Family consists in the implementation of a platform that uses the state-of-the-art technologies for creation of a Virtual Operations Room for the physically distributed European ATM Network Operations, in support of the Collaborative NOP. This platform supports the network collaborative rolling processes from strategic to real-time operations, including capabilities for online performance monitoring integrated and feeding back into the collaborative network planning. Also, the platform provides access to post-operational data for offline analysis and performance reporting. The platform shall provide SLA management capabilities, based on a holistic view of the users and their organisations, their interaction with the system and on the monitoring of the SLA adherence by the different parties. The platform will provide both a workplace tool, as well as B2B interfaces following SWIM standards, to allow integration in the stakeholders' own systems. Information and dialogue tools shall be accessed anytime, anywhere via an ATM Information Portal. Access to information is done in a secure way, tailored according the stakeholders needs and subject to access control rules, so that only those who have an operational need to access particular information are able to do so.

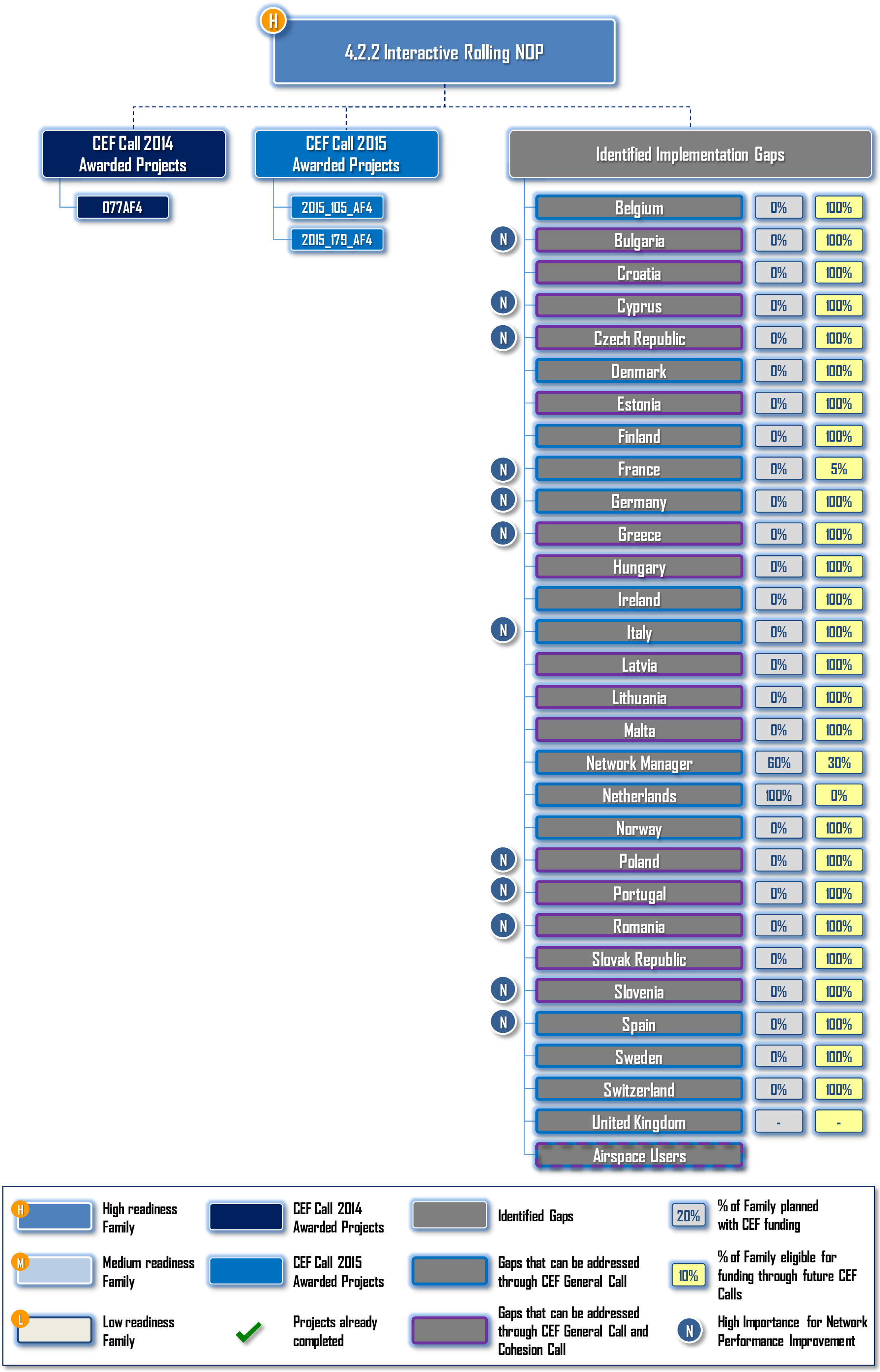
Interdependencies
Family 4.2.4 AOP/NOP information sharing Family 4.1.2 STAM phase 2 need the new platform to be deployed. Family 1.1.2 (extended AMAN) and other AF1, AF2, AF3, AF4, AF5 and AF6

Dependency on AF5 for the SWIM infrastructure and SWIM interfaces		
Synchronization Needs		
The deployment of Network Collaborative Management functionality shall be coordinated due to the potential network performance impact of delayed implementation in a wide geographical scope involving a number of stakeholders. From a technical perspective the deployment of targeted system and procedural changes shall be synchronized to ensure that the performance objectives are met.		
Civil / Military Coordination		
Yes, especially for interface requirement		

Stakeholders considered as gaps	Network Manager, ANSPs, Airspace Users(CFSP)	
Other stakeholders involved in the Family deployment	Airport Operators, Military Authorities,	
Links to ICAO GANP ASBUs	B1-NOPS Enhanced Flow Performance through Network Operational Planning	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	DCB-0103-A SESAR Release 5 DCB-0102 Available
	ATM Master Plan Level 3 (Edition 2016)	FCM05
SESAR Solutions	#20 "Collaborative NOP for Step 1"	
Very Large Scale Demonstrations	**Release 7:** PJ.24 **Release 8:** PJ.24 **Release 9:** PJ.24	
Guidance Material / Specifications / Standards	Collaborative NOP Network Strategy Plan (NSP): SO 2/1 SO 2/2 SO 2/3 and SO 2/4 NOP User Guide; Edition:19.0-92 Date:25/03/2015	
Means of compliance and / or Certification	None	
Regulations	None	
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with	

	appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them
Recommendation for IPs proposal	It will be a basic platform for info sharing between all stakeholders. IPs proposals are expected by NM (as provider of the platform) but in terms of deployment the different stakeholders are impacted, as processes need to be put in place locally to use the platform. It is recommended to take into consideration the results of Gap Analysis.
Deployment Approach	The implementation of the Family would require the Network Manager to provide B2B and HMI interfaces with other OPS actors for any relevant data exchange needed for ATM Functionalities 4 **(MM1 – NM to deploy Interactive Rolling NOP platform)**. Network Manager shall also define procedures and provide documentation for the use of the system **(MM2 – NM to develop guidance material)**. ANPSs shall then define and make available procedures for the use of interfaces; it is worth noting that airport and military could be also involved if required **(MM3 – Procedures available at local side)**. All involved operational staff from ANSPs, NM and - if required airports and militaries - shall be duly trained **(MM4 – Training)**.The execution of such activities is expected to lead to the start of permanent operational use **(MM5 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 4.2.2 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 4.2.3 – Interface ATM systems to NM systems

4.2.3 – Interface ATM systems to NM systems			
Main Sub-AF	Sub-AF 4.2 Collaborative NOP		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2022

Description and Scope

This Family addresses the message exchange between NM systems, ANSPs ATM system and AU/FOC /WOC flight plan fling systems in respect of collaborative flight planning, improving flight plan distribution and enhanced tactical flow management.

The exchanges of following messages between NM, ATM and AU/FOC systems are addressed by this Family as:

- ATC Flight plan Proposal (AFP)
- ATC flight plan CHange message (ACH)
- ATC flight PLan message (APL)
- First System Activation (FSA)
- Correlated Position Report (CPR)
- Extended Flight Plan (EFPL)
- Improved OAT Flight Plan

The EFPL will include the planned 4D trajectory of the flight as well as flight performance data in addition to ICAO 2012 FPL data.

The first phase that will be implemented should address only the exchange of EFPL information between AUs and NM.

The transmission of EFPL data to ANSP (flight plan distribution) will be implemented when transition to FF-ICE provisions is achieved. ANSPs automatically provide AFP message to NM for following events:

- Missing flight plan
- Change of route
- Diversion
- Change of flight rules or flight type
- Change of requested cruising level
- Change of aircraft type
- Change of aircraft equipment

The local ATM system shall be capable to process APL and ACH messages sent by IFPS in order to exploit the full benefits of AFP distribution to NM. NM needs to integrate the received AFP within NM systems. ANSPs need also to provide CPR and FSA messages to NM system (only few pending ANSPs). EFPL will be processed by AU flight planning systems and sent to IFPS. Initially the EFPL exchange will be implemented using the flight data model developed by the NM for B2B and that is currently used for operations.

Subsequently, as the FIXM version corresponding to FF-ICE/1 becomes available, the EFPL will be migrated to FIXM.

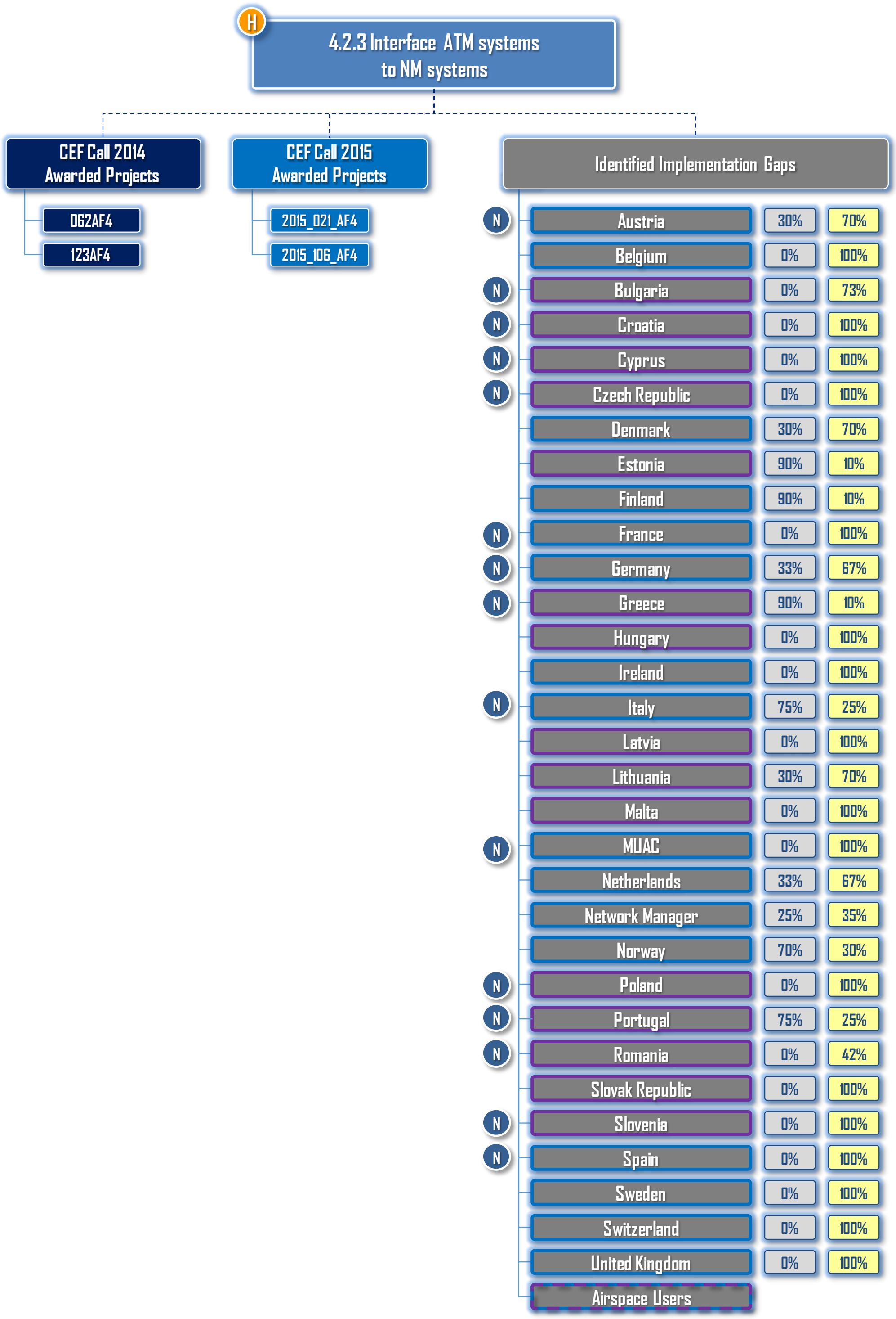
As a first Step toward the implementation of the Mission Trajectory concept, military environmental data will be processed by FDPS and IFPS (reference Sub-Family 3.1).

Despite not in the PCP, an Improved OAT FPL should be considered as an enabler processed by IFPS to describe the trajectory including the information about ARES to be used, in order to have a more comprehensive view of airspace demand.
Interdependencies
Fam. 4.4.2 - Traffic Complexity tools Dependency on AF5 for the SWIM Infrastructure and SWIM interfaces. Link with AF6 (EPP)
Synchronization Needs
Synchronisation is required for AFP between NM and ANSPs. For EFPL deployment, the synchronisation between NM, AU and ANSP is required for the development and deployment phase.
Civil / Military Coordination
Yes, required.

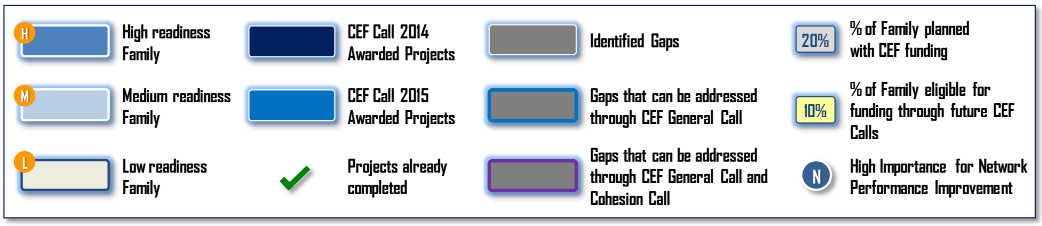
Stakeholders considered as gaps	ANSPs, Airspace Users (CFSPs), Network Manager, Military Authorities	
Other stakeholders involved in the Family deployment	None	
Links to ICAO GANP ASBUs	B1-FICE Increased Interoperability, Efficiency and Capacity through Flight and Flow Information for a Collaborative Environment Step-1 (FF-ICE/1) application before Departure B1-NOPS Enhanced Flow Performance through Network Operational Planning	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	IS-0102 Available AUO-0203 SESAR Release 5 AUO-0215 SESAR Release 7
	ATM Master Plan Level 3 (Edition 2016)	FCM03, FCM08
SESAR Solutions	#37 “Extended Flight Plan”; PJ.18-01 “Mission Trajectories”	
Very Large Scale Demonstrations	**Release 7:** PJ. 24 **Release 8:** PJ. 24 **Release 9:** PJ. 24	
Guidance Material / Specifications / Standards	Network Strategy Plan (NSP): SO 4/2 and SO 5/1 NM Flight Progress Messages Document – Edition 2.1 (03/2015)	
Means of compliance and / or Certification	Community Specifications 0101 Edition 1.1 Specification for the Initial Flight Plan	

Regulations	None
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them
Recommendation for IPs proposal	The exchanges of collaborative flight planning messages are essential for improving the Pan-European flight predictability. It should be considered to prime importance to address the existing gaps for the provision of CPRs, AFP and FSA messages to NM. ANSPs which not yet provide these messages to NM should consider submitting IP proposal. NM and AUs should consider submitting IP proposal for EFPL and iOAT flight plan. It is recommended to take into consideration the results of Gap Analysis.
Deployment Approach	The implementation of the Family would require ANSPs (and - if needed - airports) to upgrade their systems in order to generate messages to NM and for NM to receive and process, and distribute as required (including FSA, CPR, AFP, APL, ACH messages). The involvement of militaries is necessary for GAT (EFPL) and OAT FPL **(MM1 – System upgrade to send messages to NM)**. ANSPs (and - if needed - airports) are also required to upgrade their systems in order to receive and process messages coming from Network Manager, using the guidance material developed by NM for Family 4.2.2 **(MM2 – System upgrade to receive messages from NM)**. ANSPs (and airports - if needed) shall perform pre-implementation trials **(MM3 – Integration test with NM)**. Operational procedures for the use of new messages shall be defined and made available **(MM4 – Procedures available)**. A safety assessment for associated operational and system changes shall be performed successfully **(MM5 – Safety Assessment)** and all operational/technical staff involved shall be duly trained **(MM6 – Training)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM7 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



NB. ATM system upgrade for Oro Navigacija (Lithuania) has been funded under category Other Projects in CEF Call 2015



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 4.2.3 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 4.2.4 – AOP/NOP information sharing

4.2.4 –AOP/NOP information sharing			
Main Sub-AF	Sub-AF 4.2 Collaborative NOP		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2022

Description and Scope

The Airport element that reflects the operational status of the Airport and therefore facilitates Demand and Capacity Balancing is the Airport Operations Plan (AOP), described in Family 2.1.4. The AOP connects the relevant stakeholders, notably the Airspace Users' Flight Operations Centres (FOC) and Wing Operations Centres (WOC). It contains data and information relating to the different status of planning phases and is in the format of a rolling plan, which naturally evolves over time.

The AOP is 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.

In order to improve the European ATM network performance, notably capacity and flight efficiency through exchange, modification and management of trajectory information there is a clear need for information sharing between the AOP and the NOP (Network Operation Plan). The integration of AOP and NOP provides a rolling picture of the network situation used by stakeholders to prepare their plans and their inputs to the network CDM processes (e.g. negotiation of airspace configurations). As such the collaborative NOP will be fully integrated in ATM stakeholders' planning processes and working methods.

The creation and maintenance of the AOP as well as the integration and the consistency with the NOP involves a large number of stakeholders, with different roles and responsibilities: the airspace users including the flight crews and the AU FOC/WOC, the Airport Operators, the Air Navigation Service Providers, the Network Manager and the MET services.

The AOP/NOP information sharing is the technical data layer on the collaborative NOP. The output of SESAR is relatively mature and further refinement is on-going driven by NM. Currently data-exchange is achieved via AFTN, which is to be replaced over time by cooperative network information services, using the yellow SWIM Profile. Details have to be defined in collaboration between the NM and the implementing stakeholders.

Interdependencies

Family 4.2.2 and Family 2.1.4

Family 5.4.1

Synchronization Needs

4.2.4 is to be synchronised between NM, the Airport and the ANSPs.

Civil / Military Coordination		
Yes, depending on civil/military ATS organization		
Stakeholders considered as gaps	Network Manager, Airport Operators	
Other stakeholders involved in the Family deployment	ANSPs, Military Authorities, MET Service Providers,	
Links to ICAO GANP ASBUs	B0-NOPS Improved Flow Performance through Planning based on a Network-wide view	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	DCB-0103-A SESAR Release 5 AO-0801-A SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	FCM05
SESAR Solutions	#20 "Collaborative NOP for Step 1" #21 "Airport Operations Plan and AOP-NOP Seamless Integration"	
Very Large Scale Demonstrations	**Release 7:** PJ.24, 28 **Release 8:** PJ.24, 28 **Release 9:** PJ.24, 28	
Guidance Material / Specifications / Standards	NM AOP/NOP Interface Specifications and Guidance Material Network Strategy Plan (NSP): SO 4/3 SO 06/2; and SO 6/4 ICAO Doc 9971 Manual on Collaborative Air Traffic Flow Management (ATFM part)	
Means of compliance and / or Certification	None	
Regulations	None	
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them	

Recommendation for IPs proposal	In order to achieve full performance of Family 4.2.4, it is recommended to implement Family 2.1.4 since it is part of the critical initiatives to resolve and mitigate the impacts of current capacity constraints and potential bottlenecks, which might hinder the overall performance at network level. For that reason, it is highly recommended that NM define the interface between AOP and NOP to be in a position to deploy AOP/NOP integration as soon as AOP is available. It is recommended to take into consideration the results of Gap Analysis, considering also the Gap Analysis of Family 2.1.4.
Deployment Approach	The implementation of the Family would require the Network Manager to adapt their system to receive and process information coming from AOP and distribute as required to operational stakeholders **(MM1 – NM to develop interface for AOP integration)**. Network Manager shall also develop the required procedures and the associated documentation to support the utilisation of interfaces **(MM2 – NM to develop operational guidance documentation)**. All interested systems shall be updated in order to allow the system-to-system data exchange and to enable all necessary functionalities. Military could be involved in such activities **(MM3 – Integration of AOP with NOP)**. The procedures for generating and/or using messages shall be elaborated, with the involvement of ANSPs and Militaries, if necessary **(MM4 – Procedures available)**. All involved operational staff shall be duly trained **(MM5 – Training)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM6 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.

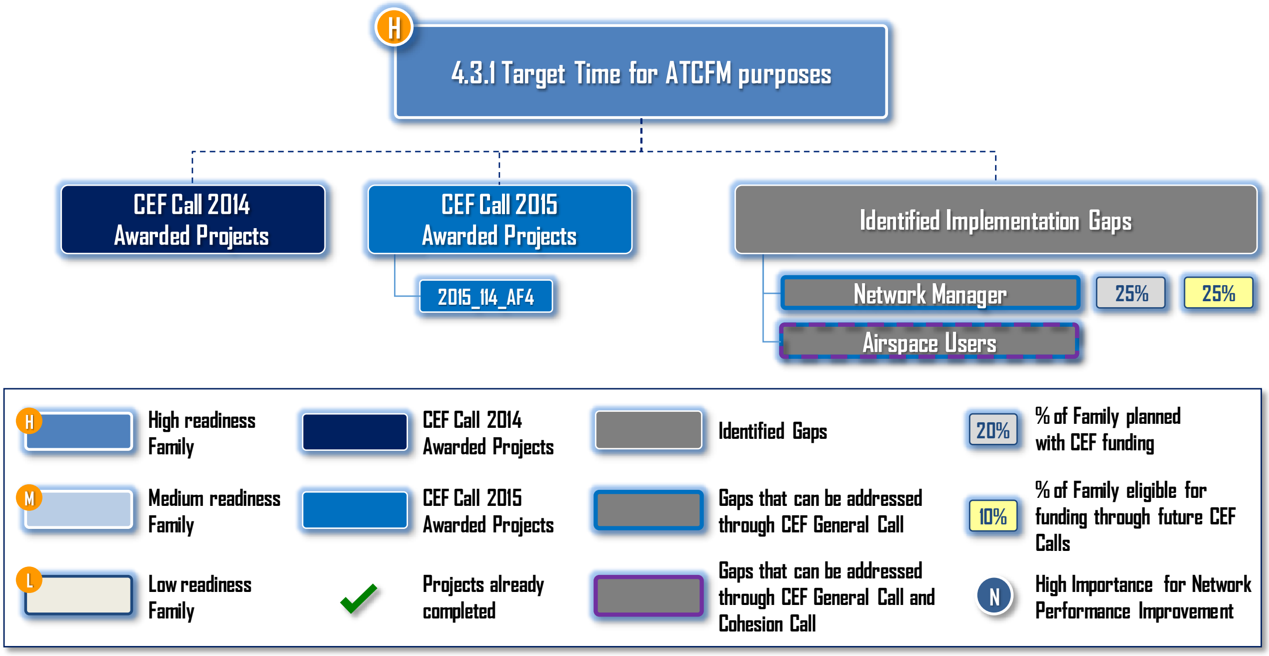
A dedicated table within Annex A encompasses the list of implementation initiatives associated to Family 4.2.4 awarded in 2015 CEF Call, along with a more detailed description of each Implementation Project. No Implementation Project associated to this Family has been awarded in 2014 CEF Call.

Family 4.3.1 – Target Time for ATFCM purposes

4.3.1 – Target Time for ATFCM purposes			
Main Sub-AF	Sub-AF 4.3 CTOT to Target Time for ATFCM Purposes		
Readiness for implementation	High		
Initial Operational Capability	01/01/2017	**Full Operational Capability**	01/01/2022
Description and Scope			
First Step: NM system should transmit calculated target time at the most penalising regulation reference point in addition to CTOT to all concerned users. Those users should be able to manage this new feature and potential system upgrades should be foreseen. Second step (to be validated in 2016): This first step, particularly in case of unique Airport regulation, either linked to ground (AOP) or arrival sequencing (AMAN, extended-AMAN), will permit an early partial optimisation from a local point of view via the transmission of local TTA/TTO to NM. NM will be in charge of assessing the network impact leading eventually to coordination with the originator, and of transmission of CTOT and TTA/TTO to the concerned flight. This process will be limited to the planning phase and transmission of CTOT and updated CTOT as per standard processes. It will also enhance the slot swapping process.			
Interdependencies			
Fam 4.1.2 STAM phase 2 (coordination with originator of TT) Fam 1.1.2 Extended AMAN Fam 2.1.4 Initial AOP			
Synchronization Needs			
Coordination between NM and other stakeholder for eventual local implementation			
Civil / Military Coordination			
Not foreseen			
Stakeholders considered as gaps	Network Manager, Airspace Users (CFSP)		
Other stakeholders involved in the Family deployment	ANSPs, Airport Operators, Military Authorities		
Links to ICAO GANP ASBUs	B0-NOPS Improved Flow Performance through Planning based on a Network-wide view		

ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	DCB-0208 SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	FCM07.1
SESAR Solutions	#18 "CTOT and TTA"	
Very Large Scale Demonstrations	**Release 7:** PJ.24 **Release 8:** PJ.24 **Release 9:** PJ.24	
Guidance Material / Specifications / Standards	Network Strategy Plan (NSP): SO 4/3, SO 5/4 ICAO Doc 9971 Manual on Collaborative Air Traffic Flow Management (ATFM part)	
Means of compliance and / or Certification	None	
Regulations	None	
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them	
Recommendation for IPs proposal	After a first step for the transmission by NM of target time on the constrained area on top of CTOT, airport and ANSP could consider submitting IP's proposal for the deployment of this Family. AUs need to update their system to take target times into account in their planning procedure. It is recommended to take into consideration the results of Gap Analysis.	
Deployment Approach	The implementation of the Family would require the Network Manager to provide description and guidance upon the interfaces between the NM systems and other systems (e.g. AU), as well as the related procedures **(MM1 – NM to provide guidance on use of target time)**. All systems of the involved stakeholder dedicated to Target Times processing and use shall also be updated **(MM2 – System upgrades)**. Procedures for all involved actors (NM/ANSPs and airports for planning purposes) to facilitate Target Times for ATFCM purposes shall be developed and made available **(MM3 – Procedures available)**. All involved operational staff shall be duly trained **(MM4 – Training)**.The execution of such activities is expected to lead to the start of permanent operational use **(MM5 – Implementation completed)**.	

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



A dedicated table within Annex A encompasses the list of implementation initiatives associated to Family 4.3.1 awarded in 2015 CEF Call, along with a more detailed description of each Implementation Project. No Implementation Project associated to this Family has been awarded in 2014 CEF Call.

Family 4.3.2 – Reconciled target times for ATFCM and arrival sequencing

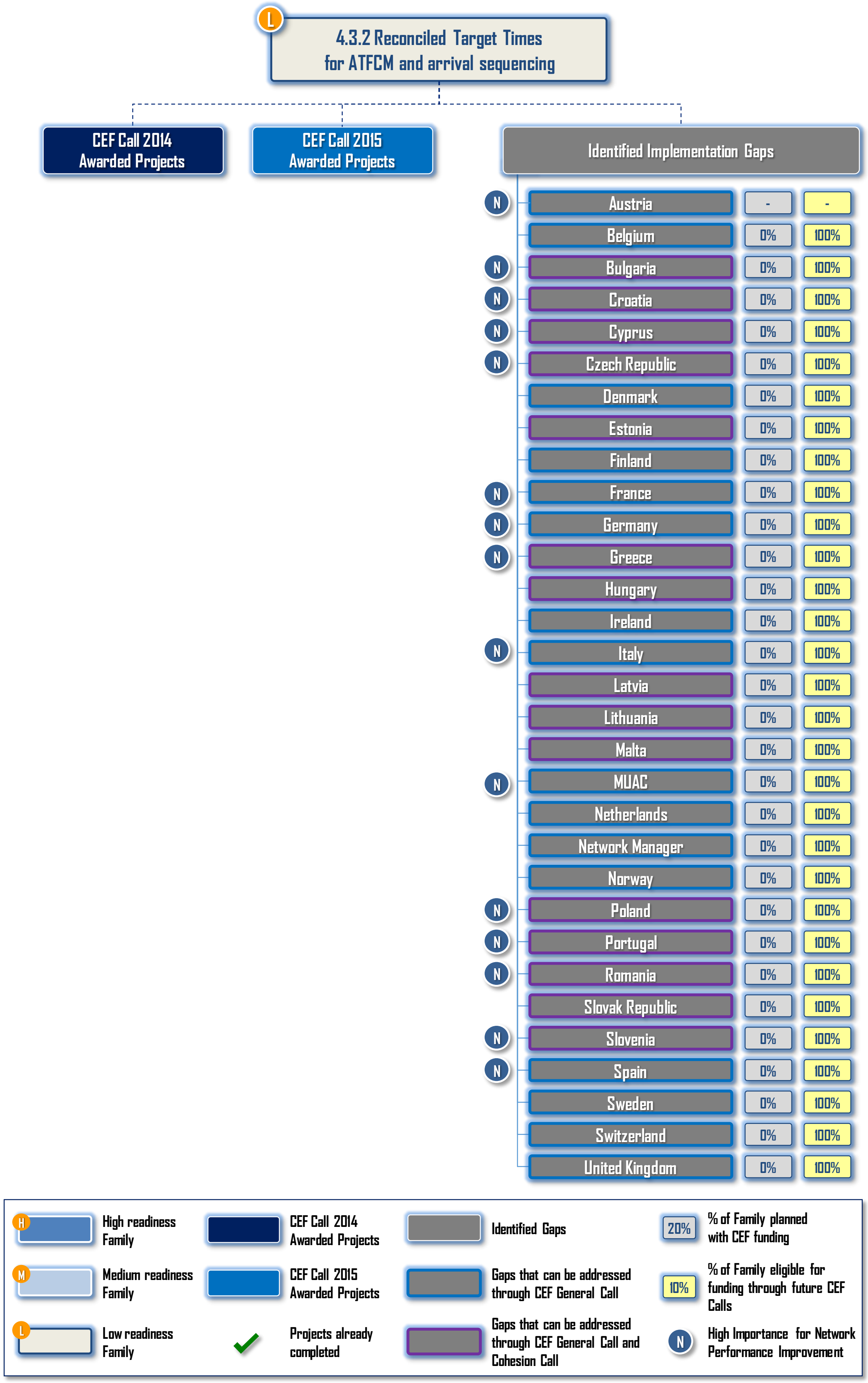
4.3.2 – Reconciled Target Times for ATFCM and Arrival Sequencing			
Main Sub-AF	Sub-AF 4.3 CTOT to Target Time for ATFCM Purposes		
Readiness for implementation	Low		
Initial Operational Capability	01/01/2019	**Full Operational Capability**	01/01/2022

Description and Scope
The scope of this Family contains the process, procedure and system upgrades related to the reconciliation of multiple local Target Time constraints, coming from Airport (AOP), ANSP (either AMAN/extended AMAN or en-Route) or Network DCB process. To this end, the potential solution will be coordinated and disseminated to the different stakeholders (supported by the Network CDM Information Platform and within the context of the NOP) at the Local and Network levels. Once coherence and agreement is achieved, the implementation will be initiated. Considering the current status of development work, the concept still needs to be validated at SJU level.
Interdependencies
Family 1.1.2 (extended AMAN), Family 2.1.4 (iAOP), Family 4.1.2 (STAM phase 2), Family 4.3.1 - Target Time for ATFCM purposes
Synchronization Needs
Synchronisation required between NM, airport and ANSP
Civil / Military Coordination
Yes, depending on civil/military ATS organization and concept of operation.

Stakeholders considered as gaps	ANSPs, Airport Operators, Airspace Users(CFSP), Network Manager	
Other stakeholders involved in the Family deployment	Military Authorities	
Links to ICAO GANP ASBUs	B1-NOPS Enhanced Flow Performance through Network Operational Planning	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	DCB-0213 SESAR Release 9 DCB-0208 SESAR Release 5

	ATM Master Plan Level 3 (Edition 2016)	FCM07.2
SESAR Solutions	PJ.09-02 "Integrated Local DCB Processes" #18 "CTOT and TTA"	
Very Large Scale Demonstrations	N/A	
Guidance Material / Specifications / Standards	NM CTOT to TTA for ATFCM Network Strategy Plan (NSP): SO 4/3, SO 5/4, SO 6/5	
Means of compliance and / or Certification	None	
Regulations	None	
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them	
Recommendation for IPs proposal	Considering the current status of development work, SDM considers that the concept still needs to be validated at SJU level.	
Deployment Approach	The implementation of the Family would require the definition of the concept of operations for reconciled target times for ATFCM and arrival sequencing; such activities shall include - where necessary - the local coordination with the military **(MM1 – Concept of operation defined)**. NM shall upgrade their system to reconciliate the different target time, as required by the defined concept **(MM2 – NM system upgrade for reconciliated TT)**. NM shall also produce the proper guidance documentation on the use of reconciliated target time and the definition of the interfaces for system-to-system data exchange **(MM3 – NM to develop guidance material for reconciliated TT)**. System shall be upgraded in order to process reconciliated Target Time and to allow their use **(MM4 – System upgrades available to process reconciliated target time)**. Procedures for all involved operational stakeholders to operate reconciliated Target Times for ATFCM purposes shall be made available **(MM5 – Procedures available)**. A safety assessment for associated operational and system changes shall be performed successfully **(MM6 – Safety Assessment)** and all operational/technical staff involved shall be duly trained **(MM7 – Training)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM8 – Implementation completed)**.	

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



No

Family 4.4.2 – Traffic Complexity tools

4.4.2 – Traffic Complexity Tools			
Main Sub-AF	Sub-AF 4.4 Automated Support For Traffic Complexity Assessment		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2022

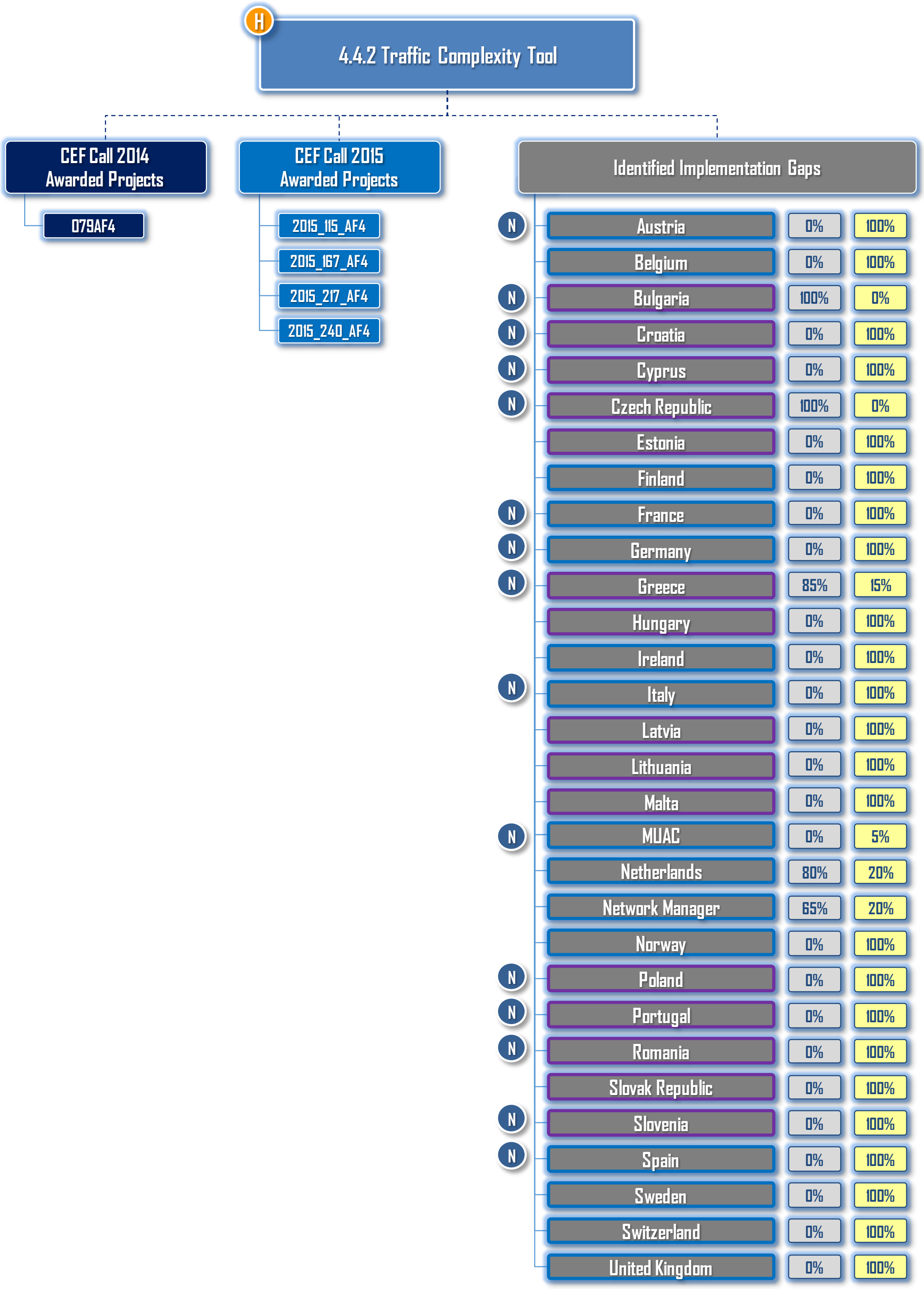
Description and Scope
The traffic complexity tools continuously monitor sector demand and evaluate traffic complexity (by applying predefined complexity metrics) according to a predetermined qualitative scale. The predicted complexity coupled with traffic demand enables ATFCM to take timely action to adjust capacity, or request the traffic profile changes in coordination with ATC and airspace users. The rigid application of ATFCM regulations based on standard capacity thresholds as the pre-dominant tactical capacity measure needs to be replaced by a close working relationship between ANSPs and Network Manager, which would monitor both the real demand, the sector capacity and their dynamic management. The scope of this Family shall include: - ANSP to implement Local Traffic Complexity tools and procedures. The Traffic Complexity tool continuously monitor and evaluate current and expected traffic loads and estimated controller's workload . It provides a support in the determination of solutions in order to plan airspace, sectors and staff to handle the predicted traffic. It is suggested that ANSPs develop concept for the complexity tools utilisation before considering the procurement/upgrades of ATM systems with this functionality - The local complexity tools need to receive process and integrate EFD provided by NM. This is needed in order to supplement the local traffic counts with the flight plan data from ETFMS; - The NM systems adaptation activities deal with improving the quality of the planned trajectory (processing of ATC information part of 4.2.3 Family, processing of EFPL and improved OAT FPL information part of 4.2.3 Family, support to mixed mode operations, Implementation of traffic count methodologies that do not impact trajectory calculation) thus enhancing NM complexity assessment. Implementation of scenario management tools in support of traffic complexity. It will rely on the planned trajectory and allows simulating options optimising the use of available capacity. It will help NM operations identify possible mitigation strategies to be applied at network or local level, in coordination with FMPs and airspace users if applicable.

Interdependencies
Fam. 4.1.1 - STAM Phase 1 Fam. 4.1.2 - STAM Phase 2 Fam. 4.2.3 - Interface ATM system to NMS and 4.2.4 AOP/NOP integration Fam. 3.2.1 – Upgrade of ATM systems (NM, ANSPs, AUs) to support DCT and Free Route and Fam 3.1.4 Dynamic Airspace Configuration

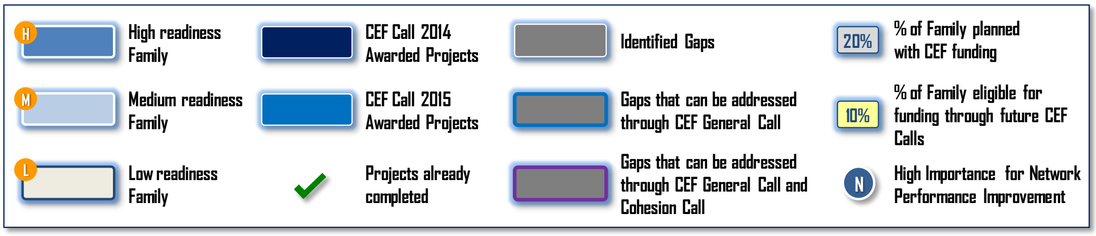
Synchronization Needs		
Synchronisation between NM and ANSPs is required		
Civil / Military Coordination		
Yes, depending on civil/military ATS organization		
Stakeholders considered as gaps	ANSPs, Network Manager	
Other stakeholders involved in the Family deployment	Military Authorities	
Links to ICAO GANP ASBUs	B1-NOPS Enhanced Flow Performance through Network Operational Planning	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	CM-0103-A SESAR Release 5 CM-0101 Available IS-0102 Available
	ATM Master Plan Level 3 (Edition 2016)	FCM06
SESAR Solutions	#19 "Automated support for Traffic Complexity Detection and Resolution"	
Very Large Scale Demonstrations	**Release 7:** PJ.24 **Release 8:** PJ.24 **Release 9:** PJ.24	
Guidance Material / Specifications / Standards	NM Automated Support for Traffic Complexity Assessment guidance material Network Strategy Plan (NSP): SO 4/3 and SO 5/4 NM Flight Progress Messages Document; Edition 2.1 (03/2015)	
Means of compliance and / or Certification	None	
Regulations	None	
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with	

	appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them
Recommendation for IPs proposal	Taking into account that complexity tools need to be deployed in collaboration between ANSPs and NM, particularly at ATC planning level, the IP proposal should be mainly focused on ANSPs and NM system upgrades. It is recommended to take into consideration the results of Gap Analysis.
Deployment Approach	The implementation of the Family would require the development and definition of the concept of operations, encompassing the overall process, including roles and responsibilities of the involved stakeholders. Such activity could require local coordination with the military, if necessary **(MM1 – Concept of operations developed)**. Network Manager shall develop and provide guidance documentation as basis for required operational procedures and systems **(MM2 – Operational guidance documentation developed)**. NM shall adapt its systems in support of complexity assessments, including the exchange of associated data **(MM3 – Adaptation of NM-systems)**. Local stakeholders shall implement complexity tool in the local systems, or adapt the NM tool for the required usage **(MM4 – Installation of local complexity tool)**. If required for a smooth exchange of data and information, the implementation of system-to-system interfaces shall be performed **(MM5 – Integration of local tool with NM)**. Procedures for operational stakeholders for facilitating the use of the tool shall be defined and made available **(MM6 – Procedures available)**. All involved operational staff shall be duly trained **(MM7 - Training)**.The execution of such activities is expected to lead to the start of permanent operational use **(MM8 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



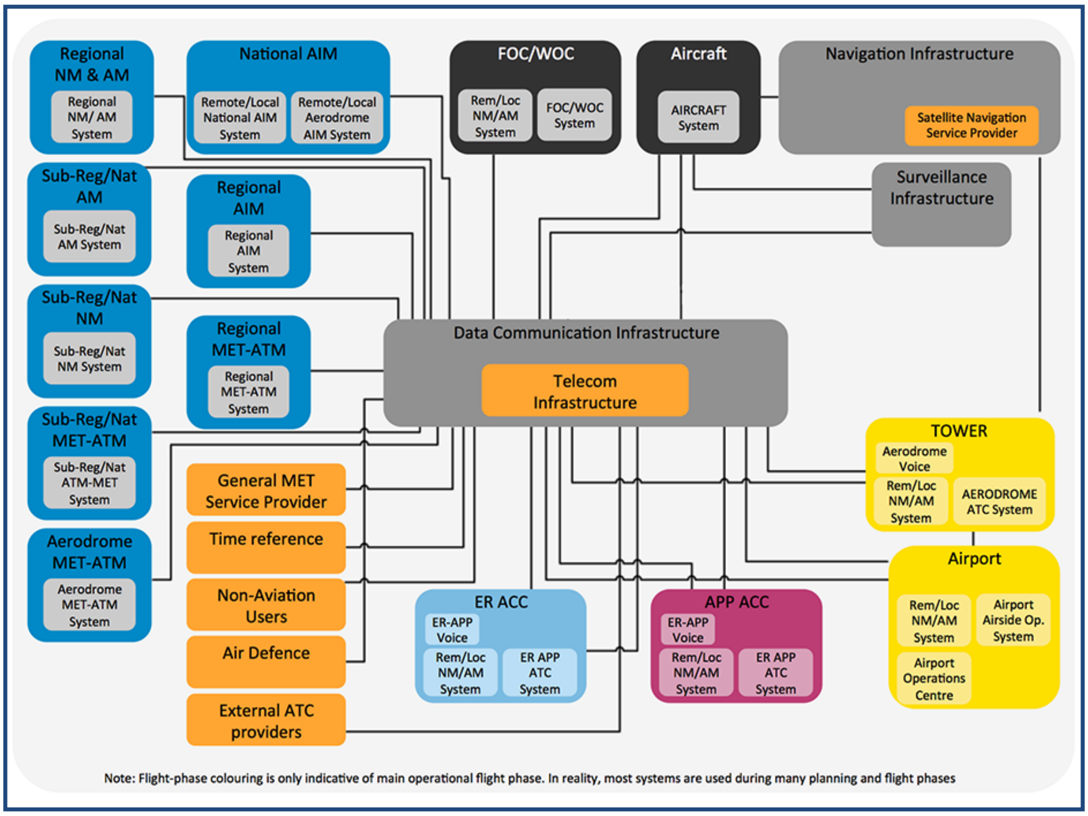
NB. ATM system upgrade for Oro Navigacija (Lithuania) has been funded under category Other Projects in CEF Call 2015



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 4.4.2 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

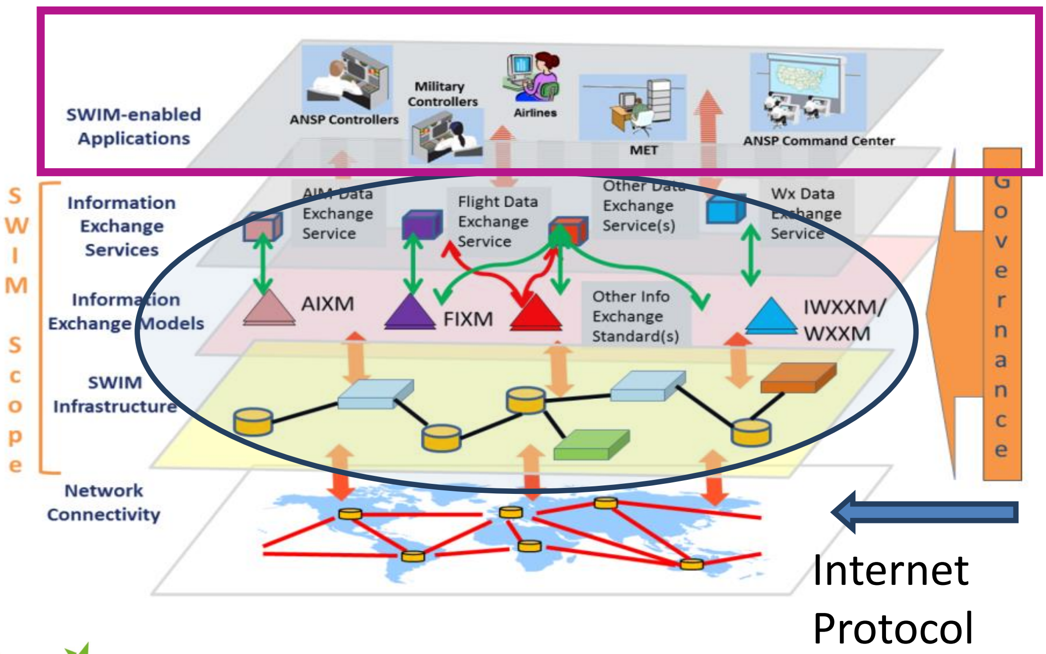
AF #5 – Initial SWIM

SWIM Infrastructure is included in the SESAR EATM Architecture Data Communication Infrastructure and in the lower layers of the ATM systems connected to the Data Communication Infrastructure.



SESAR EATM Architecture

The SWIM Infrastructure supports the exchanges of SWIM ATM information between the Operational Stakeholders. Initial SWIM, iSWIM as called in the PCP, is limited to some **Ground-Ground Aeronautical, Meteorological, Cooperative Network and Flight Data Information exchanges.**



Based on the ICAO definition of SWIM depicted above, according to which "SWIM comprises **standards**, **infrastructure** and **governance** enabling the management of information and its exchange between operational stakeholders via **interoperable services**", the DP 2015 had developed 9 Families as a guideline for the operational stakeholders to implement initial SWIM projects. Taking on board the lessons learned from the 2014 and 2015 CEF Transport Calls for Proposal, as well as the updated outputs of SESAR1 and the updated European ATM Master Plan, DP 2016 envisages ATM Functionality #5 as organized in 12 Families: two new Families are dealing with Security implementation and one new Family with Flight Object implementation.

A first set is dealing with the necessary common components/structures/developments the operational stakeholders have to put in place together to facilitate the SWIM interoperability and interconnectivity:

- 5.1.1: PENS1: the first implementation of PENS ending in June 2018
- 5.1.2: NewPENS: the new PENS implementation, with a new stronger governance, launched very beginning 2016 replacing PENS1 after a transition period (2017-2018)
- 5.1.3: SWIM Governance and Registry implementing the necessary structures and processes for SWIM operation and evolution
- 5.1.4 (NEW): PKI and Cybersecurity developing the necessary common security requirements to guarantee a common secure SWIM implementation

A second set is dealing with the dedicated infrastructure that each operational stakeholder has to implement within its own architecture to be able to support the SWIM information exchanges:

- 5.2.1: dedicated Internet Protocol Network Services to support IP exchanges
- 5.2.2: dedicated SWIM infrastructure (middleware) to support SWIM Profiles
- 5.2.3 (NEW): dedicated PKI and Cybersecurity components and processes to meet local security requirements in line with common ones defined in 5.1.4

A third and last set is dealing with the different kinds of ATM information exchanges defined in the PCP, including the interdependencies with the other AFs:

- 5.3.1: The Aeronautical Information Exchanges
- 5.4.1: The Meteorological Information Exchanges
- 5.5.1: The Cooperative Network Information Exchanges
- 5.6.1: The Flight Information Exchanges
- 5.6.2 (NEW): The Flight Object Information Exchanges

Finally, Appendix 1 containing a list of services, developed in the context of SESAR 1 or services deployed or planned by NM, provides to the Stakeholders a partial coverage of the PCP ATM information exchanges defining the SWIM implementation starting point to be then expanded step by step by the SWIM Governance.

The following chart highlights the overall structure of the ATM Functionality #5, namely its SUB AFs, Families and their relevant Implementation initiatives related to both 2014 and 2015 CEF Call awarded projects.

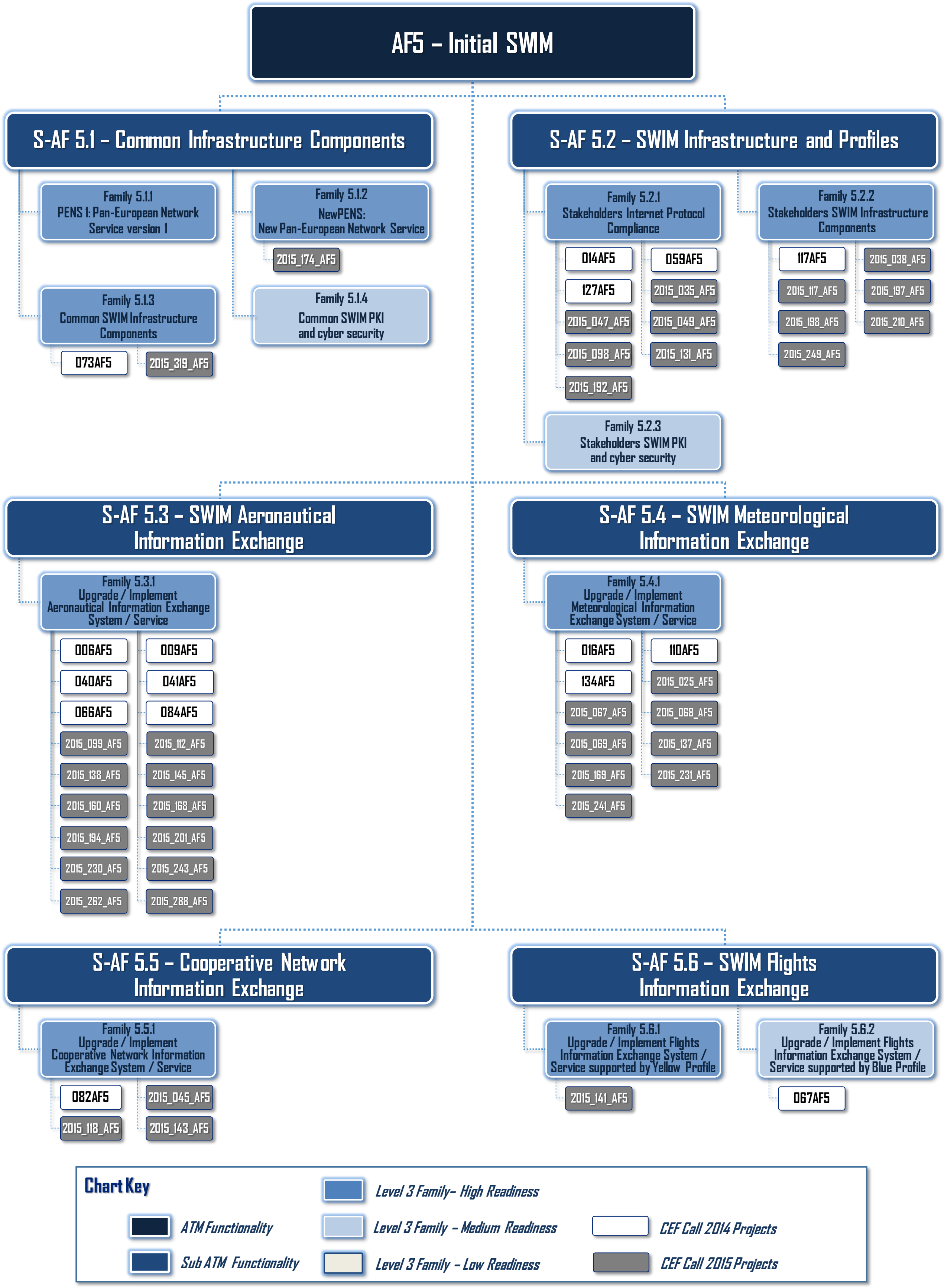


Fig. 23 – AF #5 Structure

The following Gantt chart shows the implementation roadmap for each Family included in AF5 in terms of start and end date of deployment, and it has been defined taking into account the target dates for each ATM Functionality and Sub-ATM Functionality, as stated in Regulation (EU) No 716/2014.

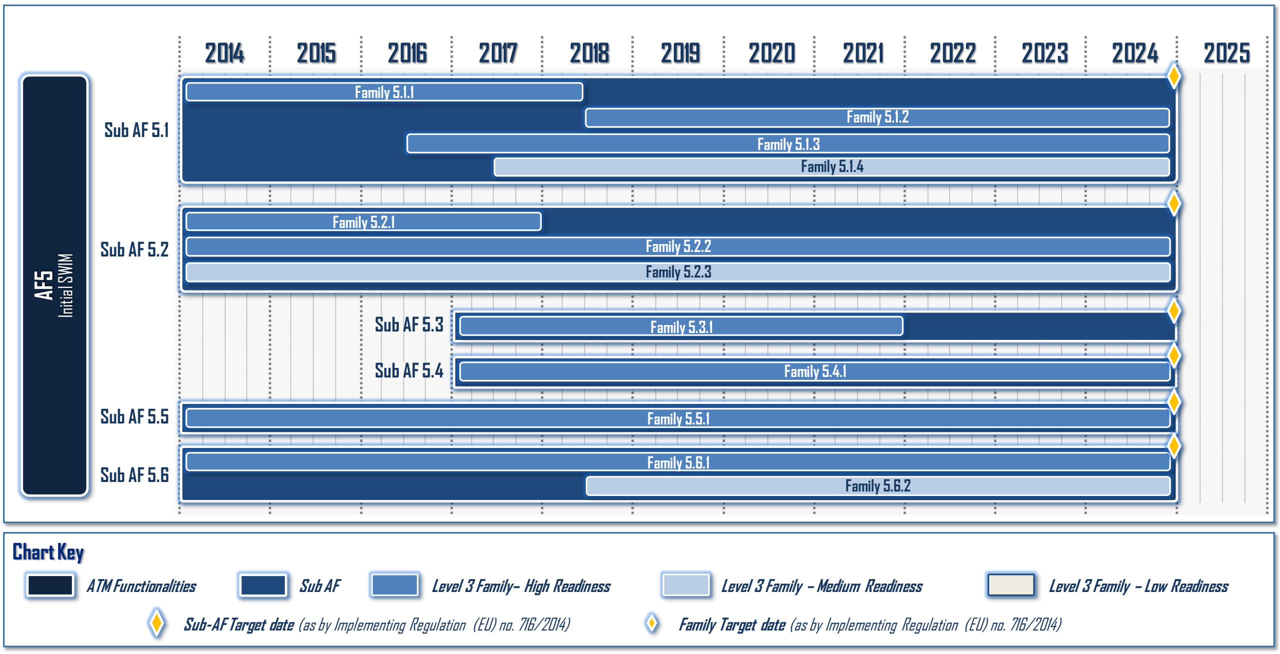


Fig. 24 – AF #5 Implementation Timeline

Family 5.1.1 – PENS 1: Pan-European Network Service version 1

5.1.1 – PENS1: Pan-European Network Service version 1			
Main Sub-AF	Sub-AF 5.1 Common Infrastructure Components		
Readiness for implementation	High		
Initial Operational Capability	Before 2014 PENS1 has been deployed from 2009 by NM and ANSPs	**Full Operational Capability**	30/06/2018 PENS1 is planned to end in June 2018 before to be replaced by NewPENS

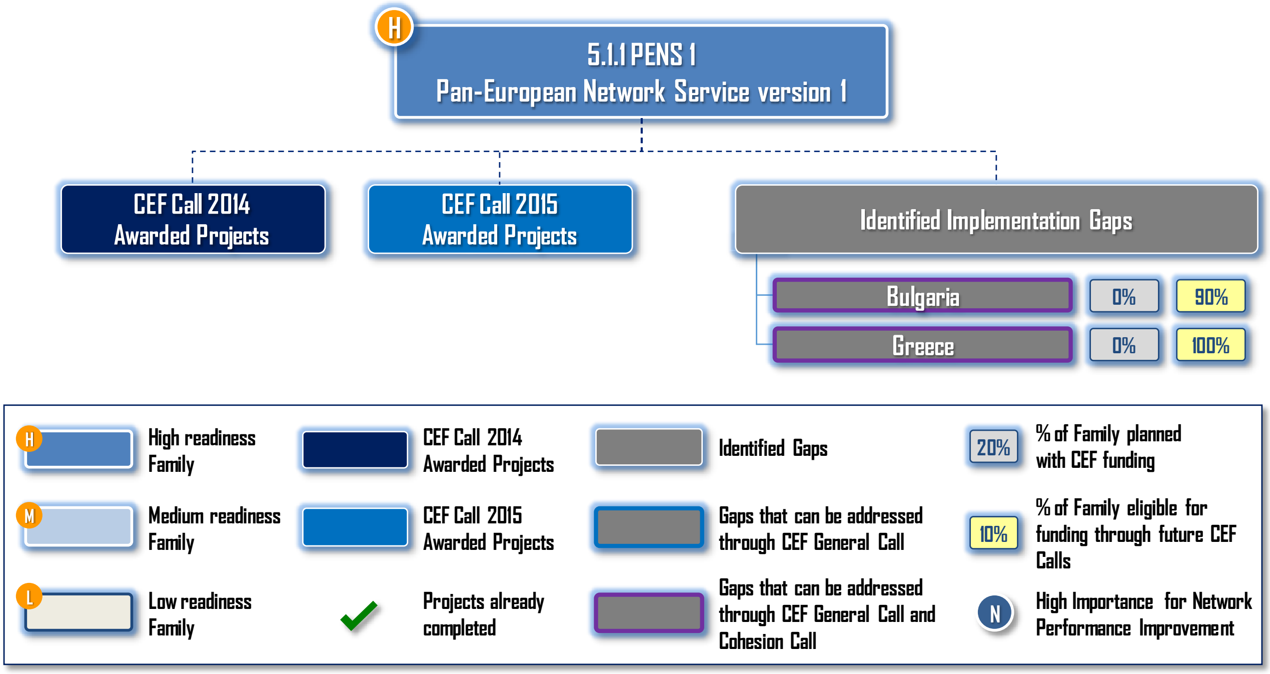
Description and Scope
An Internet Protocol (version6) Network connectivity is necessary to support the SWIM Exchanges. The current PENS (Pan European Network Service), called PENS1, supports the exchanges of the current ATM information based on Internet Protocol (version 4, 6). PENS1, provided by SITA, is expected to terminate in June 2018, but a new PENS, called NewPENS, is planned to be deployed from beginning 2017 to replace PENS1 with a transition period (2017-mid 2018) to guarantee the continuity of operations. The PCP stipulates *"To support the blue SWIM TI Profile (for Flight Object), very high and high capacity centres shall be connected to Pan-European Network Services (PENS)".* So ANSPs, planning to implement IOP FO, have to be or become PENS user. The scope of this Projects Family aims at implementing projects for ANSPs not yet PENS1 user and having planned to implement IOP / FO before June 2018.
Interdependencies
5.1.2 (NewPENS) to guarantee the transition from PENS1 to NewPENS 5.3.1, 5.4.1, 5.5.1, 5.6.1 5.6.2 (Flight Object Exchanges) PENS1 shall be able to manage ATM VoIP communications proposed as an enabler in Family 3.1.4
Synchronization Needs
The synchronization and coordination is performed by the PSSG (PENS Steering Group) and the PMU (PENS Management Unit), the main bodies of the PENS1 Governance. Any PENS user has, when entering PENS by signing the PENS CPA (Common Procurement Agreement) and the dedicated Amendment, a representative in PSSG.
Civil / Military Coordination
Where States have agreed or intend to share information between civil and military ANSPs via the NewPENS it is essential that migrations to IP Network Services are coordinated between all parties.

Stakeholders considered as gaps	ANSPs, Network Manager, Military ANSPs who require direct interconnections to civil ANSPs

Other stakeholders involved in the Family deployment	None	
Links to ICAO GANP ASBUs	B1-SWIM Performance Improvement through the Application of System-Wide Information Management (SWIM)	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	CTE-C06a-PENS-Phase 1 Available
	ATM Master Plan Level 3 (Edition 2016)	None
SESAR Solutions	N/A	
Very Large Scale Demonstrations	N/A	
Guidance Material / Specifications / Standards	CEN ATM information security EN 16495 (Version 2) (2017) PENS 1 documents (PSSG) Internet Protocol version 4 and 6 for Unicast and Multicast (RFC) ECTL Stand/Spec on TI SWIM Yellow Profile definition (2017) ECTL Stand/Spec on TI SWIM Blue Profile Definition (2020) ICAO Doc 10039 – Manual on System Wide Information Management concept	
Means of compliance and / or Certification	None	
Regulations	None	
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them.	
Recommendation for IPs proposal	Any ANSP, not yet PENS user, planning to implement IOP FO before mid 2018 is invited to present a project to become a PENS1 user. PENS is also able to support all the ATM information exchanges even if the Commission Implementing Regulation (EU) No 716/2014 is requiring PENS only for the Blue Profile required for Flight Object. So any OS, not yet PENS user, could present an IP to become a PENS user.	
Deployment Approach	The implementation of the Family would require the signature of both the PENS1 CPA (Common Procurement Agreement) with EUROCONTROL and the Amendment with the Network Service Provider **(MM1 – PENS1 CPA (Common Procurement**	

	Agreement) and Amendment signed). The Network Service Provider shall then install its routers in the Operational Stakeholder premises in order for the OS to gain access(es) to PENS1 **(MM2 – PENS1 access(es) installed)**, connect with the Operational Stakeholder IP Network in a secure manner **(MM3 – PENS1 connection(s) installed integrated including security measures)**. Before the start of operational use, the planning of end-to-end network services deployment (test, validation, operation) shall be completed with other Operational Stakeholders, such as NM, ANSPs, AUs, Airport Operators, etc **(MM4 – Planning of the Network Services)**. The execution of such activities is expected to lead to the start of permanent operational use meaning that all end-to-end network services shall be in operation, supporting Yellow and Blue Profiles **(MM5 – Network Services in Operation)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



No Implementation Initiatives related to this Family has been neither awarded nor submitted for 2014 CEF Call or CEF Call 2015, respectively.

Family 5.1.2 – NewPENS: New Pan-European Network Service

5.1.2 – NewPENS: New Pan-European Network Service			
Main Sub-AF	Sub-AF 5.1 Common Infrastructure Components		
Readiness for implementation	High		
Initial Operational Capability	01/06/2018	**Full Operational Capability**	01/01/2025

Description and Scope

An Internet Protocol (version6) Network connectivity is necessary to support the SWIM Exchanges. NewPENS (New Pan European Network Service) will exchange information based on Internet Protocol.

NewPENS will replace PENS1 terminating in June 2018. The PCP stipulates "*To support the blue SWIM TI Profile (for Flight Object), very high and high capacity centres shall be connected to Pan-European Network Services (PENS)*". So civil and military ANSPs, planning to implement IOP FO, have to be NewPENS users.

Although the Yellow Profile has less demanding QoS requirements than the Blue Profile, it can also be supported by NewPENS instead of Public Internet. It will be up to Stakeholders, according to their requirements, to select the Public Internet Protocol Network or NewPENS.

After the signature end 2015 of the NewPENS CPA (Common Procurement Agreement) by Operational Stakeholders, NewPENS had been set-up with a dedicated Governance. The NewPENS governance comprises:

1. Three bodies, representing all the Operational Stakeholders having signed the CPA, at the executive level, from the top to the down:
    a. A Top Management Body (TMB) at the CEOs levels
    b. A PENS Executive Board (PEB) at the Directors level
    c. PENS Boards at the Operational and Technical level representing the different types of Operational Stakeholders (NM, ANSPs, …)
2. One EUROCONTROL unit at the Management level, the PMU (PENS Management Unit) responsible to perform the necessary procurements and to manage the related contracts with the future providers of Network Services and interfacing the NewPENS users.
3. One PENS Technical Center (PTC) composed of some Operational Stakeholders Representatives responsible to define and drive the technical and operational NewPENS evolutions.
4. PENS Operational Centers responsible to provide the help desk services between the NewPENS users and the NewPENS Providers to guarantee a safe and secure continuity of service 24/7/365.
5. Network Service Provider(s) (contractor(s)) providing the Internet Protocol Services to the PENS Users according to the required SLAs (Service Level Agreements).

A CPTF (Common Procurement task Force), composed of 15 Operational Stakeholders representatives and steered by the PEB, was set-up beginning 2016 to establish the related Procurement documents supporting the forthcoming Call for Tender (mid 2016) to be managed by EUROCONTROL on behalf of the CPA signatories to select in 2017 the future Network Service Provider(s) (NSP).

A transition phase to migrate from PENS1 to NewPENS is then expected from 2017 to mid 2018, date of the full operation of NewPENS and of the PENS1 termination.

The coordination with same initiatives in other ICAO Regions should be relevant for worldwide interoperability.

Interdependencies

With 5.1.1 (PENS1), 5.3.1, 5.4.1, 5.5.1, 5.6.1 (Flights Information Exchanges) and 5.6.2 (FO) and possible interdependencies with all the projects Families dealing with ATM Information exchanges using NewPENS. NewPENS shall be also able to manage ATM VoIP communications as an enabler in Family 3.1.4.

Synchronization Needs

The synchronization and coordination will be performed by the NewPENS Governance bodies in place from the beginning 2016.

Any NewPENS user has, when entering NewPENS by signing the NewPENS CPA (Common Procurement Agreement) and later, after the contract awarding, the dedicated Amendment, a representative in the NewPENS Governance bodies (TMB, PEB, PENS Boards).

Civil / Military Coordination

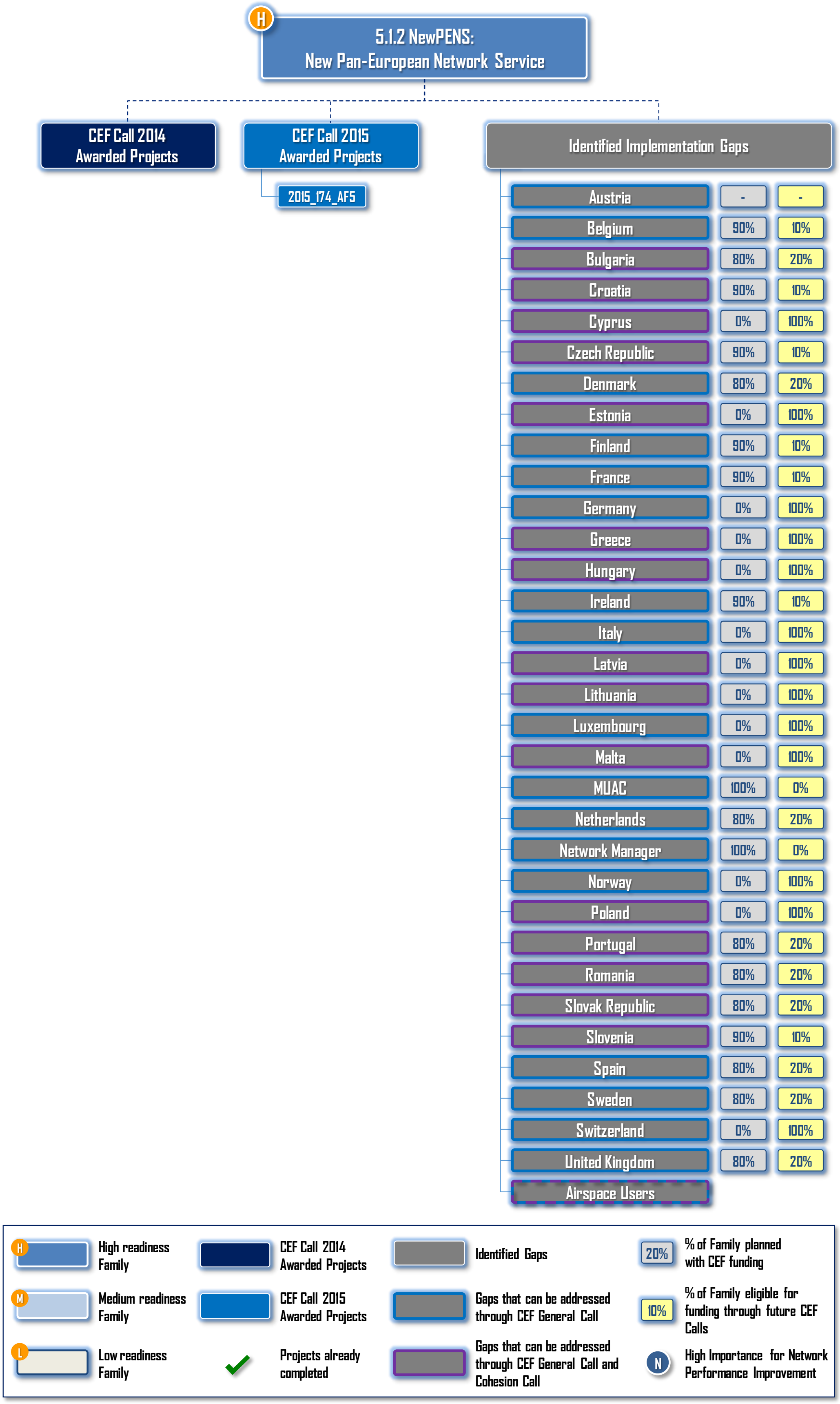
Where States have agreed or intend to share information between civil and military ANSPs via the NewPENS it is essential that migrations to IP Network Services are coordinated between all parties.

Stakeholders considered as gaps	ANSPs, Airport Operators, Airspace Users, Network Manager, Military Authorities, MET Service Providers
Other stakeholders involved in the Family deployment	None

Links to ICAO GANP ASBUs	B1-SWIM Performance Improvement through the Application of System-Wide Information Management (SWIM)	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	CTE-C06b-PENS-Phase 2 SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	COM12
SESAR Solutions	N/A	
Very Large Scale Demonstrations	**Release 7:** PJ. 24, 27 **Release 8:** PJ. 24, 27 **Release 9:** PJ. 24, 27	
Guidance Material / Specifications / Standards	CEN ATM Information security EN 16495 (Version 2) (2017) NewPENS documents (PENS Executive Board) (2018) Internet Protocol version 4 and 6 for Unicast and Multicast (RFC) ECTL Stand/Spec on TI SWIM Yellow Profile definition (2017)	

	ECTL Stand/Spec on TI SWIM Blue Profile Definition (2020) ICAO Doc 10039 Manual on System Wide Information Management concept
Means of compliance and / or Certification	None
Regulations	None
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them
Recommendation for IPs proposal	Within the framework of the CEF 2015 several Stakeholders has made an IP proposal led by EUROCONTROL to set-up NewPENS. Now any OS is invited to propose an IP for becoming a NewPENS user. NewPENS is able to support all the ATM information exchanges even if the Commission Implementing Regulation (EU) No 716/2014 is requiring PENS only for the Blue Profile required for Flight Object.
Deployment Approach	The implementation of the Family would require the signature of both the NewPENS CPA (Common Procurement Agreement) with EUROCONTROL and the Amendment with the Network Service Provider **(MM1 – NewPENS CPA (Common Procurement Agreement and Amendment signed**). The Network Service Provider shall then install its routers in the Operational Stakeholder premises in order for the OS to gain access(es) to NewPENS **(MM2 – NewPENS access(es) installed)**, connect with the Operational Stakeholder IP Network in a secure manner **(MM3 – NewPENS connection(s) installed integrated including security measures)**. Before the start of operational use, the planning of end-to-end network services deployment including the possible transitions from PENS1 to NewPENS (test, validation, operation) shall be completed with other Operational Stakeholders, such as NM, ANSPs, AUs, Airport Operators, etc **(MM4 – Planning of the Network Services)**. The execution of such activities is expected to lead to the start of permanent operational use, meaning that all end-to-end network services shall be in operation, supporting Yellow and Blue Profiles **(MM5 – Network Services in Operation)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



A dedicated table within Annex A encompasses the list of implementation initiatives associated to Family 5.1.2 awarded as 2015 CEF Call candidate project, along with a more detailed description of its content.

Family 5.1.3 – Common SWIM Infrastructure Components

5.1.3 – Common SWIM Infrastructure Components			
Main Sub-AF	Sub-AF 5.1 Common Infrastructure Components		
Readiness for implementation	High		
Initial Operational Capability	01/06/2016 For starting the SWIM Governance Structure and Processes and SWIM Registry	**Full Operational Capability**	01/01/2025

Description and Scope

Within the Commission Implementing Regulation (EU) No716/2014 the SWIM Infrastructure has been split in two parts:

- The common components § 5.1.1. Common infrastructure components
- The stakeholders' components § 5.1.2. SWIM Technical Infrastructure and Profiles

According to Commission Implementing Regulation (EU) No 716/2014 § 5.1.1. the **Common SWIM Infrastructure Components** are:

— ***The registry***, *which shall be used for publication and discovery of information regarding service consumers and providers, the logical service and information models, SWIM enabled services (Service Implementations), business, technical, and policy information*

— ***Public Key Infrastructure*** *(PKI), which shall be used for signing, emitting and maintaining certificates and revocation lists; The PKI ensures that information can be securely transferred*

The Commission Implementing Regulation (EU) No 716/2014 stipulates also that *SWIM comprises standards, infrastructure and* ***governance*** *enabling the management of information and its exchange between operational stakeholders via interoperable services*.

The current Family is dealing with the **common** components **governance and registry** while the Family "Stakeholder SWIM Infrastructure Components" (5.2.2) is dealing with the dedicated **stakeholders**' components. The Public Key and Security Infrastructure is dealt with in two separate Families, Family 5.1.4 for the common part and Family 5.2.3 for the stakeholder implementation.

The scope of this Family is the implementation of the SWIM common components SWIM governance and SWIM registry.

The **SWIM governance** consists of bodies including civil and military stakeholders and of processes that together steer the operation of SWIM and ensure its controlled evolution. SWIM governance

- manages the common components, in particular the registry
- contributes to the elaboration of SWIM standards
- maintains the SWIM Compliance Framework and governs the compliance assessments
- devises the policies for the provision and the consumption of the SWIM services, i.e.
  - the compliance policy,
  - the information security policy and

    - the service policy.
- Coordinates the service implementation
- Coordinates the migration from legacy protocols
- Devises and carries out the processes for the evolution of SWIM, e.g. change management, the service lifecycle, etc.

A **SWIM registry** managed by the SWIM governance bodies, is the common information repository. It allows the discovery of existing services by providing the service catalogue (list of service models and service implementations). Furthermore it supports the implementation of SWIM by providing reference documents such as the ATM Information Reference Model (AIRM), the AIRM and the ISRM Foundations, SWIM TI Profile definitions, compliance framework and criteria, SWIM Governance policies, etc.

Interdependencies

Family 5.1.3, dealing with common SWIM components, is complemented for each Stakeholder by Family 5.2.2, for security by Families 5.1.4 and 5.2.3 and is a prerequisite for the full implementation of Families 5.3.1, 5.4.1, 5.5.1 and 5.6.1 even if their implementation has already started based on the material provided by SESAR 1 and the NM.

Synchronization Needs

Strong coordination is necessary between all stakeholders to implement the common components starting with agreed SWIM Governance (consisting of the structure and the processes) and then further components – in particular the registry – under the steering of the SWIM Governance. Coordination with other ICAO regions is required since a majority of the information exchanged via SWIM requires exchange beyond Europe.

Civil / Military Coordination

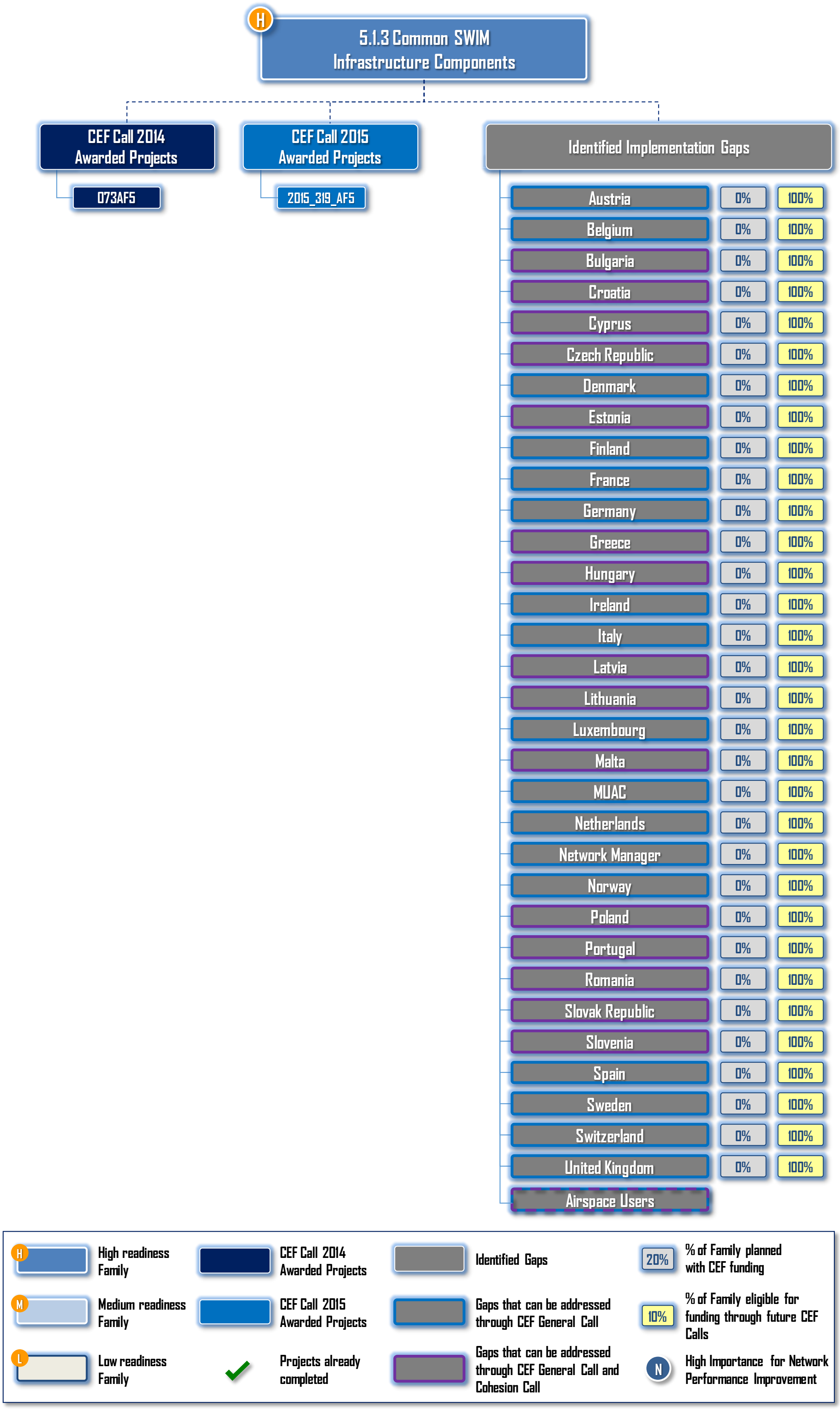
Military must be represented in the SWIM Governance bodies and their specific needs must be considered in the identified processes

Stakeholders considered as gaps	ANSPs, Airport Operators, Airspace Users, Network Manager, Military Authorities, MET Service Providers	
Other stakeholders involved in the Family deployment	None	
Links to ICAO GANP ASBUs	B1-SWIM Performance Improvement through the Application of System-Wide Information Management (SWIM)	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	IS-0901-A SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	INF08.1, INF08.2
SESAR Solutions	#46 "Initial SWIM"	
Very Large Scale Demonstrations	**Release 7:** PJ.24, 27 **Release 8:** PJ.24, 27 **Release 9:** PJ.24, 27	

Guidance Material / Specifications / Standards	CEN ATM information security EN 16495 (Version 2) (2017) ECTL SWIM Foundation material (2017) ECTL AIRM (2017) ECTL AIRM Rulebook (2017) ECTL ATM Information Service Rulebook (2017) ECTL Compliance framework (2017) ECTL Stand/Spec on TI SWIM Yellow Profile definition (2017) ECTL Stand/Spec on TI SWIM Blue Profile Definition (2020) ICAO Doc 10039 Manual on System Wide Information Management concept
Means of compliance and / or Certification	None
Regulations	None
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them
Recommendation for IPs proposal	An implementation initiative engaging a wide number of stakeholders from all categories (ANSPs, AOs, AUs) has already been launched, addressing the setup and initial operation of a SWIM Governance structure and the associated processes. This initiative will refine and implement the entire SWIM Governance framework initiated in SESAR1, which has a direct impact on all IPs related to the implementation of AF5, specifically the Families 5.1.3, 5.1.4, 5.2.2, 5.2.3, 5.3.1, 5.4.1, 5.5.1, 5.6.1 and 5.6.2. For this reason, stakeholders are invited to express their interest in joining the SWIM Governance structure.
Deployment Approach	The implementation of the Family requires the refinement of the structure of the SWIM Governance and the processes for performing governance developed during SESAR 1, in order to meet the needs of iSWIM deployment. This structure and the related processes shall subsequently be put in operation. Concerned Stakeholder: Chairman of the SWIM Steering Group (currently the leader of the SWIM Governance IP, i.e. DSNA). (**MM1 – SWIM governance structure and processes set up**). The Stakeholder shall agree to adhere to the principles of SWIM Governance and to follow the processes defined by the SWIM Governance structure. Moreover, the stakeholder can actively participate in the SWIM Governance structure, i.e. by participating in one or more of the groups. Concerned stakeholders: All stakeholders mandated to implement AF5

	according to the PCP (**MM1.1 – Adhesion to the SWIM Governance principles**). The concept of the design-time registry for SWIM devised during SESAR 1 shall be refined to meet the requirements of iSWIM deployment. Concerned stakeholder: Chairman of the SWIM Steering Group (currently the leader of the SWIM Governance IP, i.e. DSNA) (**MM2 – SWIM Registry refined (concept) and adopted by the SWIM Governance**). The SWIM Registry as a tool shall be developed and then tested. Concerned stakeholder: Chairman of the SWIM Steering Group (currently the leader of the SWIM Governance IP, i.e. DSNA) (**MM3 – SWIM Registry developed and adopted by the SWIM Governance**). The SWIM Registry tool shall be deployed and made available for Operational Stakeholders to use. Concerned stakeholder: Chairman of the SWIM Steering Group (currently the leader of the SWIM Governance IP, i.e. DSNA) (**MM4 – SWIM Registry deployed and declared ready for use by the SWIM Governance**). For full implementation of the Family the Stakeholder is expected to actively use the registry, i.e. registers his own services, uses the registry to discover services, uses the registry to retrieve SWIM standards and guidance material. Concerned stakeholders: All stakeholders mandated to implement AF5 according to the PCP (**MM5 – SWIM Registry used by concerned OS**).

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 5.1.3 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 5.1.4 – Common SWIM PKI and Cybersecurity

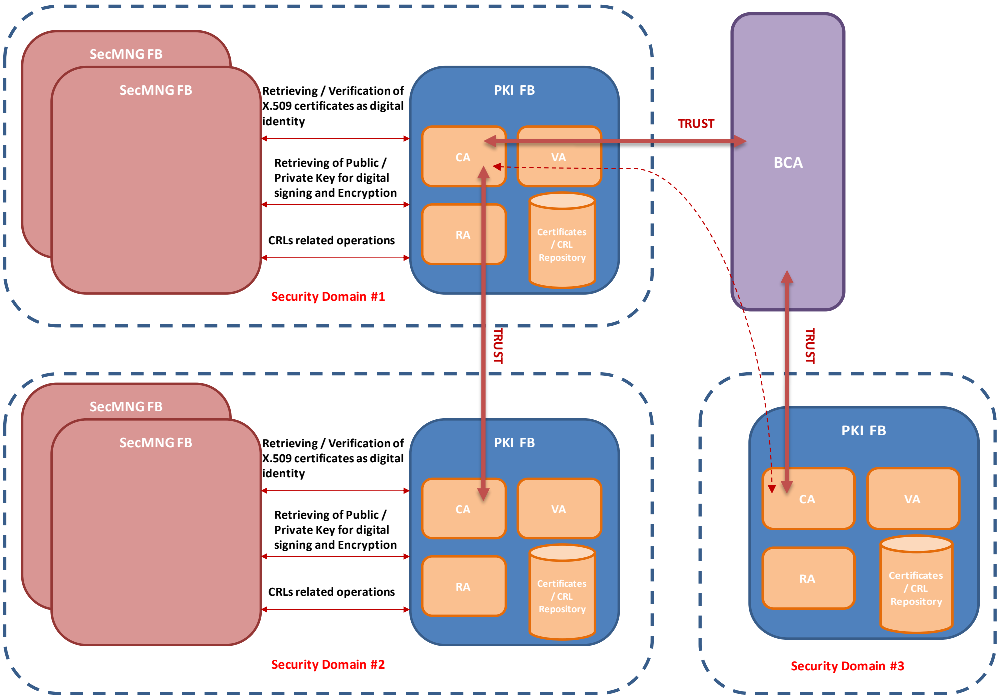
5.1.4 – Common SWIM PKI and cyber security			
Main Sub-AF	Sub-AF 5.1 Common Infrastructure Components		
Readiness for implementation	Medium		
Initial Operational Capability	01/06/2017	**Full Operational Capability**	01/01/2025

Description and Scope

Within the Commission Implementing Regulation (EU) No716/2014 the SWIM Infrastructure has been split in two parts:
- The common components § 5.1.1. Common infrastructure components
- The stakeholders' components § 5.1.2. SWIM Technical Infrastructure and Profiles
According to Commission Implementing Regulation (EU) No 716/2014 § 5.1.1. the **Common SWIM Infrastructure Components** are:
— ***The registry***, *which shall be used for publication and discovery of information regarding service consumers and providers, the logical service and information models, SWIM enabled services (Service Implementations), business, technical, and policy information*
— ***Public Key Infrastructure*** *(PKI), which shall be used for signing, emitting and maintaining certificates and revocation lists; The PKI ensures that information can be securely transferred*
The Commission Implementing Regulation (EU) No 716/2014 stipulates also that *SWIM comprises standards, infrastructure and* ***governance*** *enabling the management of information and its exchange between operational stakeholders via interoperable services*.
The Family 5.1.3 is dealing with the **common** components **governance and registry** while the Family "Stakeholder SWIM Infrastructure Components" (5.2.2) is dealing with the dedicated **stakeholders**' components. The Public Key Infrastructure and cybersecurity are dealt with in two separate Families, Family 5.1.4 for the common part and Family 5.2.3 for the stakeholder implementation. The scope of this Family is the implementation of the SWIM common components cybersecurity and PKI.
It shall support users from all civil and military stakeholders.
 	
The technical implementation of PKI is a stakeholder issue and is covered by Family 5.2.3 when the common specifications relating to PKI and its governance are developed in this Family:
• Processes related to signing, emitting, maintaining and revoking certificates
• Objectives and requirements for:
    o Confidentiality
    o Integrity
    o Non-repudiation
    o Accountability
    o Authenticity
    o Safety
• Rules and processes for delegating a certificate

- Establishment and tasks of bridge authorities
- Establishment and tasks of a root certification authority

Global coordination to ensure secure information exchange on a world-wide scale.



FB: Functional Block

CA: Certificate Authority

VA: Validation Authority

RA: Registration Authority

CRL: Certificate Revocation Lists

BCA: Bridge Certificate Authority

Interdependencies

Families 5.1.4 and 5.2.3 is a prerequisite for the full secure implementation of Families 5.1.3, 5.2.2, 5.3.1, 5.4.1, 5.5.1, 5.6.1 and 5.6.2 even if their implementation has already started with some current draft, mature enough, material provided by SESAR 1 and the NM.

Synchronization Needs

Strong coordination is necessary between all stakeholders to implement the common components starting with an agreed SWIM Governance (consisting of the structure and the processes) – under the steering of the SWIM Governance.

Civil / Military Coordination

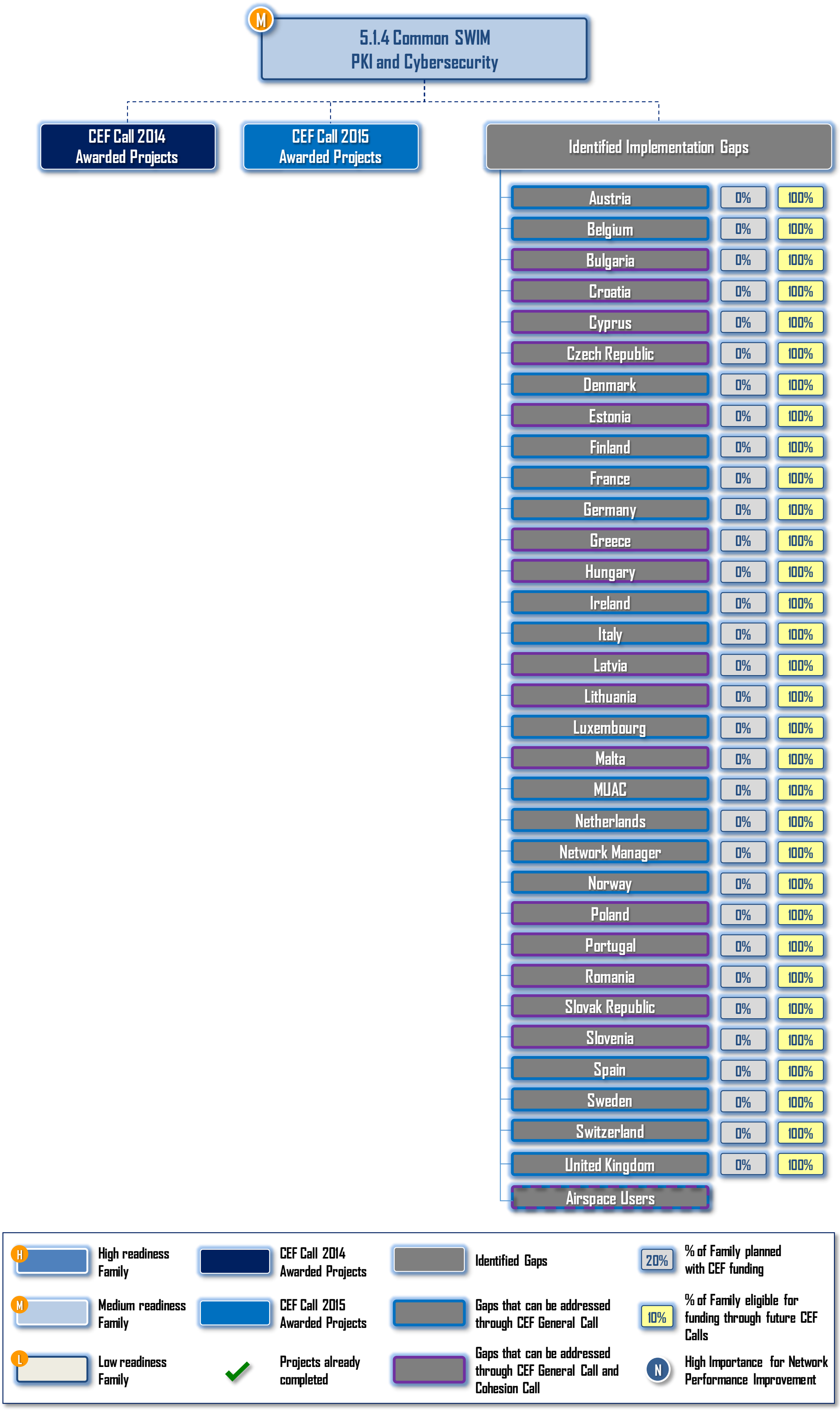
It is recommended that data security and confidentiality is managed as an integrated requirement.

Stakeholders considered as gaps	ANSPs, Airport Operators, Airspace Users, Network Manager, Military Authorities, MET Service Providers

Other stakeholders involved in the Family deployment	None	
Links to ICAO GANP ASBUs	B1-SWIM Performance Improvement through the Application of System-Wide Information Management (SWIM)	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	IS-0901-A SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	INF08.1, INF08.2
SESAR Solutions	#46 "Initial SWIM"	
Very Large Scale Demonstrations	**Release 7:** PJ.24, 27 **Release 8:** PJ.24, 27 **Release 9:** PJ.24, 27	
Guidance Material / Specifications / Standards	CEN ATM information security EN 16495 (Version 2) (2017) ECTL SWIM Foundation material (2017) ECTL AIRM (2017) ECTL AIRM Rulebook (2017) ECTL ATM Information Service Rulebook (2017) ECTL Compliance framework (2017) ECTL Stand/Spec on TI SWIM Yellow Profile definition (2017) ECTL Stand/Spec on TI SWIM Blue Profile Definition (2020) x.509 (ITU) ICAO Doc 10039 Manual on System Wide Information Management concept	
Means of compliance and / or Certification	None	
Regulations	None	
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them	
Recommendation for IPs proposal	It is recommended that stakeholders launch a common Implementing Project, in coordination with the SWIM Governance, dealing with the topics of security and cybersecurity of SWIM, in particular the PKI. While the technical specification	

	of PKI is mature, its application (organizational setup, processes etc.) in the ATM domain is not, hence the project would have to tackle the completion of this topic early on to ensure its implementation by all stakeholders within the FOC date stipulated by the Commission Implementing Regulation (EU) No 716/2014.
Deployment Approach	The implementation of this Family at first requires the setup of the SWIM Governance structure and the establishment of the governance processes **(MM.1 - SWIM governance structure and processes set up)**. In turn stakeholders would have to agree to adhere to the policies and processes put in place by the SWIM Governance, in particular the security policy **(MM.1.1 - Adhesion to the SWIM Governance principles)**. Based on these agreements the SWIM Governance can ensure and steer the implementation of PKI. In a first step the concept for this component needs to be refined to meet the requirements for iSWIM deployment **(MM.2.1- PKI refined (concept) and adopted by the SWIM Governance)**. Thereafter the PKI component will be developed **(MM.3.1 - PKI developed and adopted by the SWIM Governance**) and deployed **(MM.4.1 - PKI deployed and declared ready for use by the SWIM Governance)**. The Family implementation is finished once the PKI infrastructure is used operationally by the stakeholders **(MM.5.1- PKI used by concerned OS)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.


M
5.1.4 Common SWIM PKI and Cybersecurity
CEF Call 2014 Awarded Projects
CEF Call 2015 Awarded Projects
Identified Implementation Gaps
Austria 0% 100%
Belgium 0% 100%
Bulgaria 0% 100%
Croatia 0% 100%
Cyprus 0% 100%
Czech Republic 0% 100%
Denmark 0% 100%
Estonia 0% 100%
Finland 0% 100%
France 0% 100%
Germany 0% 100%
Greece 0% 100%
Hungary 0% 100%
Ireland 0% 100%
Italy 0% 100%
Latvia 0% 100%
Lithuania 0% 100%
Luxembourg 0% 100%
Malta 0% 100%
MUAC 0% 100%
Netherlands 0% 100%
Network Manager 0% 100%
Norway 0% 100%
Poland 0% 100%
Portugal 0% 100%
Romania 0% 100%
Slovak Republic 0% 100%
Slovenia 0% 100%
Spain 0% 100%
Sweden 0% 100%
Switzerland 0% 100%
United Kingdom 0% 100%
Airspace Users
H High readiness Family
M Medium readiness Family
L Low readiness Family
CEF Call 2014 Awarded Projects
CEF Call 2015 Awarded Projects
Projects already completed
Identified Gaps
Gaps that can be addressed through CEF General Call
Gaps that can be addressed through CEF General Call and Cohesion Call
20% % of Family planned with CEF funding
10% % of Family eligible for funding through future CEF Calls
N High Importance for Network Performance Improvement

Family 5.2.1 – Stakeholders Internet Protocol Compliance

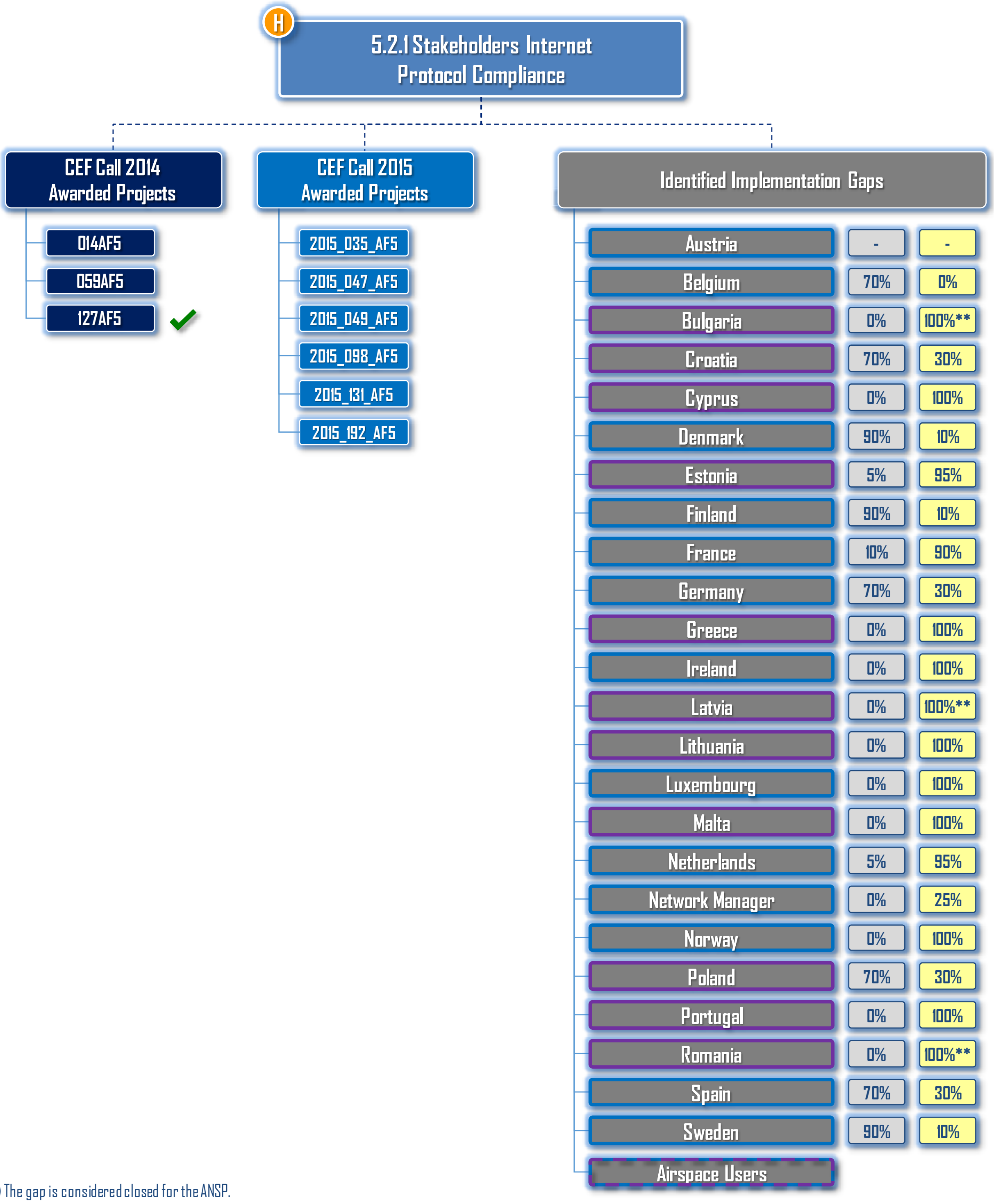
5.2.1 – Stakeholders Internet Protocol Compliance			
Main Sub-AF	Sub-AF 5.2 SWIM Infrastructure and Profiles		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2018

Description and Scope
The Commission Implementing Regulation (EU) No 716/2014 stipulates "*Initial System Wide Information Management (iSWIM) supports information exchanges that are built on standards and delivered through an internet protocol (IP)-based network by SWIM enabled systems*". So a strong SWIM prerequisite is to be IP-compliant. This Family is dealing with the necessary Internet Protocol compliance for each civil and military stakeholder to be able to support future SWIM information exchanges through SWIM Yellow and Blue profiles based on Internet Protocol. The scope of this Projects Family aims mainly at implementing on civil and military stakeholder side Internet Protocol Network connectivity to be able to exchange ATM information.
Interdependencies
All AF5 Families.
Synchronization Needs
Each civil and military stakeholder not yet Internet Protocol compliant should plan to transition to Internet Protocol version 6 connectivity in order to be in a position to exchange information with other stakeholder in the near future through SWIM Network.
Civil / Military Coordination
There are clear benefits to all stakeholders to coordinate and synchronize the deployment of SWIM infrastructure in order to exploit the efficient sharing of information between civil and military stakeholders. Therefore, all stakeholders planning migration to IP connectivity are encouraged to coordinate between civil and military authorities.

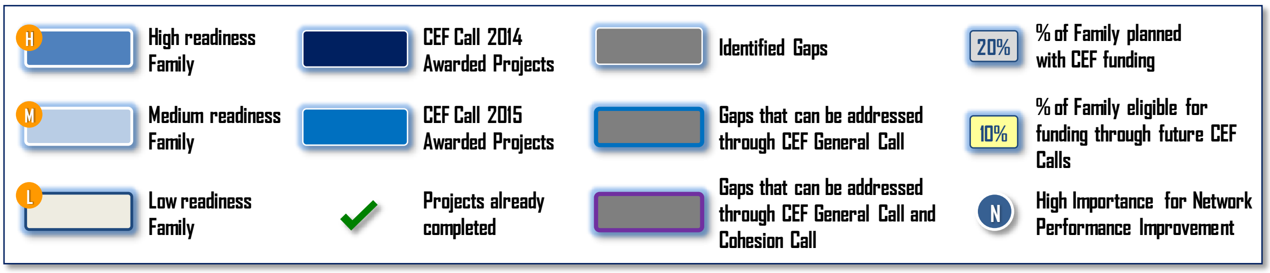
Stakeholders considered as gaps	ANSPs, Airport Operators, Airspace Users, Network Manager, Military Authorities, MET Service Providers
Other stakeholders involved in the Family deployment	None
Links to ICAO GANP ASBUs	B1-SWIM Performance Improvement through the Application of System-Wide Information Management (SWIM)

ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	CTE-C06 Available
	ATM Master Plan Level 3 (Edition 2016)	INF08.1
SESAR Solutions	N/A	
Very Large Scale Demonstrations	N/A	
Guidance Material / Specifications / Standards	CEN ATM information security EN 16495 (Version 2) (2017) ECTL Stand/Spec on TI SWIM Yellow Profile definition (2017) ECTL Stand/Spec on TI SWIM Blue Profile Definition (2020) Internet Protocol version 4 and 6 for Unicast and Multicast (RFC) ICAO Doc 10039 Manual on System Wide Information Management concept	
Means of compliance and / or Certification	None	
Regulations	None	
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them	
Recommendation for IPs proposal	Stakeholders not yet compliant are highly invited to present implementation projects for achieving IP compliance. It is recommended to take into consideration the results of Gap Analysis.	
Deployment Approach	The implementation of the Family would require the deployment of the Internet Protocol Services in order to ensure the handling of the Yellow Profile. References: SESAR 14.01.04.D43-004-SWIM-TI Yellow Profile Technical Specification 3.1, 14.01.04.D43-005-SWIM-TI Blue Profile Technical Specification 3.1, 14.01.04.D43-SWIM Profiles Interface Bindings Catalogue. (**MM1 – Internet Protocol based Network supporting Yellow Profile**). The Internet Protocol Services shall then be deployed in order to support the Blue Profile. References: SESAR 14.01.04.D43-004-SWIM-TI Yellow Profile Technical Specification 3.1, 14.01.04.D43-005-SWIM-TI Blue Profile Technical Specification 3.1, 14.01.04.D43-SWIM Profiles Interface Bindings Catalogue. (**MM2 – Internet Protocol based Network supporting Blue Profile**).	

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



(**) The gap is considered closed for the ANSP.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 5.2.1 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 5.2.2 – Stakeholders SWIM Infrastructures Components

5.2.2 – Stakeholders' SWIM Infrastructures Components			
Main Sub-AF	Sub-AF 5.2 SWIM Infrastructure and Profiles		
Readiness for implementation	High for implementation of Yellow and medium for Blue TI profile regardless of link to actual information exchange implementation.		
Initial Operational Capability	Before 2014 Even if the common SWIM Infrastructure is not yet formally set-up, some Stakeholders have already started the implementation of SWIM by using the first deliverables of SESAR1.	**Full Operational Capability**	01/01/2025

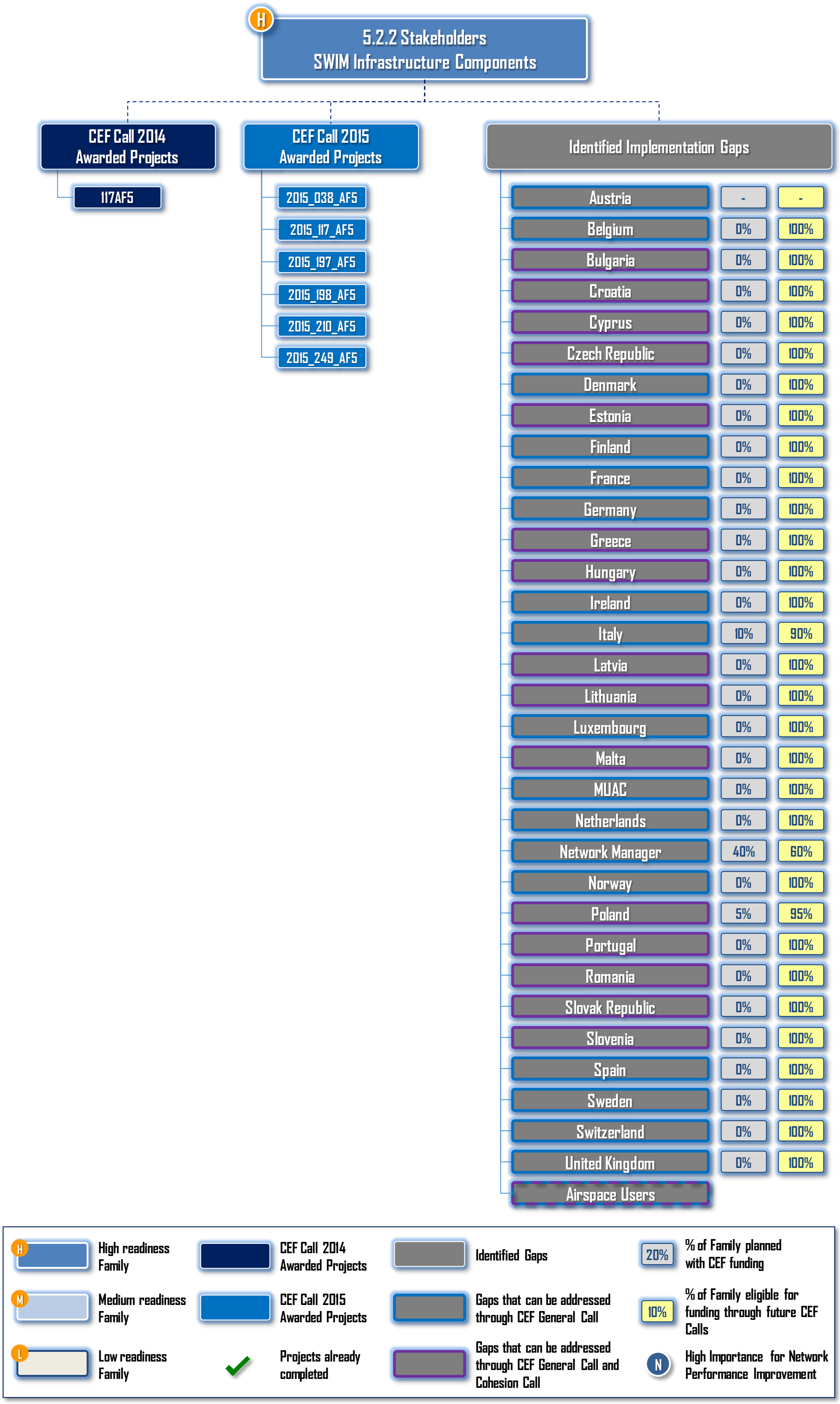
Description and Scope
Within the Commission Implementing Regulation (EU) No 716/2014 the SWIM Infrastructure has been split in two parts: - The common components § *5.1.1. Common infrastructure components* - The stakeholders' components § *5.1.2. SWIM Technical Infrastructure and Profiles* According to §*5.1.2. SWIM Technical Infrastructure and Profiles* of ATM stakeholders shall be driven by the following requirements: *A SWIM Technical Infrastructure (TI) Profile implementation shall be based on standards and interoperable products and services. Information exchange services shall be implemented on one of the following profiles:* — *Blue SWIM TI Profile, which shall be used for exchanging flight information between ATC centres and between ATC and Network Manager. Blue TI profile is intended for Flight Object exchange services as defined in 5.1.6.* — *Yellow SWIM TI Profile, which shall be used for any other ATM data (aeronautical, meteorological, airport, etc.) Yellow TI profile applies for information exchange services defined in 5.3.1, 5.4.1, 5.5.1 and 5.6.1* This Family is dealing with the **Stakeholders SWIM Infrastructure Components** while the Family "Common SWIM Infrastructure Components" (5.1.3) is dealing with the common SWIM components. PKI and security are covered by Families 5.1.4 and 5.2.3 respectively. The scope of this Projects Family aims at implementing in each civil or military Stakeholder the following SWIM components: - Blue Profile - Yellow Profile - Training and certification of technical personnel - All other components necessary for stakeholder SWIM implementation (supervision, monitoring and control) This Family has also to address the Stakeholder transition issues from legacy protocol (AFTN, AMHS, FMTP,) to SWIM environment. Note that the definition of the Yellow Profile does not target contexts, in which • real-time or near real-time use or • extreme high availability are required. These constraints mainly apply if Yellow Profile is deployed using public

<table>
<tr><td colspan="3">internet as the transport medium, which cannot guarantee an appropriate QoS level. For this reason it is recommended to analyse the QoS requirements of the services deployed on top vis-à-vis the QoS level available by the public internet and to use a service with guaranteed QoS, for example PENS/NewPENS, as underlying transport medium if the required QoS level is not achievable by public internet.</td></tr>
<tr><th colspan="3">Interdependencies</th></tr>
<tr><td colspan="3">5.1.3, 5.1.4, 5.2.3, 5.3.1, 5.4.1, 5.5.1, 5.6.1, 5.6.2</td></tr>
<tr><th colspan="3">Synchronization Needs</th></tr>
<tr><td colspan="3">It is essential that appropriate SWIM Governance Structure and Processes are established to develop and monitor an agreed SWIM implementation roadmap.
Strong coordination and synchronisation is necessary between all stakeholders (including military) to implement their SWIM infrastructure according to the agreed SWIM roadmap.</td></tr>
<tr><th colspan="3">Civil / Military Coordination</th></tr>
<tr><td colspan="3">Yes, civil/military coordination is required</td></tr>
<tr><th>Stakeholders considered as gaps</th><td colspan="2">ANSPs, Airport Operators, Airspace Users, Network Manager, Military Authorities, MET Service Providers</td></tr>
<tr><th>Other stakeholders involved in the Family deployment</th><td colspan="2">None</td></tr>
<tr><th>Links to ICAO GANP ASBUs</th><td colspan="2">B1-SWIM
Performance Improvement through the Application of System-Wide Information Management (SWIM)</td></tr>
<tr><th rowspan="2">ATM Master Plan References</th><th>ATM Master Plan Level 2 (Dataset 16)</th><td>IS-0901-A
SESAR Release 5
CM-0201-A
SESAR Release 5</td></tr>
<tr><th>ATM Master Plan Level 3 (Edition 2016)</th><td>INF08.1, INF08.2</td></tr>
<tr><th>SESAR Solutions</th><td colspan="2">#46 "Initial SWIM"
#28 "Initial Ground-Ground Interoperability"</td></tr>
<tr><th>Very Large Scale Demonstrations</th><td colspan="2">Release 7: PJ.24, 27
Release 8: PJ.24, 27
Release 9: PJ.24, 27</td></tr>
<tr><th>Guidance Material / Specifications / Standards</th><td colspan="2">CEN ATM information security EN 16495 (Version 2) (2017)
ECTL SWIM Foundation material (2017)
ECTL AIRM (2017)
ECTL AIRM Rulebook (2017)
ECTL ATM Information Service Rulebook (2017)
ECTL Compliance framework (2017)
ECTL Stand/Spec on TI SWIM Yellow Profile definition (2017)</td></tr>
</table>

	ECTL Stand/Spec on TI SWIM Blue Profile Definition (2020) ICAO Doc 10039 Manual on System Wide Information Management concept
Means of compliance and / or Certification	None
Regulations	None
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them
Recommendation for IPs proposal	According to their SWIM implementation planning, stakeholders are invited to propose IPs to implement their SWIM infrastructure as basis for the implementation of ATM information exchanges according to the PCP (aeronautical, meteorological, cooperative network and flight information exchange).
Deployment Approach	The implementation of the Family requires the definition of the future system architecture able to cover information exchanges in compliance with SWIM Governance policies: relevant profile Blue and/or Yellow shall be supported as well as technical monitoring and control. The concept shall also include SWIM enabled applications defined in AF1, AF2, AF3 and AF4 (**MM1 – Transition / architecture concept from legacy protocol (AFTN…) to SWIM environment available**). The SWIM information exchange implementation plan shall be defined in order to cover all information currently exchanged, but also include a plan for necessary changes or definition of procurement requirements to applications (AF1, AF2, AF3 and AF4). The implementation plan shall in detail describe the realization of the architecture defined in the previous milestone and it must be compliant with the relevant SWIM Governance policies. Furthermore, the plan shall specifically address the transition, ensuring flight safety and minimizing negative network effects (Part of Safety Case) and it may be linked to concrete implementation of SWIM-enabled applications (**MM2 – SWIM information exchange implementation plan available**). The Yellow TI profile middleware and, depending on QoS requirements, Public Internet Protocol Network or PENS access point shall be implemented; supporting technical monitoring and control shall be in place and operational; all relevant technical personnel shall be duly trained (**MM3 – Installation of local Infrastructure Components to support Yellow profile communications**). Blue TI profile middleware and PENS access point shall be established; supporting technical monitoring and control shall be

	in place and operational; all relevant technical personnel (ATSEP) shall be duly trained and new S/E ratings shall be issued (**MM4 – Installation of local Infrastructure Components to support Blue profile communications (FO)**). Before the start of operational use, the local infrastructure shall be both verified and validated, ready to support communication between SWIM-enabled applications. For the Blue TI profile, special care must be taken to ensure that all safety objectives from the safety case are met and documented. The local infrastructure must be compliant to the relevant SWIM Governance policies to guarantee interoperability within the SWIM network. The execution of such activities will lead to the start of permanent operational use (**MM5 – Implementation completed**).

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 5.2.2 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 5.2.3 – Stakeholders SWIM PKI and Cybersecurity

<table>
<tr><th colspan="4">5.2.3 – Stakeholders' SWIM PKI and cyber security</th></tr>
<tr><td>Main Sub-AF</td><td colspan="3">Sub-AF 5.2 SWIM Infrastructure and Profiles</td></tr>
<tr><td>Readiness for implementation</td><td colspan="3">SWIM Public Key Infrastructure (PKI) is rated medium due to the maturity/readiness of the actual implementation available SWIM standards and governance. However PKI standards and technology and NM security infrastructure are very mature.</td></tr>
<tr><td>Initial Operational Capability</td><td>Before 2014</td><td>Full Operational Capability</td><td>01/01/2025</td></tr>
<tr><th colspan="4">Description and Scope</th></tr>
<tr><td colspan="4">This Family is dealing with the Stakeholder's SWIM PKI and cyber security while the Family "Common SWIM PKI and cyber security" (5.1.4) is dealing with the common components, mainly the development of agreed common specifications. The scope of this Projects Family aims at implementing in each civil or military Stakeholder, in line with their own Security Management System approved by their National Supervisory Authority, the following Establish basic/generic public key infrastructure management.
This includes:
o Certificate emitting
o Certificate signing
o Certificate distribution
o Certificate renewal
o Certificate revocation
o Certificate suspension
o Certificate verification
o Certificate storing

Key lifecycle Management includes:
o Creation of key pairs
o Updating keys
o Archiving keys
o Backup and recovery
- Training and certification of technical personnel
- Monitoring and control, in particular, establish a Security Operations Center to monitor and protect the IT systems against cyber attacks
- Procedure development covering normal and degraded operation. Technical standard operating procedures (SOPS) shall also cover certificate management.
- Local policies for authorising and mandating local organization to do certificate management.
- Definition of policies and procedures ensuring compliant certificate usage with respect to both common (AF 5.1.3) and local standards.
- Implementation of audit programmes ensuring continuous compliance with common and local policies and standards.</td></tr>
<tr><th colspan="4">Interdependencies</th></tr>
<tr><td colspan="4">5.1.3, 5.1.4, 5.2.2, 5.3.1, 5.4.1, 5.5.1, 5.6.1</td></tr>
</table>

<table>
<tr><th colspan="3">Synchronization Needs</th></tr>
<tr><td colspan="3">It is essential that appropriate SWIM Governance Structure and Processes are established to develop and monitor an agreed SWIM implementation roadmap.</td></tr>
<tr><th colspan="3">Civil / Military Coordination</th></tr>
<tr><td colspan="3">Yes, civil/military coordination is required</td></tr>
<tr><td>Stakeholders considered as gaps</td><td colspan="2">ANSPs, Airport Operators, Airspace Users, Network Manager, Military Authorities, MET Service Providers</td></tr>
<tr><td>Other stakeholders involved in the Family deployment</td><td colspan="2">None</td></tr>
<tr><td>Links to ICAO GANP ASBUs</td><td colspan="2">B1-SWIM
Performance Improvement through the Application of System-Wide Information Management (SWIM)</td></tr>
<tr><td rowspan="2">ATM Master Plan References</td><td>ATM Master Plan Level 2 (Dataset 16)</td><td>IS-0901-A
SESAR Release 5
CM-0201-A
SESAR Release 5</td></tr>
<tr><td>ATM Master Plan Level 3 (Edition 2016)</td><td>INF08.1, INF08.2</td></tr>
<tr><td>SESAR Solutions</td><td colspan="2">#46 “Initial SWIM”
#28 “Initial Ground-Ground Interoperability”</td></tr>
<tr><td>Very Large Scale Demonstrations</td><td colspan="2">Release 7: PJ.23, 27
Release 8: PJ.23, 27
Release 9: PJ.23, 27</td></tr>
<tr><td>Guidance Material / Specifications / Standards</td><td colspan="2">CEN ATM information security EN 16495 (Version 2) (2017)
ECTL Stand/Spec on TI SWIM Yellow Profile definition (2017)
ECTL Stand/Spec on TI SWIM Blue Profile Definition (2020)
x.509 (ITU)
ICAO Doc 10039 Manual on SWIM concept</td></tr>
<tr><td>Means of compliance and / or Certification</td><td colspan="2">None</td></tr>
<tr><td>Regulations</td><td colspan="2">None</td></tr>
<tr><td>Cyber security requirements</td><td colspan="2">Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them</td></tr>
</table>

Recommendation for IPs proposal	Stakeholders are invited to launch projects implementing local PKI and cyber security measures in line with a possible common project launched in the framework of the Family 5.1.4. Though changes to the use of PKI in the SWIM context are expected, PKI is very mature both regarding technology and management. The advantages of early implementation of PKI outweigh later changes to SWIM standards.
Deployment Approach	The implementation of the Family requires the definition of the future system architecture able to cover security for the information exchanges in compliance with SWIM Governance policies. The concept shall also take into account SWIM-enabled applications defined in AF1, AF2, AF3 and AF4 (**MM1 – Transition / architecture concept from legacy protocol (AFTN…) to SWIM environment available**). The SWIM information exchange implementation plan shall be defined or enhanced in order to cover the security required for all information exchanges. The implementation plan shall in detail describe the realization of the PKI defined in the previous milestone and it must be compliant with the relevant SWIM Governance policies. Furthermore, the plan shall specifically address the transition, ensuring flight safety and minimizing negative network effects (Part of Safety Case) and it may be linked to concrete implementation of the communication between SWIM-compliant applications (**MM2 – SWIM information exchange implementation plan available**). The PKI and further security measures defined within the Yellow SWIM TI profile shall be implemented; all relevant technical personnel shall be duly trained (**MM3 – Installation of local Infrastructure Components to support Yellow profile communications**). Before the start of operational use, the local security infrastructure shall be both verified and validated, ready to support communication between SWIM-enabled applications. The local security infrastructure must be compliant to the relevant SWIM Governance policies to guarantee interoperability within the SWIM network. The execution of these activities will lead to the start of permanent operational use (**MM5 – Implementation completed**).

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.

5.2.3 Stakeholders SWIM PKI and Cybersecurity

CEF Call 2014 Awarded Projects

CEF Call 2015 Awarded Projects

Identified Implementation Gaps

Austria	-	-
Belgium	0%	100%
Bulgaria	0%	100%
Croatia	0%	100%
Cyprus	0%	100%
Czech Republic	0%	100%
Denmark	0%	100%
Estonia	0%	100%
Finland	0%	100%
France	0%	100%
Germany	0%	100%
Greece	0%	100%
Hungary	0%	100%
Ireland	0%	100%
Italy	0%	100%
Latvia	0%	100%
Lithuania	0%	100%
Luxembourg	0%	100%
MUAC	0%	100%
Netherlands	0%	100%
Network Manager	40%	60%
Norway	0%	100%
Poland	0%	100%
Portugal	0%	100%
Romania	0%	100%
Slovak Republic	0%	100%
Slovenia	0%	100%
Spain	0%	100%
Sweden	0%	100%
Switzerland	0%	100%
United Kingdom	0%	100%
Airspace Users		

H High readiness Family	CEF Call 2014 Awarded Projects	Identified Gaps	20% % of Family planned with CEF funding
M Medium readiness Family	CEF Call 2015 Awarded Projects	Gaps that can be addressed through CEF General Call	10% % of Family eligible for funding through future CEF Calls
L Low readiness Family	✔ Projects already completed	Gaps that can be addressed through CEF General Call and Cohesion Call	N High Importance for Network Performance Improvement

Family 5.3.1 – Upgrade / Implement Aeronautical Information Exchange system / service

5.3.1 – Upgrade / Implement Aeronautical Information Exchange system / service			
Main Sub-AF	Sub-AF 5.3 SWIM Aeronautical Information Exchange		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2025
Description and Scope			

Commission Implementing Regulation (EU) No 716/2014 stipulates the following with regard to Aeronautical Information exchange: *Operational stakeholders shall implement services which support the exchange of the following aeronautical information using the yellow SWIM TI Profile:*

- *Notification of the activation of an Airspace Reservation/Restriction (ARES)*
- *Notification of the de-activation of an Airspace Reservation/Restriction (ARES)*
- *Pre-notification of the activation of an Airspace Reservation/Restriction (ARES)*
- *Notification of the release of an Airspace Reservation/Restriction (ARES)*
- *Aeronautical information feature on request. Filtering possible by feature type, name and an advanced filter with spatial, temporal and logical operators.*
- *Query Airspace Reservation/Restriction (ARES) information*
- *Provide Aerodrome mapping data and Airport Maps* (including eTOD: electronic Terrain and Obstacle Data)
- *Airspace Usage Plans (AUP, UUP) — ASM level 1, 2 and 3*
- *D-NOTAMs*

Service implementations shall be compliant with the applicable version of Aeronautical Information Reference Model (AIRM), the AIRM Foundation Material and the Information Service Reference Model (ISRM) Foundation Material.

This Family aims at upgrading or implementing Aeronautical Information Exchange systems and services in accordance with SWIM principles.

The systems shall be upgraded or implemented to support the Aeronautical Information exchange as service provider or service consumer; the service implementation shall comply with the Yellow SWIM TI Profile, either using the Public Internet or PENS1/NewPENS. The service implementations shall further be compliant with the applicable version of the standardisation material which corresponds to the material mentioned in the Implementing Rule (AIRM, the AIRM Foundation Material and the ISRM Foundation Material). The applicable version of these documents will at any time be available in the SWIM registry, which is maintained by the SWIM Governance.

Appendix 1 contains a list of services that provide partial coverage of the Commission Implementing Regulation (EU) No 716/2014 based on services developed in the context of SESAR 1 or services deployed or planned by NM.

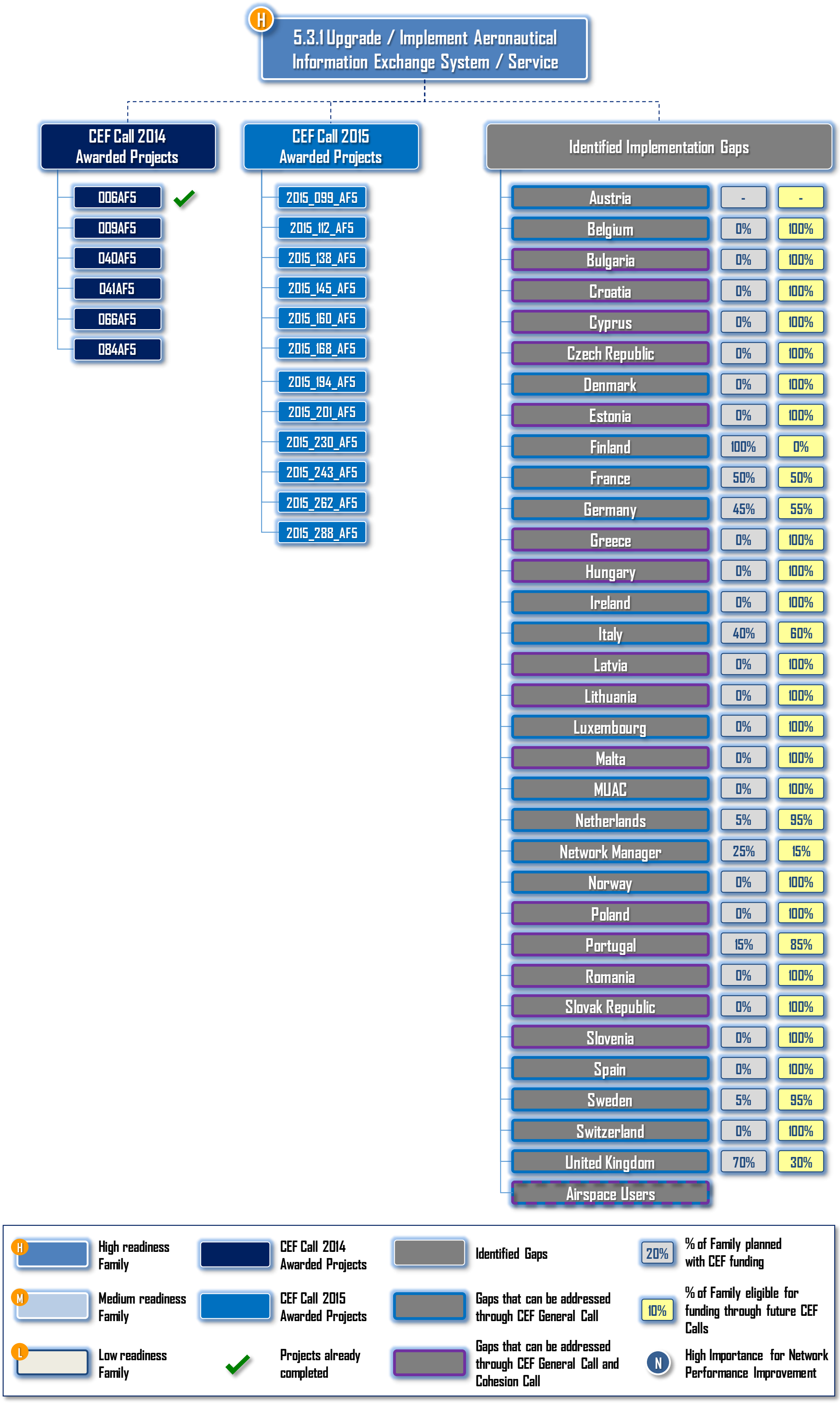
After the closure of SESAR1 in 2016 this list will be amended through the SWIM Governance to finally cover the whole PCP scope; the actual list of services will be available at any time in the registry managed by the SWIM Governance. The registry

will also contain the detailed specifications of the services (SDD – Service Design Document) and the technical specifications related to the implementation (TI Profile specification etc.), allowing the consumers to develop applications that use those services. The Stakeholders systems shall be adapted to support simultaneously the legacy messaging exchanges (e.g. AFTN, AMHS …) and the Yellow SWIM profile information exchange, allowing a smooth migration of the stakeholders to SWIM. Security and availability shall be upgraded to support the strong dependencies caused by the system to system interactions. Stakeholder security shall be improved by conducting a risk assessment and by establishing security monitoring and management tools and procedures. The related ATM systems requiring aeronautical information shall be able to use the Aeronautical information exchange services.		
Interdependencies		
Interdependency with Family 5.1.3 since SWIM Governance processes and bodies will be used to define the list of services required to fulfil the Commission Implementing Regulation (EU) No 716/2014. Interdependencies with families 5.1.1, 5.1.2, 5.1.4, 5.2.1, 5.2.2 and 5.2.3 for implementing the physical interconnection and the common and stakeholder-specific infrastructure components. Interdependencies with all Families of S-AF 3.1 Airspace Management and Advanced Flexible Use of Airspace as well as with Family 3.2.1 - Upgrade of ATM systems (NM, ANSPs, AUs) to support Direct Routings (DCTs) and Free Routing Airspace (FRA). Potential interdependency with all Families requiring aeronautical information for their full implementation.		
Synchronization Needs		
Synchronization will be needed between IPs intending to exchange data with the European Aeronautical Database (EAD) and the providers of EAD to ensure that the required functionality is available at the right point in time.		
Civil / Military Coordination		
ARES information sharing needs coordination		
Stakeholders considered as gaps	ANSPs, Airport Operators, Airspace Users, Network Manager, Military Authorities	
Other stakeholders involved in the Family deployment	None	
Links to ICAO GANP ASBUs	B1-DATM Service Improvement through Integration of all Digital ATM Information	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	IS-0901-A SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	INF08.1

SESAR Solutions	#46 "Initial SWIM"
Very Large Scale Demonstrations	**Release 7:** PJ.23, 27 **Release 8:** PJ.23, 27 **Release 9:** PJ.23, 27
Guidance Material / Specifications / Standards	ECTL SWIM Foundation material (2017) CEN ATM information security EN 16495 (Version 2) (2017) ECTL AIRM (2017) ECTL AIRM Rulebook (2017) ECTL ISRM Rulebook (2017) ECTL Stand/Spec on TI SWIM Yellow Profile definition (2017) 1. ECTL Aeronautical Information Exchange Model v5.1 ICAO IMP SARPs on AIRM (2018) ECTL Electronic e-AIP Specification EUROCAE ED-76A / DO-200B Standard for processing aeronautical data EUROCAE ED-98C TS User Requirements for terrain & obstacle data EUROCAE ED-99D TS User Requirements for Mapping information EUROCAE ED-119C Terrain, obstacles and aerodrome maps AIS Data Exchange Standard NM B2B technical documentation (for interoperability with NM) ICAO Doc 10039 Manual on System Wide Information Management concept ICAO PANS AIM ICAO Doc 8126 Aeronautical Information Services Manual (2018) OGC Aviation Domain WG – GML Profile for Aviation Data OGC/ISO – Web Feature Service (WFS)
Means of compliance and / or Certification	None
Regulations	Commission Regulation (EU). 73/2010 (ADQ IR) as amended by Commission Implementing Regulation (EU) 1029/2014
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them
Recommendation	Stakeholders are invited to deploy the services according to the SWIM Governance decisions by using Appendix 1 as a starting

for IPs proposal	point. For Services previously deployed, the Stakeholders have to upgrade, if necessary, according to the SWIM Governance material.
Deployment Approach	The implementation of this Family requires an analysis of upgrades and new implementations of services to be performed, as well as the development of a concept on how to tackle the transition for this Family. This analysis shall include the development of a roadmap of the transition and the identification of the relevant artefacts (Roadmap, services definition, AIRM version, XM models, Profiles, Safety and Security framework, compliance framework) (**MM1 – Transition concept from legacy protocol (AFTN…) to SWIM**). Before the start of operational use, the services required to fulfill Family 5.3.1 objectives shall be developed (**MM2 – New implementation or upgrade of Service developed**) and then validated (**MM3 – New implementation or upgrade of Service validated**). The deployment of the new or upgraded services shall be planned, in terms of test, validation, operation with other Stakeholders who are providers or consumers of the services: NM, ANSPs, AUs, Airport Operators, etc. (**MM4 – Planning of communications deployment**). The execution of these activities will lead to the start of permanent operational use for the Operational Stakeholders (**MM5 – Implementation completed**).

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 5.3.1 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 5.4.1 – Upgrade / Implement Meteorological Information Exchange system / service

<table>
<tr><th colspan="4">5.4.1 – Upgrade / Implement Meteorological Information Exchange system / service</th></tr>
<tr><td>Main Sub-AF</td><td colspan="3">Sub-AF 5.4 SWIM Meteorological Information Exchange</td></tr>
<tr><td>Readiness for implementation</td><td colspan="3">High</td></tr>
<tr><td>Initial Operational Capability</td><td>01/01/2016</td><td>Full Operational Capability</td><td>01/01/2025</td></tr>
<tr><td colspan="4">Description and Scope</td></tr>
<tr><td colspan="4">Commission Implementing Regulation (EU) No 716/2014 stipulates the following with regard to Meteorological Information exchange: Operational stakeholders shall implement services which support the exchange of the following meteorological information using the yellow SWIM TI Profile:
- Meteorological prediction of the weather at the airport concerned, at a small interval in the future:
o wind speed and direction
o the air temperature
o the altimeter pressure setting
o the runway visual range (RVR)
- Provide Volcanic Ash Mass Concentration
- Specific MET info feature service
- Winds aloft information service
- Meteorological information supporting Aerodrome ATC & Airport Landside process or aids involving the relevant MET information, translation processes to derive constraints for weather and converting this information in an ATM impact; the system capability mainly targets a 'time to decision' horizon between 20 minutes and 7 days.
- Meteorological information supporting En Route/Approach ATC process or aids involving the relevant MET information, translation processes to derive constraints for weather and converting this information in an ATM impact; the system capability mainly targets a 'time to decision' horizon between 20 minutes and 7 days
- Meteorological information supporting Network Information Management process or aids involving the relevant MET information, translation processes to derive constraints for weather and converting this information in an ATM impact (by making use of probabilistic models to aid decision support); the system capability mainly targets a 'time to decision' horizon between 20 minutes and 7 days
This Family aims at upgrading or implementing Meteorological Information Exchange systems and services in accordance with SWIM principles. All Meteorological Information required for the implementation of the Families in AF1, AF3 and AF4[28] has to be</td></tr>
</table>

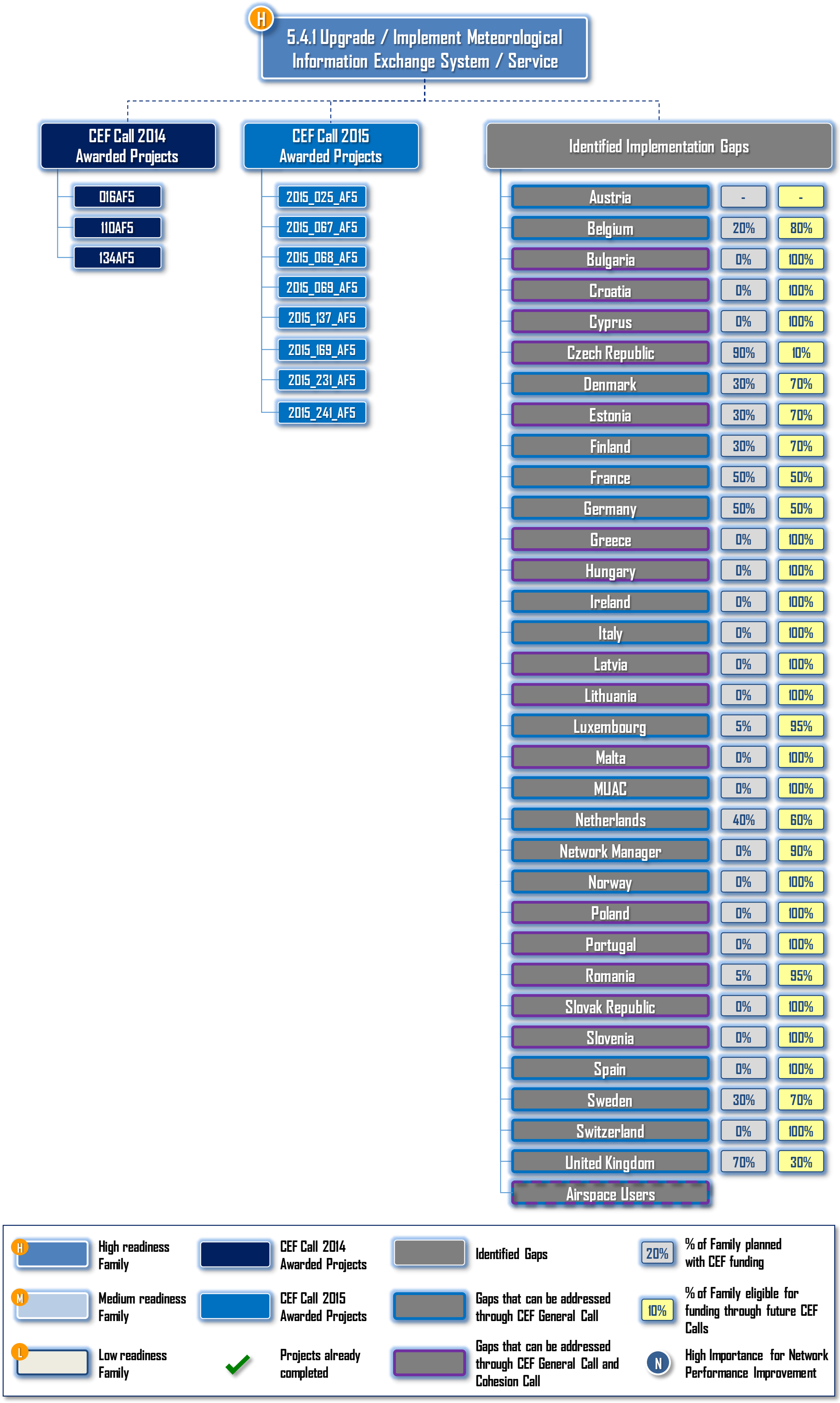
[28] The implementation of AF2 will also require meteorological information, however the use of SWIM for retrieving meteorological information is not mandated for AF2 by the PCP IR

provided by services situated in Family 5.4.1; in this sense Family 5.4.1 constitutes the gateway between the meteorological and the ATM world. The systems shall be upgraded or implemented to support the exchange of Meteorological Information as service provider or service consumer in WXXM,IWXXM, GRIB2 or HDF5 data formats; the service implementation shall comply with the Yellow SWIM TI Profile, either using the Public Internet or PENS1/NewPENS. The different communications paradigms of this profile shall be adapted for supporting the different levels of technical compliance of the stakeholders. The service implementations shall be compliant with the applicable version of AIRM, the AIRM Foundation Material and the ISRM Foundation Material. The applicable version of these documents will at any time be available in the SWIM registry, which is maintained by the SWIM Governance. Appendix 1 contains a list of services that provide partial coverage of the Commission Implementing Regulation (EU) No 716/2014 based on services developed in the context of SESAR 1 or services deployed or planned by NM. After the closure of SESAR1 in 2016 this list will be amended through the SWIM Governance to finally cover the whole PCP scope; the actual list of services will be available at any time in the registry managed by the SWIM Governance. The registry will also contain the detailed specifications of the services (SDD – Service Design Document) and the technical specifications related to the implementation (TI Profile specification etc.), allowing the consumers to develop applications that use those services. The Stakeholders systems shall be adapted to support simultaneously the legacy messaging exchanges and the yellow SWIM profile information exchange, allowing a smooth migration of the stakeholders to SWIM. Security and availability shall be upgraded to support the strong dependencies caused by the system to system interactions. Stakeholder security shall be improved by conducting a risk assessment and by establishing security monitoring and management tools and procedures. The related ATM systems requiring meteorological information shall be able to use the Meteorological information exchange services.
Interdependencies
Interdependency with Family 5.1.3 since SWIM Governance processes and bodies will be used to define the list of services required to fulfil the Commission Implementing Regulation (EU) No 716/2014. Interdependencies with families 5.1.1, 5.1.2, 5.1.4, 5.2.1, 5.2.2 and 5.2.3 for implementing the physical interconnection and the common and stakeholder-specific infrastructure components. Interdependencies with Families 2.1.4 – Initial Airport Operational Plan (AOP), 2.3.1 – Time Based Separation and 4.2.4 - AOP/NOP information Sharing regarding meteorological information and systems. Further interdependencies with all Families requiring meteorological information for their full implementation, including but not limited to Families 1.1.1, 1.1.2, 3.1.4, 4.1.1, 4.1.2, 4.2.2 and 4.4.2.
Synchronization Needs
Civil / Military Coordination
Yes, civil/military coordination is required

Stakeholders considered as gaps	ANSPs, Airport Operators, Airspace Users, Network Manager, Military Authorities, MET Service Providers	
Other stakeholders involved in the Family deployment	None	
Links to ICAO GANP ASBUs	B1-AMET Enhanced Operational Decisions through Integrated Meteorological Information (Planning and Near-term Service)	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	IS-0901-A SESAR Release 5 MET-0101 SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	INF08.1
SESAR Solutions	#35 "MET Information Exchange" #46 "Initial SWIM"	
Very Large Scale Demonstrations	**Release 7:** PJ.31 **Release 8:** PJ.31 **Release 9:** PJ.31	
Guidance Material / Specifications / Standards	CEN ATM information security EN 16495 (Version 2) (2017) EUROCAE ED-119C Terrain, obstacles and aerodrome maps AIS Data Exchange Standard ECTL SWIM Foundation material (2017) ECTL AIRM (2017) ECTL AIRM Rulebook (2017) ECTL ISRM Rulebook (2017) ECTL Compliance framework (2017) ECTL Stand/Spec on TI SWIM Yellow Profile definition (2017) ICAO IMP SARPs on AIRM (2018) EUROCAE MET SWIM Service (2020) ICAO/WMO IWXXM v.1.1 ECTL/FAA WXXM 2.0 GRIB2: WMO-No. 306, Manual on Codes Volume I.2 WMO HDF5 (www.hdfgroup.org/HDF5/doc/H5.format.html) ICAO Doc 10003 Manual on the digital exchange of aeronautical information ICAO Doc 8896 Manual of Aeronautical Meteorological Practice ICAO Doc 9328 Manual of Runway Visual Range Observing and Reporting Practices ICAO Doc 9377 Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services ICAO Doc 9691 Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds ICAO Doc 9766 Handbook on the International Airways Volcano Watch (IAVW) Operational Procedures	

	ICAO Doc 9817 Manual on Low-level Wind Shear ICAO Doc 9837 Manual on Automatic Meteorological Observing Systems at Aerodromes ICAO Doc 10039 Manual on System Wide Information Management concept OGC Aviation Domain WG – GML Profile for Aviation Data OGC/ISO Web Feature Service (WFS) OpenGIS Web Map Service Interface (WMS) OGC Web Coverage Service (WCS)
Means of compliance and / or Certification	None
Regulations	None
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them
Recommendation for IPs proposal	Stakeholders are invited to deploy the services according to the SWIM Governance decisions by using Appendix 1 as a starting point. For Services previously deployed, the Stakeholders have to upgrade, if necessary, according to the SWIM Governance material.
Deployment Approach	The implementation of this Family requires an analysis of upgrades and new implementations of services to be performed, as well as the development of a concept on how to tackle the transition for this Family. This analysis shall include the development of a roadmap of the transition and the identification of the relevant artefacts (Roadmap, services definition, AIRM version, XM models, Profiles, Safety and Security framework, compliance framework) (**MM1 – Transition concept from legacy protocol (AFTN…) to SWIM**). Before the start of operational use, the services required to fulfill Family 5.4.1 objectives shall be developed (**MM2 – New implementation or upgrade of Service developed**) and then validated (**MM3 – New implementation or upgrade of Service validated**). The deployment of the new or upgraded services shall be planned, in terms of test, validation, operation with other Stakeholders who are providers or consumers of the services: NM, ANSPs, AUs, Airport Operators, etc. (**MM4 – Planning of communications deployment**). The execution of these activities will lead to the start of permanent operational use for the Operational Stakeholders (**MM5 – Implementation completed**).

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 5.4.1 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 5.5.1 – Upgrade / Implement Cooperative Network Information Exchange system/service

5.5.1 – Upgrade / Implement Cooperative Network Information Exchange system / service			
Main Sub-AF	Sub-AF 5.5 Cooperative Network Information Exchange		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2025 The Network Operation Plan plans a completion of this Family by end of 2019 as the Cooperative Network Information exchanges are based on mature technologies and services.

Description and Scope
The Network Information will be freely exchanged between the systems of the operational stakeholders by means of defined cooperative network information B2B services, using the Yellow SWIM TI Profile. The scope of the Family is the implementation by the operational stakeholders of the cooperative network information exchange with NM using the Yellow SWIM TI Profile for the sake of Air Traffic Flow and Capacity Management. The information to be exchanged according to the PCP comprises: - *Maximum airport capacity based on current and near term weather conditions,* - *Synchronization of Network Operations Plan and all Airport Operations Plans,* - *Departure and arrival planning information,* - *ATFCM pre-tactical and tactical plans (regulations, re-routings, sector configurations, runway updates, monitoring values, capacities, traffic volume activations, scenarios, etc.),* - *Short term ATFCM measures,* - *ATFCM congestion points,* - *Network events,* - *Rerouting opportunities,* - *Restrictions,* - *Traffic counts information,* - *Demand data (civil, military),* - *Flow and Flight message exchange (flight exchanges are meant for ATFCM purpose),* - *Airspace structure, availability and utilisation,* - *Network and En-Route/Approach Operation Plans,* - *Network impact assessment,* - *Service availability information,* - *General information messages (ATFCM Information Messages and headline news),* The systems shall be upgraded to support the exchange of information in compliance

with the Yellow SWIM TI Profile, either through the Public Internet or over PENS. The different communications paradigms of this profile shall be provided by the Network Manager, supporting the different levels of technical compliance of the stakeholders.

The list of SWIM services developed by NM and already available in operations that are in scope of 5.5.1 is the following.

- Airspace structure, availability and utilisation:
  - Download of complete AIXM 5.1 datasets with the following entities: AS, PT, RT, UT, AD, AZ, TV, TZ, RL, FW, RS
  - Incremental AIXM 5.1 data sets
  - Creation and update of Airspace Use Plan service for AMCs
  - Publication of the European Airspace Use Plan
- ATFCM pre-tactical and tactical plans
  - Retrieve regulation list and details, sector configuration plans, runways configuration plan, monitoring values, capacity plan, traffic volume activations
  - Create and update sector configurations plan, runways configuration plan, monitoring values, capacity plan, traffic volume activations
- Restrictions
  - Part of the airspace structure service
- Traffic counts information
  - Traffic counts (entry or occupancy, where relevant) by AO, by AD, by AZ, by AS, by PT, by TV
- General Information Messages
  - Retrieve ATFCM Information messages
- Flow and Flight message exchange (flight exchanges are meant for ATFCM purposes)
  - Retrieve flight lists by AO, AD, PT, AS, TV, AZ
  - Retrieve flight details

The Service implementations shall be compliant with the applicable version of AIRM, the AIRM Foundation Material and the ISRM Foundation Material. The applicable version of these documents will at any time be available in the SWIM registry, which is maintained by the SWIM Governance.

Appendix 1 provides a mapping between the PCP required information exchanges and the NM B2B services already operational (see above) and planned till 2018 that support those exchanges.

The Network Manager systems shall be adapted to support simultaneously the legacy messaging exchanges and the yellow SWIM profile information exchange, allowing for a progressive migration of the stakeholders to SWIM.
The exchange of data with NM via an HMI is covered in Family 4.2.2.
Security and availability shall be upgraded to support the strong dependencies caused by the system to system interactions.

Interdependencies

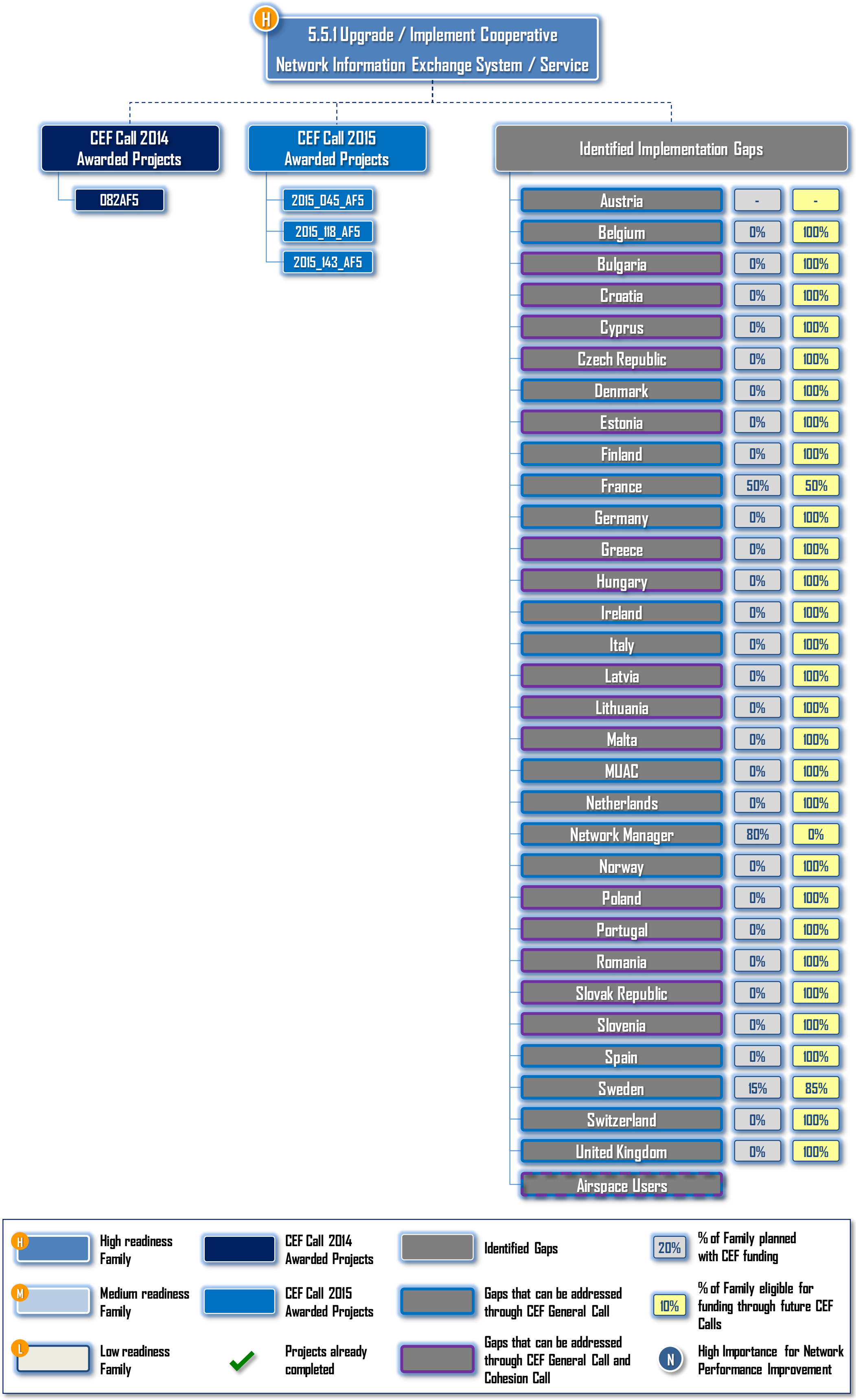
System-to–system interfaces for access to Network Information in other AFs (AF2.1.1, AF2.1.3, AF2.1.4, AF3.1.1, AF3.1.2, AF3.1.3, AF3.1.4, AF3.2.1, AF4.1.2, AF4.2.2, AF4.2.4, AF4.3.1, AF4.3.2 and AF4.4.2).

Interdependencies with families 5.1.1, 5.1.2, 5.1.4, 5.2.1, 5.2.2 and 5.2.3 for implementing the physical interconnection and the common and stakeholder-specific infrastructure components.

Synchronization Needs		
NM shall coordinate and support the stakeholders for the deployment of the information exchange with NM via the NM B2B services.		
Civil / Military Coordination		
Yes, civil/military coordination is required		
Stakeholders considered as gaps	ANSPs, Airport Operators, Airspace Users, Network Manager, Military Authorities	
Other stakeholders involved in the Family deployment	None	
Links to ICAO GANP ASBUs	B1-FICE Increased Interoperability, Efficiency and Capacity through Flight and Flow Information for a Collaborative Environment Step-1 (FF-ICE/1) application before Departure B1-NOPS Enhanced Flow Performance through Network Operational Planning	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	IS-0901-A SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	INF08.1
SESAR Solutions	#46 "Initial SWIM"	
Very Large Scale Demonstrations	**Release 7:** PJ.24,27 **Release 8:** PJ.24,27 **Release 9:** PJ.24,27	
Guidance Material / Specifications / Standards	CEN ATM information security EN 16495 (Version 2) (2017) ECTL SWIM Foundation material (2017) ECTL AIRM (2017) ECTL AIRM Rulebook (2017) ECTL ISRM Rulebook (2017) ECTL Compliance framework (2017) ECTL Stand/Spec on TI SWIM Yellow Profile definition (2017) FIXM v4 including flow management (FIXM development team) NM B2B Reference Manuals NM Technical roadmap available in the Network Operations Plan Network Strategy Plan (NSP): SO 2/2, SO 2/4, SO 5/2, SO5/4, SO5/5, SO6, SO7/6 ICAO Global Air Navigation Plan (GANP) ICAO Doc 10039 Manual on System Wide Information Management concept	

Means of compliance and / or Certification	None
Regulations	None
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them
Recommendation for IPs proposal	This is a multi-stakeholders initiative (NM and various Network users), thus stakeholders' initiatives should be synchronised to foster benefits. NM shall coordinate and support the stakeholders for the deployments of the NM services but it is not recommended to package deployments in a unique project.
Deployment Approach	The priority of each service implementation is dictated by the other AFs identified in the "Interdependencies" section. For each service the following implementation milestones, involving NM and the stakeholders, were identified: - Development of a concept and plan for how to migrate from current situation with legacy protocols to SWIM service implementation. Such analysis shall include the development of a roadmap of the transition and the identification of the relevant artefacts, including aspects of safety and security and compliance. The transition plan involves the impacted stakeholders via the Network Manager governance bodies **(MM1 – Transition concept from legacy protocol (AFTN…) to SWIM)**. - Specifications for each service shall be provided by the Network Manager allowing the stakeholders to start their development **(MM2 – Specification from NM available)** - Development and validation of the services by NM and corresponding developments and validations by the stakeholders **(MM3 – New implementation or upgrade of Service developed and MM4 – New implementation or upgrade of Service validated)** - Deployment plan shall be communicated and executed by NM **(MM5 – Planning of NM Communications deployment)** and by the stakeholders **(MM6 – Planning of communications deployment with NM completed)** - Start of permanent operational use of the service by the stakeholders **(MM7 – Implementation completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 5.5.1 awarded in 2014 or 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 5.6.1 – Upgrade / Implement Flights Information Exchange system / service supported by Yellow Profile

5.6.1 – Upgrade / Implement Flights Information Exchange system / service supported by Yellow Profile			
Main Sub-AF	Sub-AF 5.6 SWIM Flights Information Exchange		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	01/01/2025

Description and Scope

PCP content: […] Operational stakeholders shall implement the following services for exchange of flight information using the yellow SWIM TI Profile:

- Validate flight plan and routes

- Flight plans, 4D trajectory, flight performance data, flight status

- Flights lists and detailed flight data

- Flight update message related (departure information)

Service implementations shall be compliant with the applicable version of AIRM, the AIRM Foundation Material and the ISRM Foundation Material.

This Family aims at upgrading or implementing Flight Information Exchange systems and services supported by the Yellow Profile in accordance with SWIM principles.

The systems shall be upgraded or implemented to support the Flight Information exchange as service provider or service consumer; the service implementation shall comply with the Yellow SWIM TI Profile, either using the Public Internet or PENS1/NewPENS. The service implementations shall further be compliant with the applicable version of AIRM, the AIRM Foundation Material and the ISRM Foundation Material. The applicable version of these documents will at any time be available in the SWIM registry, which is maintained by the SWIM Governance.

This family is also intended to provide the prerequisites for trajectory management, which in addition to the Flight Object (Family 5.6.2) requires the sharing of information regarding

- Aircraft performance,
- Trajectory, and
- Meteorological data.

While the last type of information is covered by family 5.4.1, the other 2 information categories are considered part of this family dealing, among other topics, as written in the PCP, "*4D trajectory, flight performance data*".

Appendix 1 contains a list of services that provide partial coverage of the Commission Implementing Regulation (EU) No 716/2014 based on services developed in the context of SESAR 1 or services deployed or planned by NM.

After the closure of SESAR1 in 2016 this list will be amended through the SWIM Governance to finally cover the whole PCP scope; the actual list of services will be available at any time in the registry managed by the SWIM Governance. The registry will also contain the detailed specifications of the services (SDD – Service Design Document) and the technical specifications related to the implementation (TI Profile

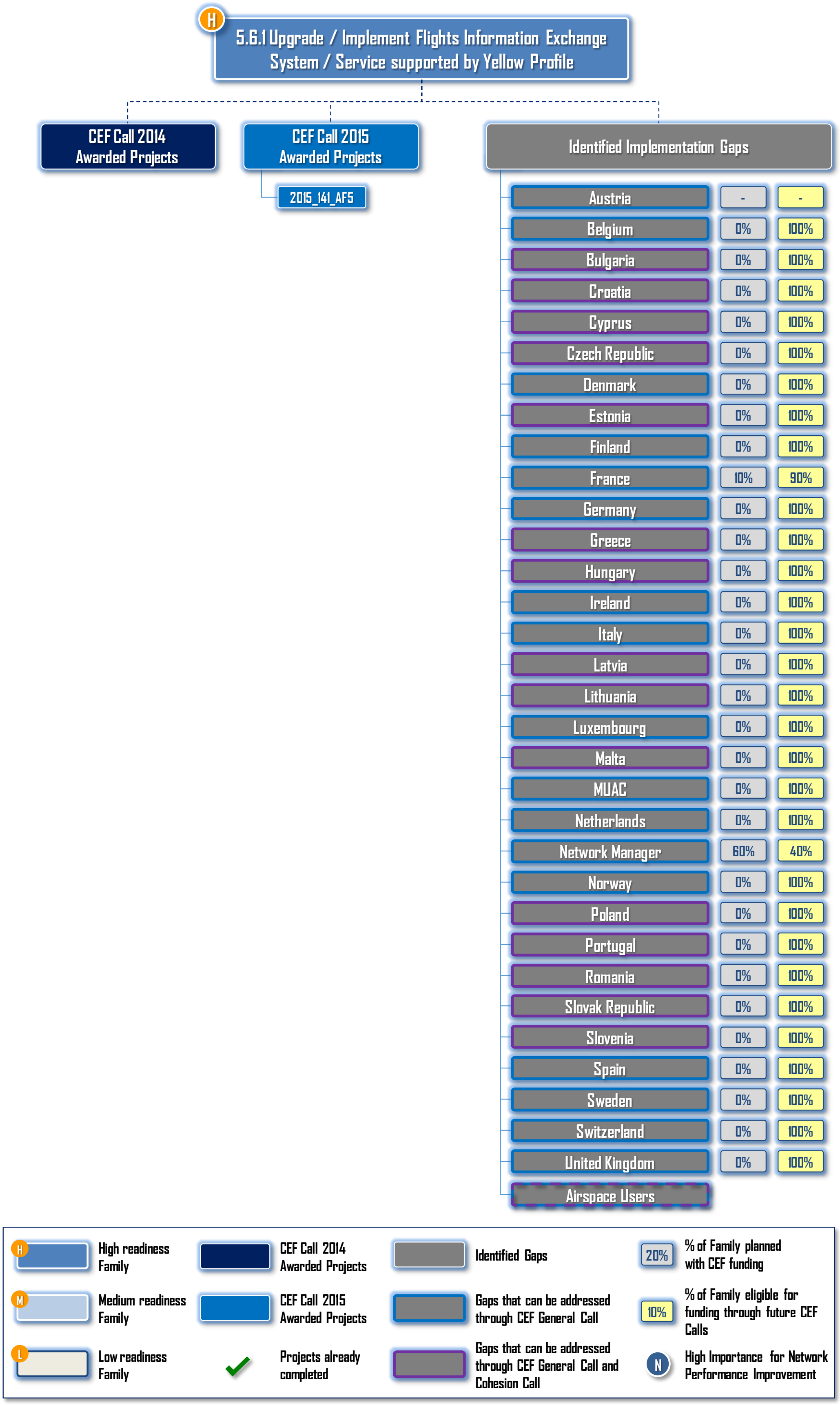
specification etc.), allowing the consumers to develop applications that use those services. The Stakeholders systems shall be adapted to support simultaneously the legacy messaging exchanges (e.g. AFTN, AMHS …) and the Yellow SWIM profile information exchange, allowing a smooth migration of the stakeholders to SWIM. Security and availability shall be upgraded to support the strong dependencies caused by the system to system interactions. Stakeholder security shall be improved by conducting a risk assessment and by establishing security monitoring and management tools and procedures. The related ATM systems requiring Flight information shall be able to use the Flight information exchange services.	
Interdependencies	
Interdependencies with families 5.1.1, 5.1.2, 5.1.4, 5.2.1, 5.2.2 and 5.2.3 for implementing the physical interconnection and the common and stakeholder-specific infrastructure components. Interdependencies with AF1, AF2, AF3 and AF4.	
Synchronization Needs	
The coordination could be performed by the NM for the information exchanges performed with the NM.	
Civil / Military Coordination	
Particular needs from the military must be considered, when justified by civil-military interoperability needs. Where for operational security reasons there are restrictions to share the information specific mitigating measures must be introduced including higher level security measures or alternative exchange mechanisms.	

Stakeholders considered as gaps	ANSPs, Airport Operators, Airspace Users, Network Manager, Military Authorities	
Other stakeholders involved in the Family deployment	None	
Links to ICAO GANP ASBUs	B1-FICE Increased Interoperability, Efficiency and Capacity through Flight and Flow Information for a Collaborative Environment Step-1 (FF-ICE/1) application before Departure B2-FICE Improved Coordination through Multi-centre Ground-Ground Integration (FF ICE, Step 1 and Flight Object, SWIM)	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	IS-0901-A SESAR Release 5 CM-0201-A SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	INF08.1

SESAR Solutions	#46 "Initial SWIM" #28 "Initial Ground-Ground Interoperability"
Very Large Scale Demonstrations	**Release 7:** PJ. 24,27 **Release 8:** PJ. 24,27 **Release 9:** PJ. 24,27
Guidance Material / Specifications / Standards	CEN ATM information security EN 16495 (Version 2) (2017) ECTL SWIM Foundation material (2017) ECTL AIRM (2017) ECTL AIRM Rulebook (2017) ECTL ISRM Rulebook (2017) FIXM v4 (FIXM Development Team) ECTL Stand/Spec on TI SWIM Yellow Profile definition (2017) NM B2B Reference Manuals NM Technical roadmap available in the Network Operations Plan ICAO Doc 10039 Manual on System Wide Information Management concept
Means of compliance and / or Certification	CEN Community Specification on FDP (2019)
Regulations	None
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them
Recommendation for IPs proposal	Stakeholders are expected to submit IPs for the exchange of flight information via the SWIM Yellow Profile, either proposals that include the use of the NM B2B Flight Services or proposals for the provision of services in this domain. As stated above there are several information exchanges required as prerequisite for trajectory management. SDM explicitly encourages projects dealing with these information exchanges in preparation for the deployment of the families related to trajectory management.
Deployment Approach	The implementation of the Family would require the SWIM implementation analysis of transitions and new implementations to be performed, as well as the development of a concept on how to tackle the transition for this Family. Such analysis shall include the development of a roadmap of the transition and the identification of the relevant artefacts (Roadmap, services definition, AIRM version, XM models, Profiles, Safety and

	Security framework, compliance framework) **(MM1 – Transition concept from legacy protocol (AFTN…) to SWIM)**. The services required by Family 5.6.1 using Yellow Profile **(MM2 – New implementation or upgrade of services for Yellow Profile developed)** shall be developed. The services required by Family 5.6.1 using Yellow Profile **(MM3 – New implementation or upgrade of services for Yellow Profile validated)** shall be validated. The deployment of the services required by Family 5.6.1 using Yellow Profile shall be planned, in terms of test, validation, operation, with other Stakeholders, such as NM, ANSPs, AUs, Airport Operators, etc. **(MM4 – Planning of communications Yellow Profile deployment completed)**. The execution of such activities is expected to lead to the start of operational use by the Operational Stakeholders Yellow Profile **(MM5 – Implementation Yellow Profile completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 5.6.1 awarded in 2015 CEF Calls, along with a more detailed description of each Implementation Project.

Family 5.6.2 – Upgrade / Implement Flights Information Exchange system / service supported by Blue Profile

<table>
<tr><th colspan="4">5.6.2 – Upgrade / Implement Flights Information Exchange system / service supported by Blue Profile</th></tr>
<tr><td>Main Sub-AF</td><td colspan="3">Sub-AF 5.6 SWIM Flights Information Exchange</td></tr>
<tr><td>Readiness for implementation</td><td colspan="3">Medium : the readiness will become High after the validation of the IOP solution based on the ED 133 versions and the Blue Profile</td></tr>
<tr><td>Initial Operational Capability</td><td>01/06/2018</td><td>Full Operational Capability</td><td>01/01/2025</td></tr>
<tr><td colspan="4">Description and Scope</td></tr>
<tr><td colspan="4">PCP content: [...] Flight information shall be exchanged during the pre-tactical and tactical phases by ATC systems and Network Manager. Operational stakeholders shall implement services which support the exchange of the following flight information as indicated in the table below using the blue SWIM TI Profile:
- Various operations on a flight object: Acknowledge reception, Acknowledge agreement to FO, End subscription of a FO distribution, Subscribe to FO distribution, Modify FO constraints, Modify route, Set arrival runway, Update coordination related information, Modify SSR code, Set STAR, Skip ATSU in coordination dialogue
- Share Flight Object information. Flight Object includes the flight script composed of the ATC constraints and the 4D trajectory [...] Service implementations shall be compliant with the applicable version of AIRM, the AIRM Foundation Material and the ISRM Foundation Material.
System requirements:
- ATC systems shall make use of the flight information exchange services
This Family aims at implementing Flight Object Exchange systems and services in accordance with SWIM principles.
The systems shall be implemented to support the Flight Object exchange in compliance with the Blue SWIM TI Profile over PENS1/NewPENS and the official versions of ED133. The service implementations shall be compliant with the applicable version of AIRM, the AIRM Foundation Material and the ISRM Foundation Material. The applicable version of these documents will at any time be available in the SWIM registry, which is maintained by the SWIM Governance.
Appendix 1 contains a list of services that provide partial coverage of the Commission Implementing Regulation (EU) No 716/2014 based on services developed in the context of SESAR 1 or services deployed or planned by NM.
Two SESAR1 services, ATC Flight Object Control Service and Shared Flight Object Service in line with the ED133 draft versions, are currently covering partially the services related to Flight Object.
After the closure of SESAR1 in 2016 this list will be amended through the SWIM Governance to finally cover the whole PCP scope; the actual list of services will be available at any time in the registry managed by the SWIM Governance. The registry will also contain the detailed specifications of the services (SDD – Service Design Document) and the technical specifications related to the implementation (TI Profile specification etc.), allowing the consumers to develop applications that use those services.</td></tr>
</table>

The civil Stakeholders systems shall be adapted to support simultaneously the legacy messaging exchanges (e.g. AFTN, AMHS, FMTP …) and the Blue SWIM profile information exchange, allowing a smooth migration of the stakeholders to SWIM. Security and availability shall be upgraded to support the strong dependencies caused by the system to system interactions. Stakeholder security shall be improved by conducting a risk assessment and by establishing security monitoring and management tools and procedures.

The related ATM systems requiring Flight information shall be able to use the Flight information exchange services.

Particular needs from the military must be considered, especially where for operational security reasons the information cannot and will not be shared.

Interdependencies

Interdependencies with families 5.1.1, 5.1.2, 5.1.4, 5.2.1, 5.2.2 and 5.2.3 for implementing the physical interconnection and the common and stakeholder-specific infrastructure components.

SWIM services related to FO enable flight data processing systems to flight data processing systems exchange of down-linked trajectory information between ATS units required by Initial Trajectory Information Sharing functionality referred in AF6.

Interdependencies with AF3 and AF4.

Synchronization Needs

The implementation of the Flight Object distribution and consumption shall be synchronized and coordinated at least by big area like FAB or neighbouring ANSPs. To implement Flight Object only in one ANSP has a limited interest. It could be relevant that a cluster of ANSPs presents IP to implement FO in their Airspace, especially synchronized with e.g. Free Route implementation.

Civil / Military Coordination

A civil-military coordination to exchange flight object data is beneficial to perform 4D trajectory management as well as identification process

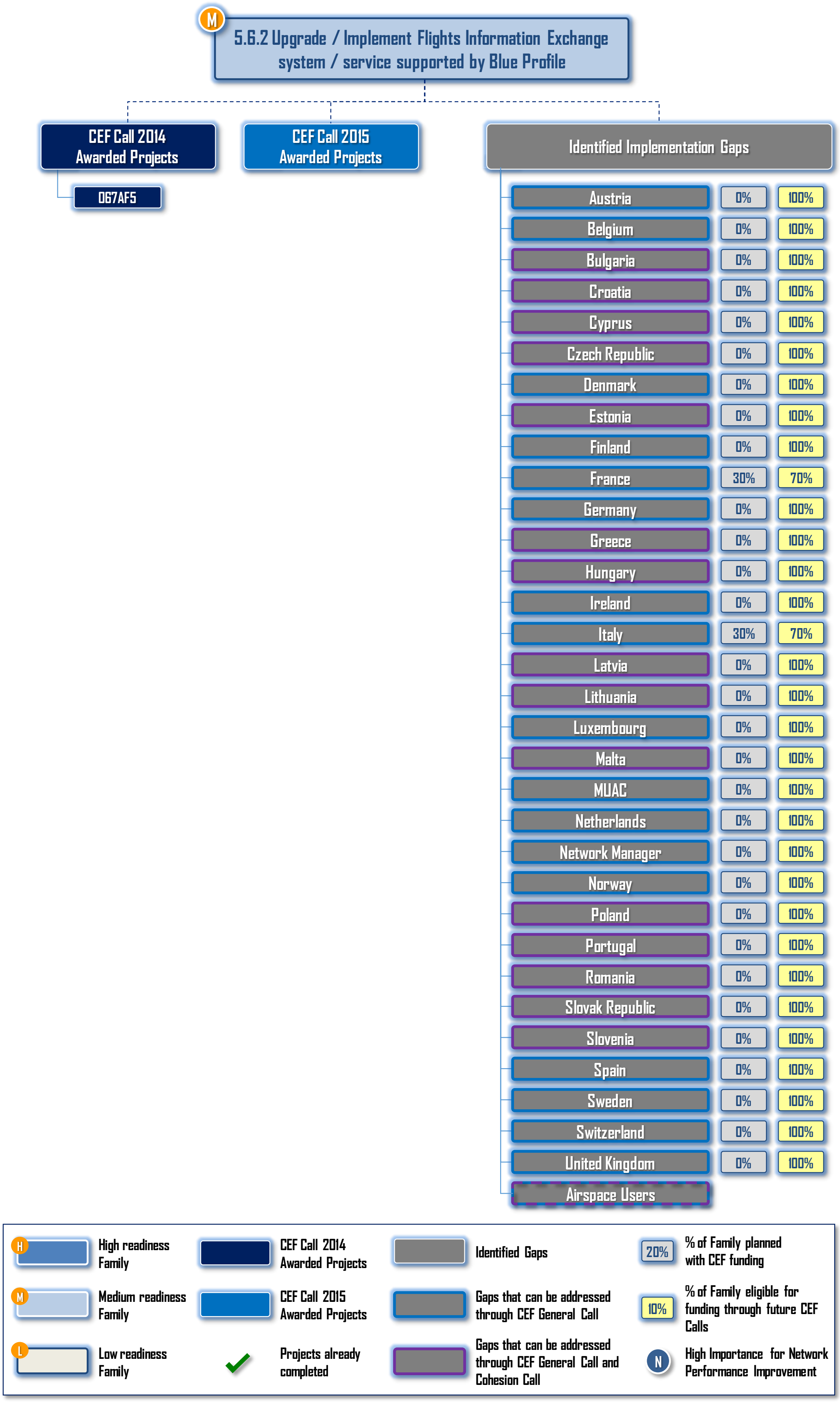
Stakeholders considered as gaps	ANSPs, Network Manager
Other stakeholders involved in the Family deployment	Military Authorities

Links to ICAO GANP ASBUs	B1-FICE Increased Interoperability, Efficiency and Capacity through Flight and Flow Information for a Collaborative Environment Step-1 (FF-ICE/1) application before Departure B2-FICE Improved Coordination through Multi-centre Ground-Ground Integration (FF ICE, Step 1 and Flight Object, SWIM)	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	IS-0901-A SESAR Release 5 CM-0201-A SESAR Release 5

	ATM Master Plan Level 3 (Edition 2016)	INF08.1
SESAR Solutions	#46 "Initial SWIM" #28 "Initial Ground-Ground Interoperability"	
Very Large Scale Demonstrations	**Release 7:** PJ. 24,27 **Release 8:** PJ. 24,27 **Release 9:** PJ. 24,27	
Guidance Material / Specifications / Standards	CEN ATM information security EN 16495 (Version 2) (2017) ECTL SWIM Foundation material (2017) ECTL AIRM (2017) ECTL AIRM Rulebook (2017) ECTL ISRM Rulebook (2017) EUROCAE ED-133 Flight Object Interoperability specification exchange EUROCAE ED-133A and potential future revisions (2020) ECTL Stand/Spec on TI SWIM Blue Profile definition (2017) Interoperability of Flight Data Processing (FDP) (TS 16071) ICAO Doc 10039 Manual on System Wide Information Management concept	
Means of compliance and / or Certification	CEN Update of TS 16071 to an EN when ED-133A is available (2019) CEF Community specifications on FDP (2019)	
Regulations	None	
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them	
Recommendation for IPs proposal	It could be relevant that a cluster of ANSPs, a FAB or neighbouring ANSPs, present common Implementing Projects to implement FO - based on the two SWIM services ATC Flight Object Control Service and Shared Flight Object Service and ED133 versions - in their Airspace especially synchronized with Free Route implementation. SDM is available to help ANSPs and NM for building implementation scenarios.	
Deployment Approach	The implementation of the Family would require the IOP implementation analysis of transitions and new implementations to be performed, as well as the development of a concept on how to tackle the transition for this Family. Such analysis shall include the development of a roadmap of the transition and the	

	identification of the relevant artefacts (Roadmap, services definition, AIRM version, XM models, Profiles, Safety and Security framework, compliance framework) **(MM1 – Transition concept from OLDI-FMTP to FO)**. The services required by Family 5.6.2 using both Blue Profile **(MM2 – New implementation or upgrade of services for Blue Profile developed)** shall be developed. The services required by Family 5.6.2 using Blue Profile **(MM3 – New implementation or upgrade of services for Blue Profile validated)** shall be validated. The deployment of the services required by Family 5.6.2 using Blue Profile shall be planned, in terms of test, validation, operation, with other Stakeholders, being NM, ANSPs, AUs, Airport Operators, etc **(MM4 – Planning of communications Blue Profile deployment completed)**. The execution of such activities is expected to lead to the start of operational use by the Operational Stakeholders for both Blue Profile **(MM5 – Implementation Blue Profile completed)**.

The following Work Breakdown Structure at Family level illustrates the list of all implementation priorities towards the timely implementation of the Pilot Common Project, including both 2014 and 2015 CEF Calls awarded projects.



Dedicated tables within Annex A encompass the list of implementation initiatives associated to Family 5.6.2 awarded in 2015 CEF Calls, along with a more detailed description of each Implementation Project.

AF #6 – Initial Trajectory Information Sharing

Note: In DP2016, the AF6 family contents are restructured as described below. Therefore, **families 6.1.1 to 6.1.4**, which already existed in DP2015 and before, **do not have the same contents as in previous versions** of the Deployment Programme. A table providing an overview of similarities between old and new versions of the AF6 families can be found at the end of this introduction.

The primary objective of ATM Functionality #6, Initial Trajectory Information Sharing, is the integration of aircraft predicted flight path information and other on-board parameters into the ATM systems. To achieve this, a successful implementation of the data link capabilities described in (EC) No 29/2009, the Data Link Services Implementing Rule, is an essential prerequisite. In addition to these air/ground data link capabilities, an effective ground/ground dissemination of the aircraft predicted flight path information is needed.

After the first implementations of the DLS IR (i.e., "CPDLC"), it became apparent that the VDL Mode 2 network deployed within the scope of the DLS IR did not meet the performance requirements set by the DLS IR and the complementing standards. A detailed analysis of the network issues was conducted in the "ELSA study": "VDL Mode 2 Measurement, Analysis and Simulation Campaign". Major results and recommendations of this study have been incorporated in the family descriptions of AF6 (specifically, 6.1.3 and 6.1.4, as described below).

The AF6 families are grouped in the following three domains:

ATSP domain upgrades for Initial Trajectory Information Sharing

- 6.1.1 ATN B1 based services in ATSP domain
- 6.1.2 ATN B2 based services in ATSP domain

Communication domain upgrades for Initial Trajectory Information Sharing

- 6.1.3 A/G and G/G Multi Frequency DL Network in defined European Service Areas

Aircraft domain upgrades for Initial Trajectory Information Sharing

- 6.1.4 ATN B1 capability in Multi Frequency environment in aircraft domain
- 6.1.5 ATN B2 in aircraft domain

Families related to ATN Baseline 1 (ATN B1) target the implementation of the original DLS IR on ANSP (6.1.1) and Airspace User (6.1.4) side. These families enable CPDLC (beside other applications). Family 6.1.4 includes ELSA study's recommendations for the aircraft domain.

Families related to ATN Baseline 2 (ATN B2) target the implementation of trajectory information sharing on ANSP/NM (6.1.2) and Airspace User (6.1.5) side. These families enable the ADS-C EPP application, including the ground/ground dissemination of the trajectory information through flight object exchange.

Family 6.1.3 is related to the implementation of a air/ground and ground/ground network supporting ATN B1, ATN B2 and ACARS and providing

- in the short term, coverage and performance required to satisfy the DLS IR, and
- in the medium term, capacity to support the increased data volume expected with the introduction of trajectory downlinks with ADS-C EPP.

Operational benefits achieved by the implementation of AF6 are envisaged by the PCP in the areas of improved de-confliction and the reduction of tactical interventions as a result of improved use of target times and trajectory information. However, AF6 can also be regarded as an infrastructure provision, integrating the aircraft as a node into the ATM network.

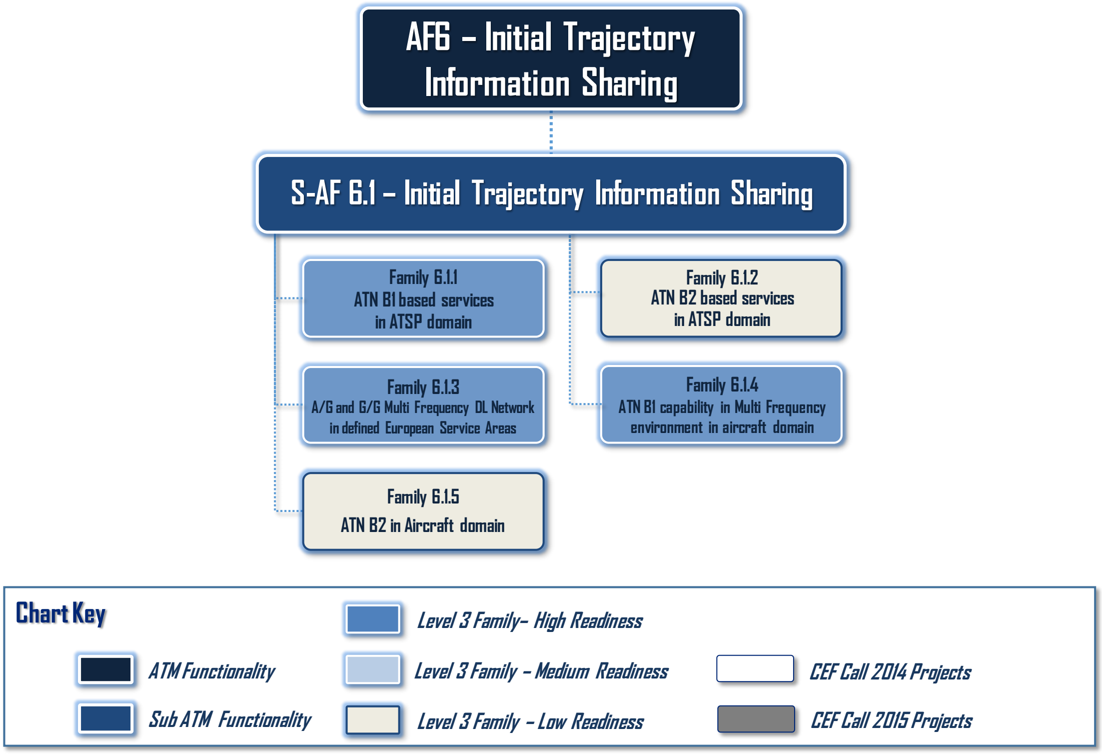


Fig. 25 – AF #6 Structure

Note: Mapping between DP2015 families and DP2016 families:

DP2015 Family	Original content (brief)	DP2016 Family	New content (brief)
6.1.1	ADS-C EPP (ATN B2), ANSPs	**6.1.2**	ADSC-EPP (ATN B2), ANSPs
6.1.2	CPDLC (DLS IR, ATN B1), all stakeholders	**6.1.1**	CPDLC (ATN B1), ANSPs
		6.1.3	Communication Network (ATN B1 & B2), CSPs/ANSPs
		6.1.4	CPDLC (ATN B1), AUs
6.1.3	VDL M2 capacity (ATN B2), CSPs/ANSPs	**6.1.3**	Communication Network (ATN B1 & B2), CSPs/ANSPs
6.1.4	ADS-C EPP (ATN B2), AUs	**6.1.5**	ADS-C EPP (ATN B2), AUs

The following Gantt chart shows the implementation roadmap for each Family included in AF6 in terms of start and end date of deployment, and it has been defined taking into account the target dates for the ATM Functionality, as stated in Regulation (EU) No 716/2014.

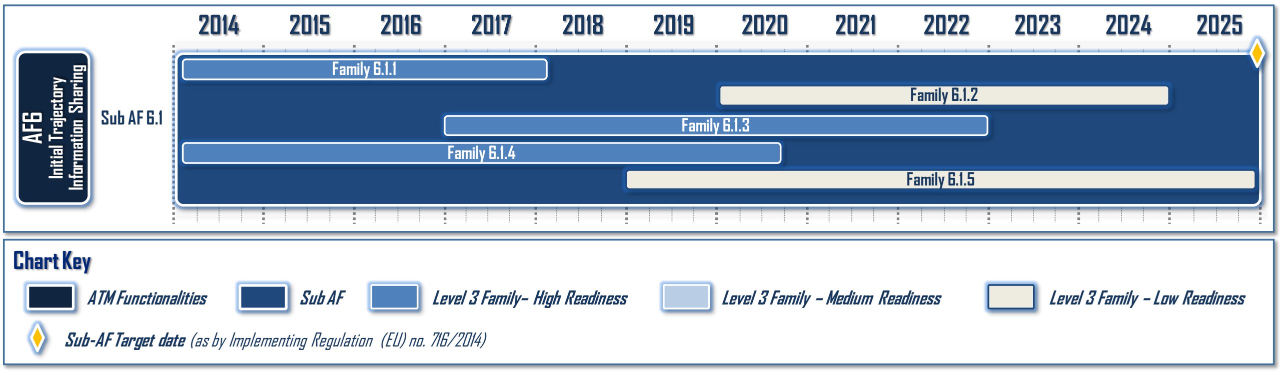


Fig. 26 – AF #6 Implementation Timeline

Family 6.1.1 – ATN B1 based services in ATSP domain

6.1.1 - ATN B1 based services in ATSP domain			
Main Sub-AF	Sub-AF 6.1 Initial Trajectory Information Sharing		
Readiness for implementation	High		
Initial Operational Capability	Before 2014	**Full Operational Capability**	05/02/2018

Description and Scope

Air Ground Data Link capability according to Commission Regulation (EC) No 29/2009 on data link services is an essential prerequisite for Baseline 2 and particularly for Initial Trajectory Information Sharing. This regulation has been updated by Commission Implementing Regulation (EU) No 310/2015 and is complemented by Commission Regulation (EC) No 30/2009 on exchange of flight data (ground/ground) in support of data link services.

This Family encompasses:

- ATM system upgrades (FDP, HMI, Recording, Front end processor):
  - Processing of data link related flight plan information by the flight data processing system to support the association of data link communication with flight plans
  - Processing and display of Data Link Initiation Capabilities (DLIC) service messages to support the establishment of CPDLC communication with the airborne systems, as well as the transfer of air/ground data link communication to other ATSUs
  - Processing and display of Logon Forward (LOF) and Next Authority NNotified (NAN) messages by the flight data processing system to support the transfer of air/ground data link communication between ATSUs,
  - Processing and display of ATC Communications Management (ACM) service messages to support the transfer of voice and data communications between sectors of the same ATSU and between different ATSUs
  - Processing and display of ATC Clearances (ACL) service messages, including monitoring and supervision of dialogue states.
  - Processing of ATC Microphone Check (AMC) service messages to support controllers to simultaneously instruct all (data link connected) flight crews to check the status of their voice communication systems
- Implementation of DLS performance monitoring system
- ATN Interface providing connection to the air/ground communication network (see Family 6.1.3)
- Operations manuals updates to include working methods and operating procedures for the use of CPDLC
- Training of ATCOs and technical staff

Interdependencies

Family 6.1.3: Family 6.1.1 can only be implemented in conjunction with Family 6.1.3, which is providing the corresponding communication infrastructure for air/ground data link.

Synchronization Needs		
Family 6.1.4 targets the implementation of avionic systems supporting ATN B1 applications. Therefore, synchronisation between ANSPs and AUs is necessary.		
Civil / Military Coordination		
In certain circumstances military ANSPs may provide ATS services to traffic where DLS is implemented. In those cases, military ATM systems must be also adapted (taking into account their specificity).		
Stakeholders considered as gaps	ANSPs	
Other stakeholders involved in the Family deployment	Military authorities, when relevant	
Links to ICAO GANP ASBUs	B0-TBO (Improved Safety and Efficiency through the Initial Application of Data Link En-route)	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AUO-0301 Available
	ATM Master Plan Level 3 (Edition 2016)	ITY-AGDL
SESAR Solutions	N/A	
Very Large Scale Demonstrations	N/A	
Guidance Material / Specifications / Standards	Network Strategy Plan (NSP): SO 8.3 EUROCAE ED-100A/DO-258A, Interoperability Requirements for ATS Applications using ARINC 622 Data Communications. EUROCAE ED-110B/DO-280B, Interoperability Requirements Standard for Aeronautical Telecommunication Network Baseline 1 (Interop ATN B1) EUROCAE ED-154A/DO-305A, Future Air Navigation System 1/A - Aeronautical Telecommunication Network Interoperability Standard (FANS 1/A – ATN B1 Interop Standard). EUROCAE ED-120/DO-290, Safety and Performance Requirements Standard for Initial Air Traffic Data Link Services in Continental Airspace (SPR IC) EUROCAE ED-122/DO-306, Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace (Oceanic SPR Standard) EUROCAE ED-93, Minimum Aviation System Performance Specification for CNS/ATM message recording systems ICAO Doc 10037 ICAO GOLD edition 2 ICAO Doc 9694 Manual of Air Traffic Services DL Applications	

	ICAO Doc 9880 Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols, Part II — Ground-Ground Applications — Air Traffic Services Message Handling Services (ATSMHS) EUROCONTROL Specification for On-Line Data Interchange (OLDI) Edition 4.2 EUROCONTROL Specification on Data Link Services, Eurocontrol Spec-0116, Edition 2.1 ATC Data Link Operational Guidance Edition 6.0 17 December 2012 Link 2000+ Guidance to Ground Implementers edition 2.3 14 Oct 2014
Means of compliance and / or Certification	ETSI EN 303 214 (v.1.2.1) Data Link Services (DLS) System; Community Specification; Requirements for ground constituents and system testing EASA RMT.0524 – Data Link Services (Planned)
Regulations	Commission Regulation (EC) 1032/2006, as amended by Regulation (EC) 30/2009 Commission Regulation (EC) n. 29/2009, as amended by Regulation (EU) 2015/310 EASA Updated regulatory package on DL Operations (TBD)
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them.
Recommendation for IPs proposal	It is recommended to take into consideration Family 6.1.3 which is necessary to provide the required communication infrastructure. It is further recommended to take into consideration the results of the DLS survey, as reported within Section 5.1
Deployment Approach	The implementation of the Family would require the upgrade of the existing ATM systems and/or installation of new systems (e.g., data link front end processor). Such systems would also require the provision of their final acceptance and the integration with other existing systems, considering that some of these components are included in Family 6.1.3 **(MM1 – ATM systems upgrade)**. The applicable concept of operations shall also be broken down into documented and approved work procedures **(MM2 – Procedures available)**. Before the start of the operational use of CPDLC based services, a safety assessment shall be performed successfully **(MM3 – Safety Assessment)** and all operational/technical staff involved

	shall be duly trained **(MM4 – Training)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM5 – Implementation completed)**.

Family 6.1.2 – ATN B2 based services in ATSP domain

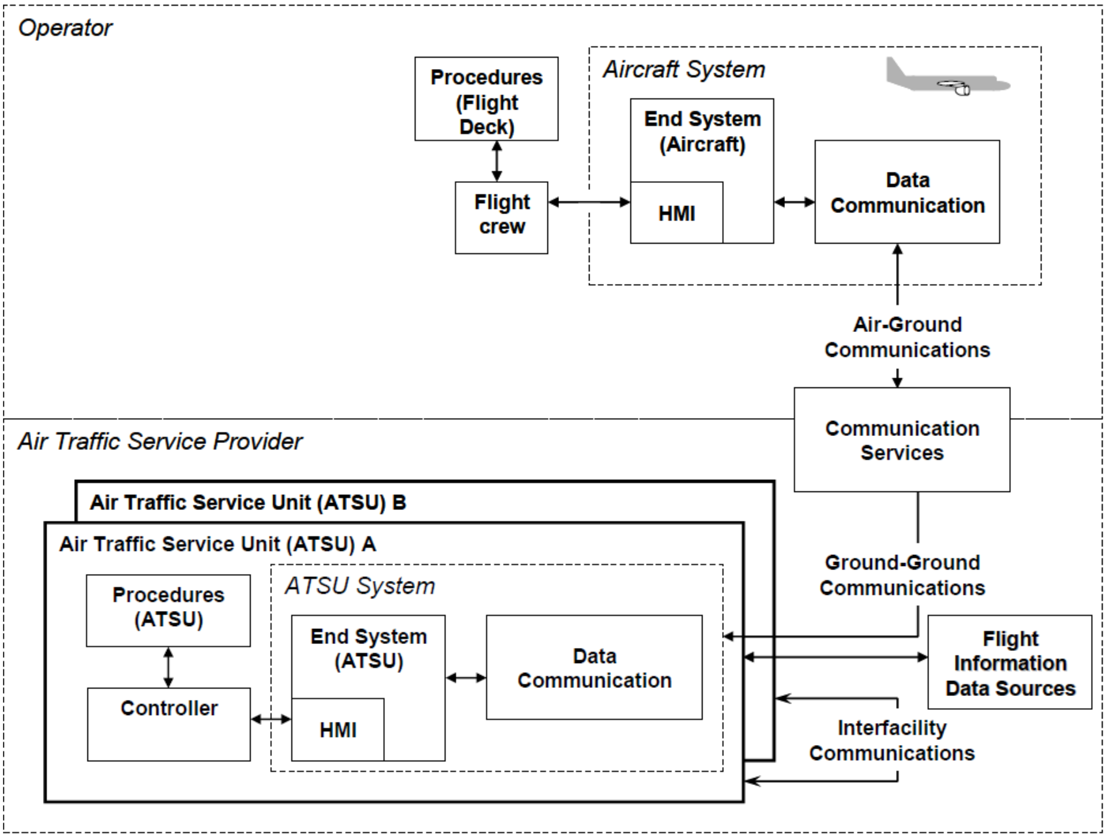
6.1.2 ATN B2 based services in ATSP domain			
Main Sub-AF	Sub-AF 6.1 Initial Trajectory Information Sharing		
Readiness for implementation	Low		
Initial Operational Capability	01/01/2020	**Full Operational Capability**	01/01/2025

Description and Scope

Adapt ANSP/NM ATM systems to process the air derived flight data provided by EPP. The new capabilities of the ATM system are:

- establishing and operating the appropriate ADS-C contract;
- processing EPP information in the FDP; and
- exchanging EPP enhanced ground trajectory with other ATSUs

These new functionalities will be allocated according to local architectures. The figure below represents an overview of the CNS/ATM system as per RTCA/EUROCAE.



On the basis of this model the following allocations can be assumed:

- ATSU (Air Traffic Service Unit) System:
  - Determine parameters for the appropriate ADS-C Contract Request
  - Process EPP data in FDP to derive performance benefits (includes FDP Trajectory Prediction, HMI, Controller support tools, Safety Nets as appropriate)

- NM Systems:
  - Process and integrate EPP data to derive network performance benefits
- ATSU Data Communication
  - Establish the appropriate ADS-C Contract with Aircraft System either directly or through delegation to an appropriate external function of Communication Services (involves Datalink Front End Processor (DL-FEP) and/or interfaces to external functions as appropriate)
  - Provide support for SWIM enabled interfacility sharing of EPP or EPP enhanced ground trajectory data.
- Communication Services

Interdependencies

6.1.3 is a necessary prerequisite providing the physical and logical network infrastructure. Families 5.6.1 and 5.6.2 provide the vehicle for interfacility exchange of EPP data

Synchronization Needs

6.1.5 is a mutual interdependency with this family, providing the airborne segment of the chain.

Civil / Military Coordination

This family must also support interoperability needs of military/state transport-type aircraft deemed to be ADS-C EPP capable

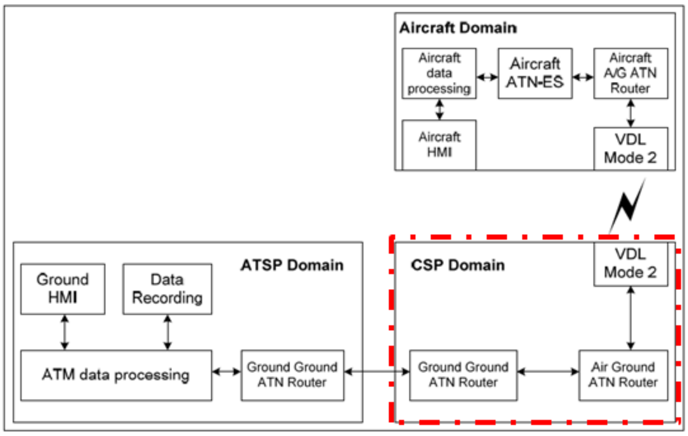
Stakeholders considered as gaps	ANSP, NM	
Other stakeholders involved in the Family deployment	Military authorities when relevant	
Links to ICAO GANP ASBUs	B1-TBO (Improved Traffic Synchronization and Initial Trajectory-based Operation)	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	IS-0303-A (ER APP ATC 149a, ER APP ATC 119, ER APP ATC 100) SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	None
SESAR Solutions	N/A	
Very Large Scale Demonstrations	**Release 7:** PJ.24,25,31 **Release 8:** PJ.24,25,31 **Release 9:** PJ.24,25,31	
Guidance Material / Specifications / Standards	EUROCAE ATN B2 Standards ED-228A, ED-229A, ED-230A, ED-231A. EUROCAE WG-85 ED-75D	

	ICAO CP Update Doc 9869 Manual on Required Communication Performance (RCP) ICAO Doc 9880 Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols ICAO Doc 10037 – ICAO GOLD edition 3 (2018) ICOA Doc 9694 Manual of Air Traffic Services Data Link Applications ICAO Doc 9896 Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using the Internet Protocol Suite (IPS) Edition 3 ICAO Doc 9925 Manual on the Aeronautical Mobile Satellite (Route) Service Edition 2 ARINC 623 – Character oriented Air Traffic Service (ATS) applications
Means of compliance and / or Certification	ETSI Updated CS on Data Link (2020-not planned)
Regulations	None
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them.
Recommendation for IPs proposal	It is recommended to take into consideration Family 6.1.3 which is necessary to provide the required VDL Mode 2 communication infrastructure. It is further recommended to take into consideration the results of the DLS survey, as reported within Section 5.1
Deployment Approach	Implementing partners shall equip their respective systems with the required functionalities **(MM.1 - System Upgrade to support the acquisition and management of EPP data in the ground systems)**. This step shall be followed with a safety assessment campaign concluding on a safety assessment report providing a basis for an operational approval **(MM.2 – Safety Assessment)**. Upgraded systems shall be integrated in the existing systems **(MM.3 – Integration)**. The applicable concept of operations shall also be broken down into documented and approved work procedures **(MM.4 – Procedures available)** and all operational/technical staff involved shall be duly trained **(MM.5 – Training of OPS and technical staff)**. The execution of such activities is expected to lead to the start of permanent operational use **(MM.6 – Implementation completed)**.

Family 6.1.3 – A/G and G/G Multi Frequency DL Network in defined European Service Areas

6.1.3 A/G and G/G Network Multi Frequency DL Network in defined European Service Areas			
Main Sub-AF	Sub-AF 6.1 Initial Trajectory Information Sharing		
Readiness for implementation	High		
Initial Operational Capability	01/01/2017	**Full Operational Capability**	31/12/2022
Description and Scope			

The Family 6.1.3 is related to the A/G and G/G Multi Frequency (MF) DL Network in defined European Service Areas[29], consisting in the European implementation of the A/G and G/G Network based on European Service Areas and VDL Mode 2 as part of ATN COM (COMmunication) domain components as identified in the following ETSI Architecture (highlighted in red in the picture):



A T N Data Link System Architecture (ETSI EN 303 214)

The ATN COM domain, identified in the previous picture, supports ATN B1 services and trajectory downlinks with EPP (part of ATN B2 services) and is composed by:

- the VDL M2 network;
- the ATN routing components (Ground/Ground ATN and Air/Ground ATN Routers).

The related ATN COM infrastructure can be split in two segments:

- Air-Ground (A/G) network that is the Radio Frequency (RF) network based on VDL M2[30] and,
- Ground-Ground (G/G) network[31] that is composed by:
  - ATN routing components and
  - ATS data distribution network needed to connect:
    - the ATN routing components among them
    - the ATN routing components with the A/G network and with ATSP domain.

Currently, ATN Data Link systems, based on VDL M2, are already implemented in some European Countries, but performance issues (provider and user aborts) have been

[29] Portions of airspace, homogeneous in terms of operational and technical needs to provide data-link services in a safe, secure and efficient way. They could be identical with FABs or as new entities established regardless of state boundaries.
[30] This network is used also for ACARS messages (ACARS over AVLC - AoA) as in each aircraft is possible to open only one VDL M2 communication session for both ATS and AOC services).
[31] The AOC messages transport is not considered here.

experienced during the operational use of ATN B1 services making it difficult to continue to use them in the current configuration.

With this regard, the EC has requested:

- a technical investigation to EASA, resulting in the elaboration of a specific Report (Technical Issues in the implementation of Regulation EC 29/2009) which identifies the causes of the current DLS issues;
- a technical study to SJU - ELSA Study (VDL Mode 2 Measurement, Analysis and Simulation Campaign) - in order to analyze the causes of the current DLS issues and identify solutions.

The EASA Report clearly identified that the use of a single frequency (the CSC channel alone, used for AOC as well as ATS data) was one of the most important root causes of the technical problems. So, the needs to meet the ATS performances have led the aeronautical community to consider upgrading the current single frequency VDL M2 networks by developing and deploying multi-frequency infrastructures, as requested by ICAO standards (also the SJU Capacity Study confirmed the single frequency saturation in core Europe starting from 2015).

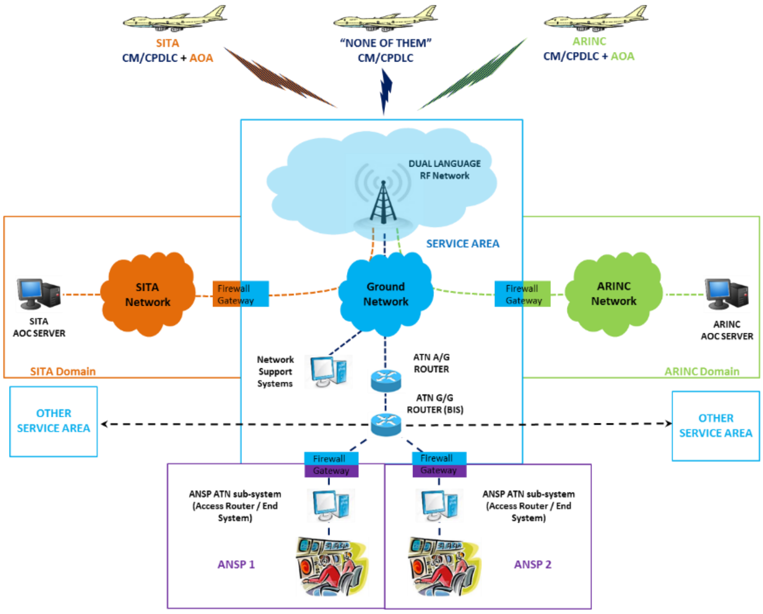
Starting from the EASA report, the following Ground Network recommendations have been elaborated by ELSA:

- improve the VHF Ground Station (VGS) network and fix the ground system issues:
  - use a dedicated channel for transmissions at the airport in regions with high traffic levels in en-route;
  - use alternative communication means for AOC in the airport domain (e.g., Wi-Fi, cellular, AeroMACS) to off-load the frequencies used for CPDLC;
  - progressively implement additional VDL2 frequencies in accordance with the traffic level;
  - optimise the en-route VGS network coverage;
  - ensure the availability of a fifth VDL2 frequency (at a minimum);
  - use the CSC as common control channel only, unless traffic level is very low;
  - implement ELSA recommended protocol optimisation: limit AVLC frame size;
  - fix the ELSA identified ground system problem;
- start implementing the transition roadmap to the MF VDL2 target technical solution: introduction of alternate channels using reserved frequencies [32], addition of frequencies, and transition to one managed MF VDL2 network per Service area.

With reference to the last, ELSA Study, after a technical assessment of the various MF deployment identified options, concluded that **the best model for MF deployment in Europe is a model comprising a number of Service Areas, where all VDL M2 Ground Stations (VGS) operating on VDL frequencies in a given Service Area work together under one unique frequency licensee responsible for managing the traffic on the RF network**. Thus the European architecture is based on a "Service Areas" approach that, from a pure technical point of view, means a European distributed architecture.

[32] Means that all ground stations operating on that VDL frequency in a given Service area work together under one unique frequency licensee responsible for managing the traffic on the RF network.

Such model – named ***Model D*** - represents the target high level architecture solution for the ATN COM infrastructure outlined in the following picture:



Target high level architecture solution for the ATN COM infrastructure

Model D:

Model D description:

As outlined in the previous figure, the model D consists of a European distributed architecture based on Service Areas.

For each Service Area, the following components are included:

- RF network: MF VDL M2 VGS implementing Dual Language[33] technology
- Ground network: IP network for internal and external components connections (the AOC transport is not considered in the family scope)
- ATN Ground Network: composed by ATN A/G and G/G routers in a dedicated ATN
- domain
- Network support systems: monitoring, recording, billing and network management systems
- Network interfaces: Firewall/Gateways for external interfaces.

It is worth noting that, at European Level, Network Support Systems should be envisaged to ensure an overall monitoring supporting the Common DL Service provision.

One of the most important element of the Model D is its scalability, that means the possibility to add new frequency, also only one, each time the available bandwidth becomes insufficient in the Service Area as well as in the Country/Region within the Service Area (the number of frequencies "linearly" grows with the traffic increase).

Regarding to the ground networking (Ground Network and ATN Ground Network), a possible common approach is to implement the G/G network ATN rationalization for DLS based on PENS use and considering also the Service Area approach as defined in the TEN-T study "New European Common Service Provision for PENS 2 and DLS".

33 "Single Language" means that any VGS broadcasts the ID (Identifier) of only one (Single) Digital Service Providers . "Dual Language" means that any VGS broadcasts the IDs (Identifier) of multiple (Dual) Digital Service Providers in its Ground Station Information Frames (GSIF) on the RF channel.

Towards Model D:

Having defined the European target solution architecture for the ATN COM infrastructure, also the transition from the current situation to the target solution has been studied by ELSA. The European current situation can be represented by three different statuses which can be assumed as starting points for the transition:

- **"Model A":** a country/region with a multiple VDL M2 networks implemented in the same airspace, using a One-GSIF[34] system on common frequencies;
- **"Model C":** a country/region with a single VDL M2 network implemented in the same airspace, using a Two-GSIF system on reserved frequencies;
- **No implementation yet**: a country/region that has not implemented any ATN COM infrastructure.

Due to the need to consider:

- the existing infrastructure;
- the time required to move forward the technical target solution (assuming that some of the current infrastructures are in operation;)

a transition model, named "Model B", has been introduced.

Model B description:

Model B consists of **Multiple VDL M2 networks implemented in the same airspace using a One-GSIF system on reserved frequencies with MF implementation.**

To make it possible to implement the Model B in a way suitable to meet the requirements, it is necessary to have at least five frequencies available in the high traffic area, considering the current situation of two operating CSPs. (EUR ICAO FMG is currently working on this topic). **The Model B has to be considered as a temporary step to reach the Model D.**

The following table recaps the Models described above:

Model	VDL RF operating Networks	VDL RF Frequency Use	GSIF on each Frequency announced by each Network	Existing today	Note
A	MULTIPLE	COMMON	ONE	YES	Current Central EU model
B	MULTIPLE	RESERVED	ONE	NO	**Target Short term evolution**
C	SINGLE	RESERVED	TWO	YES	Current model deployed in a limited area[35]
D	SINGLE	RESERVED	TWO	NO	**Target Long term model for EU VDL network evolution**

*Currently deployed by ENAV on Italian airspace.

[34] A One-GSIF system implements the "Single Language". A Two-GSIF system implements the "Dual Language".
[35] Currently deployed by ENAV on Italian airspace.

Stakeholders involved:

The stakeholders involved in the Family implementation are *ANSPs and CSPs* that are asked to provide:

- in the short term, coverage and performance required to satisfy the DLS IR 29/2009 (ATN B1 services), amended by IR 310/2015 and considered as pre-requisite for PCP;
- in the medium term, capacity to support the increased data volume expected with the introduction of trajectory downlinks with EPP (part of ATN B2 services) for Initial trajectory information sharing (i4D) as requested by PCP.
  In this perspective, the SDM DL strategy has proposed to EC to achieve the target Model D by December 2022.

Interdependencies

Family 6.1.3 can only be implemented in conjunction with Family 6.1.1 and 6.1.2, which are providing the corresponding ATM infrastructures for data link services.

+Synchronization Needs

Family 6.1.4 and 6.1.5 target the implementation of avionic systems supporting ATN B1 and ATN B2 applications. Therefore, synchronisation between ANSPs/CSPs and AUs is necessary.

Civil / Military Coordination

No special requirements.

Stakeholders considered as gaps	ANSPs	
Other stakeholders involved in the Family deployment	CSPs	
Links to ICAO GANP ASBUs	B0-TBO (Improved Safety and Efficiency through the Initial Application of Data Link En-route)	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	N/A
	ATM Master Plan Level 3 (Edition 2016)	ITY-AGDL
SESAR Solutions	N/A	
Very Large Scale Demonstrations	N/A	
Guidance Material / Specifications / Standards	SJU/LC/0109-CFT – D1602 "VDL Mode 2 Measurement, Analysis and Simulation Campaign", Deliverable D11 – Final Report EUROCAE ED-92B - MOPS for an Airborne VDL Mode-2 System	

	Operating in the Frequency Range 118-136.975 MHz ICAO Doc 9776 Manual on VDL Mode 2 Technical Specifications ARINC Specification 631-6
Means of compliance and / or Certification	VHF air-ground Digital Link (VDL) Mode 2; Technical characteristics and methods of measurement for ground-based equipment; Part 1: Physical layer and MAC sub-layer ETSI EN 301 841-1 VHF air-ground Digital Link (VDL) Mode 2; Technical characteristics and methods of measurement for ground-based equipment; Part 2: Upper Layers; ETSI EN 301 841-2 VHF air-ground Digital Link (VDL) Mode 2, Part 3: Harmonized EN covering the essential requirements of the Directive 2014/53/EU ETSI EN 301 841-3
Regulations	IR (EC) No 29/2009 amended by IR (EU) No 2015/310
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks; it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them.
Recommendation for IPs proposal	Refer to Strategic View – Addendum - *DLS Implementation Strategy towards Initial Trajectory Information Sharing*.
Deployment Approach	Refer to Strategic View – Addendum - *DLS Implementation Strategy towards Initial Trajectory Information Sharing*.

Family 6.1.4 – ATN B1 capability in Multi Frequency environment in Aircraft domain

6.1.4 - ATN B1 capability in Multi Frequency environment in Aircraft domain			
Main Sub-AF	Sub-AF 6.1 Initial Trajectory Information Sharing		
Readiness for implementation	High		
Initial Operational Capability	01/09/2016	**Full Operational Capability**	05/02/2020

Description and Scope

The purpose of this family is for civil and military aircraft operators concerned by DLS IR to upgrade to "best in class" avionic configurations as prescribed by ELSA and/or those having successfully passed subsequent and equivalent test and certification activities.

One of the outcomes of ELSA was a set of avionic configurations that were tested and demonstrated as sufficient to comply with the ATN/VDL2 performance expectations in multi-frequency (MF) environment. ELSA Final report (D11) refers to this set as "best in class"; select aircraft type families are covered, see below.

ELSA identified the need to continue testing efforts beyond the lifespan of the study itself to cover both newly emerging avionic configurations as well as other existing configurations that were not covered in the ELSA study.

ELSA proposed that ultimately, an effective end to end certification process for both ground and air components should be defined and implemented.

The current airborne routers and VHF Data Radio already labelled as "best in class" in the frame of the ELSA project are listed below:

1) Data Link Management Units (airborne routers)

- AIRBUS FANS B+ ATSU CSB8
- HONEYWELL
  - MkII+ CMU upgrade from -501 and -521 to -522
  - EPIC CMF upgrade to Block 3.xx or later
  - B787 CMF upgrade to BPV3
  - B777 CMF upgrade to BPv17A BLE
- Rockwell Collins CMU-900 operators should upgrade to CMU Core software 815-5679-505 (refer to CMU-900 Service Information Letter 15-1) in order to fix a software bug impacting the VDL2 Multi-Frequency operations.

2) On board VDR (VHF Data Radio)

- Honeywell
  - RTA-50D PN 965-1696-0F1
  - RTA-44D PN 064-50000-2052 or with service bulletin SB23-1570 installed
  - EPIC avionics fitted with mod D or greater for the VDR element.
- Rockwell Collins
  - VHF-920: P/N 822-1250-002w/SB16 or 822-1250-020w/SB17
  - VHF-2100: P/N 822-1287-101/180w/SB7 or 822-1287-121/141

Note: Regardless of the family's readiness for deployment, one outcome of the ELSA study is the need for an effective end-to-end system certification process including both ground and air components and reference material for the ground network infrastructure. Need to accelerate the delivery of supporting material.		
Interdependencies		
None		
Synchronization Needs		
6.1.1 and 6.1.3 addressing ground system capabilities for ATN B1 services		
Civil / Military Coordination		
Stakeholders considered as gaps	Airspace Users	
Other stakeholders involved in the Family deployment	Military authorities, when relevant (as AU)	
Links to ICAO GANP ASBUs	B0-TBO (Improved Safety and Efficiency through the Initial Application of Data Link En-route)	
ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	AUO-0301 Available
	ATM Master Plan Level 3 (Edition 2016)	ITY-AGDL
SESAR Solutions	N/A	
Very Large Scale Demonstrations	N/A	
Guidance Material / Specifications / Standards	SJU/LC/0109-CFT – D1602 "VDL Mode 2 Measurement, Analysis and Simulation Campaign", Deliverable D11 – Final Report EUROCAE ED-92B - MOPS for an Airborne VDL Mode-2 System Operating in the Frequency Range 118-136.975 MHz Network Strategy Plan (NSP): SO 8.3 EUROCAE ED-100A/DO-258A, Interoperability Requirements for ATS Applications using ARINC 622 Data Communications. EUROCAE ED-110B/DO-280B, Interoperability Requirements Standard for Aeronautical Telecommunication Network Baseline 1 (Interop ATN B1). EUROCAE ED-154A/DO-305A, Future Air Navigation System 1/A - Aeronautical Telecommunication Network Interoperability Standard (FANS 1/A – ATN B1 Interop Standard). EUROCAE ED-120/DO-290, Safety and Performance Requirements Standard For Initial Air Traffic Data Link Services	

	In Continental Airspace (SPR IC) EUROCAE ED-122/DO-306, Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace (Oceanic SPR Standard) EUROCAE ED-93, Minimum Aviation System Performance Specification for CNS/ATM message recording systems ICAO Doc 10037 - ICAO GOLD edition 2 ICOA Doc 9694 Manual of Air Traffic Services Data Link Applications ICAO Doc 9776 Manual on VDL Mode 2 Technical Specifications ICAO Doc 9880 Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols, Part II — Ground-Ground Applications — Air Traffic Services Message Handling Services (ATSMHS).
Means of compliance and / or Certification	CS-ACNS, 17 December 2013 - Community Specification on DL for aircraft implementations EASA RMT.0524 – Data Link Services (Planned)
Regulations	Commission Regulation (EC) 1032/2006, as amended by Regulation (EC) 30/2009 Commission Regulation (EC) n. 29/2009, as amended by Regulation (EU) 2015/310 Commission Regulation (EC) n. 965/2012 EASA updated regulatory package on Data Link operations (TBD)
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them.
Recommendation for IPs proposal	It is recommended to take into consideration the results of Gap Analysis, as reported within section 5.1
Deployment Approach	The deployment of this family is envisaged to commence with the procurement of required equipment or upgrade packages; this step is completed when the operator has taken delivery of all necessary hardware and software components **(MM.1 - Equipment procured)**. This step is followed by installation and integration in onboard systems of all aircraft in the respective fleet **(MM.2 - Aircraft equipped)**. Next step involves the elaboration and approval process of operational procedures and training packages **(MM.3 – Procedures and training available)**. Crews must undergo appropriate training with respect to the use of the equipment **(MM.4 – Training completed)**. Finally, the family is fully implemented when regular operations have commenced on a permanent basis **(MM.5 – Implementation completed)**.

Family 6.1.5 – ATN B2 in Aircraft domain

6.1.5 – ATN B2 in Aircraft domain			
Main Sub-AF	Sub-AF 6.1 Initial Trajectory Information Sharing		
Readiness for implementation	Low		
Initial Operational Capability	01/01/2020	**Full Operational Capability**	01/01/2026

Description and Scope
According to the PCP, one objective of AF6 is that "at least 20 % of the aircraft operating within the airspace of European Civil Aviation Conference (ECAC) countries in the ICAO EUR region corresponding to at least 45 % of flights operating in those countries, are equipped with the capability to downlink aircraft trajectory using ADS-C EPP as from 1 January 2026" This family aims at adapting aircraft systems to receive and process a ground initiated ADS-C Contract Request for EPP data. The avionic system shall, at the minimum, implement all EPP Data Operational Requirements [EPP DATA OR] listed in Annex B of ED-228A. This family encompasses: - Aircraft equipage - Procedures and training
Interdependencies
6.1.4 is a prerequisite.
Synchronization Needs
6.1.2, 6.1.3 addressing ground system capabilities for EPP exchange
Civil / Military Coordination

Stakeholders considered as gaps	Airspace Users
Other stakeholders involved in the Family deployment	Military authorities, when relevant (as AU)
Links to ICAO GANP ASBUs	B1-TBO (Improved Traffic Synchronization and Initial Trajectory-based Operation)

ATM Master Plan References	**ATM Master Plan Level 2 (Dataset 16)**	IS-0303-A (A/C-37a) SESAR Release 5
	ATM Master Plan Level 3 (Edition 2016)	None
SESAR Solutions	N/A	
Very Large Scale Demonstrations	**Release 7:** PJ.24,25,31 **Release 8:** PJ.24,25,31 **Release 9:** PJ.24,25,31	
Guidance Material / Specifications / Standards	EUROCAE ATN B2 Standards ED-228A, ED-229A, ED-230A, ED-231A. EUROCAE WG-85 Update of ED75 to support initial 4D navigation capabilities as part of the package with EPP (ED-75D) ICAO CP Update Doc 9869 Manual on Required Communication Performance (RCP) ICAO Doc 9880 Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols ICAO Doc 10037 – ICAO GOLD edition 3 (2018) EUROCAE ED-154/DO-305 Future Air Navigation System 1/A Aeronautical telecommunication network interoperability standard (FANS 1/A ATN B1 Interop Standard) ICOA Doc 9694 Manual of Air Traffic Services Data Link Applications ICAO Doc 9896 Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using the Internet Protocol Suite (IPS) Edition 3 ICAO Doc 9925 Manual on the Aeronautical Mobile Satellite (Route) Service Edition 2 ARINC 623 – Character oriented Air Traffic Service (ATS) applications	
Means of compliance and / or Certification	ETSI Update CS on Data Link (2020 – not planned)	
Regulations	None	
Cyber security requirements	Modern ATM systems design is requiring enhanced connectivity and is using more and more common and open components, services and standards. This trend exposes systems to increased cybersecurity risks, it is therefore paramount to identify these risks, assess their possible impacts and mitigate them with appropriate measures. SDM is of the opinion that some components of this family are particularly exposed to these cybersecurity risks and that stakeholders should take appropriate action to mitigate them.	
Recommendation for IPs proposal	It is recommended to take into consideration the results of Gap Analysis, as reported within section 5.1.	

Deployment Approach	The deployment of this family is envisaged to commence with the procurement of required equipment or upgrade packages; this step is completed when the operator has taken delivery of all necessary hardware and software components **(MM.1 - Equipment procured)**. This step is followed by installation and integration in onboard systems of all aircraft in the respective fleet **(MM.2 - Aircraft equipped)**. Next step involves the elaboration and approval process of operational procedures and training packages **(MM.3 – Procedures and training available)**. Crews must undergo appropriate training with respect to the use of the equipment **(MM.4 – Training completed)**. Finally, the family is fully implemented when regular operations have commenced on a permanent basis **(MM.5 – Implementation completed)**.

4. PERFORMANCE VIEW

4. Performance View

The PCP has been adopted by the Commission after positive opinion of the EU Member States and endorsement by the operational stakeholders on the basis of a high level Cost Benefit Analysis (CBA) that demonstrated an overall benefit [36]. With this CBA as justification, there was the commitment of the EC to facilitate PCP deployment by EU public funding through the Connecting Europe Facility (CEF) financial instrument in the period 2014-2020.
In line with SDM's performance policy laid down at section 2.2 above, the performance view of SDM's Deployment Programme aims at coordinating, synchronizing and monitoring the implementation of the PCP against the boundaries of the high level CBA that has triggered PCP adoption in 2014. "Against the boundaries" means within the expected return on investment according to the performance expectations.

In order to meet this objective, the performance view includes:

- An overview of **SDM's role within the SES performance framework**;
- An overview of the updated "**Performance Assessment and CBA Methodology**" that SDM has applied in support to its performance policy and how it builds on and connect with the methodologies used by other SES and SESAR bodies involved into performance;
- The presentation of the **performance gains expected from the implementation of the Deployment Programme**;
- The presentation of the **Deployment Programme Cost Benefit Analysis** (CBA).

4.1 SDM in the SES performance framework

The SDM has been established by the European Commission as a SES instrument to ensure timely, synchronised and coordinated implementation of SESAR through a series of Common Projects. **As such, SDM's performance view shall comply with SES overall performance framework, use common indicators and methodologies with other SES bodies dealing with performance and build on their expertise and early results.**

The Single European Sky (SES) initiative aims to achieve "more sustainable and performing aviation" in Europe. The SES High level Goals are political goals set by the European Commission in 2005. The purpose of these High-level Goals is to set the optimal ATM performance levels to be reached in the European Air Traffic Management (ATM) network and to drive efforts to achieve them. The four High-level Goals to be achieved by 2020 and beyond are to:

- Enable a 3-fold increase in ATM capacity, to be deployed where needed, reducing delays both on the ground and in the air;
- Improve safety by a factor of 10;

[36] PCP's global cost benefit analysis is available at http://ec.europa.eu/transport/modes/air/sesar/doc/ec-716-2014_article4c_globalcba.pdf

- Enable a 10 % reduction in the effects flights have on the environment; and
- Provide ATM services at a unit cost, to the airspace users, which is at least 50% less.

In addition to the "high level goals", and within the SESAR context, the ATM Master Plan 2015 has proposed "Performance ambitions" with a different time line but still contributing to them.

Since implementation as from 1 January 2012 of the performance scheme, the EU has been operating a formal and explicit performance-driven approach, which includes performance indicators – fit for setting binding regulatory targets on specific stakeholders accountable for delivering measurable performance outcomes. Through a succession of Reference Periods (2012-2014, 2015-2019, …) the performance scheme drives and monitors the final achievement of SES High-level Goals. As explained in the Commission Implementing Decision C(2015) 9057, "a Performance Ambition is considered as an estimation of the contribution of the SESAR project to the Single European Sky (SES) Performance objectives. This estimation shall be confirmed after the validation of the relevant Research, Development and Deployment activities".

SESAR deployment shall fit within this performance scheme: investments, benefits and performance gains drawn from SESAR deployment shall support the achievement of the specific targets of the active Reference Period. **SDM is cooperating with the Performance Review Body (PRB) to ensure this compliance.**

Another key player in the SES performance framework is the Network Manager (NM). Since 2011, with a specific consolidated local and network perspective, the NM has been forecasting, planning, monitoring and reporting to help deliver the performance targets of the Single European Sky. Since its establishment in December 2014, SDM has been closely cooperating with NM with the objective to build on NM's wide experience, tools and findings and to ensure consistency with the Network Strategy Plan, Network Operations Plan (NOP) and European Route Network Improvement Plan (ERNIP). As an early result of this cooperation, the project view of the DP already flags the gaps in PCP implementation which are the most critical to network performance with a specific "N" label. **Pursuing in this direction, the performance assessment and CBA methodology described in the annex D to the DP is closely interrelated with NM's tools and activities in the field of performance.**

Finally, the Global Cost-Benefit Analysis that SJU has delivered back to 2013 in support to PCP's adoption sets the overall frame for SDM's action in the field of performance. This document is referred to as the **"Reference and supporting material (EC) No 716/2014 article 5(C) Global cost-benefit analysis"**. With regards to the PCP CBA, SDM shall pursue several objectives:

1) **Monitoring that CBA's boundaries are met:** Taking advantage of more refined costs through implementation projects submissions and more robust assessments of expected benefits through SDM's or Network Manager's appropriate inputs as well as recent SJU's validation campaigns and upcoming Large Scale Demonstrations, SDM shall monitor that PCP is implemented within the boundaries

of the CBA and that, in particular, the ranges assumed in the CBA for the 5 sensitivity drivers are met[37];

2) **Addressing with high priority the potentially critical situation hidden behind the overall positive result of the CBA:** whilst the PCP CBA shows an overall benefit of 2,4 billion € (Net Present Value) over the period 2014-2030, it highlights some critical issues on which SDM shall be vigilant, such as:
    - AF5 and AF6 where CBA at AF level is negative;
    - AF1, AF2, AF3, AF4 where the different investments and benefits are not necessary having similar ramp-up periods or payback timings;

   Considering that PCP's CBA has been developed without taking into account the positive impact of any EU funding or financing mechanism, SDM shall play a key role in assessing EU grants' efficiency and targeting other EU financing mechanisms to adequately address those critical issues, ensuring that it is the whole PCP that will be rolled out timely and in compliance with the European regulations.

3) **Gathering updated costs and benefits data** in relation with PCP implementation that would be used to update PCP's CBA if EC decides a review of the PCP.

The three objectives above require close cooperation with NM and PRB as well as re-use by SDM of key financial assumptions and methodology that have been used by SJU when developing PCP's CBA.

4.2 Performance Assessment and CBA Methodology

SDM's performance assessment and CBA methodology is the cornerstone of SDM's performance policy. It bridges between technological investments required to achieve new ATM functionalities required through the PCP Regulation and ATM performance improvement. It contributes to ensure that all benefits expected from the whole PCP implementation will materialize whilst not exceeding the estimated cost. It is an essential tool in monitoring PCP implementation, assessing and monitoring cost and benefits of implementation projects submitted or not by operational stakeholders but also assessing the impact of "missing implementation projects", i.e. implementation projects not submitted timely and identifying solutions to recover such situations and get the whole PCP implemented.

The performance assessment and CBA methodology describes the different steps taken to set the baseline against which performance will then be monitored during DP execution. Detailed methodology is annexed to the DP as Annex D. In particular, the performance assessment and CBA methodology assumes that co-funding is awarded by INEA and reflected by the operational stakeholders in their investment plans in accordance with relevant regulations, in particular the Implementing Regulations (EU) on CEF (N° 1316/2013), on the Charging Scheme (N° 391/2013) and on the Performance Scheme (N° 390/2013).

[37] Air Traffic Growth, Fuel and CO2 savings, Delay Cost Savings, reduction of costs for the ATM service provision, PCP investments costs ground and airborne

The main updates of the SDM's performance assessment and CBA methodology are the following:

- An updated presentation of the performance indicators and their corresponding CBA metrics that allow quantifying benefits.
- A more detailed explanation of the top-down approach and the bottom-up approach in the measuring of the expected benefits.
- An additional chapter on the cost effectiveness analysis of the projects before submission.
- A detailed "consistency check" table between the Performance Indicators used by the SDM, the KPIs of the SES II Performance scheme and the KPIs of the ATM Master Plan. The three sets of indicators are coordinated between SDM/SJU/PRB.

4.3 DP expected contribution to performance

As per the project view developed in the chapter 3 above, the expected contribution of PCP implementation to performance could be divided in two blocks:

- The contribution to performance expected from the Implementation Projects awarded in 2015 as a result from the CEF Transport General Call 2014. See chapter 4.3.1;
- The contribution to performance expected from the Implementation Projects still to be awarded to the future CEF Transport Calls (2015 and the following years) in order to close the gaps identified in the DP 2015, supposing that all projects are submitted which is not necessarily the case. The contribution to performance expected from the Implementation Projects awarded in 2016 as a result from the CEF Transport General and Cohesion Calls 2015 will only be finalized after the DP 2016 will be published in September 2016.

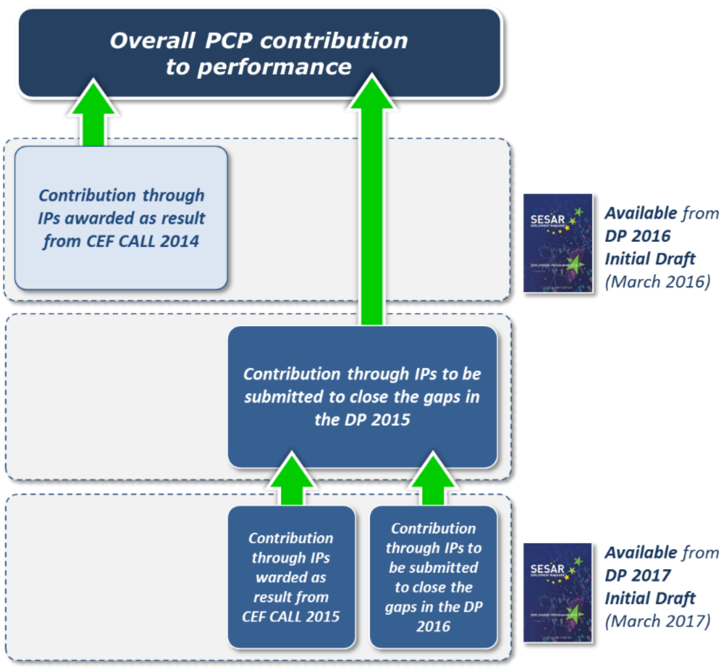


Fig. 27 – Overall PCP contribution to performance – Overview

4.3.1 Contribution from the Implementation Projects awarded through the CEF Call 2014

Performance analysis of the SGA IP 2014 has been prepared bottom-up, starting from contribution to performance expected from each implementation project (or thread[38] of implementation projects). These expectations have been declared initially by the projects themselves through an SDM performance grid, per KPAs and KPIs. After assessment by SDM and joint confirmation by SDM and the relevant implementing partners, the declared contributions to performance become "performance expectations" associated to each implementation projects. The contribution of the project managers has been essential to assess those figures with the understanding of local specificities for each project. Individual contributions are then summed up per AF to form the "performance expectations" at AF level and then for the whole SGA IP 2014 to form the "performance expectations" at SGA or action level. Those "performance expectations" constitute the reference against which projects or threads of projects, or AF, or action will be monitored until completion (see chapter 4.5.1, the so-called "monitoring"). After completion, SDM will further monitor that, after going operational, the projects actually delivers the expected contribution (see chapter 4.5.2, the so-called "final check" with examples of the first finalized projects).

For the purpose of the edition 2016 of the DP, this chapter presents the initial results of SDM performance assessment for SGA IP 2014. With the bottom-up approach, the total contribution to performance of SGA IP 2014 has been estimated to **3.4 Bn€ (1.6 Bn€ discounted), so in the range of 30% of the overall PCP benefits[39]** for the period 2014-2030.

The following figure presents the distribution per AF of the overall performance value of the SGA IP 2014 after monetisation of the various contributions to performance.

[38] A thread is a group of projects that dependent from each other to jointly deliver their benefits. The notion of thread has been used to group some implementation projects when the reasoning for performance assessment and CBA analysis couldn't be applied to each of them in isolation. For the time being, only few threads have been defined and most of the implementation projects remain analyzed on an individual basis.

[39] PCP's global cost benefit analysis is available at http://ec.europa.eu/transport/modes/air/sesar/doc/ec-716-2014_article4c_globalcba.pdf It reports 12.1 Bn€ (4.9 Bn€ discounted) as overall PCP benefits.

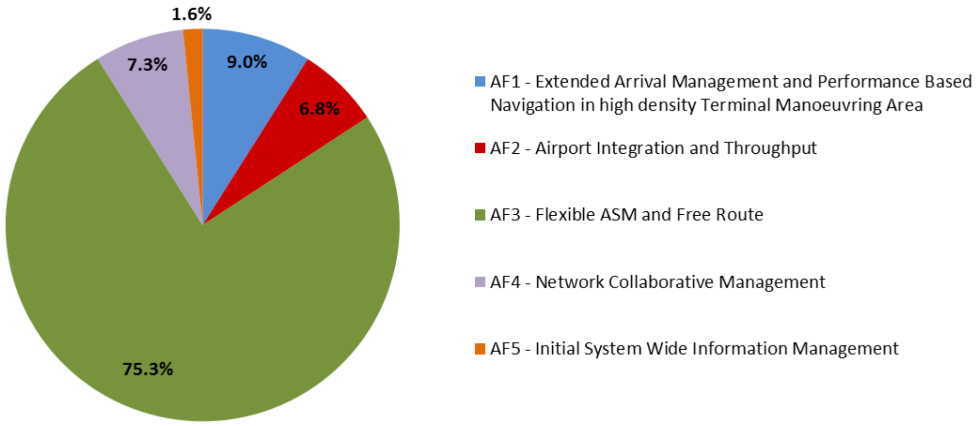


Fig. 28 – SGA IP 2014 – Expected Contribution to Performance per AF

75% of SGA IP 2014's contribution to performance is through implementations projects under AF3. AF1 represents 9%, AF2 and AF4 around 7%, and AF5 less than 2%.

The following figure shows the ramp-up profile between 2014 and 2030.

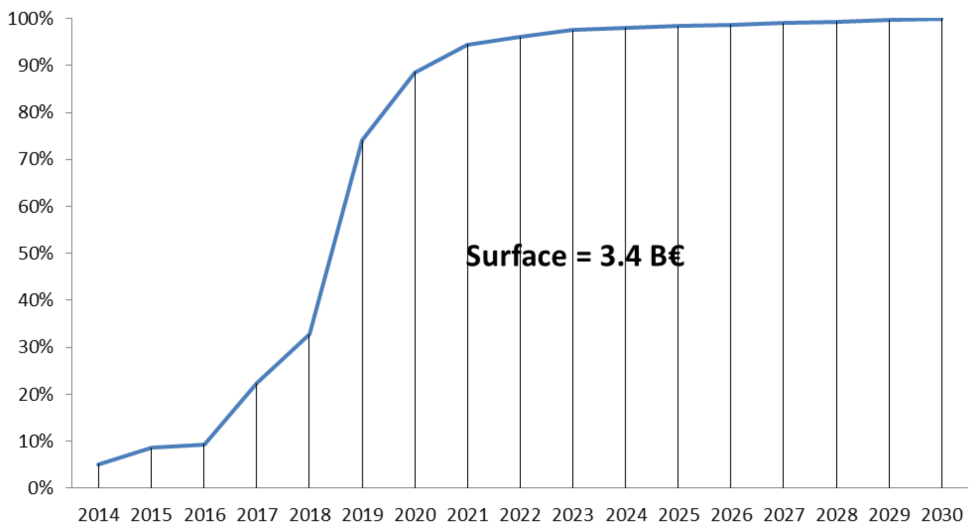


Fig. 29 – SGA IP 2014 – Ramp up of contribution to performance (2014-2030)

The curve is built from the sum of all expected benefits year by year (undiscounted) for all the projects. Most of the benefits are expected to ramp-up very quickly between 2018 and 2020. This chart doesn't pretend to reflect the exact future trend but it is an effort of transparency of what is reported in the Project Portfolio Management tool of SDM. Obviously, over the 16 years, the forecast is less and less accurate year after year because the different assumptions may be wrong and shall be revised. So, this curve shall be taken for a transparent understanding of what the shared work done on performance brings altogether.

The overall picture shows already the importance of ATM functionality AF3. Considering the limited number of submitted projects under this AF, project management and of change management practices by the relevant implementing partners are of special importance and will be carefully monitored by SDM.

The following figure also represents total **SGA IP 2014 contribution to performance but from a Key Performance Areas (KPA) perspective**. It is important to note that the Safety KPA is not monetized at this stage, therefore counted for 0.

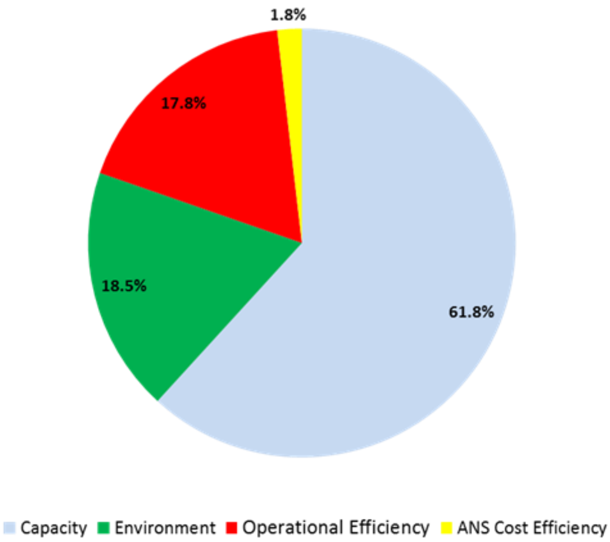


Fig. 30 – SGA 2014 – Contribution to Performance per KPA

Capacity represents the biggest share in Euro value with 62%, followed by the Environment, the Operational Efficiency and the ANS Cost Efficiency. For transparency, the detail figures of the amount for each performance indicator are as following:

KPA	Performance indicator	Amount
Capacity	En Route ATFM Delay (min)	73,000,000
Capacity	En Route ATFM Delay (TMA) (min)	900,000
Capacity	Airport ATFM Delay (min)	200,000
Environment	Saving linked to fuel consumption (ton)	766,000
Environment	Saving linked to CO2 reduction (ton)	2,357,000
ANS Cost Efficiency	Gate to Gate ANS Cost (€)	62,000,000
Operational Efficiency	ASMA Time (additional) (min)	1,300,000
Operational Efficiency	ASMA Time (unimpeded) (min)	400,000
Operational Efficiency	Taxi In Time (additional) (min)	300,000
Operational Efficiency	Taxi Out Time (additional) (min)	2,600,000
Operational Efficiency	Taxi Out Time (unimpeded) (min)	700,000
Operational Efficiency	ATC Delay (min)	200,000
Operational Efficiency	Saving minutes linked to fuel (auxiliary variable) (min)	11,400,000

The amounts here are those introduced in the system aggregating all projects providing benefits round up.

Going one level down, the following figure represents the distribution per performance indicator transformed in euro values according with the methodology.

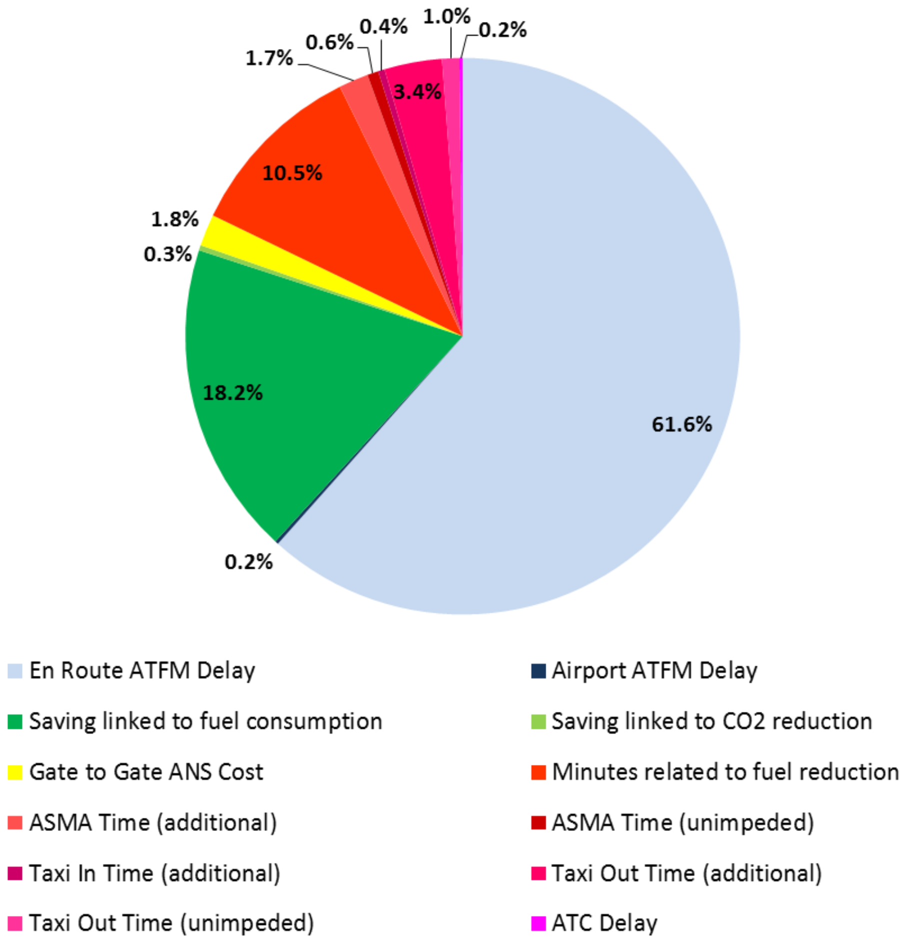


Fig. 31 – SGA 2014 – Contribution to Performance per KPI

In echo to AF3 predominance in figure 18, it is logical to have En-Route ATFM delays (73 million minutes) and the savings in fuel consumption (766 thousands of tons) as the main contributors.

Finally, the **ANS cost efficiency** is 1.8% of the overall amount.

These overall figures are hiding the unbalanced contribution of the main projects compared with those with no or very low benefits. This unbalanced situation is further more analysed taking into account the cost impact in the chapter on cost benefit analysis.

4.3.2 Contribution from the Implementation Projects to close the gaps in the DP 2015

The remaining gaps on which a performance forecast can be elaborated are the gaps of DP2015. These gaps shall be filled by future projects to cover the implementation of the PCP. Many of them have been submitted for the CEF Call 2015, others would be submitted to future calls or eventually not submitted through the SDM.

Also, because of the time it will take to assess the performance contribution of the CEF Call 2015 that will be awarded, the DP2016 can only base its performance view on the top-down evaluations it has been doing and would rely only on the SGA IP 2014 projects to ensure consistency between top-down approach and bottom-up one.

It seems therefore premature to give an overall estimation of the global benefits without additional consistency checks with the national investment plans and the national performance plans.

The first calculations tend to show that the relative importance of the AF in terms of contribution to performance would be maintained. With the caveat that the consistency checks are still missing, AF3 and AF4 together (because they are jointly assessed from a top-down approach) would cover around 80% of the total benefits.

With the CEF Call 2015 projects awarded, the SDM will be in a much better position to assess the overall situation in the DP2017

4.4 DP Cost Benefit Analysis

DP CBA builds on:

- Monetization of implementation projects' contribution to performance – the benefits; and
- Planned costs of the implementation projects', directly derived from the templates of the projects already awarded (2014) or submitted (2015), or estimated for the projects still to be submitted through future CEF Transport Calls.

The methodology used to perform the DP CBA is detailed at Annex D, "Performance Assessment and Cost Benefit Analysis Methodology". It gives a description of the CBA metrics used and the assumptions taken to monetize the performance improvements drawn from the projects and turn them into benefits.

As per the project view developed in the chapter 3 above, the PCP CBA could be divided in 2 blocks:

- The CBA for the Implementation Projects awarded in 2015 as a result from the CEF Transport General Call 2014. See chapter 4.4.1;
- The CBA for the DP2015 gaps. In the same way, this CBA will also be later on divided in two blocks:
    - The CBA of the Implementation Projects awarded in 2016 as a result from the CEF Transport General and Cohesion Calls 2015;
    - The CBA for the Implementation Projects still to be submitted to the future CEF Transport Calls in order to close the gaps identified in the DP 2016.

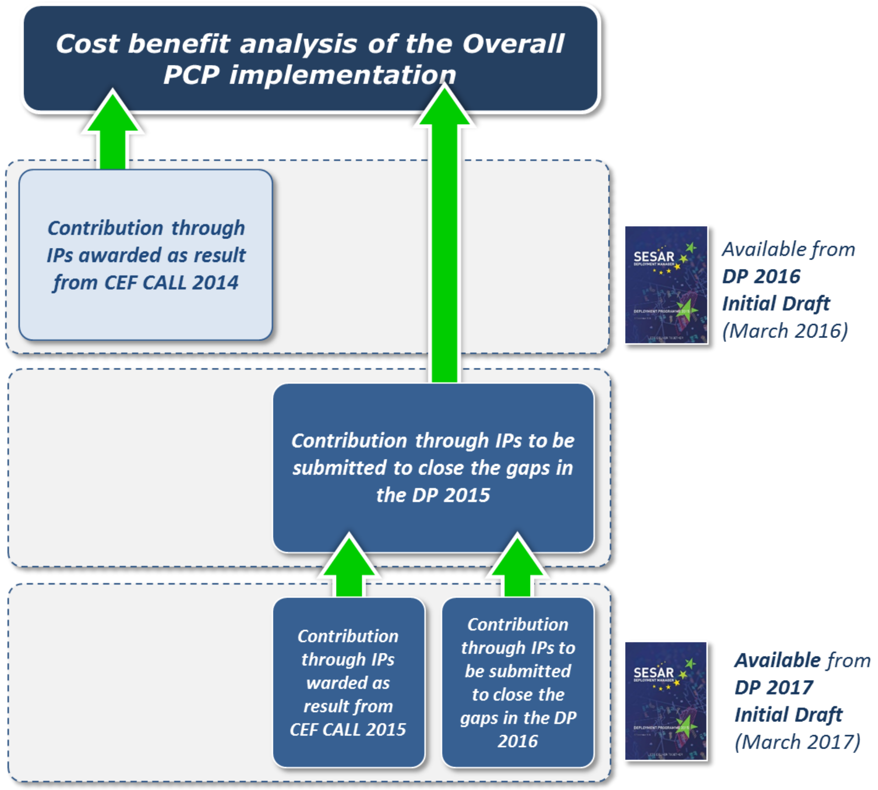


Fig. 32 – Overall PCP CBA – Overview

4.4.1 CBA for the Implementation Projects awarded through the CEF Call 2014

This section gives the February 2016 figures of the CBA/Performance assessment of the projects of the 2014 SGA, for all ATM Functionalities (AF) and then by AF.

The purpose of this CBA view at project level is to answer the important question of what is in the pipe of projects, what are the costs, what are the expected benefits, are we aligned with the expectations in terms of payback period according to the PCP CBA. The question to review all assumptions of the PCP CBA and proposed a revised CBA is not what is proposed in the DP2016. The SDM has not been mandated today to review the PCP CBA.

4.4.1.1. <u>Overview</u>

Figure 22 below is highlighting the evolution of costs, benefits and net benefits related to the deployment of Implementation Projects in the 2014 – 2030 timeframe. Specifically, the following color code is applied: planned costs are identified with blue bars, benefits with purple bars and net benefit with green bars. The net benefits are obtained by subtracting benefits from costs. Benefits are defined as "initial", as they are calculated as first/preliminary estimates to be reviewed.

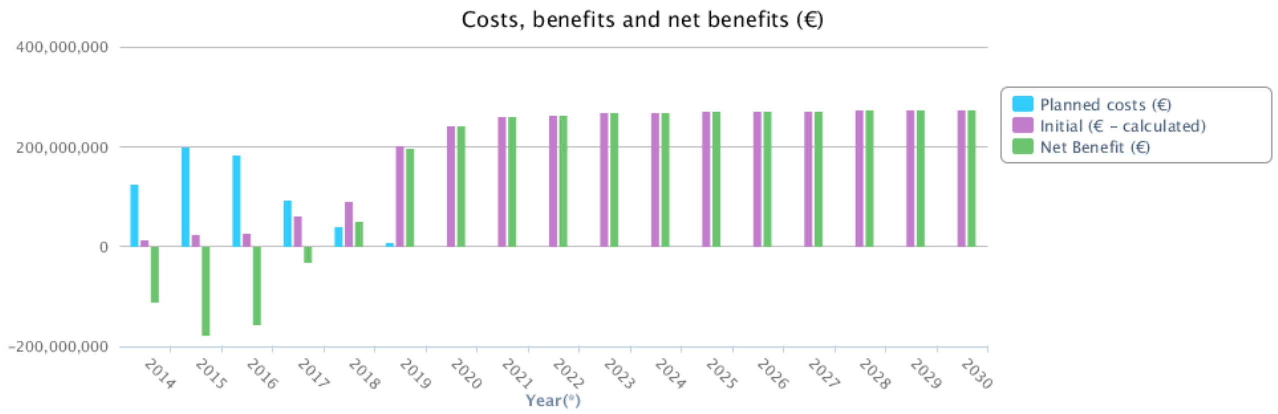


Fig. 33 – SGA 2014 - Evolution of costs, benefits and net benefits (2014 – 2030)

The chart shows:

- Investments (Planned costs in blue bars representing 649 mln€) are undertaken from 2014 to 2019
- Delivery of benefits (Initial in purple bars representing the 3.4 Bn€) is expected to start already as from 2014
- A positive net benefit (in green bars), on a yearly basis, is envisaged to be achieved starting from 2018

Figure 23 below shows the cumulated net benefit expected to be achieved. It is calculated by adding up the net benefits shown in figure 22 within the reference timeframe (2014 – 2030). The figure shows in particular when is the break-even point during the reference period, i.e. when cumulated net benefits go positive.

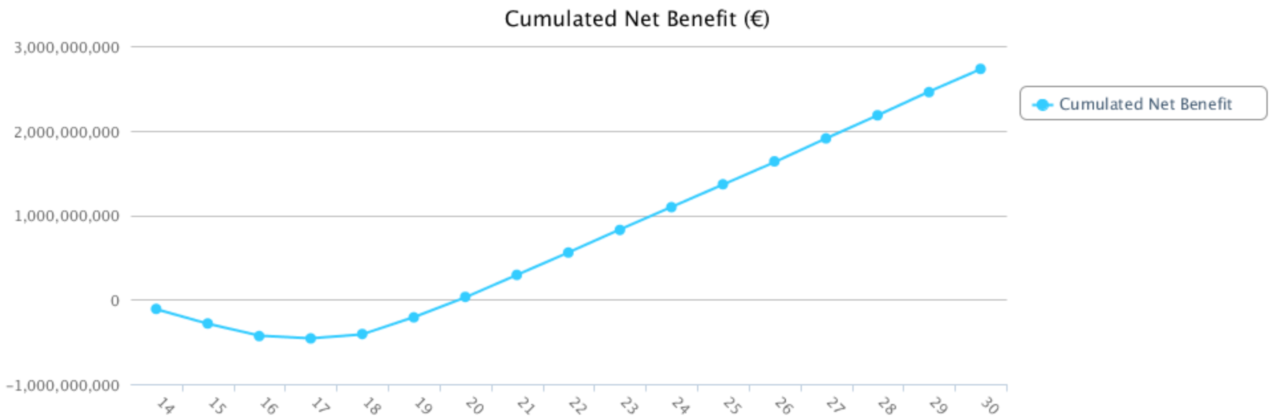


Fig. 34 – SGA 2014 – Cumulated Net Benefit in the 2014-2030 timeframe (€)

All AFs together, the cumulated net benefit for the implementation projects in the SGA IP 2014 is expected to turn positive in the year 2020 with a positive 32 mln€ Net Present Value.

After this period, the uncertainty about the right level of performance is bigger and the overall figure at the end of the period should be taken with care.

Down to the projects level but still with a transversal perspective, it should be underlined that, from an investment perspective:

- The 20 largest investment implementation projects in the SGA IP 2014 represent 80% of total SGA IP 2014 investment, leaving only 20% to the other 64 implementation projects;
- The largest investment implementation project in the SGA IP 2014 alone represents 29% of total SGA IP 2014 investment with the expectation to bring up to 52% of all SGA IP 2014 benefits. The fact that it is an AF3 implementation project confirms the criticality of this AF in terms of cost and benefit of the whole PCP implementation;
- These 20 implementation projects will be particularly monitored by the SDM as they play a key role in ensuring that PCP is implemented through the SGA IP 2014 within the boundaries of the PCP CBA envelope.

Also, from a benefit perspective:

- 83% of expected benefits discounted over 10 years are supported by 7 threads of projects. Those 7 threads of projects represent 43% of total investment. 6 of these threads are AF3 and one is AF1. Two of the AF3 threads are Network Manager projects which benefits are an estimated contribution to all AF3 projects that would only realize if the other related projects are implemented.
- 1 project "Thread #053AF3 DSNA 4 flight" represent 45% of expected quantified benefits discounted over 10 years. This project represents 29% of total investment.
- 42 threads of projects do not expected any quantified benefit. Those 42 threads of projects represent 33% of total investment
- Concerning the 37 threads of projects with quantified benefits, 10 of those have still a negative Net Present Value after 10 years.

Regarding the Net Present Value of the implementation projects in the SGA IP 2014, it should be noted that 64% of them (or group of them in case of threads) present a negative NPV, including 33% with no benefit at all. The analysis of these 64% is the following:

- 18% are AF5 SWIM projects for which negative NPV could be considered as normal due to the fact that PCP CBA states a negative NPV for the whole AF5;
- 25% are prerequisites to or phase 1 of a future implementation projects to which most of the expected benefits will be allocated. In these cases, negative NPVs result from the fragmentation of the implementation and it is the whole stream that should be considered at the end;
- 11% are Safety net, so increasing safety but without monetization of such benefit this could only result into negative NPV given the methodology applied;
- Only 10% of the other projects with negative 10 years NPV.

4.4.1.2. CBA Results – AF1

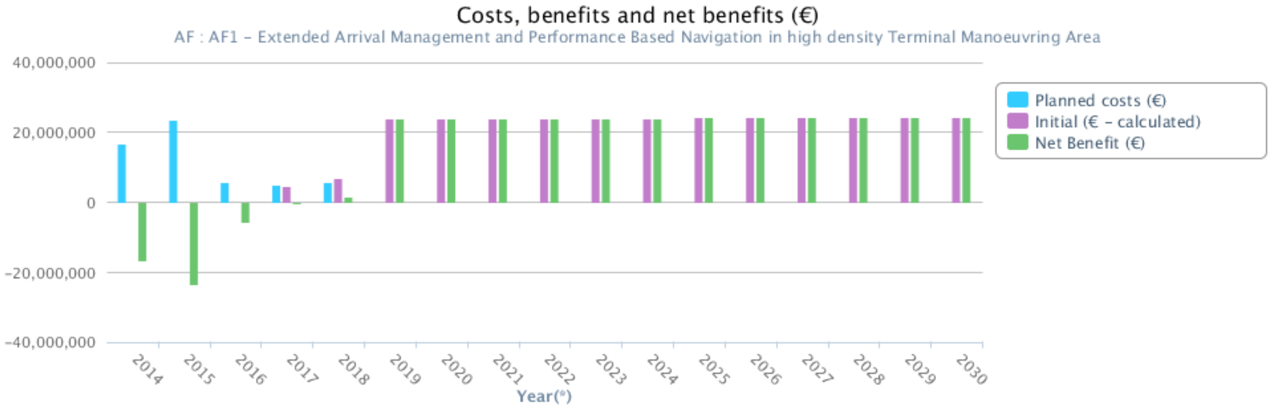


Fig. 35 –Evolution of costs, benefits and net benefits (2014-2030) – AF1

As shown by the chart:

- Investments for AF1 are undertaken from 2014 to 2018, they represent 9% of the overall SGA IP 2014 cost.
- The delivery of benefits is expected to start as from 2017 summing 301 mln€ over the period.
- A positive net benefit, on a yearly basis, is envisaged to be achieved starting from 2018.

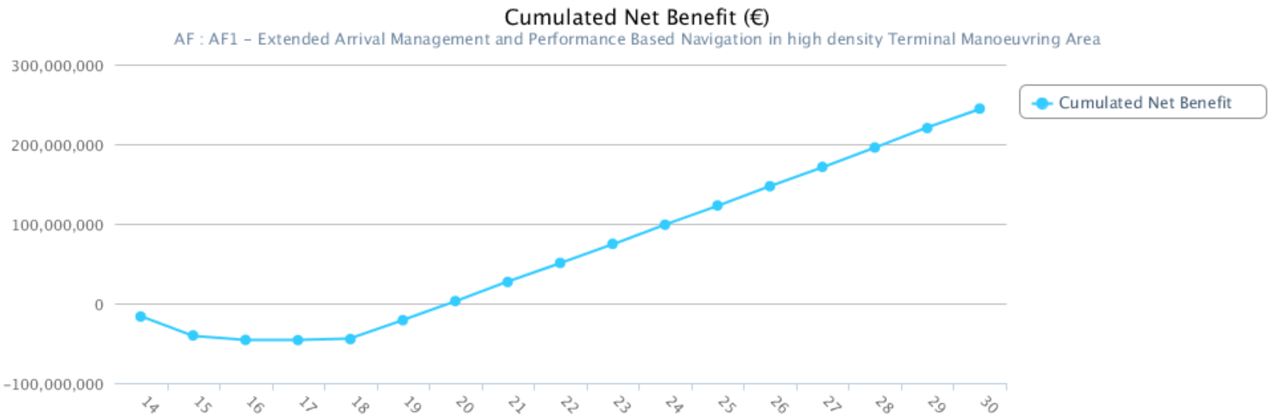


Fig. 36 – Cumulated Net Benefit in the 2014-2030 timeframe (€) – AF1

The cumulated net benefit is expected to turn positive in 2020 with a NPV of 3 mln€.

At project level, 79% of expected benefits discounted over 10 years are supported by 2 threads of projects. Those 2 threads represent 33% of total investment of AF1. There is no thread with multiple projects in AF1.

4.4.1.3. CBA Results – AF2

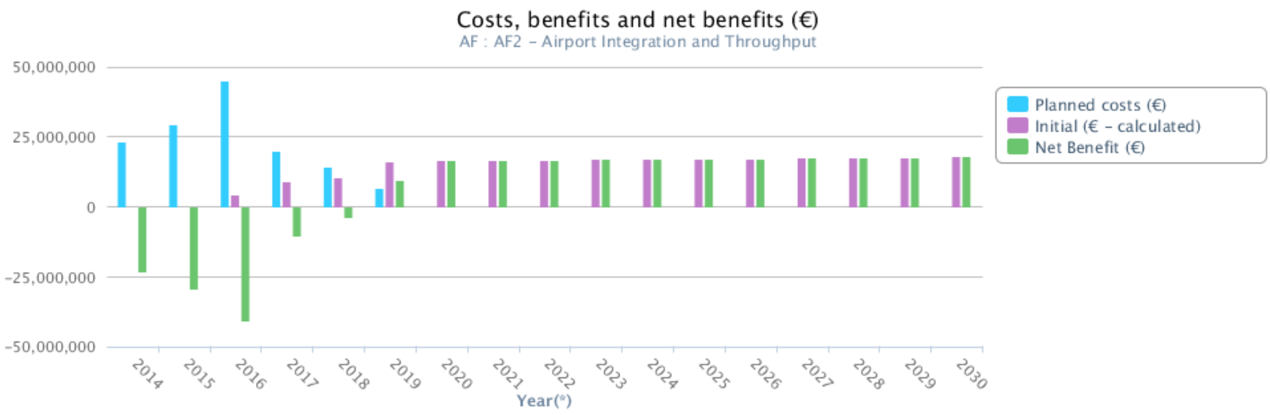


Fig. 37 –Evolution of costs, benefits and net benefits (2014-2030) – AF2

As shown by the chart:

- Investments for AF2 are undertaken from 2014 to 2019 and they represent 22% of the overall SGA IP 2014 cost.
- The delivery of benefits is expected to start from 2016 summing up 228 mln€ over the period.
- A positive net benefit, on a yearly basis, is envisaged to be achieved starting from 2019.

Two threads (CDG and ORY; NCE-Airport) were accommodated to link different projects together.

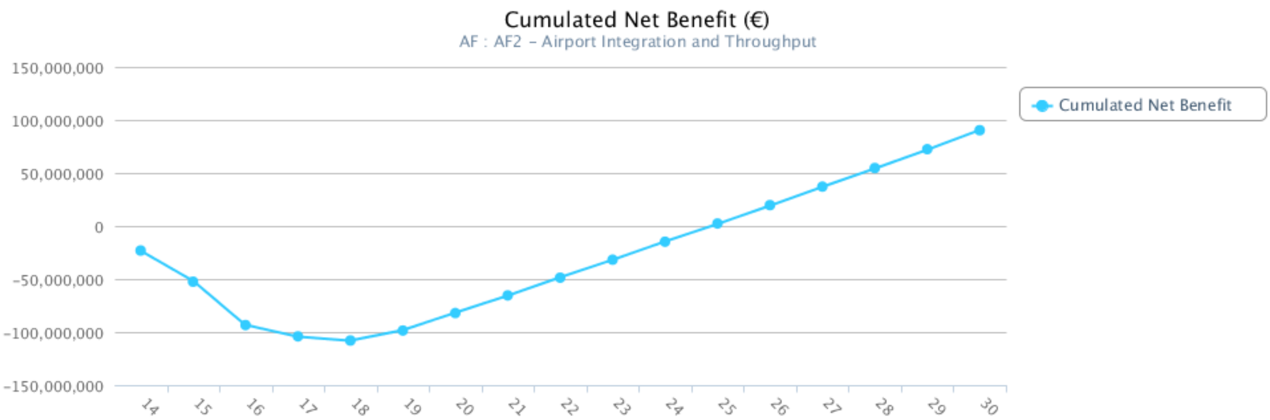


Fig. 38 – Cumulated Net Benefit in the 2014-2030 timeframe (€) – AF2

As shown by the chart, the cumulated net benefit is expected to turn positive in 2025 with a 2.4 mln€ value.
At project level, 78% of expected benefits discounted over 10 years are supported by 5 threads of projects. Those 5 threads represent 34% of total investment of AF2.

It is important to note that 9 projects (17% of the total investment of AF2) are related to safety net which is not monetized. Other projects may have also additional safety qualitative benefits.

4.4.1.4. CBA Results – AF3

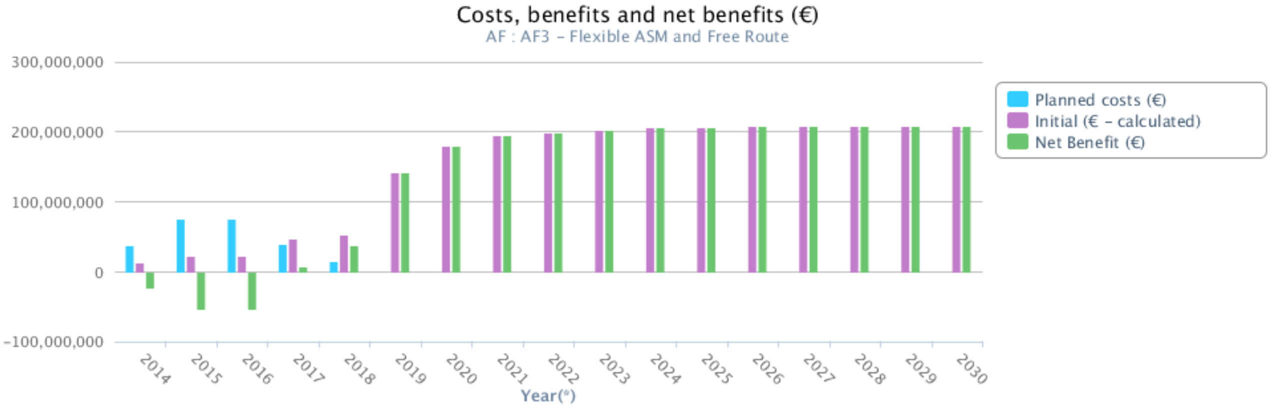


Fig. 39 –Evolution of costs, benefits and net benefits (2014-2030) – AF3

As shown by the chart:

- Investments for AF3 are undertaken from 2014 to 2018 and they represent 39% of the overall SGA IP 2014 cost.
- The delivery of benefits is accounted as having started as from 2014 summing up to 2.5 Bn€ over the period.
- A positive net benefit, on a yearly basis, is envisaged to be achieved starting from 2017.

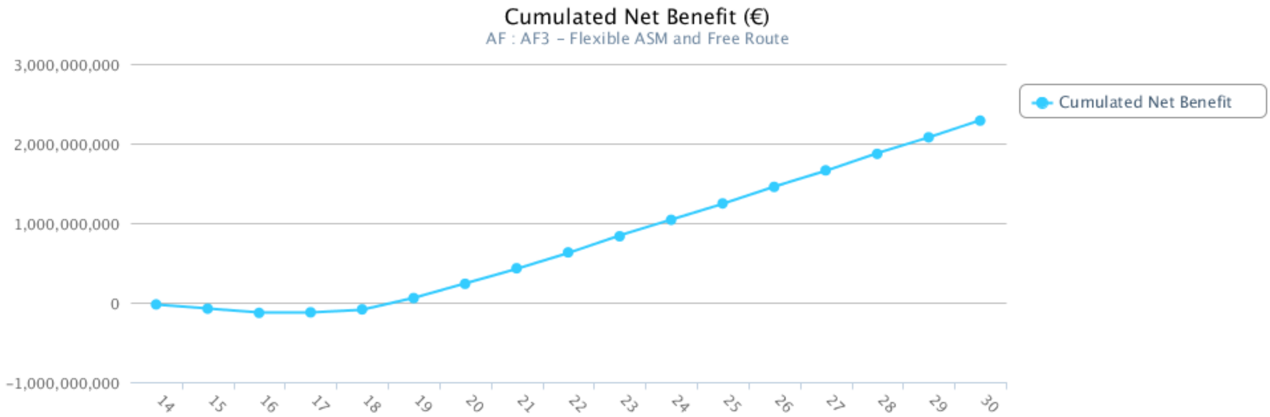


Fig. 40 – Cumulated Net Benefit in the 2014-2030 timeframe (€) – AF3

As shown by the chart, the cumulated net benefit is expected to turn positive in 2018 with a 56 mln€ value.

At project level, 80% of expected benefits discounted over 10 years are supported by 3 threads of projects. Those 3 threads represent 75.5% of total investment. In these 3 threads, one is the NM DCT FRA support project that will only deliver actually all its benefits if all related AF3 projects are implemented. One thread is accommodated to include two projects.

4. PERFORMANCE VIEW

4.4.1.5. CBA Results – AF4

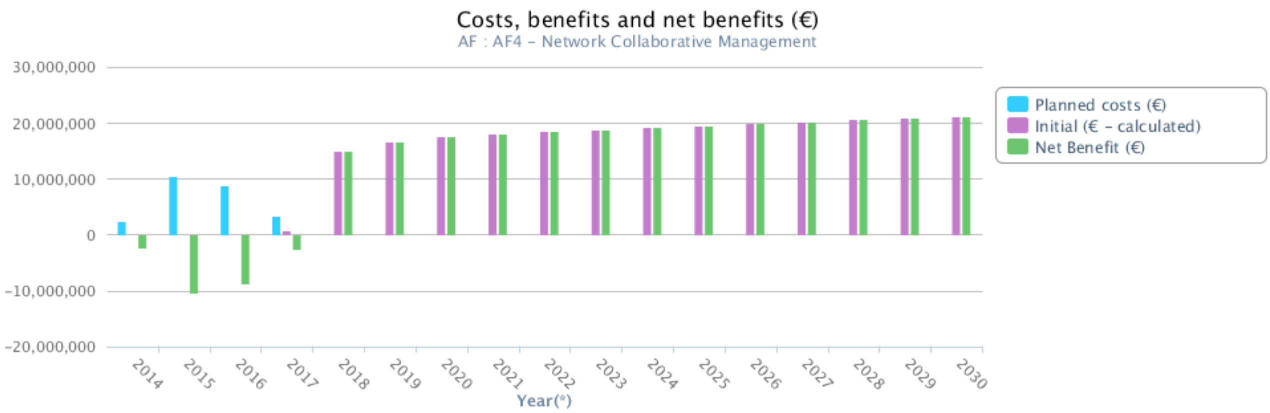


Fig. 41 –Evolution of costs, benefits and net benefits (2014-2030) – AF4

As shown by the chart:

- Investments for AF4 are undertaken from 2014 to 2017 and they represent 4% of the overall SGA IP 2014 cost.
- The delivery of benefits is expected to start from 2017 summing up to 247 mln€ over the period.
- A positive net benefit, on a yearly basis, is envisaged to be achieved starting from 2018.

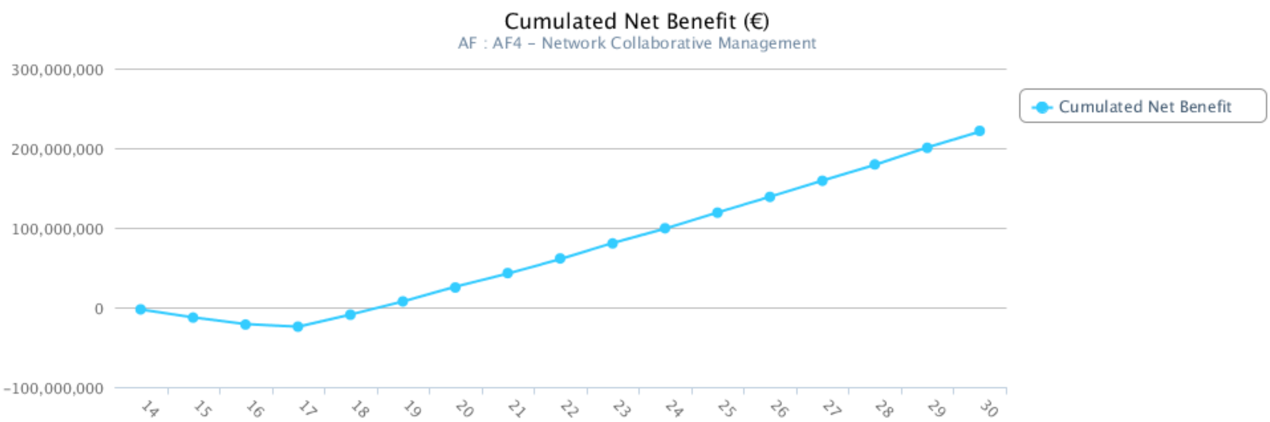


Fig. 42 – Cumulated Net Benefit in the 2014-2030 timeframe (€) – AF4

As shown by the chart, the cumulated net benefit is expected to turn positive in 2019 with 7.5 mln€ value.

Out of 5 threads, 3 are projects with benefits and two of them represent 83% of the total expected benefits. These 2 threads represent 67% of the total costs of the AF4.

4.4.1.6. CBA Results – AF5

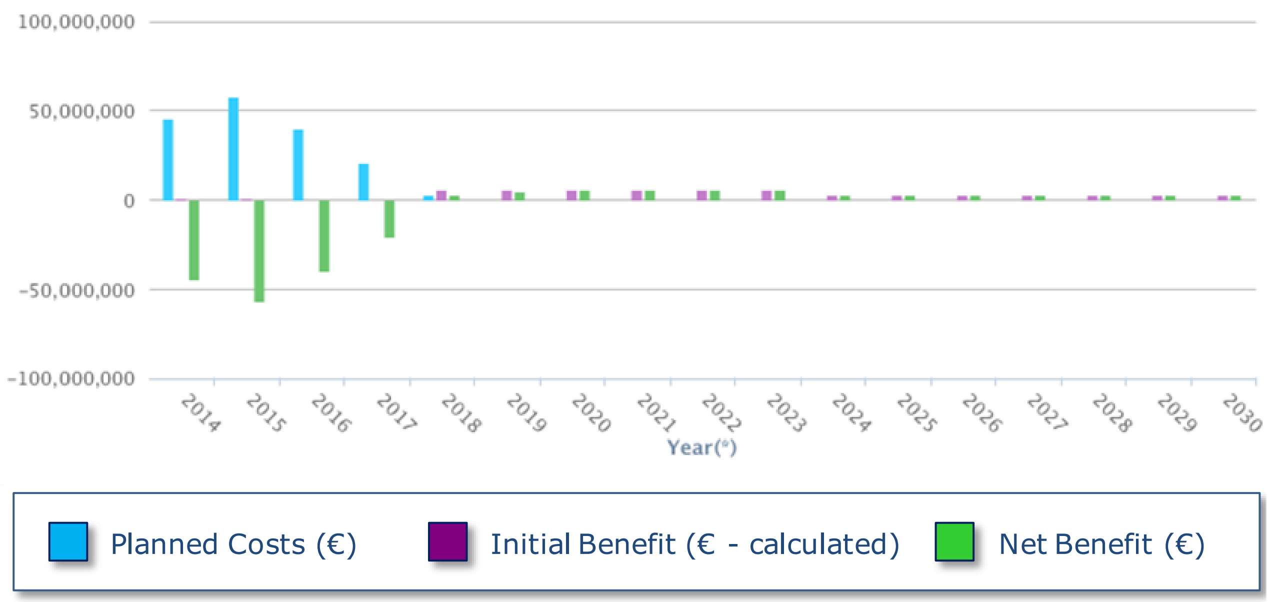


Fig. 43 –Evolution of costs, benefits and net benefits (2014-2030) – AF5

As shown by the chart:

- Investments for AF5 are undertaken from 2014 to 2018 and they represent 27% of the overall cost.
- The delivery of benefits is expected to start from 2018 summing up 53.5 mln€ over the period.
- A positive net benefit, on a yearly basis, is envisaged to be achieved starting from 2018.

Most AF5 projects are expected to generate only costs, as SWIM is an enabler for the other ATM functionalities and future Common Projects. However, out of the 16 projects, few projects are expecting to generate some savings in running costs.

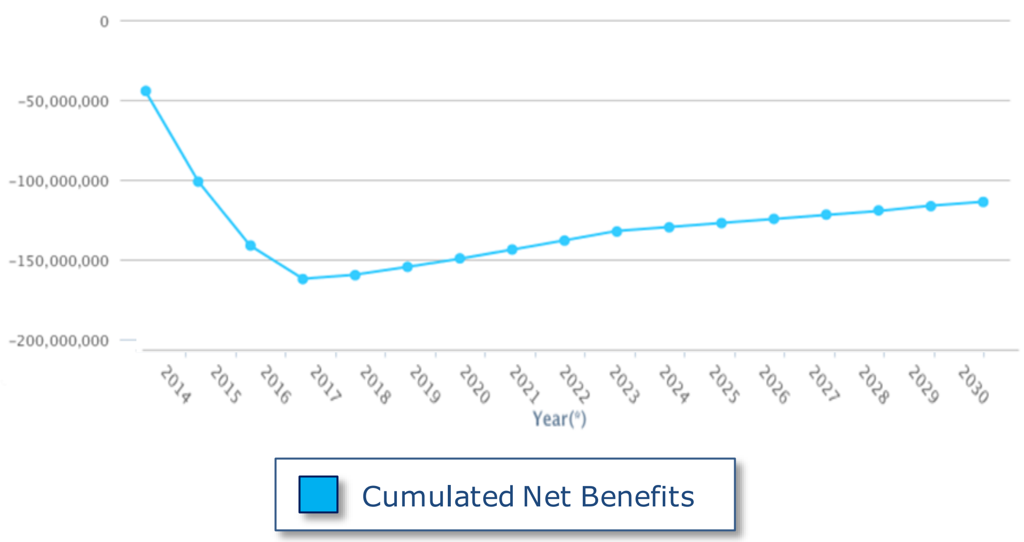


Fig. 44 – Cumulated Net Benefit in the 2014-2030 timeframe (€) – AF5

As shown by the chart, the cumulated net benefit is not expected to turn positive during the reference period. This is in line with PCP CBA's results on AF5.

At project level, 90% of expected benefits discounted over 10 years are supported by 2 threads of projects. Those 2 threads represent 36% of total investment of AF5.

4.4.1.7. CBA Results – AF6

No project in the SGA IP 2014

4.4.2 Cost efficiency of the DP2015 gaps

This section gives an overview of the cost efficiency analysis of the gaps remaining besides the SGA IP projects, which were defined in the DP 2015. The projects that are under the selection process of the CEF Call 2015 are not considered here after. Their CBA will only be assessed after selection, therefore available for DP 2017 initial draft.

To address the DP2015 gaps, we start from a first global assessment of the PCP implementation according to the Deployment Program. Then we will deduct from the global assessment the part representing the SGA IP 2014.

On the cost side, we take into account the PCP CBA reference as explained in the chapter on cost effectiveness analysis of the Annex D (Performance assessment and CBA methodology).

The discounted values for the PCP implementation on the 2014-2030 period are the following:

PCP CBA Cost references	
AF	Cost references - discounted
AF 1	€ 162.0 mln
AF 2	€ 680.9 mln
AF 3	€ 468.7 mln
AF 4	€ 309.7 mln
AF 5	€ 453.8 mln
AF 6	€ 420.4 mln
Totals	€ 2.495.5 mln

For AF2, the Safety Net families (2.5.1 and 2.5.2) have been identified separately with an expected discounted cost of 56.99 m€.

Now, summing up the cost references for the SGA IP 2014 projects, let's present the relative "consumption" of the cost references by the SGA IP 2014 by deducting the SGA IP 2014 from the expected cost of PCP deployment as assessed within the PCP CBA:

SGA IP 2014 and the PCP CBA		
AF	**SGA IP 2014 Costs (discounted)**	**% of PCP CBA Cost references**
AF 1	€ 51.1 mln	31.6 %
AF 2 not 2.5	€ 94.7 mln	15.2 %
AF2 (2.5)	€ 24.5 mln	43.0 %
AF 3	€ 213.8 mln	45.6 %
AF 4	€ 22.2 mln	7.2%
AF 5	€ 152.2 mln	33.5%
AF 6	€ 0 mln	0.0%
Totals	**€ 558.5 mln**	**22.4%**

In this respect, SGA IP 2014 has consumed globally 22.4% of the overall estimated cost of the PCP. It has consumed above 45% of its costs for AF3, and above 30% of its reference costs for AF1, AF5 and the Safety net part of AF2. Otherwise, it has consumed around 15% of its reference costs for AF2 and only 7% for AF4. Those numbers shall be taken into account for the sake of respect of the PCP CBA boundaries.

Deducting SGA IP 2014 costs, the remaining expected costs for the DP 2015 gaps that would respect the PCP CBA boundaries are:

DP 2015 Gaps Expected costs	
AF	**Cost references (discounted)**
AF 1	€ 110.9 mln
AF 2 (not 2.5)	€ 529.2 mln
2.5 Safety Nets	€ 32.5 mln
AF 3 and 4	€ 542.3 mln
AF 5	€ 301.6 mln
AF 6	€ 420.4 mln
Total	**€ 1.936.9 mln**

Considering that both the DP as well as the awarded projects include the cost for the implementation of some prerequisites and enablers critical to PCP deployment, SDM will undertake an assessment of the impact of these additional costs compared to the baseline PCP CBA in the framework of DP2017.

On the benefit side, as explained in chapter 4.3.2, because of the limited number of projects in SGA IP 2014 and the necessary checks that should be made to ensure consistency in the SES framework (the national performance plans for instance), the benefits will not be further discussed. At this stage, let's assume that they are in line with the PCP CBA.

4.5 Next Steps

4.5.1 Awarded Implementation Projects: monitoring the performance expectations

Once Implementation Projects are awarded by INEA and kicked-off under SDM's coordination as a result of a CEF call, SDM shall monitor that projects are being executed in such a way that agreed performance expectations for those projects or threads of projects remain within reach: costs are contained within initial envelop and expected contributions to performance are expected at the same level over time.

In the case where monitoring would reveal that a project or a threads of projects drifts from its initially agreed performance expectations to the extent that it becomes useless or even detrimental to PCP's overall CBA, SDM would issue recommendations to EC and INEA to recover the situation after due consultation with the relevant implementing partners. As a last resort, CEF rules would apply.

The monitoring of the performance expectations will materialize through the Performance and CBA monitoring annex of the Execution Progress Report of the DP published in May 2016. This report will give a detailed analysis per thread of projects, for the implementation projects awarded as a result of the CEF Transport General Call 2014 and which are now in the execution phase.

4.5.2 Completed Implementation Projects: the final check

During projects or threads of projects execution, SDM can monitor that everything is on track so that initially agreed performance expectations remain reachable by projects' or threads' completion. This is what is called the monitoring of the performance.

After projects or threads of projects completion, SDM intends to perform a final check to "close the loop" both in terms of contribution to performance and CBA. Different means are identified, including real life cross-checks with measurement tools by Airspace Users, NM, ANSPs or airports, and, of course follow-up of actual SES performance publication.

Close cooperation with PRB will be essential in performing this final check and drawing relevant conclusions. Although clearly foreseen as an important step to secure the visibility on the performance contribution of SESAR, this part of the methodology is not yet defined.

To date, nine implementation projects[40] have been reported as completed under SGA IP 2014. The final check analysis done at this stage is as follows:

1. #120AF1: London Airspace Management Programme (LAMP) leaded by NATS. Project completed by December 2015. No benefit expected at this stage until a second phase is launched. Although expected for 2021, they are some doubts about its completion.
2. #115AF2: A-SMGCS Renewal of the Surface Movement Radar (BORA) by Munich Airport. The project was completed in December 2015. The expected Taxi Out Additional Time reduction is of 2%. First measurable improvements are expected from 2017 onwards. Other benefits are expected but not quantified. It is anticipated that the Performance Review Report in May 2017 would bring some elements of confirmation. In the meanwhile, the SDM, involving also the project manager, will try to get actual data to check the assumption.
3. #024AF2: SAIGA by AdP. The project was completed in December 2015. The expected Taxi In Additional Time reduction of 4% in Orly and CDG will improve the situation during adverse weather conditions, which has been evaluated to 25 days and 63 days per year, respectively in CDG and Orly. The SDM would check those expectations after one year of operations. . It is anticipated that the Performance Review Report in May 2017 would bring also some elements of confirmation.
4. #008AF2:External Gateway System (EGS) by Austrocontrol. Project completed in December 2015. No benefit expected.
5. #006AF5: ATM Data Quality (ADQ) by Austrocontrol. Completed Nov 2015. No benefit expected.
6. #127AF5: National WAN Infrastructure - CANDI-IP preparation project by NAVIAIR. Completed April 2015. No benefit expected.
7. #097AF2: LHR TBS (Time based separation). The project is finalized and first observations by British Airways and NATS are delivering enthusiastic improvements, which are much higher than initially expected (+100% or €50M cumulated benefits by 2030). This positive development is reasoned by the increasing number of days with strong wind conditions in the London area. Currently some airspace users in coordination with the airport, have planned to check the improvements by comparison with actual traffic data when the weather conditions would allow it.
8. #100AF2: LHR Safety Net related to A-SMGCS will be an enabler for upcoming projects, but no quantified benefit was assessed at this stage.
9. #030AF2: Equipment of Ground Vehicles related to A-SMGCS in NCE is a safety related project and no quantified benefit was assessed.

[40] Project 120AF1a and 120AF1b have been analyzed together, as they represent a split of a single implementation initiative, thus are presented as only one implementation initiative (120AF1). In such view, the results from project 135AF2a and 051AF1b are not displayed yet, as the respective complementing implementing project (135AF2b and 051AFa) have not completed yet.
Furthermore, Implementation Project 086AF2 has been completed in September.

5. MONITORING VIEW

5. Monitoring view

The Deployment Programme represents a two-fold support at disposal of the whole European ATM Community; it is not only a planning tool, providing a common working reference for PCP implementation for all operational stakeholders, but also a reporting instrument where the current status of deployment of the PCP, based on an effective and wide-ranging monitoring exercise, is presented.

An effective monitoring of the current status of Implementation of the Programme throughout Europe is pivotal for the identification of those implementation initiatives that still need to be performed and for the definition and setup of the next steps towards the full PCP deployment. A preliminary outlook of the implementation status is ensured by SDM through *ad-hoc* monitoring exercises, whose main outcomes are respectively illustrated and presented in section 5.1 and 5.2.

The first one, carried out in strict cooperation with operational Stakeholders, is performed once per year by SDM and aims at ascertaining the overall Status of the PCP implementation across Europe, also identifying those implementation initiatives still needed to target the full Pilot Common Project deployment.

The second one, performed three times per year, aims at highlighting the progress achieved by PCP-related projects awarded in the CEF framework and is fed by the collection of up-to-date implementation data provided by the Implementing Partners and duly verified by the SDM. Specifically, the methodology underpinning these activities is described within section 5.3, in order to address and illustrate the main features of the SDM synchronization and monitoring approach.

5.1 PCP Current Status of Implementation

Considering the SESAR Deployment Manager obligation to "*implement the Commission's Decisions and monitor their implementation by the implementation level*", DP 2016 aims at identifying **all implementation activities that still need to be undertaken** in order to achieve the full PCP implementation across Europe, ensuring the adequate level of involvement of the requested stakeholders' categories.

Such identification, achieved through a dedicated monitoring exercise of the current status of implementation of the Deployment Programme and consequently of the PCP, has been performed with the two-fold objective to **support ATM stakeholders in the identification of implementation areas to be tackled** by their investments and to **avoid significant gaps in the Programme's implementation**, thus supporting performances' expectations.

It is worth noting that the results of the **gap identification** represent a **living picture** of the current status of **SESAR implementation** and, as such, are to be constantly kept updated through SDM synchronization and monitoring of the Programme. It is also worth underlying that the mentioned gap identification embodies a **coherent continuation of the Interim Deployment Programme (IDP) monitoring activities**, considering the full alignment between specific Families included in the DP 2016 and the IDP Activity Areas and/or Work Packages addressing PCP prerequisites and facilitators.

The elaboration of such a comprehensive picture of the overall current PCP implementation status relies on the **strict cooperation amongst the SESAR Deployment Manager and the operational stakeholders**, as well as on the **support of the Network Manager** and of the **European Defence Agency**. Such cooperation has resulted in a **wide-ranging monitoring exercise**, aiming at providing an up-to-date picture of the implementation of the Programme. The monitoring exercise has been carried out building on inputs provided by the relevant operational stakeholders per Family, through ***ad-hoc* templates and surveys developed by SDM aiming at detailing the status of deployment by May 2016**.

The current monitoring snapshot is therefore the result of the integration of feedback received by all stakeholder categories involved in the deployment of each Family, and clearly identifies what has still to be implemented, where and by whom. To this end, the monitoring exercise has been organized in order to involve:

- The ***ground stakeholders***, organized and clustered on a **geographical scope-basis**;
- The ***Airspace Users***, for those Families in whose deployment they are directly involved, with specific reference to the **PCP-related flight planning capabilities**, as well as the **aircraft capabilities**. The analysis has been conducted building on a **fleet-centric approach.**

In order to summarize all required information, **dedicated charts and tables have been developed per each Family**, providing a "common" overview of what has already been done until now and which implementation activities are still to be performed to achieve PCP implementation. Specifically, **for the ground stakeholders** a dedicated chart has been developed per each Family and will be featured in section 5.1.1, whilst an overall recap of the **current status of deployment of PCP with regard to the Airspace Users** will be featured in section 5.1.2.

Ground Stakeholders - Monitoring Overview

A generic overview of the chart used to outline the results of the monitoring exercise among Ground Stakeholders is proposed hereafter for illustrative purposes. Dedicated charts per each Family will be featured in section 5.1.1.

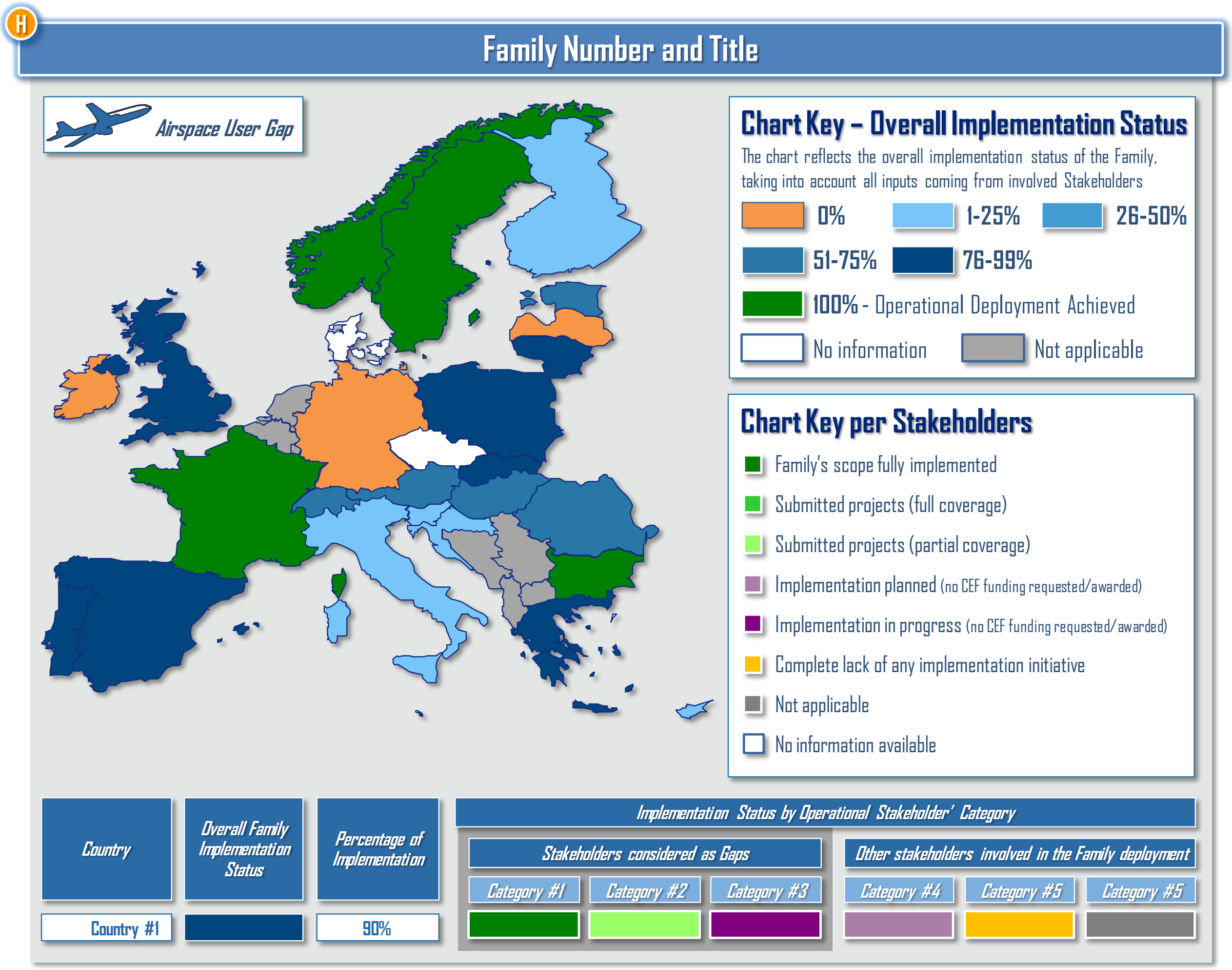
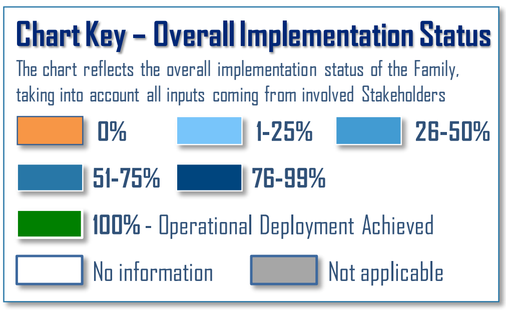


Fig. 45 – Ground Stakeholders – Overview of the results

The **structure of the chart has been developed in order to provide the reader with a wide set of information**, which are reported hereafter. The chart will clearly identify the Family number, title and its level of **readiness for implementation** (High/Medium/Low), as outlined in section 2.3 and explained in Chapter 3;



The Europe chart shows **different colours for each State within the PCP geographical scope** (plus, where applicable, MUAC and the Network Manager), aiming at providing a quick and effective indication of the overall implementation status of the Family (for AF1 and AF2, only the 25 PCP airports and – if applicable – the Network Manager will be indicated). Different colours represent

different percentage of completion of the Family and correspond to the current percentage of deployment (i.e. which part of the gap has been already covered by May 2016). It is worth noting that – considering that the goal of the monitoring exercise is to ascertain the current PCP implementation status – this percentage does not include those activities which are already planned within CEF-awarded IPs, but have not been executed yet. Such activities – and the associated percentage of expected coverage of the gap – are reported in the Project View of the Programme, within each of the Family WBSs.

This table **recaps the overall Family implementation status per each country** within the PCP geographical scope, both through the **indication of the specific percentage** and through the **colour coding already used in the Europe chart**. It is worth mentioning that this percentage represents the integration of inputs coming from all involved stakeholders responding to the dedicated *surveys* and templates distributed by SDM.

Country	*Overall Family Implementation Status*	*Percentage of Implementation*
Country #1		90%
Country #2		60%
Country ...		30%

Implementation Status by Operational Stakeholder' Category	
Stakeholders considered as Gaps	*Other stakeholders involved in the Family deployment*

For each country, the **right section of the table** allows readers to check the status of implementation for each category of stakeholders which is involved in the Family Implementation. Specifically, two kind of involvement by stakeholders' category is envisaged:

- ***Stakeholders considered as gaps**,* including those stakeholder categories that are requested by the Pilot Common Project regulatory framework to invest in order to fill in the gaps and are therefore potentially eligible for co-funding under upcoming CEF Transport Calls;
- ***Other stakeholders involved in the Family deployment***, including stakeholder categories which have to be considered as contributors for the full operational deployment of the Family itself, without being necessarily requested by the PCP framework to invest.

Building on the clustering used in DP 2015, **seven categories of implementation status** have been **identified for each involved stakeholder**, plus an eighth one in case of missing information. Such information will be featured in the right section of the table and will be **populated on the basis of the input provided by operational stakeholders** through the monitoring exercise, in accordance to the following chart key/ categories:

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

1. **Family's scope fully implemented** (*no additional activities to fully deploy the Family is expected by the operational stakeholder category*);
2. **Awarded project(s) into 2014 CEF Call and / or into 2015 CEF Call**; its/their realization will ensure the **full Family**

implementation from the operational stakeholder' perspective;

3. **Awarded project(s) into 2014 CEF Call and / or into 2015 CEF Call**; its/their realization **will not ensure the full Family implementation**;
4. **Implementation initiative planned** but for which **co-financing through CEF Transport Calls has not been requested** and/or not awarded;
5. **Implementation initiative in progress** but for which **co-financing through CEF Transport Calls has not been requested** and/or not awarded;
6. **Complete lack of any implementation initiative** aimed at contributing to the Family deployment;
7. **Family not applicable to the identified stakeholder category**, considering the specific features of the geographical scope of the implementation;
8. **No information available**.

Whenever the specific features of a Family require for an **active involvement of the Airspace Users** in order to achieve the full deployment and the realization of the related performance benefits, a **dedicated label** has been added. Due to the nature of the AU stakeholders, which are not strictly connected to an EU State but rather are operating across the whole PCP geographical scope, such label highlights the **identification of a dedicated Airspace Users gap for the Family**, which will be further detailed in section 5.1.2.

<u>**Airspace Users - Monitoring Overview**</u>

A generic overview of the chart used for outlining the Airspace User gaps is proposed hereafter for illustrative purposes. **Dedicated charts**, highlighting the current status of implementation amongst Airspace Users **per relevant ATM functionalities**, is featured in section 5.1.2.

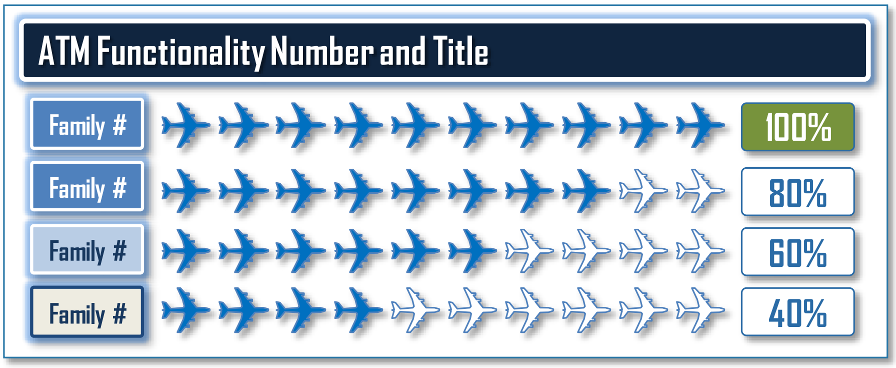


Fig. 46 – Airspace Users – Overview of the results of the Exercise

For each relevant ATM Functionality, **only Families for which Airspace Users have been identified as directly involved in the Family implementation** are listed. The gap coverage of the identified Families is defined on the basis of the dedicated survey distributed among Airlines in cooperation with the Airspace Users association on March 4th, 2016. It is worth mentioning that the charts take into account all **inputs gathered from Airspace Users headquartered in EU which replied to the SDM surveys**; such inputs are considered as resulting into a representative snap-shot of the current state-of-play on airspace user side of the PCP implementation.

Specifically, the **coverage percentage** of the Airspace Users gaps included in the charts indicates the **percentage of fleet** operated by the survey respondents **already compliant with the PCP Regulation framework**, both in terms of aircraft and flight planning capabilities.

5.1.1 Ground Gaps – View per Family

At ground level, a wide number of Operational Stakeholders have provided their **feedback on the current PCP implementation status** through the Monitoring Exercise, launched by the SESAR Deployment Manager on March 4th.

As a result, the **charts and tables** included in the following pages represent, on a Family basis, **a "common" overview of the activities that have already been performed** and **what still needs to be implemented** in order to achieve the full PCP implementation throughout Europe.

AF 1 – Extended Arrival Management and Performance Based Navigation in the High Density TMAs

1.1.1 Basic AMAN

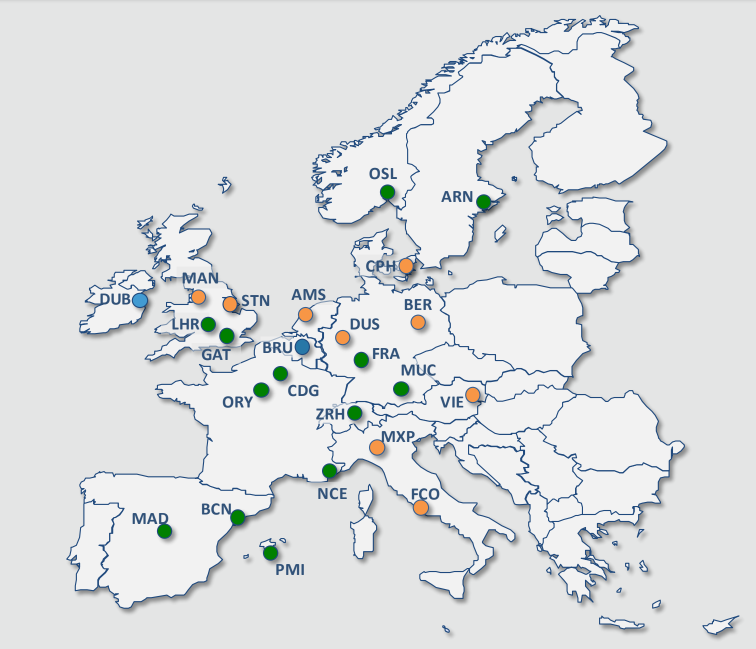


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Airport	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category: Stakeholders considered as Gaps – ANSPs	Other stakeholders involved in the Family deployment – Airport Operators
Amsterdam Schiphol		0%		
Barcelona El Prat		100%		
Berlin Brandenburg Airport		0%		
Brussels National		55%		
Copenhagen Kastrup		0%		
Dublin Airport		40%		
Dusseldorf International		0%		
Frankfurt International		100%		
Istanbul Ataturk Airport		-		
London Gatwick		100%		
London Heathrow		100%		
London Stansted		0%		
Madrid Barajas		100%		
Manchester Ringway		0%		
Milan Malpensa		0%		
Munich Franz Josef Strauss		100%		
Nice Cote D'Azur		100%		
Oslo Gardermoen		100%		
Palma de Mallorca Son San Juan		100%		
Paris Charles De Gaulle		100%		
Paris Orly		100%		
Rome Fiumicino		0%		
Stockholm Arlanda		100%		
Vienna Schwechat		0%		
Zurich Kloten		100%		

1.1.2 AMAN Upgrade to include Extended Horizon function

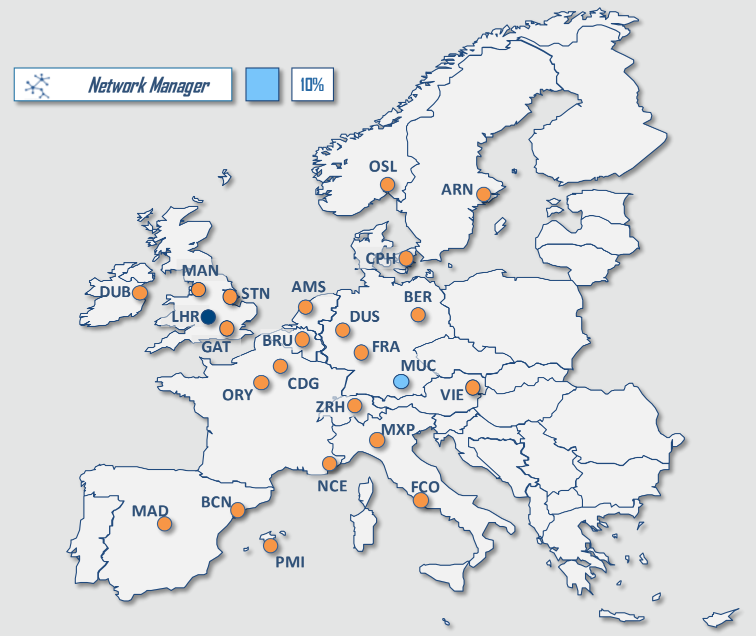


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Airport	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category: Stakeholders considered as Gaps – ANSPs	Network Manager	Other stakeholders involved – Military Authorities	Airport Operators
Amsterdam Schiphol		0%				
Barcelona El Prat		0%				
Berlin Brandenburg Airport		0%				
Brussels National		0%				
Copenhagen Kastrup		0%				
Dublin Airport		0%				
Dusseldorf International		0%				
Frankfurt International		0%				
Istanbul Ataturk Airport		-				
London Gatwick		0%				
London Heathrow		95%				
London Stansted		0%				
Madrid Barajas		0%				
Manchester Ringway		0%				
Milan Malpensa		0%				
Munich Franz Josef Strauss		10%				
Nice Cote D'Azur		0%				
Oslo Gardermoen		0%				
Palma de Mallorca Son San Juan		0%				
Paris Charles De Gaulle		0%				
Paris Orly		0%				
Rome Fumicino		0%				
Stockholm Arlanda		0%				
Vienna Schwechat		0%				
Zurich Kloten		0%				

H

1.2.1 RNP APCH with vertical guidance

Airspace User Gap

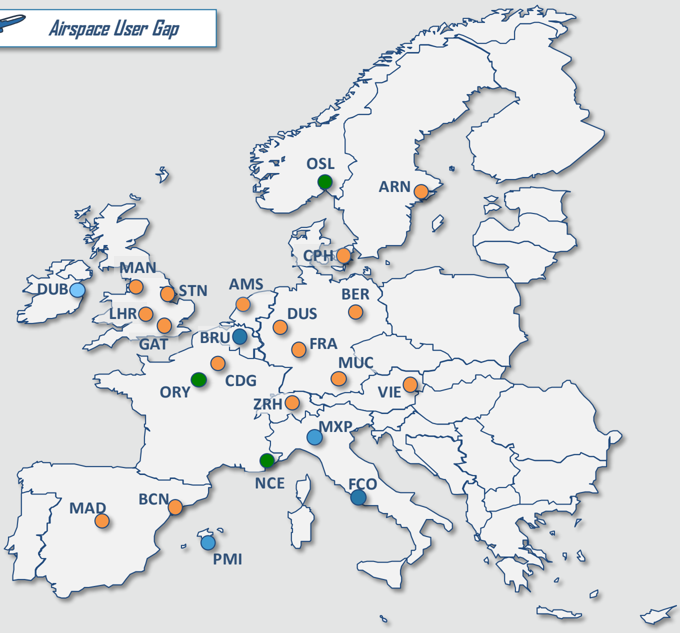


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Airport	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps: ANSPs	Airport Operators	Military Authorities
Amsterdam Schiphol		0%			
Barcelona El Prat		0%			
Berlin Brandenburg Airport		0%			
Brussels National		70%			
Copenhagen Kastrup		0%			
Dublin Airport		10%			
Dusseldorf International		0%			
Frankfurt International		0%			
Istanbul Ataturk Airport		-			
London Gatwick		0%			
London Heathrow		0%			
London Stansted		0%			
Madrid Barajas		0%			
Manchester Ringway		0%			
Milan Malpensa		40%			
Munich Franz Josef Strauss		0%			
Nice Cote D'Azur		100%			
Oslo Gardermoen		100%			
Palma de Mallorca Son San Juan		40%			
Paris Charles De Gaulle		0%			
Paris Orly		100%			
Rome Fiumicino		65%			
Stockholm Arlanda		0%			
Vienna Schwechat		0%			
Zurich Kloten		0%			

SESAR DEPLOYMENT MANAGER

5. MONITORING VIEW

H

1.2.2 Geographic Database for Procedure design

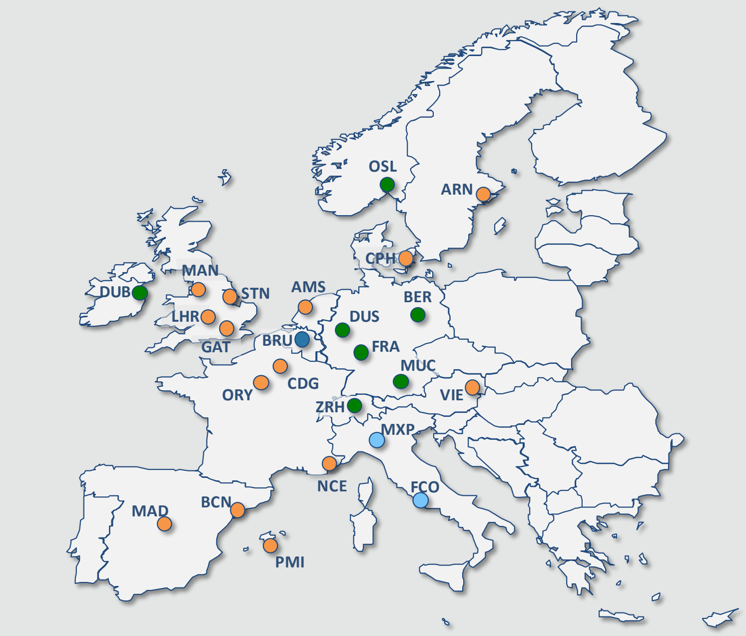


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Airport	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category		
			Stakeholders considered as Gaps		Other stakeholders involved
			ANSPs	Airport Operators	Military Authorities
Amsterdam Schiphol		0%			
Barcelona El Prat		0%			
Berlin Brandenburg Airport		100%			
Brussels National		70%			
Copenhagen Kastrup		0%			
Dublin Airport		100%			
Dusseldorf International		100%			
Frankfurt International		100%			
Istanbul Ataturk Airport		-			
London Gatwick		0%			
London Heathrow		0%			
London Stansted		0%			
Madrid Barajas		0%			
Manchester Ringway		0%			
Milan Malpensa		10%			
Munich Franz Josef Strauss		100%			
Nice Cote D'Azur		0%			
Oslo Gardermoen		100%			
Palma de Mallorca Son San Juan		0%			
Paris Charles De Gaulle		0%			
Paris Orly		0%			
Rome Fiumicino		10%			
Stockholm Arlanda		0%			
Vienna Schwechat		0%			
Zurich Kloten		100%			

SESAR DEPLOYMENT MANAGER

1.2.3 RNP 1 Operations in high density TMAs (ground capabilities)

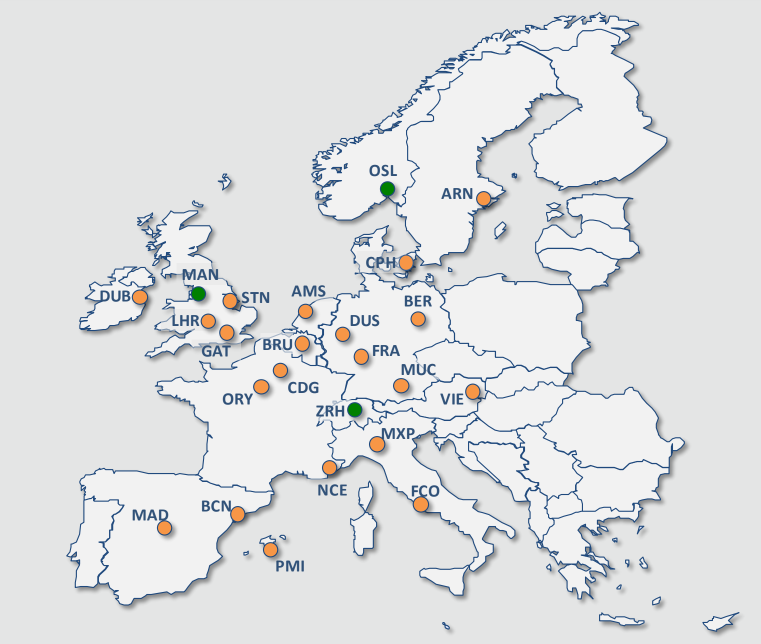


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Airport	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category: Stakeholders considered as Gaps – ANSPs	Stakeholders considered as Gaps – Airport Operators	Other stakeholders involved – Military Authorities
Amsterdam Schiphol	0%	0%	Submitted projects (partial coverage)	Submitted projects (partial coverage)	No information available
Barcelona El Prat	0%	0%	Implementation planned	Not applicable	No information available
Berlin Brandenburg Airport	0%	0%	Submitted projects (partial coverage)	Not applicable	No information available
Brussels National	0%	0%	Implementation planned	Not applicable	No information available
Copenhagen Kastrup	0%	0%	Implementation planned	Not applicable	No information available
Dublin Airport	0%	0%	Implementation in progress	Family's scope fully implemented	No information available
Dusseldorf International	0%	0%	Submitted projects (partial coverage)	Not applicable	No information available
Frankfurt International	0%	0%	Submitted projects (partial coverage)	Not applicable	No information available
Istanbul Ataturk Airport	No information	-	No information available	No information available	No information available
London Gatwick	0%	0%	Not applicable	Submitted projects (partial coverage)	No information available
London Heathrow	0%	0%	Submitted projects (partial coverage)	Submitted projects (partial coverage)	No information available
London Stansted	0%	0%	Not applicable	Implementation planned	No information available
Madrid Barajas	0%	0%	Implementation planned	Not applicable	No information available
Manchester Ringway	100%	100%	Family's scope fully implemented	Family's scope fully implemented	No information available
Milan Malpensa	0%	0%	Implementation planned	Not applicable	No information available
Munich Franz Josef Strauss	0%	0%	Submitted projects (partial coverage)	Not applicable	No information available
Nice Cote D'Azur	0%	0%	Complete lack of any implementation initiative	Complete lack of any implementation initiative	No information available
Oslo Gardermoen	100%	100%	Family's scope fully implemented	Family's scope fully implemented	No information available
Palma de Mallorca Son San Juan	0%	0%	Implementation planned	Not applicable	No information available
Paris Charles De Gaulle	0%	0%	Complete lack of any implementation initiative	Not applicable	No information available
Paris Orly	0%	0%	Complete lack of any implementation initiative	Not applicable	No information available
Rome Fiumicino	0%	0%	Implementation planned	Not applicable	No information available
Stockholm Arlanda	0%	0%	Submitted projects (partial coverage)	Not applicable	No information available
Vienna Schwechat	0%	0%	Submitted projects (partial coverage)	Not applicable	No information available
Zurich Kloten	100%	100%	Not applicable	Family's scope fully implemented	No information available

1.2.5 Implement Advanced RNP routes below Flight Level 310

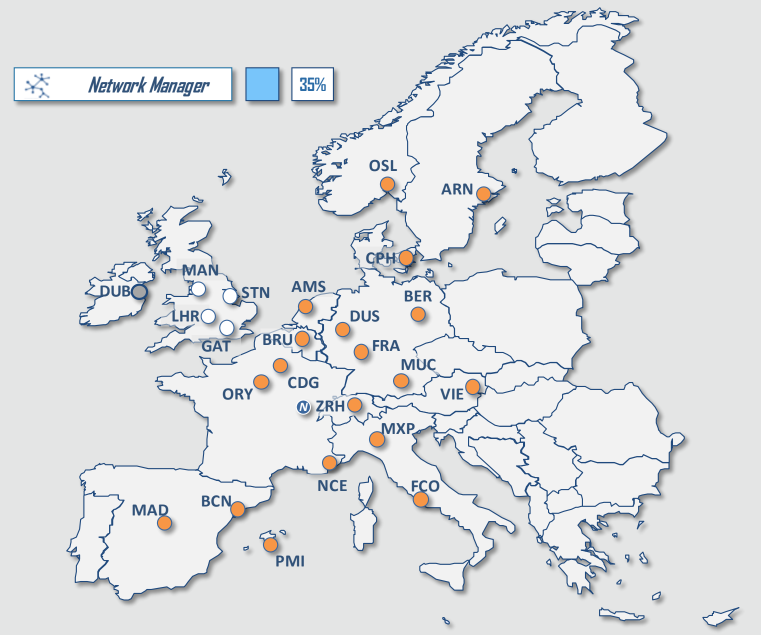


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/ awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Airport	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category		
			Stakeholders considered as Gaps		
			ANSPs	Network Manager	Military Authorities
Amsterdam Schiphol		0%			
Barcelona El Prat		0%			
Berlin Brandenburg Airport		0%			
Brussels National		0%			
Copenhagen Kastrup		0%			
Dublin Airport		-			
Dusseldorf International		0%			
Frankfurt International		0%			
Istanbul Ataturk Airport		-			
London Gatwick		-			
London Heathrow		-			
London Stansted		-			
Madrid Barajas		0%			
Manchester Ringway		-			
Milan Malpensa		0%			
Munich Franz Josef Strauss		0%			
Nice Cote D'Azur		0%			
Oslo Gardermoen		0%			
Palma de Mallorca Son San Juan		0%			
Paris Charles De Gaulle		0%			
Paris Orly		0%			
Rome Fiumicino		0%			
Stockholm Arlanda		0%			
Vienna Schwechat		0%			
Zurich Kloten		0%			

AF 2 – Airport Integration and Throughput

2.1.1 Initial DMAN

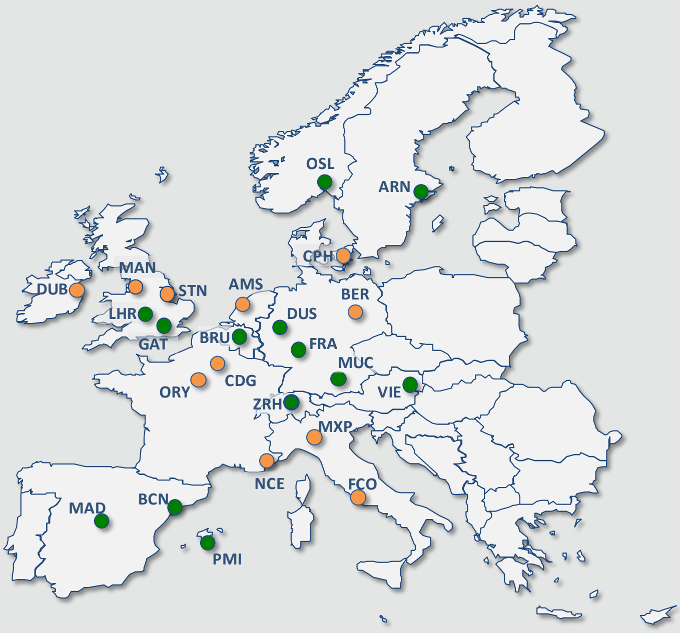


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Airport	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category: Stakeholders considered as Gaps – ANSPs	Airport Operators	Other stakeholders involved – Military Authorities
Amsterdam Schiphol		0%			
Barcelona El Prat		100%			
Berlin Brandenburg Airport		0%			
Brussels National		100%			
Copenhagen Kastrup		0%			
Dublin Airport		0%			
Dusseldorf International		100%			
Frankfurt International		100%			
Istanbul Ataturk Airport		-			
London Gatwick		100%			
London Heathrow		100%			
London Stansted		0%			
Madrid Barajas		100%			
Manchester Ringway		0%			
Milan Malpensa		0%			
Munich Franz Josef Strauss		100%			
Nice Cote D'Azur		0%			
Oslo Gardermoen		100%			
Palma de Mallorca Son San Juan		100%			
Paris Charles De Gaulle		0%			
Paris Orly		0%			
Rome Fiumicino		0%			
Stockholm Arlanda		100%			
Vienna Schwechat		100%			
Zurich Kloten		100%			

2.1.2 Electronic Flight Strips (EFS)

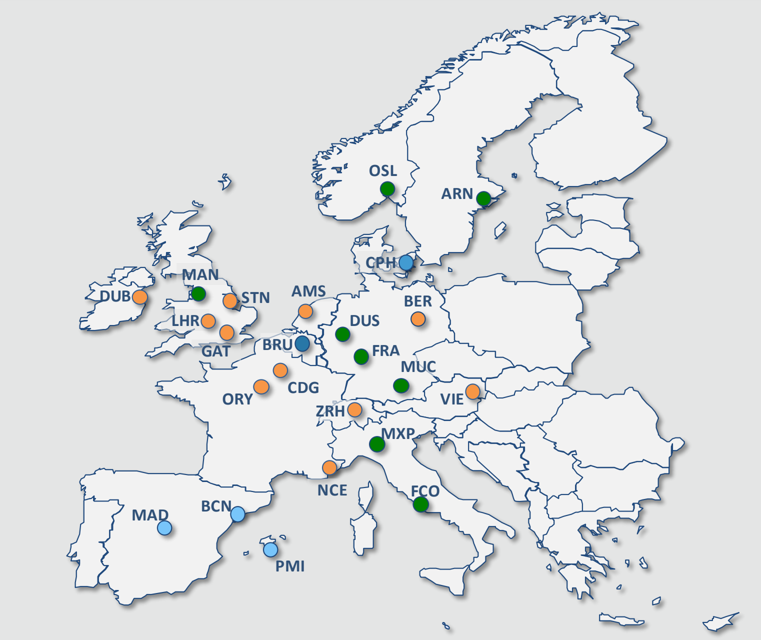


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Airport	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category: Stakeholders considered as Gaps: ANSPs	Stakeholders considered as Gaps: Airport Operators	Other stakeholders involved: Military Authorities
Amsterdam Schiphol		0%			
Barcelona El Prat		20%			
Berlin Brandenburg Airport		0%			
Brussels National		75%			
Copenhagen Kastrup		45%			
Dublin Airport		0%			
Dusseldorf International		100%			
Frankfurt International		100%			
Istanbul Ataturk Airport		-			
London Gatwick		0%			
London Heathrow		0%			
London Stansted		0%			
Madrid Barajas		20%			
Manchester Ringway		100%			
Milan Malpensa		100%			
Munich Franz Josef Strauss		100%			
Nice Cote D'Azur		0%			
Oslo Gardermoen		100%			
Palma de Mallorca Son San Juan		20%			
Paris Charles De Gaulle		0%			
Paris Orly		0%			
Rome Fiumicino		100%			
Stockholm Arlanda		100%			
Vienna Schwechat		0%			
Zurich Kloten		0%			

SESAR DEPLOYMENT MANAGER

2.1.3 Basic A-CDM

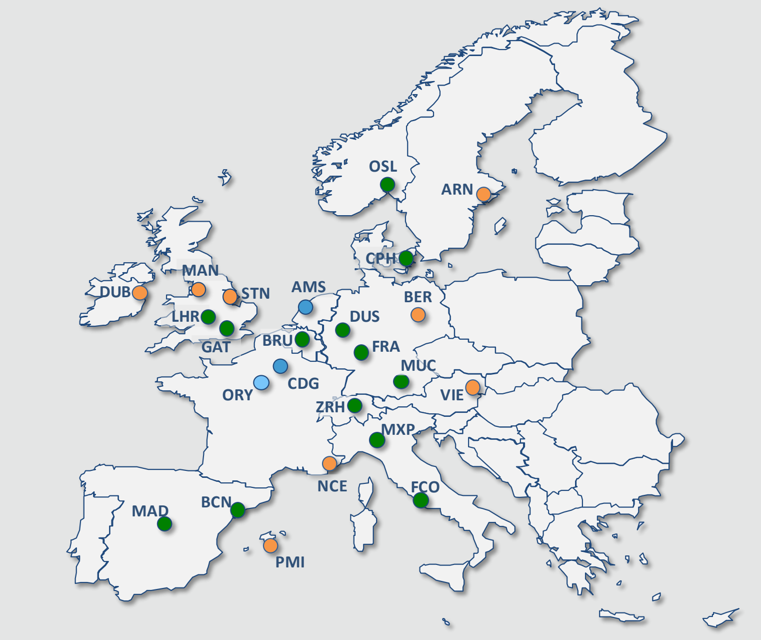


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Airport	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category			
			Stakeholders considered as Gaps		Other stakeholders involved in the Family deployment	
			ANSPs	Airport Operators	Network Manager	Military Authorities
Amsterdam Schiphol		35%				
Barcelona El Prat		100%				
Berlin Brandenburg Airport		0%				
Brussels National		100%				
Copenhagen Kastrup		100%				
Dublin Airport		0%				
Dusseldorf International		100%				
Frankfurt International		100%				
Istanbul Ataturk Airport		-				
London Gatwick		100%				
London Heathrow		100%				
London Stansted		0%				
Madrid Barajas		100%				
Manchester Ringway		0%				
Milan Malpensa		100%				
Munich Franz Josef Strauss		100%				
Nice Cote D'Azur		0%				
Oslo Gardermoen		100%				
Palma de Mallorca Son San Juan		0%				
Paris Charles De Gaulle		35%				
Paris Orly		5%				
Rome Fiumicino		100%				
Stockholm Arlanda		0%				
Vienna Schwechat		0%				
Zurich Kloten		100%				

5. MONITORING VIEW

2.1.4 Initial Airport Operations Plan (AOP)

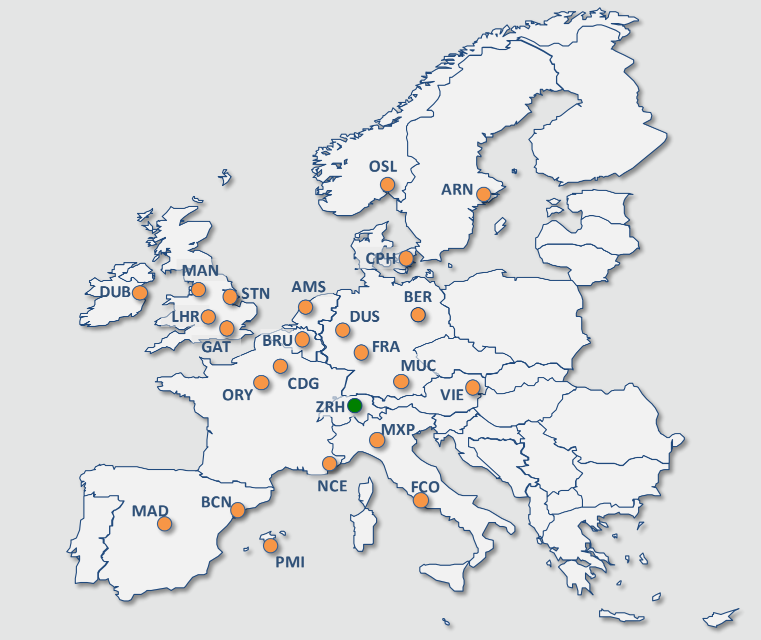


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Airport	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps: ANSPs	Airport Operators	Other stakeholders involved in the Family deployment: Military Authorities	MET Providers
Amsterdam Schiphol	0%	0%	Submitted projects (full coverage)	Submitted projects (full coverage)	No information available	Submitted projects (full coverage)
Barcelona El Prat	0%	0%	Not applicable	Complete lack of any implementation initiative	No information available	Complete lack of any implementation initiative
Berlin Brandenburg Airport	0%	0%	Not applicable	Implementation in progress	No information available	Complete lack of any implementation initiative
Brussels National	0%	0%	Implementation planned	Submitted projects (partial coverage)	No information available	Implementation planned
Copenhagen Kastrup	0%	0%	Not applicable	Implementation planned	No information available	Complete lack of any implementation initiative
Dublin Airport	0%	0%	Complete lack of any implementation initiative	Complete lack of any implementation initiative	No information available	Implementation planned
Dusseldorf International	0%	0%	Family's scope fully implemented	Implementation planned	No information available	Complete lack of any implementation initiative
Frankfurt International	0%	0%	Family's scope fully implemented	Submitted projects (partial coverage)	No information available	Complete lack of any implementation initiative
Istanbul Ataturk Airport	No information	-	No information available	No information available	No information available	No information available
London Gatwick	0%	0%	Not applicable	Submitted projects (partial coverage)	No information available	Not applicable
London Heathrow	0%	0%	Not applicable	Submitted projects (full coverage)	No information available	Not applicable
London Stansted	0%	0%	Not applicable	Complete lack of any implementation initiative	No information available	Not applicable
Madrid Barajas	0%	0%	Not applicable	Complete lack of any implementation initiative	No information available	Complete lack of any implementation initiative
Manchester Ringway	0%	0%	Not applicable	Complete lack of any implementation initiative	No information available	Not applicable
Milan Malpensa	0%	0%	Implementation planned	Implementation planned	No information available	No information available
Munich Franz Josef Strauss	0%	0%	Family's scope fully implemented	Submitted projects (partial coverage)	No information available	Complete lack of any implementation initiative
Nice Cote D'Azur	0%	0%	Submitted projects (partial coverage)	Submitted projects (partial coverage)	No information available	No information available
Oslo Gardermoen	0%	0%	Complete lack of any implementation initiative	Complete lack of any implementation initiative	No information available	Complete lack of any implementation initiative
Palma de Mallorca Son San Juan	0%	0%	Not applicable	Complete lack of any implementation initiative	No information available	Complete lack of any implementation initiative
Paris Charles De Gaulle	0%	0%	Submitted projects (partial coverage)	Submitted projects (partial coverage)	No information available	Complete lack of any implementation initiative
Paris Orly	0%	0%	Submitted projects (partial coverage)	Submitted projects (partial coverage)	No information available	Complete lack of any implementation initiative
Rome Fiumicino	0%	0%	Implementation planned	Implementation planned	No information available	No information available
Stockholm Arlanda	0%	0%	Not applicable	Submitted projects (partial coverage)	No information available	Complete lack of any implementation initiative
Vienna Schwechat	0%	0%	Not applicable	Implementation planned	No information available	Not applicable
Zurich Kloten	100%	100%	Not applicable	Family's scope fully implemented	No information available	No information available

2.2.1 A-SMGCS Level 1 and 2

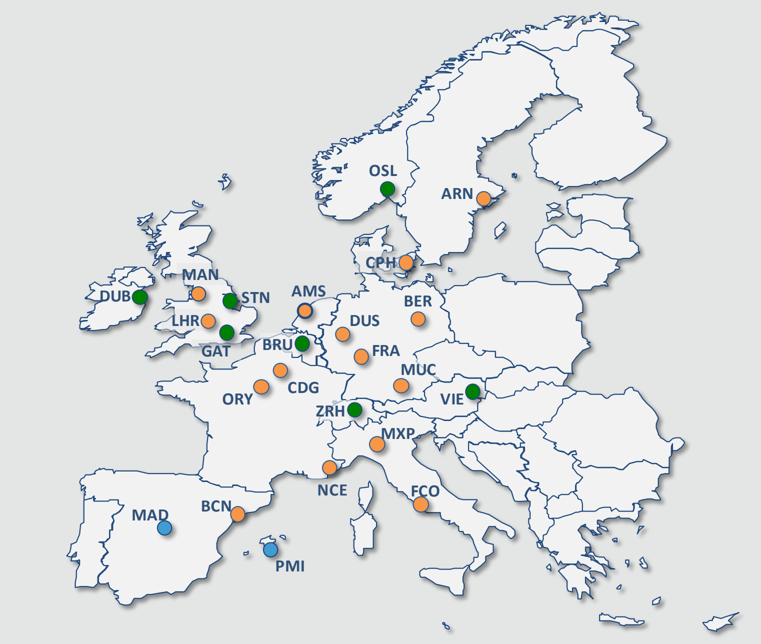


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Airport	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category: Stakeholders considered as Gaps – ANSPs	Stakeholders considered as Gaps – Airport Operators	Other stakeholders involved – Military Authorities
Amsterdam Schiphol		0%			
Barcelona El Prat		0%			
Berlin Brandenburg Airport		0%			
Brussels National		100%			
Copenhagen Kastrup		40%			
Dublin Airport		100%			
Dusseldorf International		0%			
Frankfurt International		0%			
Istanbul Ataturk Airport		-			
London Gatwick		100%			
London Heathrow		0%			
London Stansted		100%			
Madrid Barajas		30%			
Manchester Ringway		0%			
Milan Malpensa		0%			
Munich Franz Josef Strauss		0%			
Nice Cote D'Azur		0%			
Oslo Gardermoen		100%			
Palma de Mallorca Son San Juan		30%			
Paris Charles De Gaulle		0%			
Paris Orly		0%			
Rome Fiumicino		0%			
Stockholm Arlanda		0%			
Vienna Schwechat		100%			
Zurich Kloten		100%			

2.3.1 Time Based Separation (TBS)

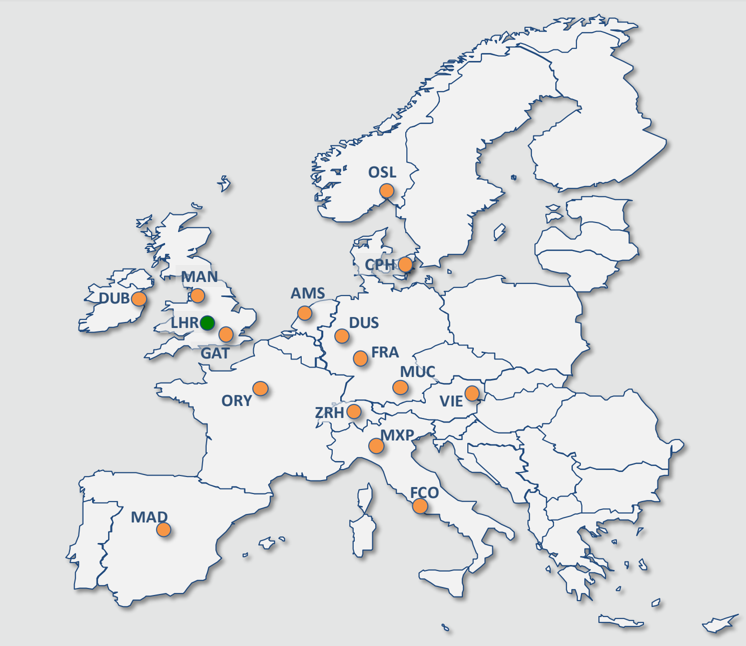


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Airport	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category: Stakeholders considered as Gaps – ANSPs	Implementation Status by Operational Stakeholder' Category: Other stakeholders involved in the Family deployment – Airport Operators
Amsterdam Schiphol		0%		
Copenhagen Kastrup		0%		
Dublin Airport		0%		
Dusseldorf International		0%		
Frankfurt International		0%		
Istanbul Ataturk Airport		-		
London Gatwick		0%		
London Heathrow		100%		
Madrid Barajas		0%		
Manchester Ringway		0%		
Milan Malpensa		0%		
Munich Franz Josef Strauss		0%		
Oslo Gardermoen		0%		
Paris Orly		0%		
Rome Fiumicino		0%		
Vienna Schwechat		0%		
Zurich Kloten		0%		

H

2.4.1 A-SMGCS Routing and Planning Functions

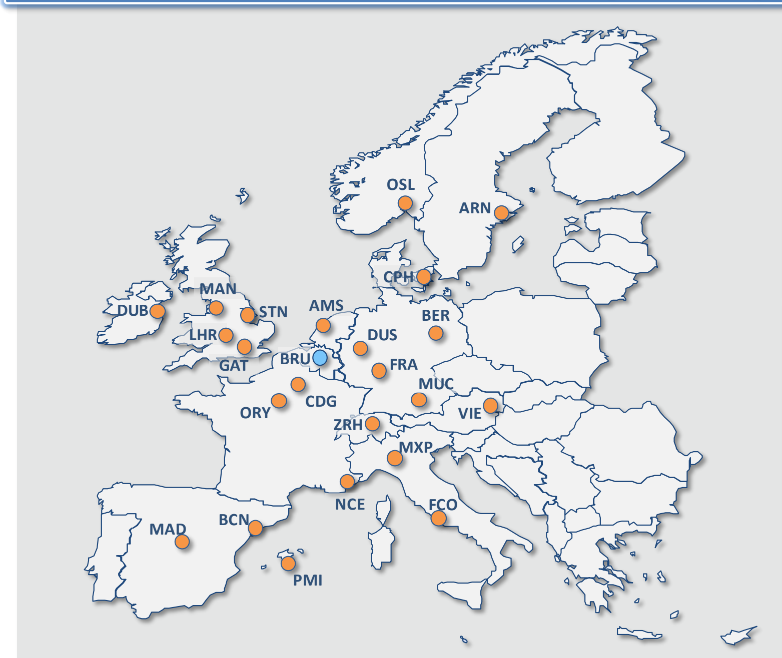


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/ awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Airport	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps – ANSPs	Implementation Status by Operational Stakeholder' Category – Other stakeholders involved in the Family deployment – Airport Operators
Amsterdam Schiphol	0%	0%	Implementation planned	Implementation planned
Barcelona El Prat	0%	0%	Implementation planned	Not applicable
Berlin Brandenburg Airport	0%	0%	Implementation planned	Complete lack of any implementation initiative
Brussels National	1-25%	10%	Submitted projects (full coverage)	Not applicable
Copenhagen Kastrup	0%	0%	Not applicable	Submitted projects (full coverage)
Dublin Airport	0%	0%	Implementation planned	Implementation in progress
Dusseldorf International	0%	0%	Implementation planned	Implementation planned
Frankfurt International	0%	0%	Implementation planned	Submitted projects (full coverage)
Istanbul Ataturk Airport	No information	-	No information available	No information available
London Gatwick	0%	0%	Not applicable	Submitted projects (full coverage)
London Heathrow	0%	0%	Not applicable	Implementation planned
London Stansted	0%	0%	Not applicable	Complete lack of any implementation initiative
Madrid Barajas	0%	0%	Implementation planned	Not applicable
Manchester Ringway	0%	0%	Not applicable	Complete lack of any implementation initiative
Milan Malpensa	0%	0%	Complete lack of any implementation initiative	Not applicable
Munich Franz Josef Strauss	0%	0%	Implementation planned	Implementation in progress
Nice Cote D'Azur	0%	0%	Submitted projects (partial coverage)	Complete lack of any implementation initiative
Oslo Gardermoen	0%	0%	Complete lack of any implementation initiative	Complete lack of any implementation initiative
Palma de Mallorca Son San Juan	0%	0%	Implementation planned	Not applicable
Paris Charles De Gaulle	0%	0%	Submitted projects (partial coverage)	Submitted projects (partial coverage)
Paris Orly	0%	0%	Submitted projects (partial coverage)	Submitted projects (partial coverage)
Rome Fiumicino	0%	0%	Complete lack of any implementation initiative	Complete lack of any implementation initiative
Stockholm Arlanda	0%	0%	Not applicable	Implementation planned
Vienna Schwechat	0%	0%	Implementation planned	Family's scope fully implemented
Zurich Kloten	0%	0%	Complete lack of any implementation initiative	Implementation in progress

H

2.5.1 Airport Safety Nets associated with A-SMGCS (Level 2)

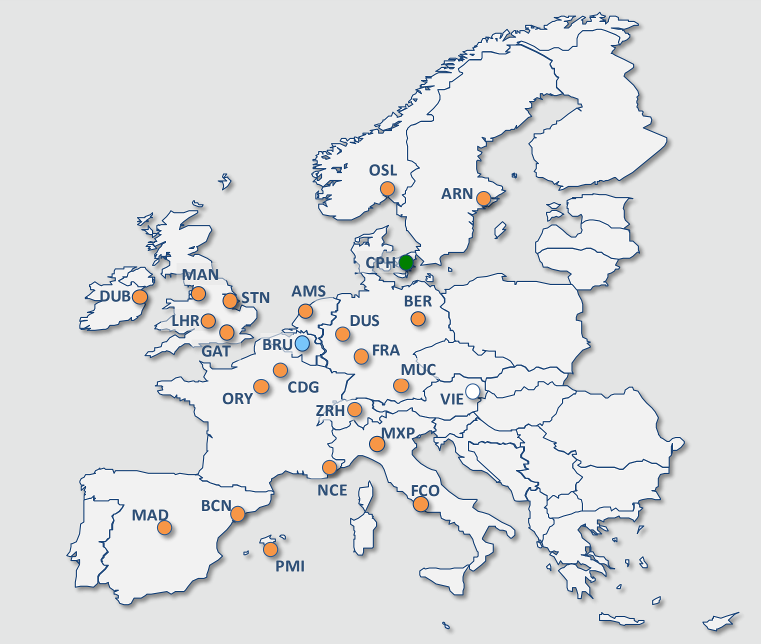


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Airport	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps: ANSPs	Airport Operators
Amsterdam Schiphol	0%	0%	Submitted projects (full coverage)	Implementation planned
Barcelona El Prat	0%	0%	Implementation planned	Not applicable
Berlin Brandenburg Airport	0%	0%	Implementation planned	Implementation planned
Brussels National	1-25%	25%	Submitted projects (full coverage)	Submitted projects (full coverage)
Copenhagen Kastrup	100%	100%	Family's scope fully implemented	Family's scope fully implemented
Dublin Airport	0%	0%	Implementation planned	Implementation planned
Dusseldorf International	0%	0%	Implementation planned	Implementation planned
Frankfurt International	0%	0%	Implementation planned	Submitted projects (partial coverage)
Istanbul Ataturk Airport	No information	-	No information available	No information available
London Gatwick	0%	0%	Not applicable	Submitted projects (full coverage)
London Heathrow	0%	0%	Not applicable	Submitted projects (full coverage)
London Stansted	0%	0%	Not applicable	Implementation planned
Madrid Barajas	0%	0%	Implementation planned	Not applicable
Manchester Ringway	0%	0%	Not applicable	Complete lack of any implementation initiative
Milan Malpensa	0%	0%	Implementation planned	Implementation planned
Munich Franz Josef Strauss	0%	0%	Implementation planned	Complete lack of any implementation initiative
Nice Cote D'Azur	0%	0%	Submitted projects (partial coverage)	Complete lack of any implementation initiative
Oslo Gardermoen	0%	0%	Implementation in progress	Implementation in progress
Palma de Mallorca Son San Juan	0%	0%	Implementation planned	Not applicable
Paris Charles De Gaulle	0%	0%	Submitted projects (partial coverage)	Submitted projects (partial coverage)
Paris Orly	0%	0%	Submitted projects (partial coverage)	Submitted projects (partial coverage)
Rome Fiumicino	0%	0%	Implementation planned	Implementation planned
Stockholm Arlanda	0%	0%	Not applicable	Submitted projects (partial coverage)
Vienna Schwechat	No information	-	Implementation in progress	No information available
Zurich Kloten	0%	0%	Implementation in progress	Implementation in progress

5. MONITORING VIEW

SESAR DEPLOYMENT MANAGER

2.5.2 Implement vehicle and aircraft systems contributing to Airport Safety Nets

Airspace User Gap

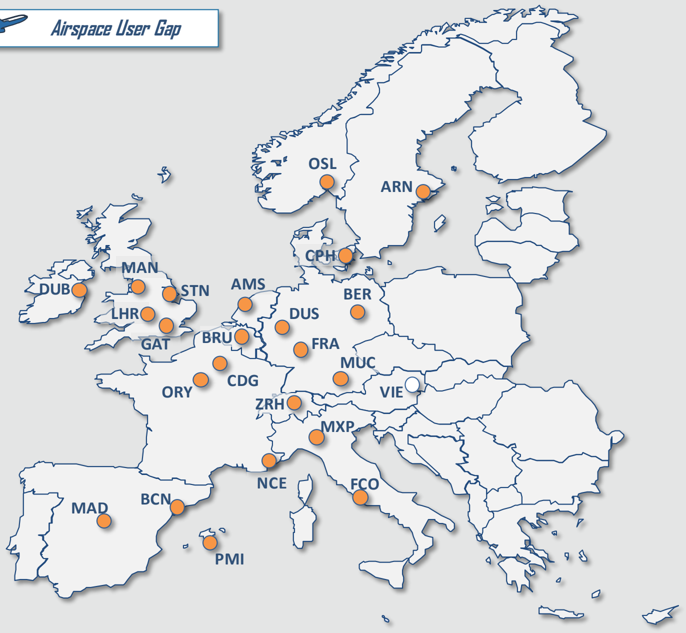


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Airport	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps: ANSPs	Airport Operators	Military Authorities
Amsterdam Schiphol	0%	0%	Complete lack of any implementation initiative	Implementation planned	No information available
Barcelona El Prat	0%	0%	Implementation in progress	Implementation in progress	No information available
Berlin Brandenburg Airport	0%	0%	Not applicable	Complete lack of any implementation initiative	No information available
Brussels National	0%	0%	Complete lack of any implementation initiative	Submitted projects (full coverage)	No information available
Copenhagen Kastrup	0%	0%	Not applicable	Complete lack of any implementation initiative	No information available
Dublin Airport	0%	0%	Implementation planned	Implementation planned	No information available
Dusseldorf International	0%	0%	Not applicable	Submitted projects (partial coverage)	No information available
Frankfurt International	0%	0%	Not applicable	Submitted projects (partial coverage)	No information available
Istanbul Ataturk Airport	No information	-	No information available	No information available	No information available
London Gatwick	0%	0%	Not applicable	Complete lack of any implementation initiative	No information available
London Heathrow	0%	0%	Not applicable	Implementation planned	No information available
London Stansted	0%	0%	Not applicable	Implementation planned	No information available
Madrid Barajas	0%	0%	Implementation in progress	Implementation in progress	No information available
Manchester Ringway	0%	0%	Not applicable	Complete lack of any implementation initiative	No information available
Milan Malpensa	0%	0%	Not applicable	Implementation planned	No information available
Munich Franz Josef Strauss	0%	0%	Not applicable	Implementation planned	No information available
Nice Cote D'Azur	0%	0%	Complete lack of any implementation initiative	Submitted projects (partial coverage)	No information available
Oslo Gardermoen	0%	0%	Implementation in progress	Implementation in progress	No information available
Palma de Mallorca Son San Juan	0%	0%	Implementation in progress	Implementation in progress	No information available
Paris Charles De Gaulle	0%	0%	Complete lack of any implementation initiative	Family's scope fully implemented	No information available
Paris Orly	0%	0%	Complete lack of any implementation initiative	Family's scope fully implemented	No information available
Rome Fiumicino	0%	0%	Not applicable	Complete lack of any implementation initiative	No information available
Stockholm Arlanda	0%	0%	Not applicable	Implementation planned	No information available
Vienna Schwechat	No information	-	Implementation in progress	No information available	No information available
Zurich Kloten	0%	0%	Not applicable	Complete lack of any implementation initiative	No information available

5. MONITORING VIEW

AF3 – Flexible Airspace Management and Free Route

3.1.1 ASM Tool to support AFUA

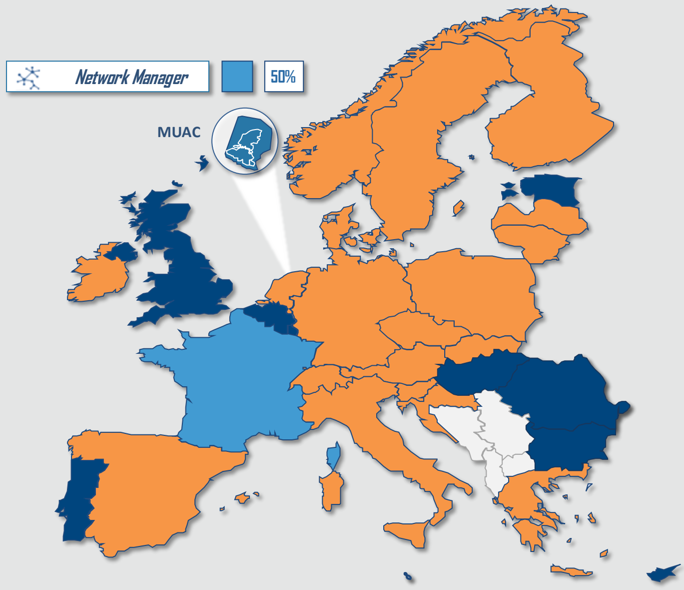


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps: ANSPs	Network Manager	Military Authorities
Austria		0%			
Belgium		85%			
Bulgaria		95%			
Croatia		0%			
Cyprus		95%			
Czech Republic		0%			
Denmark		0%			
Estonia		95%			
Finland		0%			
France		50%			
Germany		0%			
Greece		0%			
Hungary		95%			
Ireland		0%			
Italy		0%			
Latvia		0%			
Lithuania		0%			
Luxembourg		95%			
Malta		0%			
MUAC		60%			
Netherlands		0%			
Norway		0%			
Poland		0%			
Portugal		95%			
Romania		95%			
Slovak Republic		0%			
Slovenia		0%			
Spain		0%			
Sweden		0%			
Switzerland		0%			
United Kingdom		95%			

5. MONITORING VIEW

H

3.1.2 ASM Management of real time airspace data

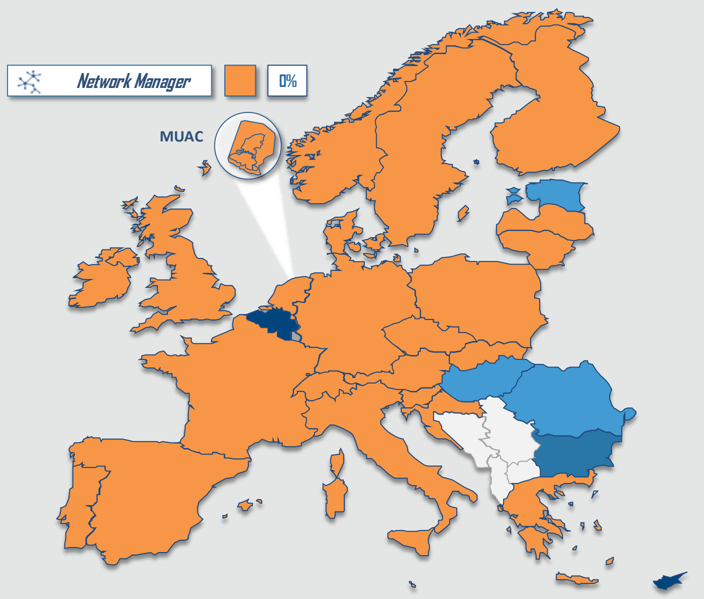


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps: ANSPs	Network Manager	Military Authorities
Austria		0%			
Belgium		85%			
Bulgaria		55%			
Croatia		0%			
Cyprus		95%			
Czech Republic		0%			
Denmark		0%			
Estonia		30%			
Finland		0%			
France		0%			
Germany		0%			
Greece		0%			
Hungary		50%			
Ireland		0%			
Italy		0%			
Latvia		0%			
Lithuania		0%			
Luxembourg		-			
Malta		0%			
MUAC		0%			
Netherlands		0%			
Norway		0%			
Poland		0%			
Portugal		0%			
Romania		30%			
Slovak Republic		0%			
Slovenia		0%			
Spain		0%			
Sweden		0%			
Switzerland		0%			
United Kingdom		0%			

H

3.1.3 Full rolling ASM/ATFCM process and ASM information sharing

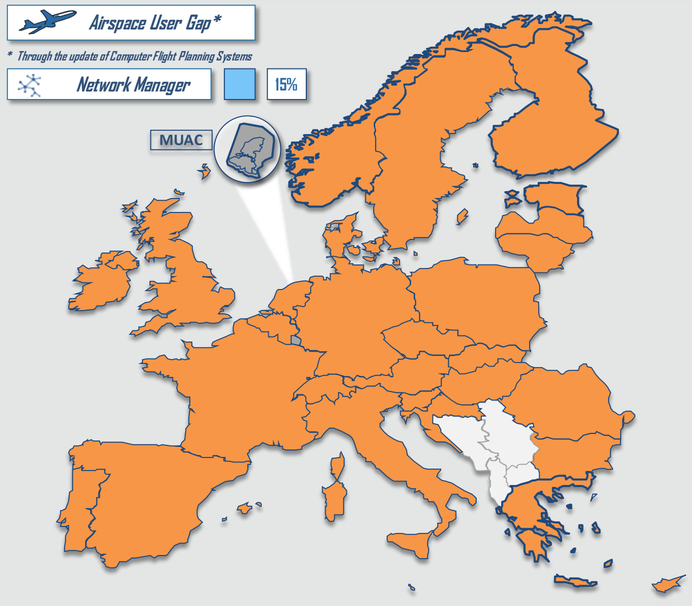


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps: ANSPs	Network Manager	Military Authorities
Austria	0%	0%	Implementation planned	Submitted projects (partial coverage)	Implementation planned
Belgium	0%	0%	Implementation in progress	Submitted projects (partial coverage)	Implementation planned
Bulgaria	0%	0%	Implementation in progress	Submitted projects (partial coverage)	Implementation planned
Croatia	0%	0%	Implementation planned	Submitted projects (partial coverage)	Implementation planned
Cyprus	0%	0%	Complete lack of any implementation initiative	Submitted projects (partial coverage)	Implementation planned
Czech Republic	0%	0%	Submitted projects (full coverage)	Submitted projects (partial coverage)	Submitted projects (partial coverage)
Denmark	0%	0%	Implementation planned	Submitted projects (partial coverage)	Implementation planned
Estonia	0%	0%	Submitted projects (full coverage)	Submitted projects (partial coverage)	Implementation planned
Finland	0%	0%	Submitted projects (partial coverage)	Submitted projects (partial coverage)	Not applicable
France	0%	0%	Implementation in progress	Submitted projects (partial coverage)	Complete lack of any implementation initiative
Germany	0%	0%	Implementation planned	Submitted projects (partial coverage)	Implementation planned
Greece	0%	0%	Implementation planned	Submitted projects (partial coverage)	Implementation planned
Hungary	0%	0%	Implementation planned	Submitted projects (partial coverage)	Implementation planned
Ireland	0%	0%	Implementation planned	Submitted projects (partial coverage)	Complete lack of any implementation initiative
Italy	0%	0%	Implementation planned	Submitted projects (partial coverage)	Implementation planned
Latvia	0%	0%	Complete lack of any implementation initiative	Submitted projects (partial coverage)	Implementation planned
Lithuania	0%	0%	Implementation planned	Submitted projects (partial coverage)	Complete lack of any implementation initiative
Luxembourg	Not applicable	-	Not applicable	Not applicable	Not applicable
Malta	0%	0%	Complete lack of any implementation initiative	Submitted projects (partial coverage)	Complete lack of any implementation initiative
MUAC	Not applicable	-	Not applicable	Submitted projects (partial coverage)	Implementation planned
Netherlands	0%	0%	Complete lack of any implementation initiative	Submitted projects (partial coverage)	Not applicable
Norway	0%	0%	Implementation in progress	Submitted projects (partial coverage)	Implementation planned
Poland	0%	0%	Implementation in progress	Submitted projects (partial coverage)	Implementation planned
Portugal	0%	0%	Implementation in progress	Submitted projects (partial coverage)	Implementation planned
Romania	0%	0%	Implementation in progress	Submitted projects (partial coverage)	Implementation planned
Slovak Republic	0%	0%	Implementation planned	Submitted projects (partial coverage)	Complete lack of any implementation initiative
Slovenia	0%	0%	Implementation planned	Submitted projects (partial coverage)	Complete lack of any implementation initiative
Spain	0%	0%	Implementation planned	Submitted projects (partial coverage)	Implementation planned
Sweden	0%	0%	Implementation in progress	Submitted projects (partial coverage)	Implementation planned
Switzerland	0%	0%	Complete lack of any implementation initiative	Submitted projects (partial coverage)	Implementation planned
United Kingdom	0%	0%	Implementation in progress	Submitted projects (partial coverage)	Implementation planned

5. MONITORING VIEW

3.1.4 Management of Dynamic Airspace Configurations

Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category		
			Stakeholders considered as Gaps		Other stakeholders involved
			ANSPs	Network Manager	Military Authorities
Austria		0%			
Belgium		0%			
Bulgaria		0%			
Croatia		0%			
Cyprus		0%			
Czech Republic		0%			
Denmark		0%			
Estonia		0%			
Finland		0%			
France		0%			
Germany		0%			
Greece		0%			
Hungary		0%			
Ireland		0%			
Italy		0%			
Latvia		0%			
Lithuania		0%			
Luxembourg		-			
Malta		0%			
MUAC		0%			
Netherlands		0%			
Norway		0%			
Poland		0%			
Portugal		0%			
Romania		0%			
Slovak Republic		0%			
Slovenia		0%			
Spain		0%			
Sweden		0%			
Switzerland		0%			
United Kingdom		0%			

5. MONITORING VIEW

3.2.1 Upgrade of ATM systems (NM, ANSPs, AUs) to support Direct Routings and Free Route Airspace

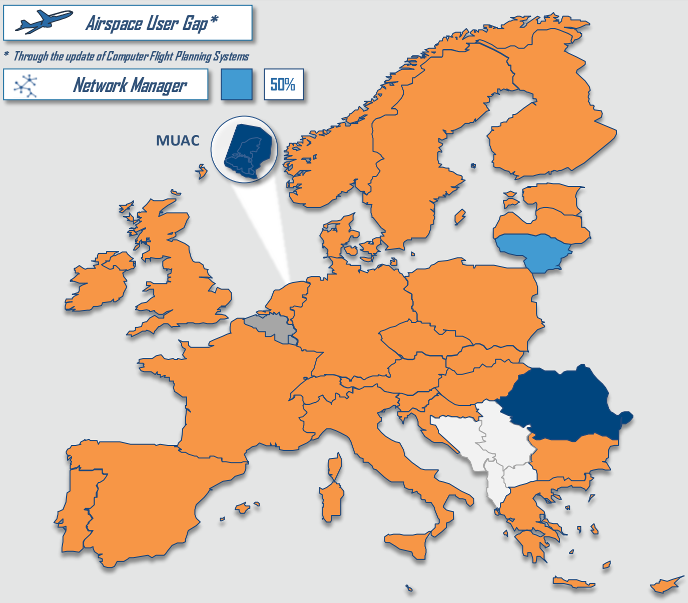


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps: ANSPs	Network Manager	Military Authorities
Austria		0%			
Belgium		-			
Bulgaria		0%			
Croatia		0%			
Cyprus		0%			
Czech Republic		0%			
Denmark		0%			
Estonia		0%			
Finland		0%			
France		0%			
Germany		0%			
Greece		0%			
Hungary		0%			
Ireland		0%			
Italy		0%			
Latvia		0%			
Lithuania		30%			
Luxembourg		-			
Malta		0%			
MUAC		95%			
Netherlands		0%			
Norway		0%			
Poland		0%			
Portugal		0%			
Romania		95%			
Slovak Republic		0%			
Slovenia		0%			
Spain		0%			
Sweden		0%			
Switzerland		0%			
United Kingdom		0%			

3.2.3 - Implement Published Direct Routings (DCTs)

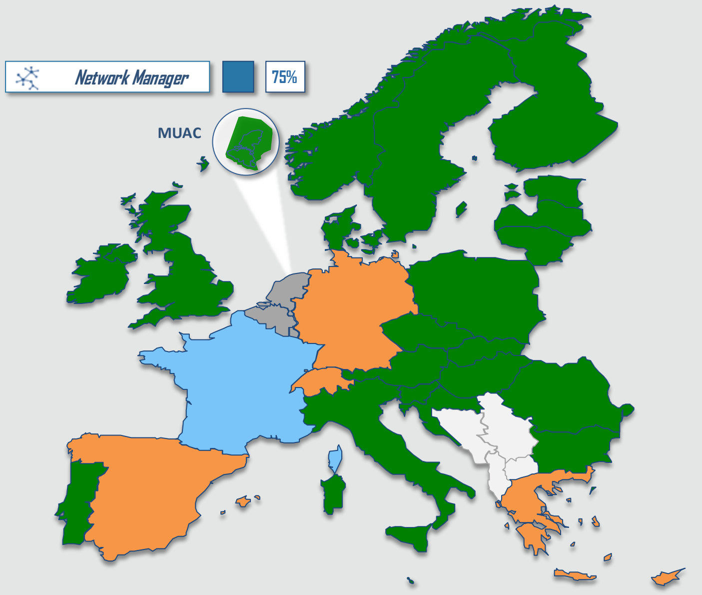


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps – ANSPs	Stakeholders considered as Gaps – Network Manager	Other stakeholders involved – Military Authorities
Austria		100%			
Belgium		-			
Bulgaria		100%			
Croatia		100%			
Cyprus		0%			
Czech Republic		100%			
Denmark		100%			
Estonia		100%			
Finland		100%			
France		15%			
Germany		0%			
Greece		0%			
Hungary		100%			
Ireland		100%			
Italy		100%			
Latvia		100%			
Lithuania		100%			
Luxembourg		-			
Malta		100%			
MUAC		100%			
Netherlands		-			
Norway		100%			
Poland		100%			
Portugal		100%			
Romania		100%			
Slovak Republic		100%			
Slovenia		100%			
Spain		0%			
Sweden		100%			
Switzerland		0%			
United Kingdom		100%			

3.2.4 – Implement Free Route Airspace

Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category: Stakeholders considered as Gaps – ANSPs	Stakeholders considered as Gaps – Network Manager	Other stakeholders involved – Military Authorities
Austria		0%			
Belgium		-			
Bulgaria		60%			
Croatia		20%			
Cyprus		0%			
Czech Republic		0%			
Denmark		100%			
Estonia		100%			
Finland		0%			
France		0%			
Germany		0%			
Greece		0%			
Hungary		0%			
Ireland		100%			
Italy		0%			
Latvia		100%			
Lithuania		100%			
Luxembourg		-			
Malta		0%			
MUAC		0%			
Netherlands		-			
Norway		100%			
Poland		0%			
Portugal		100%			
Romania		100%			
Slovak Republic		0%			
Slovenia		0%			
Spain		0%			
Sweden		0%			
Switzerland		0%			
United Kingdom		0%			

AF4 – Network Collaborative Management

4.1.1 STAM Phase 1

Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps – ANSPs	Implementation Status by Operational Stakeholder' Category – Other stakeholders involved in the Family deployment – Network Manager
Austria		0%		
Belgium		0%		
Bulgaria		-		
Croatia		0%		
Cyprus		0%		
Czech Republic		-		
Denmark		-		
Estonia		0%		
Finland		0%		
France		100%		
Germany		100%		
Greece		0%		
Hungary		100%		
Ireland		100%		
Italy		100%		
Latvia		-		
Lithuania		0%		
Luxembourg		-		
Malta		0%		
MUAC		100%		
Netherlands		0%		
Norway		-		
Poland		100%		
Portugal		100%		
Romania		-		
Slovak Republic		100%		
Slovenia		0%		
Spain		0%		
Sweden		-		
Switzerland		100%		
United Kingdom		100%		

5. MONITORING VIEW

4.1.2 STAM Phase 2

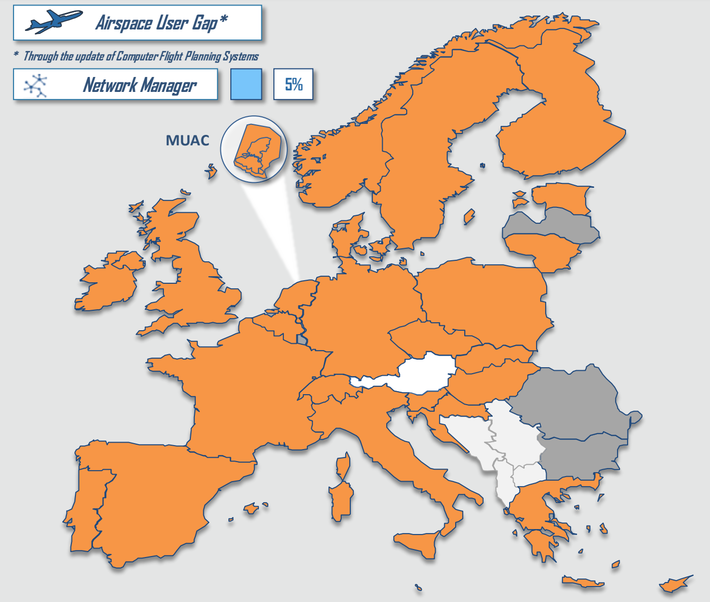


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps: ANSPs	Airport Operators	Network Manager	Other stakeholders involved: Military Authorities
Austria		-				
Belgium		0%				
Bulgaria		-				
Croatia		0%				
Cyprus		0%				
Czech Republic		0%				
Denmark		0%				
Estonia		0%				
Finland		0%				
France		0%				
Germany		0%				
Greece		0%				
Hungary		0%				
Ireland		0%				
Italy		0%				
Latvia		-				
Lithuania		0%				
Luxembourg		-				
Malta		0%				
MUAC		0%				
Netherlands		0%				
Norway		0%				
Poland		0%				
Portugal		0%				
Romania		-				
Slovak Republic		0%				
Slovenia		0%				
Spain		0%				
Sweden		0%				
Switzerland		0%				
United Kingdom		0%				

4.2.2 Interactive Rolling NOP

Airspace User Gap*

* Through the update of Computer Flight Planning Systems

Network Manager 10%

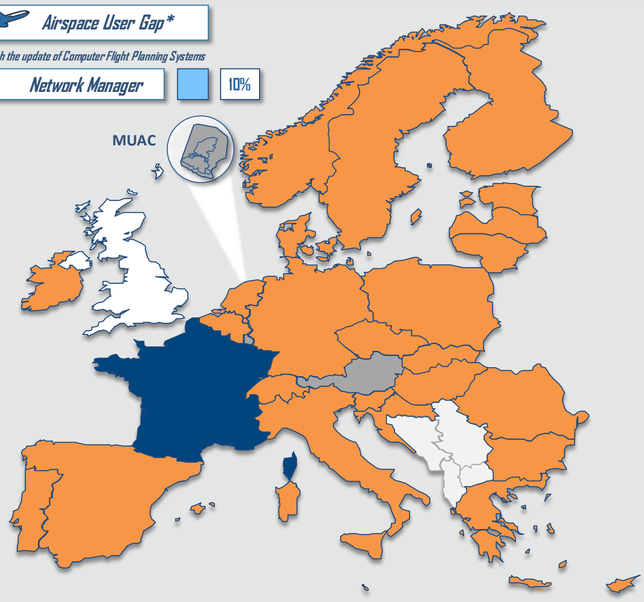


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category			
			Stakeholders considered as Gaps		Other stakeholders involved in the Family deployment	
			ANSPs	Network Manager	Airport Operators	Military Authorities
Austria		-				
Belgium		0%				
Bulgaria		0%				
Croatia		0%				
Cyprus		0%				
Czech Republic		0%				
Denmark		0%				
Estonia		0%				
Finland		0%				
France		95%				
Germany		0%				
Greece		0%				
Hungary		0%				
Ireland		0%				
Italy		0%				
Latvia		0%				
Lithuania		0%				
Luxembourg		-				
Malta		0%				
MUAC		-				
Netherlands		0%				
Norway		0%				
Poland		0%				
Portugal		0%				
Romania		0%				
Slovak Republic		0%				
Slovenia		0%				
Spain		0%				
Sweden		0%				
Switzerland		0%				
United Kingdom		-				

H

4.2.3 Interface ATM systems to NM systems

Airspace User Gap*

* Through the update of Computer Flight Planning Systems

Network Manager 40%

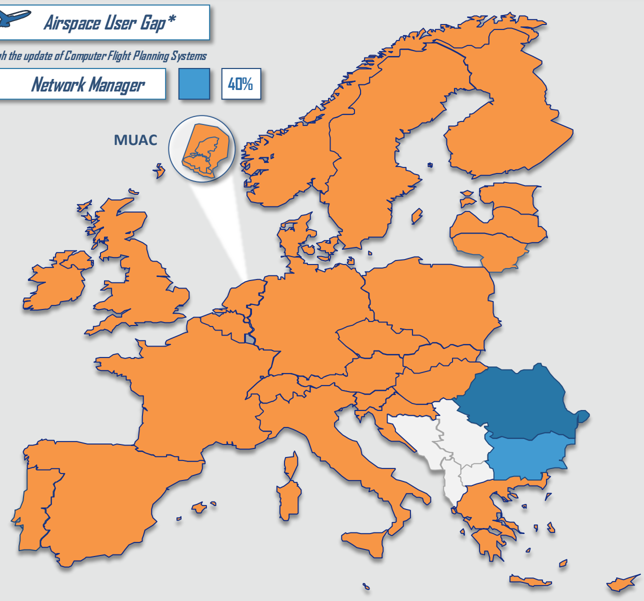


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category — Stakeholders considered as Gaps: ANSPs	Network Manager	Military Authorities
Austria		0%			
Belgium		0%			
Bulgaria		27%			
Croatia		0%			
Cyprus		0%			
Czech Republic		0%			
Denmark		0%			
Estonia		0%			
Finland		0%			
France		0%			
Germany		0%			
Greece		0%			
Hungary		0%			
Ireland		0%			
Italy		0%			
Latvia		0%			
Lithuania		0%			
Luxembourg		-			
Malta		0%			
MUAC		0%			
Netherlands		0%			
Norway		0%			
Poland		0%			
Portugal		0%			
Romania		58%			
Slovak Republic		0%			
Slovenia		0%			
Spain		0%			
Sweden		0%			
Switzerland		0%			
United Kingdom		0%			

SESAR DEPLOYMENT MANAGER

4.2.4 AOP/NOP Information Sharing

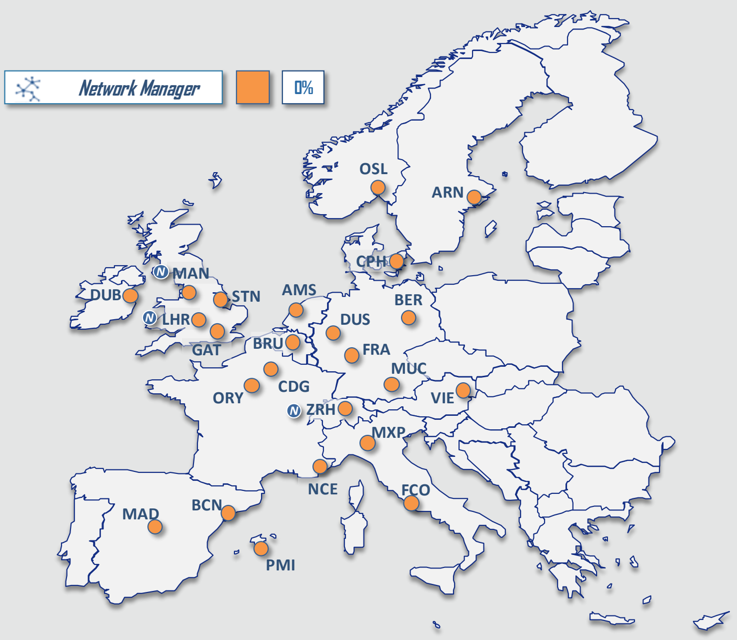


Chart Key – Overall Implementation Status

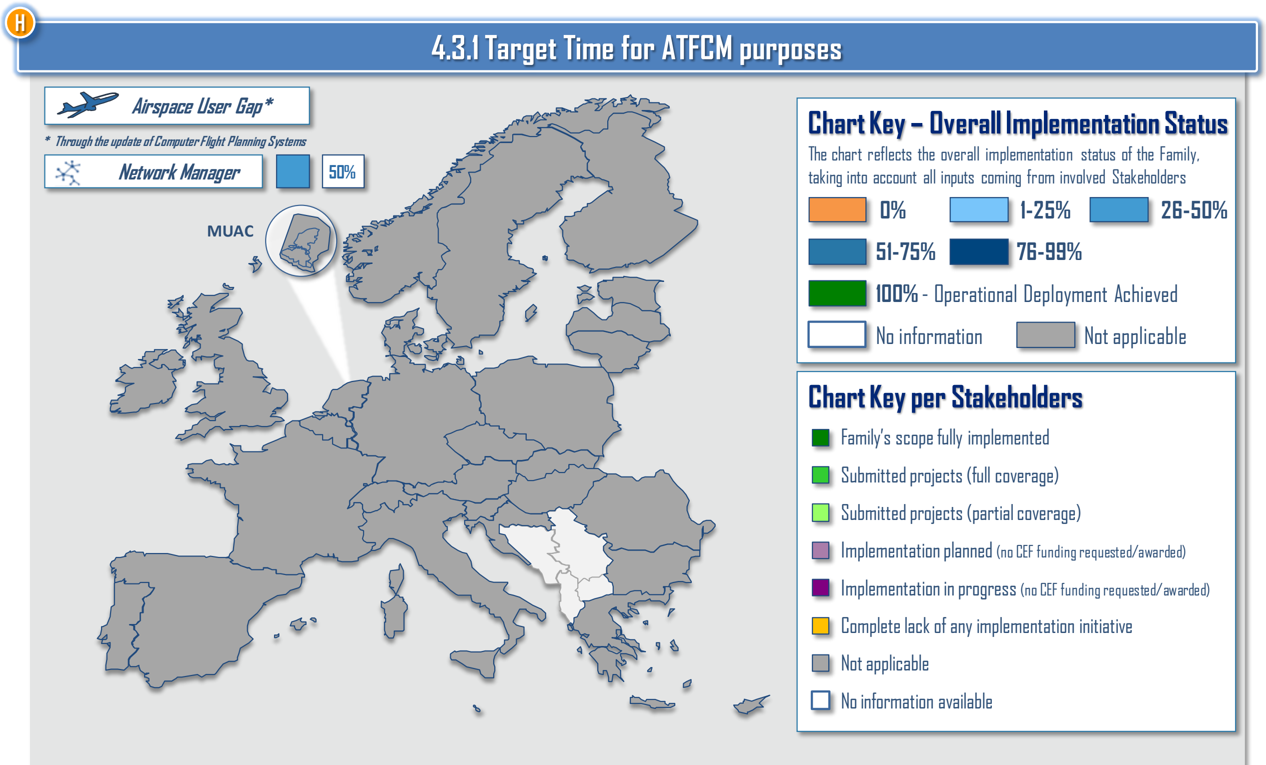
The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Airport	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category: Stakeholders considered as Gaps – Network Manager	Stakeholders considered as Gaps – Airport Operators	Other stakeholders involved in the Family deployment – ANSPs	Other stakeholders involved in the Family deployment – Military Authorities	Other stakeholders involved in the Family deployment – MET Providers
Amsterdam Schiphol	0%	0%	Partial coverage	Planned	Lack of initiative	No information	Lack of initiative
Barcelona El Prat	0%	0%	Partial coverage	Lack of initiative	Fully implemented	No information	Lack of initiative
Berlin Brandenburg Airport	0%	0%	Partial coverage	In progress	Planned	No information	Not applicable
Brussels National	0%	0%	Partial coverage	Not applicable	Lack of initiative	No information	Lack of initiative
Copenhagen Kastrup	0%	0%	Partial coverage	Partial coverage	In progress	No information	Lack of initiative
Dublin Airport	0%	0%	Partial coverage	Planned	Lack of initiative	No information	Planned
Dusseldorf International	0%	0%	Partial coverage	Planned	Planned	No information	Not applicable
Frankfurt International	0%	0%	Partial coverage	Partial coverage	Planned	No information	Not applicable
Istanbul Ataturk Airport	No information	-	No information	No information	No information	No information	No information
London Gatwick	0%	0%	Partial coverage	Lack of initiative	Not applicable	No information	Not applicable
London Heathrow	0%	0%	Partial coverage	Partial coverage	Not applicable	No information	Not applicable
London Stansted	0%	0%	Partial coverage	Lack of initiative	Not applicable	No information	Not applicable
Madrid Barajas	0%	0%	Partial coverage	Lack of initiative	Fully implemented	No information	Lack of initiative
Manchester Ringway	0%	0%	Partial coverage	Lack of initiative	Not applicable	No information	Not applicable
Milan Malpensa	0%	0%	Partial coverage	Lack of initiative	Lack of initiative	No information	No information
Munich Franz Josef Strauss	0%	0%	Partial coverage	Lack of initiative	Planned	No information	Not applicable
Nice Cote D'Azur	0%	0%	Partial coverage	Lack of initiative	Lack of initiative	No information	Not applicable
Oslo Gardermoen	0%	0%	Partial coverage	Lack of initiative	Lack of initiative	No information	Lack of initiative
Palma de Mallorca Son San Juan	0%	0%	Partial coverage	Lack of initiative	Fully implemented	No information	Lack of initiative
Paris Charles De Gaulle	0%	0%	Partial coverage	Partial coverage	Lack of initiative	No information	Not applicable
Paris Orly	0%	0%	Partial coverage	Partial coverage	Lack of initiative	No information	Not applicable
Rome Fiumicino	0%	0%	Partial coverage	Lack of initiative	Lack of initiative	No information	No information
Stockholm Arlanda	0%	0%	Partial coverage	Lack of initiative	Lack of initiative	No information	Lack of initiative
Vienna Schwechat	0%	0%	Partial coverage	Planned	Planned	Lack of initiative	Planned
Zurich Kloten	0%	0%	Partial coverage	Lack of initiative	Not applicable	Not applicable	Not applicable



The Stakeholders considered as Gaps in Family 4.3.1 are the Network Manager and the Airspace Users.
All the others Stakeholder Categories, namely the ANSPs, the Airport Operators and the Military Authorities, are considered as involved in the Family deployment.

L

4.3.2 Reconciled Target Times for ATFCM and Arrival Sequencing

Airspace User Gap*

* Through the update of Computer Flight Planning Systems

Network Manager 0%

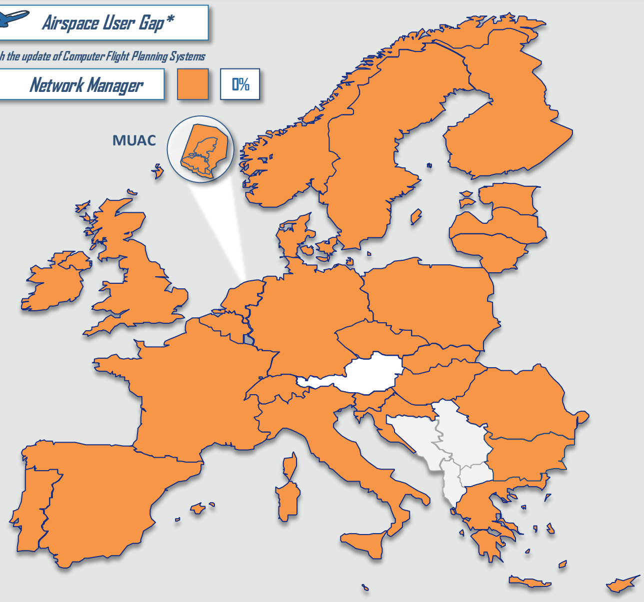


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

0% 1-25% 26-50%

51-75% 76-99%

100% - Operational Deployment Achieved

No information Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps – ANSPs	Airport Operators	Network Manager	Other stakeholders involved – Military Authorities
Austria		-				
Belgium		0%				
Bulgaria		0%				
Croatia		0%				
Cyprus		0%				
Czech Republic		0%				
Denmark		0%				
Estonia		0%				
Finland		0%				
France		0%				
Germany		0%				
Greece		0%				
Hungary		0%				
Ireland		0%				
Italy		0%				
Latvia		0%				
Lithuania		0%				
Luxembourg		-				
Malta		0%				
MUAC		0%				
Netherlands		0%				
Norway		0%				
Poland		0%				
Portugal		0%				
Romania		0%				
Slovak Republic		0%				
Slovenia		0%				
Spain		0%				
Sweden		0%				
Switzerland		0%				
United Kingdom		0%				

SESAR DEPLOYMENT MANAGER

4.4.2 Traffic Complexity Tools

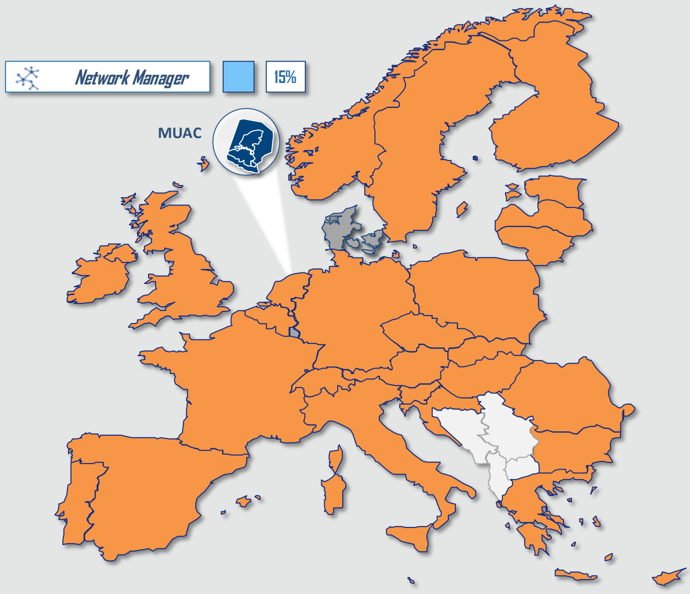


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/ awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category		
			Stakeholders considered as Gaps		Other stakeholders involved
			ANSPs	Network Manager	Military Authorities
Austria		0%			
Belgium		0%			
Bulgaria		0%			
Croatia		0%			
Cyprus		0%			
Czech Republic		0%			
Denmark		-			
Estonia		0%			
Finland		0%			
France		0%			
Germany		0%			
Greece		0%			
Hungary		0%			
Ireland		0%			
Italy		0%			
Latvia		0%			
Lithuania		0%			
Luxembourg		-			
Malta		0%			
MUAC		95%			
Netherlands		0%			
Norway		0%			
Poland		0%			
Portugal		0%			
Romania		0%			
Slovak Republic		0%			
Slovenia		0%			
Spain		0%			
Sweden		0%			
Switzerland		0%			
United Kingdom		0%			

AF5 – Initial SWIM

5.1.1 PENS: Pan-European Network Service version 1

Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps – ANSPs	Network Manager
Austria		100%		
Belgium		100%		
Bulgaria		10%		
Croatia		100%		
Cyprus		100%		
Czech Republic		100%		
Denmark		100%		
Estonia		100%		
Finland		100%		
France		100%		
Germany		100%		
Greece		0%		
Hungary		100%		
Ireland		100%		
Italy		100%		
Latvia		100%		
Lithuania		100%		
Luxembourg		100%		
Malta		100%		
MUAC		100%		
Netherlands		100%		
Norway		100%		
Poland		100%		
Portugal		100%		
Romania		100%		
Slovak Republic		100%		
Slovenia		100%		
Spain		100%		
Sweden		100%		
Switzerland		100%		
United Kingdom		100%		

5.1.2 NewPENS: New Pan-European Network Service

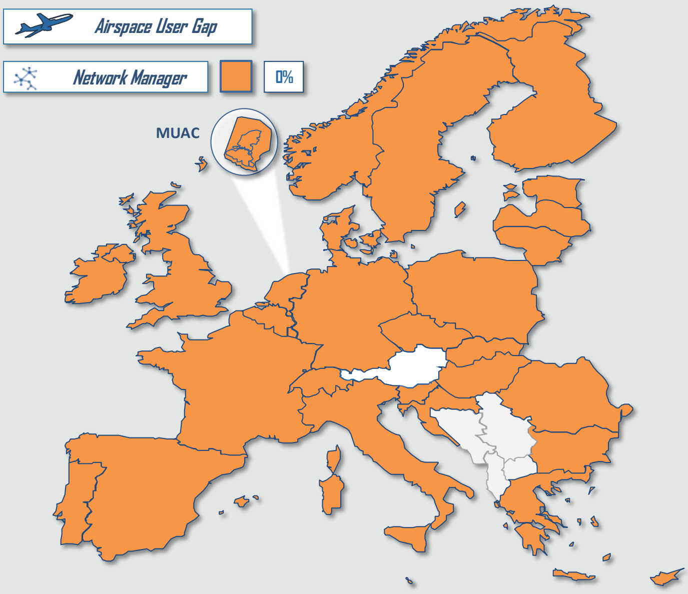


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps: ANSPs	Airport Operators	Network Manager	Military Authorities	MET Providers
Austria		-					
Belgium		0%					
Bulgaria		0%					
Croatia		0%					
Cyprus		0%					
Czech Republic		0%					
Denmark		0%					
Estonia		0%					
Finland		0%					
France		0%					
Germany		0%					
Greece		0%					
Hungary		0%					
Ireland		0%					
Italy		0%					
Latvia		0%					
Lithuania		0%					
Luxembourg		0%					
Malta		0%					
MUAC		0%					
Netherlands		0%					
Norway		0%					
Poland		0%					
Portugal		0%					
Romania		0%					
Slovak Republic		0%					
Slovenia		0%					
Spain		0%					
Sweden		0%					
Switzerland		0%					
United Kingdom		0%					

SESAR DEPLOYMENT MANAGER

5. MONITORING VIEW

5.1.3 Common SWIM Infrastructure Components

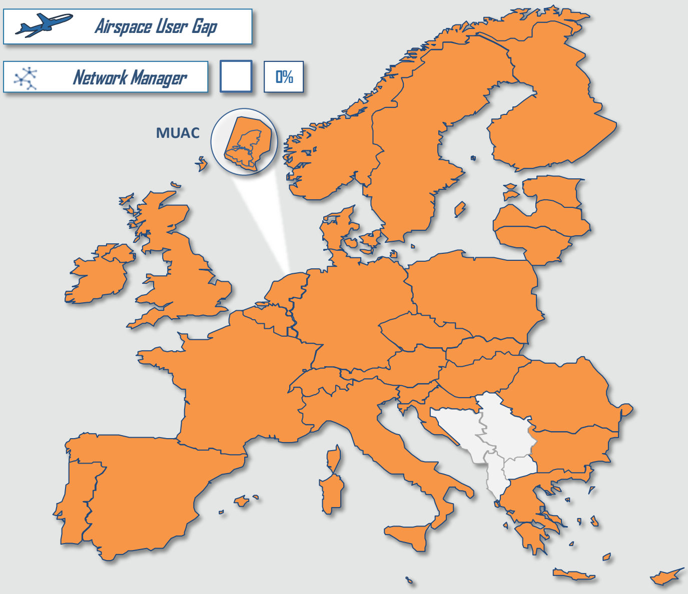


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps: ANSPs	Airport Operators	Network Manager	Military Authorities	MET Providers
Austria		0%					
Belgium		0%					
Bulgaria		0%					
Croatia		0%					
Cyprus		0%					
Czech Republic		0%					
Denmark		0%					
Estonia		0%					
Finland		0%					
France		0%					
Germany		0%					
Greece		0%					
Hungary		0%					
Ireland		0%					
Italy		0%					
Latvia		0%					
Lithuania		0%					
Luxembourg		0%					
Malta		0%					
MUAC		0%					
Netherlands		0%					
Norway		0%					
Poland		0%					
Portugal		0%					
Romania		0%					
Slovak Republic		0%					
Slovenia		0%					
Spain		0%					
Sweden		0%					
Switzerland		0%					
United Kingdom		0%					

5.1.4 Common SWIM PKI and Cybersecurity

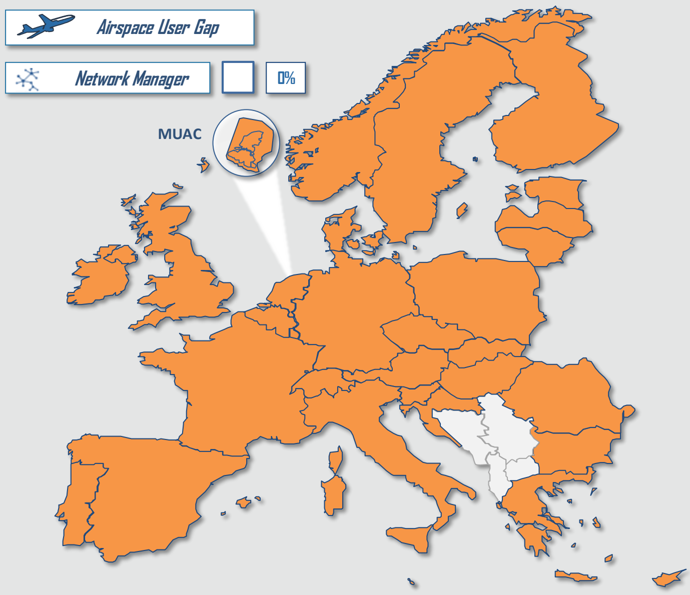


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0% (orange)
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved (green)
- No information (white)
- Not applicable (grey)

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative (yellow)
- Not applicable (grey)
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category — Stakeholders considered as Gaps: ANSPs	Airport Operators	Network Manager	Military Authorities	MET Providers
Austria	Orange	0%	Yellow	Yellow	Yellow	Yellow	Yellow
Belgium	Orange	0%	Yellow	Yellow	Yellow	Yellow	Yellow
Bulgaria	Orange	0%	Yellow	Grey	Yellow	Yellow	Yellow
Croatia	Orange	0%	Yellow	Grey	Yellow	Yellow	Yellow
Cyprus	Orange	0%	Yellow	Grey	Yellow	Yellow	Yellow
Czech Republic	Orange	0%	Yellow	Grey	Yellow	Yellow	Yellow
Denmark	Orange	0%	Yellow	Yellow	Yellow	Yellow	Yellow
Estonia	Orange	0%	Yellow	Grey	Yellow	Yellow	Yellow
Finland	Orange	0%	Yellow	Grey	Yellow	Yellow	Yellow
France	Orange	0%	Yellow	Grey	Yellow	Yellow	Yellow
Germany	Orange	0%	Yellow	Yellow	Yellow	Yellow	Yellow
Greece	Orange	0%	Yellow	Grey	Yellow	Yellow	Yellow
Hungary	Orange	0%	Yellow	Grey	Yellow	Yellow	Yellow
Ireland	Orange	0%	Yellow	Yellow	Yellow	Yellow	Yellow
Italy	Orange	0%	Yellow	Yellow	Yellow	Yellow	Yellow
Latvia	Orange	0%	Yellow	Grey	Yellow	Yellow	Yellow
Lithuania	Orange	0%	Yellow	Grey	Yellow	Yellow	Yellow
Luxembourg	Orange	0%	Yellow	Grey	Yellow	Yellow	Yellow
Malta	Orange	0%	Yellow	Grey	Yellow	Yellow	Yellow
MUAC	Orange	0%	Yellow	Grey	Yellow	Yellow	Yellow
Netherlands	Orange	0%	Yellow	Yellow	Yellow	Yellow	Yellow
Norway	Orange	0%	Yellow	Yellow	Yellow	Yellow	Yellow
Poland	Orange	0%	Yellow	Grey	Yellow	Yellow	Yellow
Portugal	Orange	0%	Yellow	Grey	Yellow	Yellow	Yellow
Romania	Orange	0%	Yellow	Grey	Yellow	Yellow	Yellow
Slovak Republic	Orange	0%	Yellow	Grey	Yellow	Yellow	Yellow
Slovenia	Orange	0%	Yellow	Grey	Yellow	Yellow	Yellow
Spain	Orange	0%	Yellow	Yellow	Yellow	Yellow	Yellow
Sweden	Orange	0%	Yellow	Yellow	Yellow	Yellow	Yellow
Switzerland	Orange	0%	Yellow	Yellow	Yellow	Yellow	Yellow
United Kingdom	Orange	0%	Yellow	Yellow	Yellow	Yellow	Yellow

5.2.1 Stakeholders Internet Protocol Compliance

Airspace User Gap

Network Manager 75%

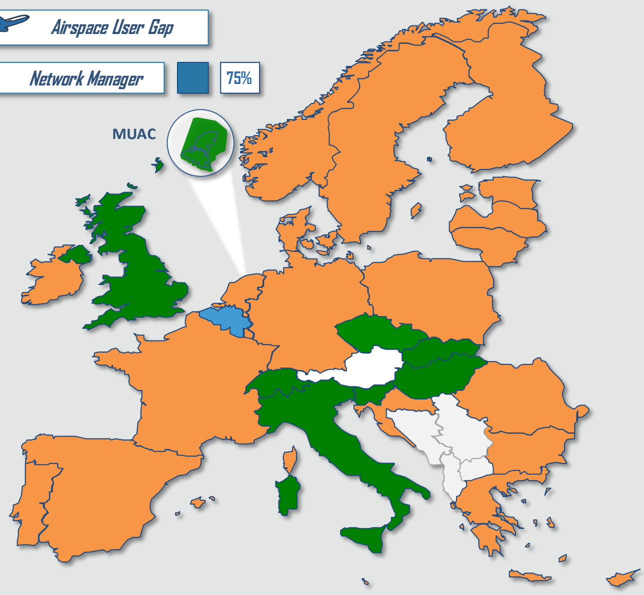


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Implementation Status by Operational Stakeholder' Category — Stakeholders considered as Gaps: ANSPs, Airport Operators, Network Manager, Military Authorities, MET Providers

Country	Overall Family Implementation Status	Percentage of Implementation
Austria		-
Belgium		30%
Bulgaria		0%
Croatia		0%
Cyprus		0%
Czech Republic		100%
Denmark		0%
Estonia		0%
Finland		0%
France		0%
Germany		0%
Greece		0%
Hungary		100%
Ireland		0%
Italy		100%
Latvia		0%
Lithuania		0%
Luxembourg		0%
Malta		0%
MUAC		100%
Netherlands		0%
Norway		0%
Poland		0%
Portugal		0%
Romania		0%
Slovak Republic		100%
Slovenia		100%
Spain		0%
Sweden		0%
Switzerland		100%
United Kingdom		100%

5.2.2 Stakeholders SWIM Infrastructure Components

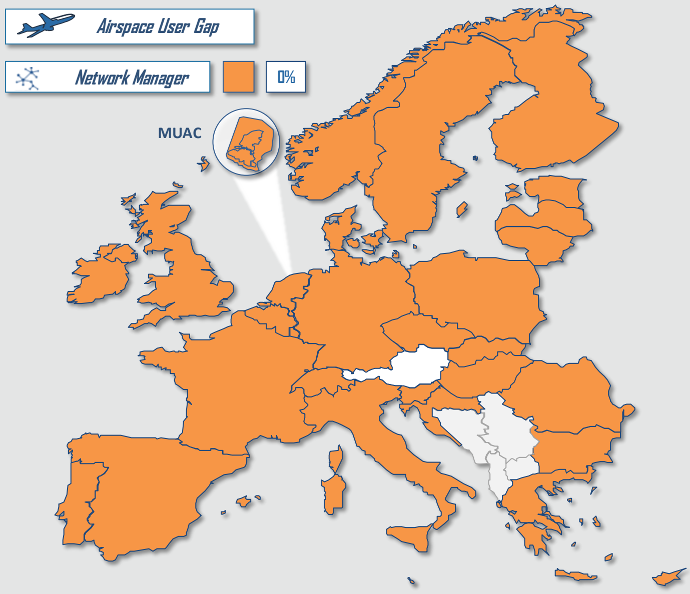


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps: ANSPs	Airport Operators	Network Manager	Military Authorities	MET Providers
Austria		-					
Belgium		0%					
Bulgaria		0%					
Croatia		0%					
Cyprus		0%					
Czech Republic		0%					
Denmark		0%					
Estonia		0%					
Finland		0%					
France		0%					
Germany		0%					
Greece		0%					
Hungary		0%					
Ireland		0%					
Italy		0%					
Latvia		0%					
Lithuania		0%					
Luxembourg		0%					
Malta		0%					
MUAC		0%					
Netherlands		0%					
Norway		0%					
Poland		0%					
Portugal		0%					
Romania		0%					
Slovak Republic		0%					
Slovenia		0%					
Spain		0%					
Sweden		0%					
Switzerland		0%					
United Kingdom		0%					

5.2.3 Stakeholders SWIM PKI and Cybersecurity

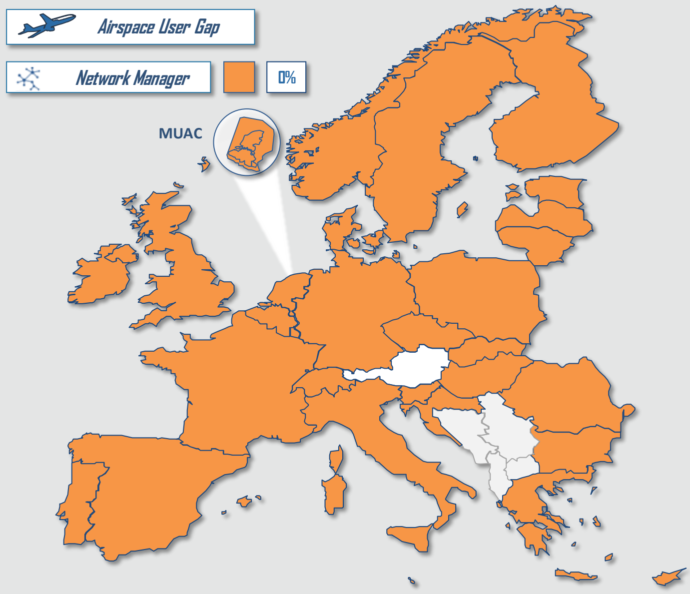


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps: ANSPs	Airport Operators	Network Manager	Military Authorities	MET Providers
Austria		-					
Belgium		0%					
Bulgaria		0%					
Croatia		0%					
Cyprus		0%					
Czech Republic		0%					
Denmark		0%					
Estonia		0%					
Finland		0%					
France		0%					
Germany		0%					
Greece		0%					
Hungary		0%					
Ireland		0%					
Italy		0%					
Latvia		0%					
Lithuania		0%					
Luxembourg		0%					
Malta		-					
MUAC		0%					
Netherlands		0%					
Norway		0%					
Poland		0%					
Portugal		0%					
Romania		0%					
Slovak Republic		0%					
Slovenia		0%					
Spain		0%					
Sweden		0%					
Switzerland		0%					
United Kingdom		0%					

5.3.1 Upgrade / Implement Aeronautical Information Exchange system / service

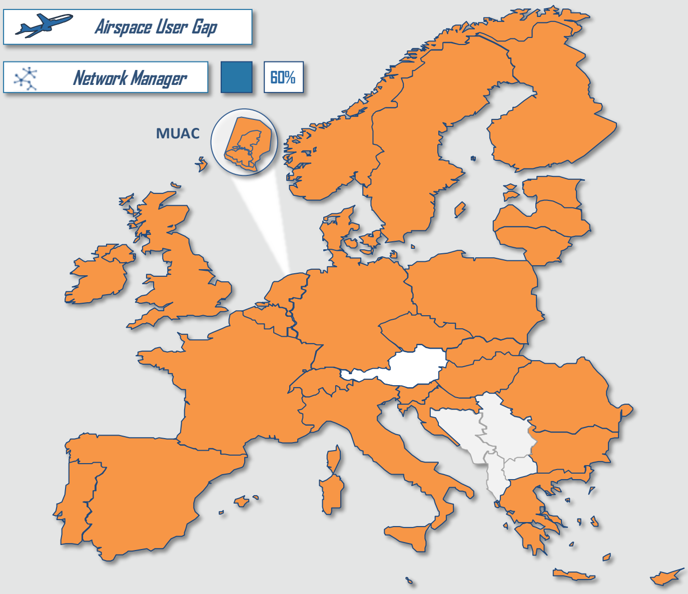


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps: ANSPs	Airport Operators	Network Manager	Military Authorities
Austria		-				
Belgium		0%				
Bulgaria		0%				
Croatia		0%				
Cyprus		0%				
Czech Republic		0%				
Denmark		0%				
Estonia		0%				
Finland		0%				
France		0%				
Germany		0%				
Greece		0%				
Hungary		0%				
Ireland		0%				
Italy		0%				
Latvia		0%				
Lithuania		0%				
Luxembourg		0%				
Malta		0%				
MUAC		0%				
Netherlands		0%				
Norway		0%				
Poland		0%				
Portugal		0%				
Romania		0%				
Slovak Republic		0%				
Slovenia		0%				
Spain		0%				
Sweden		0%				
Switzerland		0%				
United Kingdom		0%				

SESAR DEPLOYMENT MANAGER

H

5.4.1 Upgrade / Implement Meteorological Information Exchange system / service

Airspace User Gap

Network Manager 10%

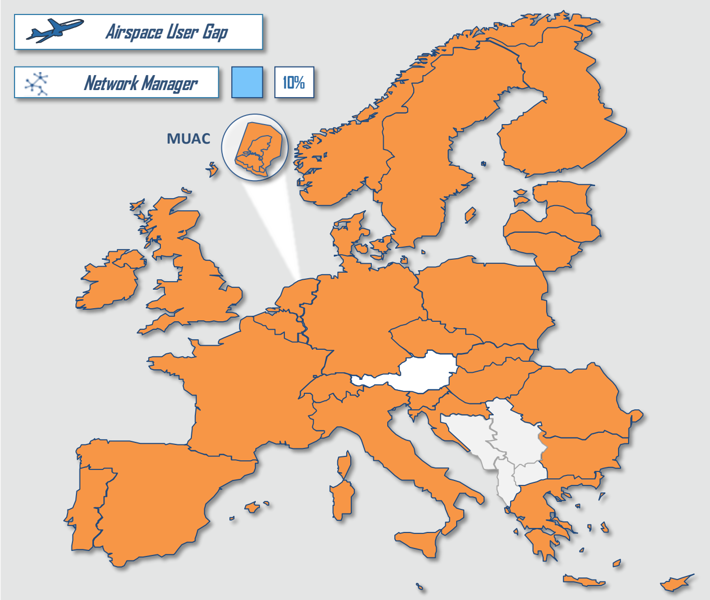


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps				
			ANSPs	Airport Operators	Network Manager	Military Authorities	MET Providers
Austria		-					
Belgium		0%					
Bulgaria		0%					
Croatia		0%					
Cyprus		0%					
Czech Republic		0%					
Denmark		0%					
Estonia		0%					
Finland		0%					
France		0%					
Germany		0%					
Greece		0%					
Hungary		0%					
Ireland		0%					
Italy		0%					
Latvia		0%					
Lithuania		0%					
Luxembourg		0%					
Malta		0%					
MUAC		0%					
Netherlands		0%					
Norway		0%					
Poland		0%					
Portugal		0%					
Romania		0%					
Slovak Republic		0%					
Slovenia		0%					
Spain		0%					
Sweden		0%					
Switzerland		0%					
United Kingdom		0%					

SESAR DEPLOYMENT MANAGER

5. MONITORING VIEW

H 5.5.1 Upgrade / Implement Cooperative Network Information Exchange system / service

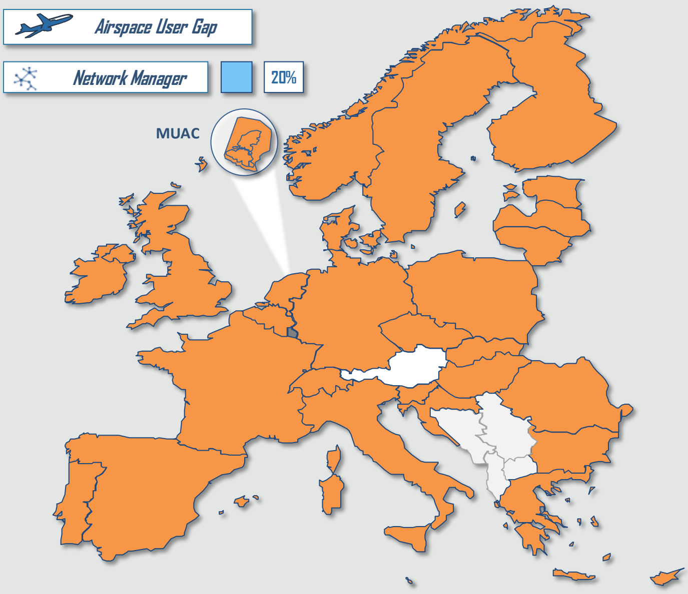


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps: ANSPs	Airport Operators	Network Manager	Military Authorities
Austria		-				
Belgium		0%				
Bulgaria		0%				
Croatia		0%				
Cyprus		0%				
Czech Republic		0%				
Denmark		0%				
Estonia		0%				
Finland		0%				
France		0%				
Germany		0%				
Greece		0%				
Hungary		0%				
Ireland		0%				
Italy		0%				
Latvia		0%				
Lithuania		0%				
Luxembourg		-				
Malta		0%				
MUAC		0%				
Netherlands		0%				
Norway		0%				
Poland		0%				
Portugal		0%				
Romania		0%				
Slovak Republic		0%				
Slovenia		0%				
Spain		0%				
Sweden		0%				
Switzerland		0%				
United Kingdom		0%				

SESAR DEPLOYMENT MANAGER

5. MONITORING VIEW

5.6.1 Upgrade / Implement Flights Information Exchange system / service supported by Yellow Profile

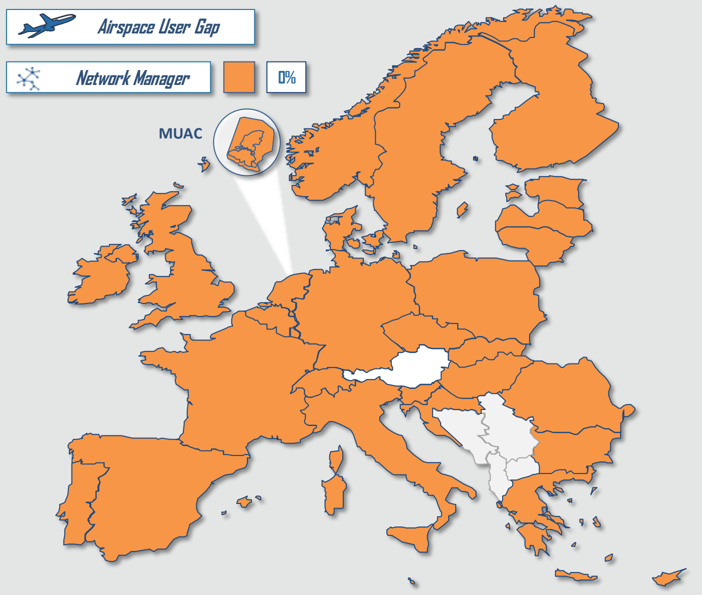


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps: ANSPs	Airport Operators	Network Manager	Military Authorities
Austria		-				
Belgium		0%				
Bulgaria		0%				
Croatia		0%				
Cyprus		0%				
Czech Republic		0%				
Denmark		0%				
Estonia		0%				
Finland		0%				
France		0%				
Germany		0%				
Greece		0%				
Hungary		0%				
Ireland		0%				
Italy		0%				
Latvia		0%				
Lithuania		0%				
Luxembourg		0%				
Malta		0%				
MUAC		0%				
Netherlands		0%				
Norway		0%				
Poland		0%				
Portugal		0%				
Romania		0%				
Slovak Republic		0%				
Slovenia		0%				
Spain		0%				
Sweden		0%				
Switzerland		0%				
United Kingdom		0%				

5.6.2 Upgrade / Implement Flights Information Exchange system / service supported by Blue Profile

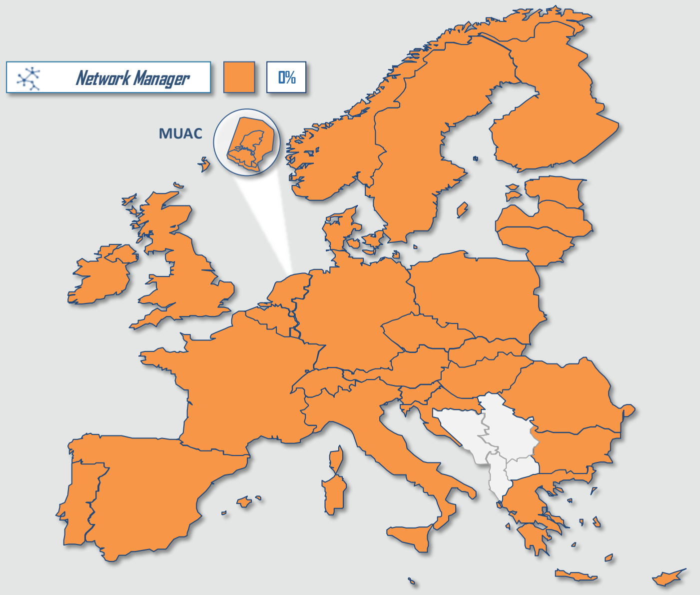


Chart Key – Overall Implementation Status

The chart reflects the overall implementation status of the Family, taking into account all inputs coming from involved Stakeholders

- 0%
- 1-25%
- 26-50%
- 51-75%
- 76-99%
- 100% - Operational Deployment Achieved
- No information
- Not applicable

Chart Key per Stakeholders

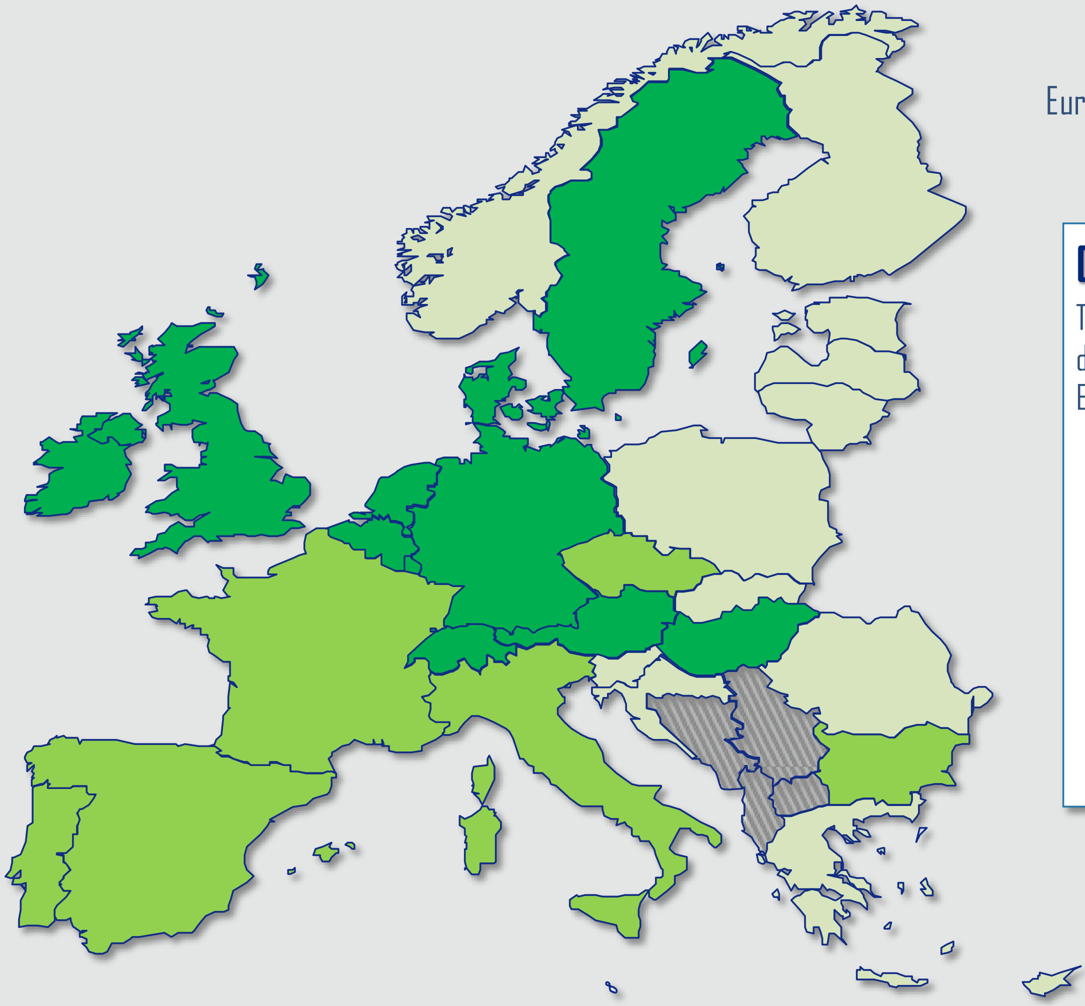
- Family's scope fully implemented
- Submitted projects (full coverage)
- Submitted projects (partial coverage)
- Implementation planned (no CEF funding requested/awarded)
- Implementation in progress (no CEF funding requested/awarded)
- Complete lack of any implementation initiative
- Not applicable
- No information available

Country	Overall Family Implementation Status	Percentage of Implementation	Implementation Status by Operational Stakeholder' Category – Stakeholders considered as Gaps			Other stakeholders
			ANSPs	Airport Operators	Network Manager	Military Authorities
Austria		0%				
Belgium		0%				
Bulgaria		0%				
Croatia		0%				
Cyprus		0%				
Czech Republic		0%				
Denmark		0%				
Estonia		0%				
Finland		0%				
France		0%				
Germany		0%				
Greece		0%				
Hungary		0%				
Ireland		0%				
Italy		0%				
Latvia		0%				
Lithuania		0%				
Luxembourg		0%				
Malta		0%				
MUAC		0%				
Netherlands		0%				
Norway		0%				
Poland		0%				
Portugal		0%				
Romania		0%				
Slovak Republic		0%				
Slovenia		0%				
Spain		0%				
Sweden		0%				
Switzerland		0%				
United Kingdom		0%				

5. MONITORING VIEW

AF6 – Initial Trajectory Information Sharing

Data Link Services Implementation Status



Due to the new structure of AF6, this picture of the current status of implementation of Data Link Services throughout Europe supports the identification of the main gaps associated to Family 6.1.1 and 6.1.3

Overall Implementation Status – June 2016

The chart reflects the inputs gathered from the responses to the dedicated DLS Survey, issued by SDM in June and distributed to all European Air Navigation Service Providers

- Data Link Services currently in operations
- Data Link Services partially implemented or not yet in operations (A/G VDLM2 Network in place)
- No A/G VDLM2 Network in place
- Not applicable

NB. The present picture and the following table have been prepared only by consolidating the information provided by the recipients of the DLS survey, without any direct cross-check of the feedback from SDM

Country	Air Navigation Service Provider	*DLS in operations*	*ATM Systems Upgrade*			*At least one VDL M2 A/G comm. Network in place*	*Updated ATC Procedures*	*ATCOs training completed*	*Starting Model***
			Front End Processor	FDP System	HMI Interface				
Austria	Austro Control		✓	✓	✓	✓	✓	✓	Model A
Bulgaria	BULATSA	By 2017	✓	✓	✓	✓	✓	✓	Model A
Croatia	Croatia Control	By 2017	✓	✓	✓				No implementation yet
Cyprus	DCAC	No date available							No implementation yet
Czech Republic	ANS CR	No date available	✓	✓	✓	✓			Model A
Denmark	Naviair		✓	✓	✓	✓	✓	✓	Model A
Estonia	EANS	By 2018	✓	✓	✓				No implementation yet
Finland	Finavia	By 2019	✓	✓	✓				No implementation yet
France	DSNA*	By 2019	✓	✓	✓	✓	✓	✓	Model A
Germany	DFS		✓	✓	✓	✓	✓	✓	Model A
Greece	HCAA	No date available							No implementation yet
Hungary	Hungaro Control		✓	✓	✓	✓	✓	✓	Model A
Ireland	IAA		✓	✓	✓	✓	✓	✓	Model A
Italy	ENAV	By 2016	✓	✓	✓	✓	✓		Model C
Latvia	LGS	By 2018		✓	✓				No implementation yet
Lithuania	Oro Navigacija	By 2018							No implementation yet
Malta	MATS	No date available							No implementation yet
MUAC Region	MUAC		✓	✓	✓	✓	✓	✓	Model A
Norway	Avinor	By 2020							No implementation yet
Poland	PANSA	By 2018							No implementation yet
Portugal	NAV Portugal*	No date available	✓	✓	✓	✓			Model A
Romania	ROMATSA	By 2017							No implementation yet
Slovak Republic	LPS	By 2018							No implementation yet
Slovenia	Slovenia Control	By 2018							No implementation yet
Spain	ENAIRE	No date available	✓	✓	✓	✓			Model A
Sweden	LFV		✓	✓	✓	✓	✓	✓	Model A
Switzerland	skyguide		✓	✓	✓	✓	✓	✓	Model A
United Kingdom	NATS		✓	✓	✓	✓	✓	✓	Model A

***NB.** According to their feedback, DSNA and Nav Portugal are currently providing only a subset of Data Link Services (respectively DLIC, AMC and ACM for France and DLIC Logon for Portugal)

****NB.** Assumptions by SDM on the basis of the feedbacks provided by the ANSPs through the DLS Surveys

5.1.2 Airspace Users Gaps – View per Family

High-level Conclusions of AU Gap Analysis Surveys

Around 40 airlines have provided feedback to the SDM between the 2015 and 2016 exercise, including **all major European hub carriers and point-to-point carriers**. With respect to the number of commercial aircraft, number of departures/arrivals and market share, the outcome of this survey reflects a representative snap-shot of the current state-of-play on airspace user side, which will however be constantly kept updated through SDM synchronization and monitoring of the Programme.

Taking into account the **gap analysis performed on current aircraft capabilities and associated operational readiness,** the differences between the percentage of aircraft equipped and the percentage of crews trained and their operational approvals highlights the need of considering the airlines crew training as part of the overall PCP implementation.

The increasing pace of change that SESAR is bringing to the ATM modernisation (e.g. switching from legacy radar-based navigation and radio communications environment to a new satellite-based navigation and digital communications environment), creates a need to train flight crew for what could be an extended transitional period, whereby both legacy and higher technological systems are in simultaneous operational use. With this significant step change and growing flight crew training burden on the airlines, there could also be a significant impact on the current training simulator capability and overall operational capacity across Europe. Therefore, consideration should be given to a wide ranging and careful logistical training plan, including the provision of additional simulator availability and capability.

Having in mind that crew training is a costly process for the airlines and would be only performed if the approaches / procedures can be actually **used in the network wide operational environment**, the synchronized implementation of the respective families together with ANSPs and airports are key factors for successful implementation again.

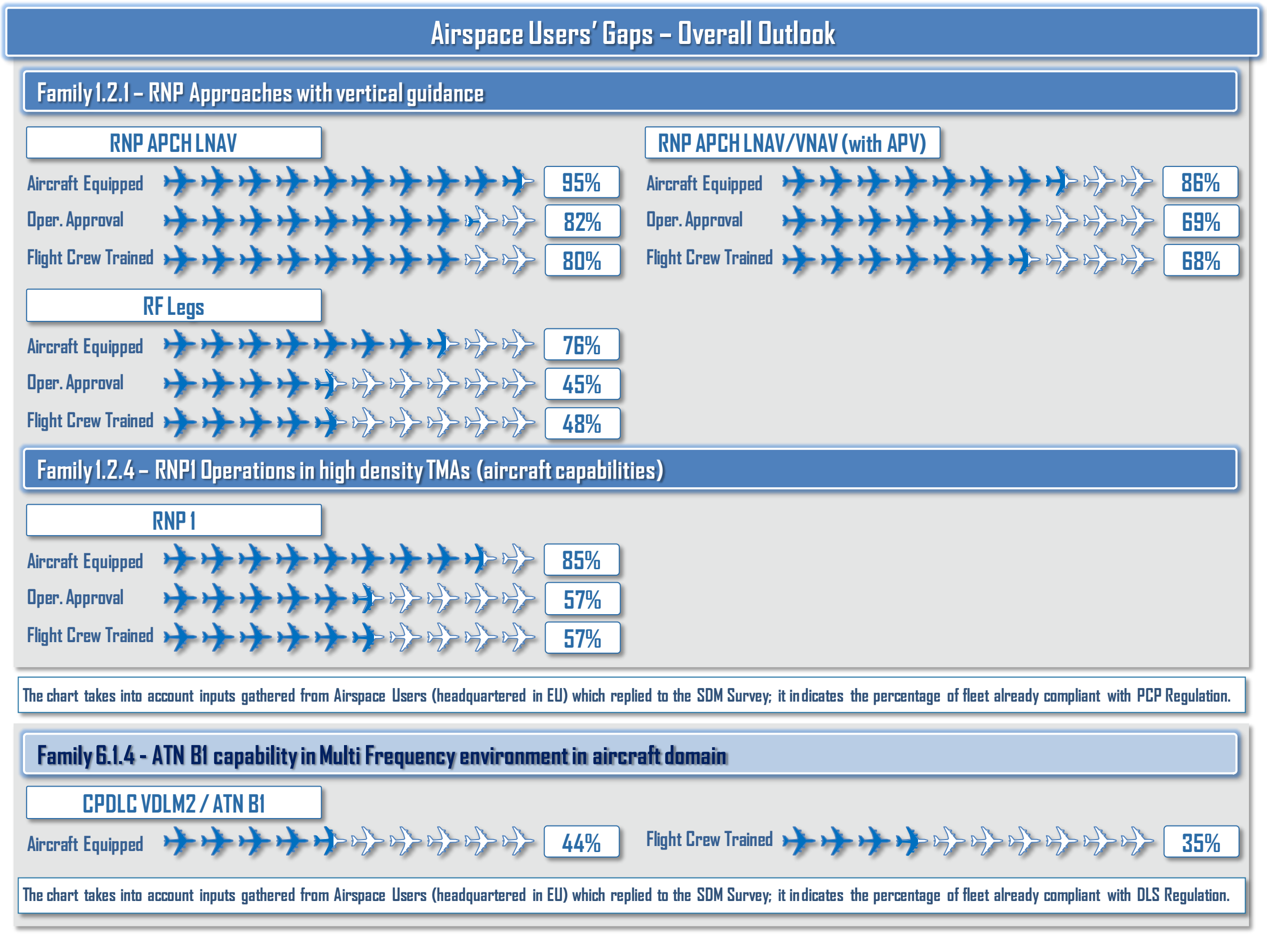
Regarding the **gap analysis on flight planning capabilities** most airlines refer to the need for synchronized implementation of the Network Manager systems, the ANSPs systems and their Computer Flight Planning System Providers (CFSPs) systems. So the involvement of the airspace users to upgrade their flight plan systems capabilities would **become a key factor for success**. Due to the nature of the airlines, using the whole European airspace, the NM system availability for AF4 families and the ANSPs readiness throughout the network are key factors. The **synchronization task of the SDM** towards ANSPS, AUs and NM will therefore have the highest priority in planning, executing and monitoring a harmonized implementation.

As a general recap, Airspace Users have to be considered as significantly affected by the deployment of the following families, and – in accordance to the PCP regulatory framework – are to be considered as potentially eligible for co-funding under upcoming CEF Transport Calls:

- **1.2.1** RNP Approaches with vertical guidance
- **1.2.4** RNP1 operations in high density TMAs (aircraft capabilities)

- **2.5.2** Vehicle and aircraft systems contributing to Airport Safety Nets
- **3.1.3** Full rolling ASM/ATFCM process and ASM information sharing
- **3.2.1** Upgrade of ATM systems (NM, ANSPs, AUs) to support Direct Routings (DCT) and Free Route Airspace (FRA)
- **4.1.2** STAM Phase 2
- **4.2.2** Interactive Rolling NOP
- **4.2.3** Interface ATM systems to NM systems
- **4.3.1** Target Time for ATCFM purposes
- **4.3.2** Reconciled Target Times for ATFCM and Arrival Sequencing
- **5.1.2** NewPENS: New Pan-European Network Service
- **5.1.3** Common SWIM Infrastructure Components
- **5.1.4** Common SWIM PKI and Cybersecurity
- **5.2.1** Stakeholders Internet Protocol Compliance
- **5.2.2** Stakeholders SWIM Infrastructures Components
- **5.2.3** Stakeholders SWIM PKI and Cybersecurity
- **5.3.1** Upgrade/Implement Aeronautical Information Exchange System/Service
- **5.4.1** Upgrade/Implement Meteorological Information Exchange System/Service
- **5.5.1** Upgrade/Implement Cooperative Network Information Exchange System/Service
- **5.6.1** Upgrade/Implement Flight Information Exchange System/Service supported by Yellow Profile
- **6.1.4** ATN B1 capability in Multi Frequency environment in aircraft domain
- **6.1.5** ATN B2 in aircraft domain

The following charts indicate the **percentage of fleet** operated by the survey respondents **already compliant with the PCP Regulation framework**, both in terms of aircraft equipage and flight crew trained, clustered by Family. Such inputs, which are considered as resulting into **a representative snap-shot of the current state-of-play** on airspace user side, have been elaborated on the basis of the feedback gathered from airlines headquartered in EU.


Airspace Users' Gaps – Overall Outlook
Family 1.2.1 – RNP Approaches with vertical guidance
RNP APCH LNAV
Aircraft Equipped 95%
Oper. Approval 82%
Flight Crew Trained 80%
RNP APCH LNAV/VNAV (with APV)
Aircraft Equipped 86%
Oper. Approval 69%
Flight Crew Trained 68%
RF Legs
Aircraft Equipped 76%
Oper. Approval 45%
Flight Crew Trained 48%
Family 1.2.4 – RNP1 Operations in high density TMAs (aircraft capabilities)
RNP 1
Aircraft Equipped 85%
Oper. Approval 57%
Flight Crew Trained 57%
The chart takes into account inputs gathered from Airspace Users (headquartered in EU) which replied to the SDM Survey; it indicates the percentage of fleet already compliant with PCP Regulation.
Family 6.1.4 - ATN B1 capability in Multi Frequency environment in aircraft domain
CPDLC VDLM2 / ATN B1
Aircraft Equipped 44%
Flight Crew Trained 35%
The chart takes into account inputs gathered from Airspace Users (headquartered in EU) which replied to the SDM Survey; it indicates the percentage of fleet already compliant with DLS Regulation.

5.2 DP Execution Status – Overview

The present chapter aims at providing an overview of the progress achieved by PCP-related projects awarded in the CEF framework. In particular, the contents of this chapter build on the analyses performed for the elaboration of the DP Execution Progress Report N. 2016-2, released on the 31st of May 2016, reflecting the progress status by the 31st of March 2016.

Specifically, the DP Execution Progress Report represents the reference document for this section as it outlines the status of the DP execution, which is provided hereinafter, and provides the detail of the main achievements and major misalignments.

For the time being, only Implementation Projects awarded as a result from the **CEF Transport General Call 2014** are considered, as they are being executed as part of the sole active implementation Action within the framework of the DP (Specific Grant Agreement for Implementation Projects 2014 – SGA IP 2014); in the future, information related to projects awarded in the next Calls will be included in the present section.

The **main figures** related to the implementation phase of the Action are reported below:

- **Period of execution**: from the 1st of January 2014 to the 31st of December 2020;
- **Number of Implementation Projects**: 84 (out of which 3 are split into two different parts due to application of different co-funding rates, making the total number of Implementation Projects rise to 87);
- **Number of multi-stakeholder projects**: 10;
- **Number of European Union Member States involved**: 23 Member States and 2 neighbouring States;
- **Number of Implementing Partners**: 45;
- **Number of planned milestones**: 1.258;
- **Number of planned deliverables**: 738.

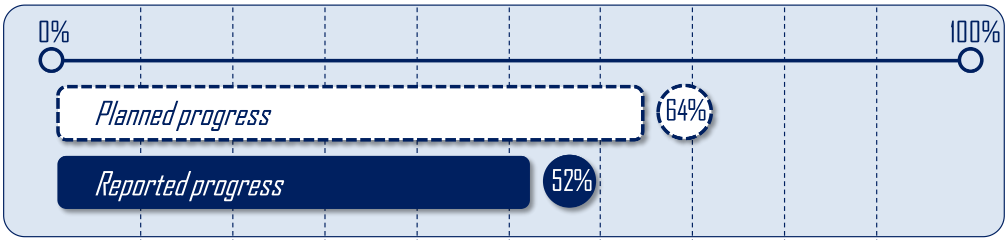
The Implementation Projects address **5 different ATM Functionalities** (AFs) as follows:

- **12** projects in AF1 ("Extended AMAN and PBN in high density TMA");
- **38** projects in AF2 ("Airport Integration and Throughput");
- **13** projects in AF3 ("Flexible ASM and Free Route");
- **5** projects in AF4 ("Network Collaborative Management");
- **16** projects in AF5 ("Initial SWIM").

The analysis of the **progress reported by the Implementing Partners**, and reviewed by the SDM, shows that the technical progress of the Action is substantially in line with the planned progress. The gap between planned and reported progress amounts to 12 percentage points (64% vs. 52%[41]); this does not result in shifting the overall end date of the Action, despite the postponement/rescheduling of some projects, milestones and

[41] The outlined progress computation does not take into account Action coordination and project management sub-activities, but only sub-activities including Implementation Projects. Furthermore, it is worth noting that the progress calculation takes into account, as "end date" of each AF, the expected "end date" of the last project included in each of them.

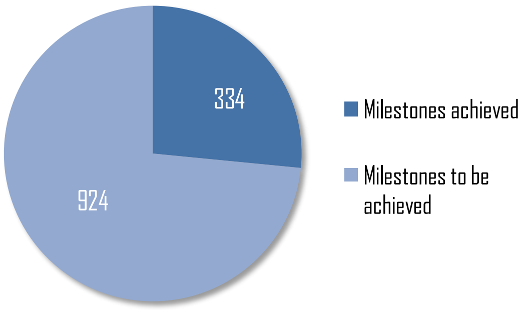
deliverables proposed by the Implementing Partners. Moreover, no Implementation Project is expected to end beyond the timeframe of the related AF as specified in the PCP, and no implications are envisaged in terms of timely achievement of the expected operational targets and benefits.

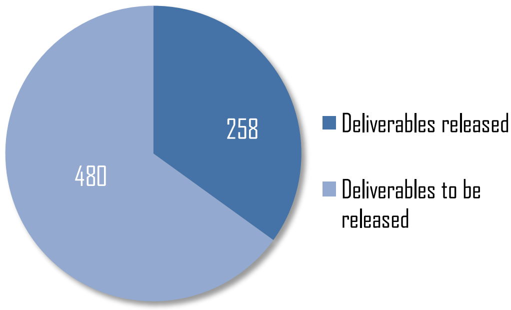


The planned and reported progress related to each AF is outlined in the following table.

	AF1	AF2	AF3	AF4	AF5
Planned progress	60%	68%	66%	65%	60%
Reported progress	53%	51%	55%	47%	53%

Concerning the **milestones**, 27% of them (334 out of 1.258) have been already achieved and validated by the SDM. With regards to **deliverables**, 35% of them (258 out of 738) have been successfully released by the Implementing Partners and validated by the SDM.





Both milestones' and deliverables' completion has been reported by the Implementing Partners though the submission of appropriate "supporting documents" to be verified and validated by the SDM. Likewise, supporting documents have been provided also to describe the reasons for postponements and deviations, with related rescheduling needs. On this last point, with specific reference to milestones and deliverables to be achieved and released by 31st of March 2016:

- 36% of planned milestones have been postponed;
- 34% of planned deliverables have been postponed.

It is worth noting that the postponements of milestones and deliverables do not affect the final date of the Action, which is safeguarded.

As outlined in the DP EPR N. 2016-2, the execution of Implementation Projects has brought to the achievement of **concrete results** providing tangible benefits to the aviation sector, and the community at large. Some projects have already been completed:

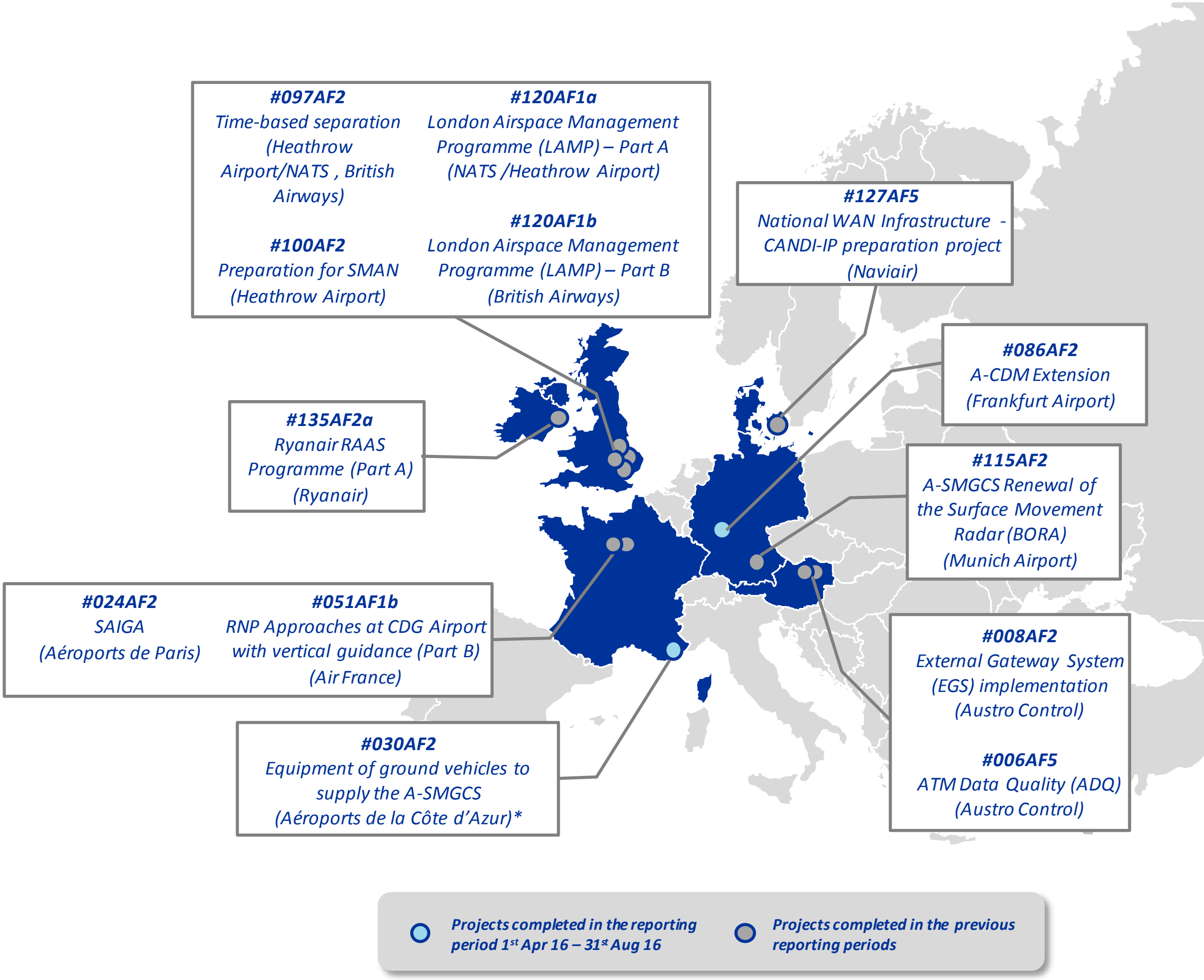
- **3 Implementation Projects in AF1**:
  - **#051AF1b**: RNP Approaches at CDG Airport with vertical guidance (Part B), deployed by Air France;
  - **#120AF1a**: London Airspace Management Programme (LAMP)- Part A, deployed by NATS and Heathrow Airport;
  - **#120AF1b**: London Airspace Management Programme (LAMP), deployed by British Airways;
- **6 Implementation Projects in AF2**:
  - **#008AF2**: External Gateway System (EGS) implementation, deployed by Austro Control;
  - **#024AF2**: SAIGA, deployed by Aéroports De Paris;
  - **#097AF2**: Time-based separation, deployed by Heathrow Airport, NATS and British Airways;
  - **#100AF2**: Preparation for SMAN, deployed by Heathrow Airport;
  - **#115AF2**: A-SMGCS Renewal of the Surface Movement Radar (BORA), deployed by Munich Airport;
  - **135AF2a**: Ryanair RAAS Programme (Part A), deployed by Ryanair;
- **2 Implementation Projects in AF5**:
  - **#006AF5**: ATM Data Quality (ADQ), deployed by Austro Control;
  - **#127AF5**: National WAN Infrastructure - CANDI-IP preparation project, deployed by Naviair.

In addition, two additional Implementation Projects in AF2 have been **successfully completed after the 31st of March 2016**:

- **#030AF2**: Equipment of ground vehicles to supply the A-SMGCS, deployed by Aéroports de la Côte d'Azur;
- **#086AF2:** A-CDM Extension, deployed by Fraport.

It is worth mentioning that the completion of the last Implementation Project will be reported in the next DP Execution Progress Report (DP EPR N. 2016-3) to be delivered by the 30th of September 2016.

The following map illustrates the **geographical distribution** of the 13 Implementation Projects completed until September 30th, 2016.



In addition, a comprehensive list of **risks** at AF level has been identified by the SDM in cooperation with the Activity leaders, building on the list of risks detailed in the DP 2015 and linking them to the risks at IP level reported by the Implementing Partners. *Ad-hoc* **mitigation actions** are associated to each risk[42].

[42] The list of risks and related mitigation actions is provided in the DP Execution Progress Report (DP EPR N. 2016-2)

5.3 SDM Synchronisation and Monitoring Approach

An overview of the key features of the synchronization and monitoring methodological approach applied by the SDM is provided in the following paragraph, along with the main results achieved. The synchronization approach applied by the SDM encompasses four phases, as outlined in the following chart.

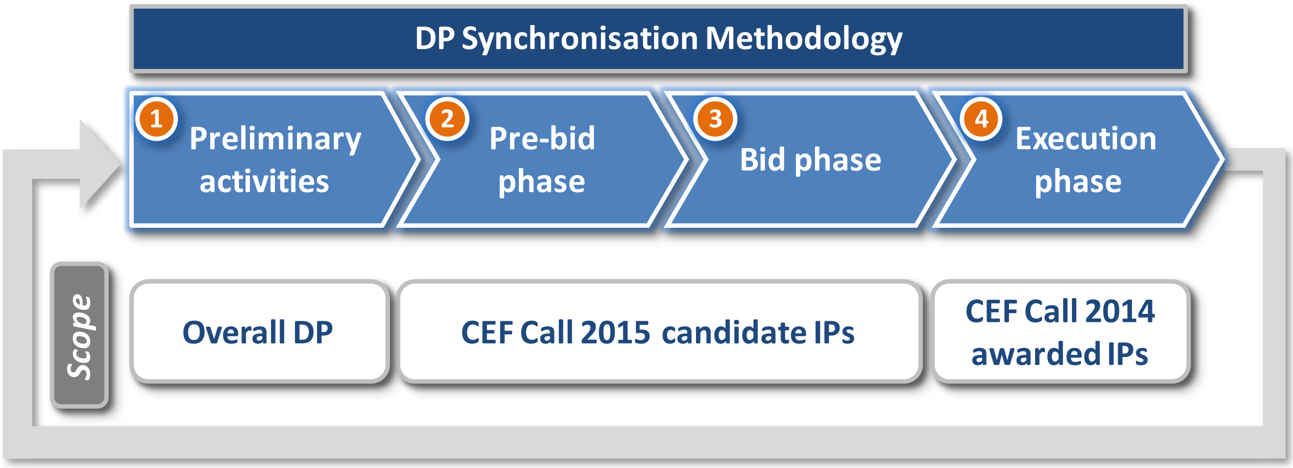


Fig. 47 – Overall DP Synchronization Methodology

In particular, the SDM methodology aims at ensuring that:

- the synchronization needs at Family level are effectively identified (phase 1);
- the content of indication of interests (phase 2) and IP templates (phase 3) submitted by the operational stakeholders is consistent with the need to ensure a synchronized deployment of the Programme (e.g. all the concerned stakeholders have been involved, the start and end dates of the candidate IPs are consistent, etc.);
- the implementation of awarded IPs (phase 4) is effectively monitored and the most suitable coordination mechanisms are identified and put in place by the SDM.

An overview of the methodology phases is provided hereinafter.

1. **Preliminary activities:** during the DP 2015 elaboration, some key principles to be applied to the overall Deployment Programme, in order to ensure its **synchronised implementation**, were identified by the SDM. In particular, the SDM has identified the sequencing and synchronization needs at Family level and defined the relevant milestones to be monitored to ensure a coordinated deployment. Specifically:
   - **synchronization needs at Family level:** the Families included into the DP have been analysed in order to identify the synchronisation needs related to the affected Stakeholders groups as well as to the sequencing of the Families themselves;
   - **milestones to be monitored to ensure a coordinated deployment:** in order to facilitate the synchronised and coordinated deployment of the Programme, the SDM identified a set of "common" milestones to be monitored during the execution phase; such set includes milestones to be applied to all the

IPs and milestones which are specific on the basis of the Family to which each IP belongs.

Such principles, defined in the context of the DP2015, have been reviewed before the elaboration of the DP 2016, in order to confirm their applicability.

2. **Pre-bid phase:** during the pre-bid phase, the "***Indications of Interest***" provided by the operational stakeholders have been analysed by SDM in order to **verify that synchronization needs at "IP level" have been taken in duly account**; it is worth noting that, during this phase, the **SDM interacted directly with operational stakeholders**, providing tailored suggestions and guidance in order to support stakeholders in the subsequent elaboration of IP proposals.

   The 2015 Indications of Interest exercise was conducted by SDM in the weeks ahead of the launch of 2015 CEF Call and resulted in a **massive participation of operational stakeholders, despite being on a completely voluntary basis**. More than **380 Indications of Interest** were submitted to SDM until the end of October **by all relevant Stakeholder categories** (i.e. ANSPs, Airspace Users, Airport Operators, MET Providers, Military authorities, Industry/providers, the Network Manager, EUROCONTROL, etc.). It is worth mentioning that also Military stakeholders demonstrated a significant participation, by submitting 91 Indications of interest under the coordination of European Defence Agency.

   The SESAR Deployment Manager provided each individual submitter with targeted formal feedback, having regard to technical elements, as well as to planning/sequencing of the initiatives.

   Specifically, the **activities performed by SDM aimed at**:

   - **Checking projects compliance to PCP Regulation and the association to the Programme's Families**, in order to ensure alignment of implementation projects with the DP and provisions for easier coordination and synchronisation by the SDM in the execution phase;
   - **Raising Quality of the future proposals to a common high level standard**, in particular through the harmonisation of descriptions of the projects and continuous interactions with the operational stakeholders to provide feedback and comments, setting the way for a more efficient monitoring of the activities;
   - **Supporting cooperation and dialogue among individual stakeholders** with closely related projects to **favour merging of IPs and defragmentation of PCP implementation** as a whole;
   - **Identifying how submitted initiatives planned to cover the identified Family level "gaps"** with an impact on the synchronisation dimension;
   - **Triggering proposals where relevant gaps identified in the Programme appeared partially uncovered**, with potential consequences on other implementation initiatives.

   Considering the success of the exercise for CEF Call 2015, the **SESAR Deployment Manager plans to replicate and enhance these activities in 2016**, in order to support Stakeholders in preparing the ground for future CEF Transport Calls. The available timeframe will also enable a **wider and less challenging roadmap**, which will give operational stakeholders **more time to take into account SDM suggestions in the project proposal elaboration** for upcoming Calls.

3. **Bid phase:** during the so called "bid phase", a significant effort was devoted by the SDM in the analysis of the ***"IP Templates"*** submitted by the operational stakeholders in the framework of the CEF Call 2015. The activities performed by SDM were mainly aimed at ensuring that the adequate level of detail was provided, with specific regard to monitoring milestones and synchronization/coordination needs. It is important to stress that, as for the "pre-bid" phase, also in the bid Phase continuous interactions with the operational stakeholders took place, also to enhance the quality of the proposal.
   The noteworthy participation of operational stakeholders to the initiative is demonstrated by the following figures:
   - **223** IP templates were submitted;
   - The total costs of candidate IPs exceed **€ 2.4 bln**, for a total funding need of around **€ 1.2 bln**.

   In order both to secure the most relevant projects for a timely and effective PCP implementation and to allow for the smooth execution of monitoring synchronization activities, the candidate projects were assessed by SDM through **5 key items**, identified on the basis of the Project view content included in DP 2015:
   - Continuity of implementation with projects already awarded through 2014 CEF Call ("Phase 2" of "Phase 1" projects which are already in the DP);
   - Level of readiness and nature of the relevant Family associated to the implementation activities;
   - Link to and coverage of one of the gaps identified in DP 2015;
   - Timeframe of the implementation initiative;
   - Multi-stakeholder involvement.

4. **Execution phase:** the SDM, in coordination with the Action leader and Activity leaders and supported by the PMO, has monitored the achievements of the 2014 CEF Call awarded projects and proposed, where necessary, the most convenient mitigation actions to ensure a synchronized implementation of the Programme. In particular, the **high-level principles** underpinning the execution phase as a whole are reported in figure 37, in the following page.

Time

It is of the outmost importance that deployment activities are performed within the agreed timeframe, in order to enable the timely implementation of the SESAR Pilot Common Project and the effective achievement of the expected performance benefits. It is crucial that delays in the implementation activities are promptly identified and managed, in order to avoid "domino effects" which could result in a postponement of the Activities and/or Actions deployment end dates.

Quality

The expected scope of the awarded Implementation Projects should be correctly fulfilled, in order to ensure the effective deployment of the SESAR Pilot Common Project. In such perspective, the "supporting documents" submitted by the Implementing Partners for reporting purposes should be compliant with the quality requirements set by the SDM, so as to enable a clear understanding of Implementation Projects' technical achievements.

Progress

A continuous monitoring of the progress achieved in the deployment activities is needed to ensure the timely, synchronized and coordinated implementation of the projects and, ultimately, of the PCP. Should the progress declared by Implementing Partners be substantially below the planned progress, it is key that interactions occur between the SDM and the affected parties to clearly identify the reasons for potential delays and agree on the most suitable mitigation actions.

Costs

Consistency between planned and actual costs represents an important indicator of the capacity of Implementation Projects to fulfill the envisaged deployment scope within the defined timeframe. In such perspective, significant misalignments in terms of overspending and underspending at project level should be identified, analysed and monitored during the Actions.

Fig. 48 – High-level Principles

The monitoring and coordination activities performed by the SDM leveraged on data provided by the operational stakeholders, which led to the elaboration of the first DP Execution Progress Report (see Chapter 5.2). Moreover, the coordinating activities performed by the SDM facilitated the elaboration of the Action Status Reports by the Implementing Partners, through the provision of guidance and support.
The monitoring activities performed by the SDM were undertaken in line with the principles described in the "Guidelines for Execution Phase"; moreover, such principles were also described in the DP 2015, in which the monitoring process was outlined in terms of "what", "who", "how" and "when".

In particular, the analysis of the progress achieved by the IPs was made possible through the submission of "supporting documents" by the operational stakeholders, providing:

- Information on tasks, milestones and deliverables accomplished;
- Rationales for delays in tasks, milestones and deliverables.

In such perspective, the SDM, supported by the PMO, has gathered from the operational stakeholders the relevant information concerning:

- **Tasks**: interactions have been performed to gather the progress of all the **tasks (537)** expected to be started within the **87 Implementation Projects** of the **CEF 2014 Action**; for the completed tasks, as well as for tasks expected to be completed by the 31/12/2015 but not accomplished yet, the SDM has analysed the "supporting documents" submitted by the operational stakeholders, in order to verify the actual results achieved and, where necessary, the rationales for delays;
- **Milestones:** the SDM has verified, through the relevant supporting documents submitted by the operational stakeholders, the actual achievement of milestones expected to be accomplished by the 31st of December 2015; such activity included both the milestones which are specific for each IP and the "common milestones" proposed by the SDM (in particular, those to be applied by all the IPs and those which are "Family specific"); in such framework, the SDM has:
  - Reviewed and validated the achievement of **255 milestones** accomplished by the end of 2015;
  - Interacted with the operational stakeholders to investigate delays in the achievement of expected milestones and agree on the relevant mitigation actions.
- **Deliverables:** the SDM has validated the completion of **195 deliverables** through the analysis of the relevant supporting documents provided by the operational stakeholders; moreover, in case of delays in the submission of deliverables expected to be completed by the 31st of December 2015, the SDM has identified, through the submitted supporting documents, the reasons for the delays, analysed potential impacts and defined mitigation actions;
- **Costs:** the SDM, supported by the PMO, has gathered and analysed the actual costs sustained by the operational stakeholders in the 2014 and 2015 timeframe, in order to detect misalignments vis-à-vis the planned costs; in such circumstances, the relevant justifications have been requested to the implementing partners and analysed by the SDM.

It is worth noting that:

- the gathering of consistent information concerning the IPs achievements has been made possible through the **active involvement** of **all the parties** within the **Action** (SDM, Implementing partners, Action leader, Activity leaders, PMO) and continuous interactions among them;
- the collection of monitoring information has been performed through the **STAR tool,** which represents the main reporting and communication tool within the Action; in particular, a significant effort was devoted by SDM in the configuration, implementation and testing of the tool, in order to create an effective common platform for monitoring and coordinating the DP across Europe;
- **67** "discrepancies" (i.e. potential misalignments between actual and planned data) have been identified starting from the gathered data and evaluated by the SDM in order to assess their impact and define the most suitable mitigation actions.

6. RISK AND MITIGATION ACTIONS

6. Risks and Mitigation Actions

The following tables have been developed by SDM in order to present those risks with higher relevance to the successful, synchronized and timely implementation of the Deployment Programme and the overall PCP, which are known as Risks at Programme Level. Some of the risks included in this Chapter might look like targeted at a single AF. However, the reason for this inclusion is their transversal nature and their potential capacity to endanger the successful Programme implementation.

These risks have been identified building on the lessons learnt during the elaboration of the DP2016, and on the outputs of the coordination between SDM and both operational and non-operational stakeholders.

Risks and Mitigation Actions are presented in the following tables, which highlight:

- High level definition of the risk;
- Indication of their potential impact on the PCP implementation and probability of occurrence. Each element will be scored Very Low, Low, Medium, High or Very High, based on the qualitative assessment of the SDM experts. This will help characterize the overall risk in the table below;
- Major objectives likely to be impacted;
- Main consequences and/or impacts;
- Mitigation actions to be implemented by the SDM and/or other stakeholders.

The SDM has liaised directly with those stakeholders identified as potential candidates to undertake mitigation actions and will continue to do so during the Programme implementation. In parallel SDM is also working with SJU in order to ensure that the high level risks in the DP connects well with the risks in the ATM MP for what concerns implementation.

<table>
<tr><th colspan="2" rowspan="2">Risk</th><th colspan="5">Impact</th></tr>
<tr><th>Very Low</th><th>Low</th><th>Medium</th><th>High</th><th>Very High</th></tr>
<tr><th rowspan="5">Probability</th><th>Very High</th><td rowspan="3">Low Level Risk</td><td rowspan="2">Medium Level Risk</td><td>High Level Risk</td><td colspan="2" rowspan="3">High Level Risk</td></tr>
<tr><th>High</th><td rowspan="3">Medium Level Risk</td></tr>
<tr><th>Medium</th><td rowspan="3">Low Level Risk</td></tr>
<tr><th>Low</th><td rowspan="2">No Risk</td><td rowspan="2">Medium Level Risk</td><td>High Level Risk</td></tr>
<tr><th>Very Low</th><td>Low Level Risk</td><td>Medium Level Risk</td></tr>
</table>

Fig. 49 – DP Risks: Probability/Impact Matrix

<table>
<tr><th colspan="3">Risk n.1 – Implementation Delay</th><th>High Level Risk</th></tr>
<tr><td>Objectives affected by the risks</td><td colspan="3">Timely PCP implementation, timely release of associated benefits</td></tr>
<tr><td>Impact</td><td>Very high</td><td>Probability</td><td>Medium</td></tr>
<tr><td>Consequences / Impacts</td><td colspan="3">The gap analysis showed that there are families that are not implemented or just partially implemented in the PCP geographical scope. The impact of the late implementation of the Families identified as high relevance could lead to a potential delay of the overall PCP implementation. Furthermore, in some cases the deployment of pre-requisites is lagging behind, with potential impacts on the subsequent investment end dates. The analysis has been performed taking into consideration all projects awarded to CEF Call 2015, as as some implementation initiatives submitted in CEF Call 2015 that have not been awarded with funding by INEA might be postponed or even cancelled by operational stakeholders. If this situation occurs, the timely delivery of performance benefits would be delayed accordingly. Additionally, late or missed investment could also have a negative impact on other stakeholder categories</td></tr>
<tr><th colspan="4">Mitigation Actions</th></tr>
<tr><th colspan="3">To be performed by SESAR Deployment Manager</th><th>Proposed to be performed by other Stakeholders</th></tr>
<tr><td colspan="3">On-going:
▪ Strong promotion of the Deployment Programme together with dedicated local face to face meetings between SDM and “concerned stakeholders” and/or group/platform of stakeholders (e.g. at airport level). Stress also at local level the need to close the gaps in the high readiness families as a priority;
▪ Strong promotion and information initiatives in order to emphasize the need to proceed with the deployment of pre-requisites and enablers for the Pilot Common Project;
▪ Preparation and distribution of information packages to the operational stakeholders to support/facilitate the submission of the IPs both at technical and financial/administrative level;
▪ Support/facilitate the submission of proposals through a dedicated and timely process (anticipated as much as feasible) on Indications of Interest;
▪ Facilitation of stronger local partnership between the operational stakeholders in preparation for the upcoming CEF calls;
▪ Request demonstration of local coordination with other relevant stakeholders by projects leaders prior to projects submission to CEF calls;
▪ Enhancement of the transversal approach and buy in among airspace users, airports and ANSPs;
▪ Synchronisation / coordination activity on identified projects by SDM;</td><td>To be performed:
DG MOVE to ensure that future calls take place in order to maintain a flow of IPs throughout CEF timeframe and to support full PCP implementation (including its pre-requisites).</td></tr>
</table>

▪ Close correlation between requests for payment by the implementation projects to SDM and their effective transmission to INEA by SDM. For not awarded projects, SDM has organized dedicated meetings and/or established communication flows in order to ascertain why a project was not awarded and to check whether it can be successfully submitted within next CEF Calls. SDM has also liaised with the operational stakeholders in order to check if the investments will be carried on, postponed and/or cancelled. The monitoring of the progress of the projects will be however carried out through the overall SDM Monitoring Exercise.	

<table>
<tr><th colspan="3">Risk n.2 – PCP Implementation out of SESAR Deployment FPA</th><th>High Level Risk</th></tr>
<tr><td>Objectives affected by the risks</td><td colspan="3">PCP Benefits</td></tr>
<tr><td>Impact</td><td>High</td><td>Probability</td><td>Medium</td></tr>
<tr><td>Consequences / Impacts</td><td colspan="3">Within its current mandate, SDM should prioritize its effort to monitor the progress of implementation only for those projects awarded through SESAR deployment FPA. Should a significant part of PCP be implemented outside SESAR deployment FPA and not properly monitored by SDM, this could lead to incomplete picture of PCP’s implementation status and to an impact on overall performances analysis.</td></tr>
<tr><th colspan="4">Mitigation Actions</th></tr>
<tr><th colspan="3">To be performed by SESAR Deployment Manager</th><th>Proposed to be performed by other Stakeholders</th></tr>
<tr><td colspan="3">On-going:
SDM is performing a monitoring exercise within the framework of the DP 2016 elaboration for all the Families of the Programme with the support of the operational stakeholders: this exercise engages and both stakeholders already involved in the SESAR FPA and stakeholders which have not submitted Implementing Projects so far and therefore are outside SESAR FPA. That is to keep track of all implementation initiative, both within and beyond the CEF framework and the SDM coordination.
The approach followed by SDM and consulted through the Stakeholders Consultation Platform has resulted into an overall view of PCP deployment status in Europe. The report will be produced annually and embedded in each DP release, as part of the DP Monitoring View.</td><td>To be performed:
EC to take formal actions to facilitate the gathering of monitoring data by SDM, especially from operational stakeholders outside FPA.</td></tr>
</table>

Risk n.3 – Failure to adequately achieve full military involvement			Medium Level Risk
Objectives affected by the risks	Full and timely PCP implementation, associated benefits		
Impact	High	**Probability**	Low
Consequences / Impacts	The lack of adequate military involvement, both at European and local level, could lead to an insufficient buy in of the military community and to a "backlog" concerning the necessary investments in line with PCP and DP priorities.		

Mitigation Actions	
To be performed by SESAR Deployment Manager	**Proposed to be performed by other Stakeholders**
Completed ▪ The single communication channel between SDM and EDA has been reinforced in order to facilitate and accelerate dialogue with the military authorities; ▪ Cooperative Arrangement with EDA has been signed on 29th June 2015; ▪ The cooperation with EDA on several streams of activity has been enhanced, e.g. EDA representatives are directly involved in the development of the Deployment Programme. **On-going:** ▪ Continue to liaise with EDA to further facilitate local coordination between the local civil stakeholders (level 3) and the military authorities; ▪ Continue to support EDA in the promotion of the PCP and the DP amongst military authorities; ▪ Identify and highlight the areas where military projects can be expected in the context of DP 2016 and subsequent versions; ▪ Support the civil and military implementing partners with proposed processes enabling the local civil/military coordination.	**On-going:** EDA to continue with the promotion of the PCP amongst military authorities. Military authorities to submit projects to CEF calls (starting with an Indication of Interest), according to the context set by DP 2016 and subsequent versions.

Risk n.4 – Failure to provide required standards and regulations on time			High Level Risk
Objectives affected by the risks	Timely PCP implementation, associated benefits		
Impact	High	**Probability**	Medium
Consequences / Impacts	Some of the families necessary for the full PCP implementation are not ready yet for deployment as indicated by their planned completion date of V3-phase (Pre-Industrial Development & Integration of E-OCVM – European Operational Concept Validation Methodology) and/or not covered by appropriate standards (ESOs and EUROCAE responsibilities), specifications and dedicated means of compliance (EASA responsibility). This issue could lead to a non-harmonized deployment, a lack of interoperability, integration problems and consequently to the need of reinvestments at a later stage to upgrade the deployed solutions to the required standards. Ultimately, this could lead to impossibility to go operational and deliver the expected benefits.		

Mitigation Actions

To be performed by SESAR Deployment Manager	Proposed to be performed by other Stakeholders
Completed: SDM has signed the Cooperative Arrangement with EUROCAE in March 2016. **On-going:** Continue to reinforce the synergies with: ▪ SJU for the prioritization of the validation exercises and the Large Scale Demonstrations; ▪ EASA, EUROCAE and European Standardization Organizations to align their work programmes with the deployment priorities, as identified in the European Standardisation Rolling Development Plan (RDP); ▪ EASCG as the main coordination body for relevant standardisation activities, bringing together all relevant organisations; ▪ Manufacturing industry and operational stakeholders to seek their assistance in contributing to the timely development of the necessary standards and marketing of the necessary hardware and software; ▪ ICAO for standards and recommended practices, to ensure their timely provision as well as the alignment of their content with the deployment priorities.	**On-going:** Relevant stakeholders to refer to and use existing standards and regulatory material and/or updated material to the most possible extent to avoid new rulemaking and/or standardisation tasks. **To be performed:** EUROCAE members to adequately promote and provide resources to the working groups involved in the development of the required standards. EC to promote stronger commitment by key players for timely delivery and necessary funding to bodies involved in critical development of standards and regulation to secure necessary resources.

Indeed, SDM is working closely with the SJU, EASA and EUROCAE in order to ensure alignment of their work programmes with the Deployment Programme needs and avoid implementation delays. With respect to ICAO SARPs and guidance material, SDM will work closely with the members of ICAO working groups nominated by European States, under the guidance of EC and in close cooperation with SJU. SDM is also strengthening the cooperation with the operational stakeholders via the SCP, involving and updating them on the monitoring of the delivery-status and progress of SDM’s mitigation actions. SDM is also connecting key players in specific working groups and workshops to foster cooperation and find solutions to issues linked to delays in standardization and industrialisation. **To be performed:** Study and prepare a proposal to facilitate and encourage the participation of operational stakeholders on high-priority regulation activities by relevant EUROCAE WGs. SDM will work, under the guidance of EC and in close cooperation with SJU, with those members of ICAO working groups which have been nominated by European States. A Cooperative Arrangement with EASA is going to be signed as well as several Cooperative Arrangements with Manufacturing Industry.	

<table>
<tr><th colspan="3">Risk n.5 – Failure to ensure global interoperability</th><th>Medium Level Risk</th></tr>
<tr><td>Objectives affected by the risks</td><td colspan="3">Harmonized PCP implementation, associated benefits</td></tr>
<tr><td>Impact</td><td>Medium</td><td>Probability</td><td>Medium</td></tr>
<tr><td>Consequences / Impacts</td><td colspan="3">The consequences of the lack of global interoperability are the potential misalignment for avionics and/or processes between the different aviation regions in the world (e.g. between SESAR / NextGen, as the ATM modernisation programmes), potential misalignment between the different avionics vs. ground systems and amongst ground systems themselves. The potential impact could be:
- Civil and military Airspace users having to buy, certify, install, maintain, train and carry redundant systems;
- Increased costs and workload for civil and military airspace users, as well for airports and ANPSs;
- Additional costs due to misalignments could overshadow operational benefits and efficiencies.

This risk is strongly linked to the Risk n. 4.</td></tr>
<tr><th colspan="4">Mitigation Actions</th></tr>
<tr><th colspan="3">To be performed by SESAR Deployment Manager</th><th>Proposed to be performed by other Stakeholders</th></tr>
<tr><td colspan="3">Completed:
SDM has appointed an International Relations Manager to handle this specific risk.
On-going:
SDM and SJU coordinate with FAA (NextGen and ATO) under the EU/US MoC on this specific topic to ensure adequate actions in securing requirements and timelines of major ATM operation & technical changes through alignment of Master Plan and Deployment Programme with NextGen Implementation Plan.
With respect to ICAO activities on global harmonisation, SDM is working closely with the members of the ICAO working groups nominated by European States as required, under the political guidance of EC and in close cooperation with SJU, to ensure timely and content alignment with the European deployment priorities. Special focus is being given to European deployment alignment with ICAO GANP/ASBUs update activities.
Furthermore, SDM is seeking assistance from the manufacturing industry (notably airborne equipment manufacturers) on the issue of global interoperability and alignment of industrialization and deployment roadmaps.</td><td>On-going:
SJU with SDM promoting SESAR requirements based on full life cycle view, towards FAA/NextGen and ICAO GANP/ASBU activities.
To be performed:
Relevant stakeholders to adequately promote the SESAR deployment needs to the working groups involved on European and global level.
EC to promote interoperable and synchronized mandates, with the US and globally. High priority to be given on Data Link Systems and Surveillance systems implementation strategies.</td></tr>
</table>

Risk n.6 – Misalignment between CEF co-funding profile and readiness for implementation			High Level Risk
Objectives affected by the risks	Timely PCP implementation, associated benefits		
Impact	High	**Probability**	Medium
Consequences / Impacts	Given, on the one hand, the uncertainty regarding CEF co-funding availability after CEF calls 2015, and on the other hand the outcomes from the gap analysis as laid down in the DP2016, clearly stating the need for more IPs, it would be premature to say that SESAR deployment has been concluded with CEF calls 2015. Significant investment needs remain in order to complete PCP implementation. Additionally, DP 2016 confirms that, still in 2016, not all families in the DP are ready for implementation. Some families might even require 2-3 years before they can be classified as high readiness for implementation by SDM. The conjunction of both constraints could lead to a significant time gap in PCP implementation due to the need to wait, after 2015-2016, until next financial period (2021-2027) to resume PCP implementation.		

Mitigation Actions	
To be performed by SESAR Deployment Manager	**Proposed to be performed by other Stakeholders**
On-going: SDM informed the EC about the importance of grants as a mean to secure the network benefits associated to the implementation of the PCP. They should continue in the critical period 2017-2020.	**To be performed:** Align co-funding profile (calls and available co-funding) to foreseeable evolution of families' readiness for implementation, ensuring smooth implementation of PCP throughout the whole CEF period. This option would require EC to take action to secure part of the SESAR deployment co-funding beyond CEF midterm review in 2017.

<table>
<tr><th colspan="3">Risk n.7 – Misalignment between DP and operational stakeholders’ investment plans</th><th>Medium Level Risk</th></tr>
<tr><td>Objectives affected by the risks</td><td colspan="3">Timely PCP implementation, associated benefits</td></tr>
<tr><td>Impact</td><td>Medium</td><td>Probability</td><td>Low</td></tr>
<tr><td>Consequences / Impacts</td><td colspan="3">Investment plans of operational stakeholders are not yet aligned with DP/PCP needs. This could happen due to an insufficient awareness of the regulation and funding opportunities or simply because not willing to invest (different business priorities).
As a consequence, this could result in a lack of IPs submitted to INEA under SDM coordination as well as a general lack of deployment initiatives that could jeopardize the full and timely PCP implementation.</td></tr>
<tr><th colspan="4">Mitigation Actions</th></tr>
<tr><th colspan="2">To be performed by SESAR Deployment Manager</th><th colspan="2">Proposed to be performed by other Stakeholders</th></tr>
<tr><td colspan="2">On-going:
SDM has directly contacted stakeholders to stress the importance of aligning their internal investment plans with gaps described in DP2015.
SDM continues with the engagement of implementation partners at executive level to raise their awareness on the importance of DP realisation and on the opportunity to obtain CEF co-funding in order to facilitate their compliance with PCP Regulation.
SDM has started the promotion of PCP/DP priorities at local level and initiated a dedicated Indications of Interest Exercise in June.
To be performed
Annex C and the Chapter 5 of this document contain a list of all gaps per each of the countries included within the PCP geographical scope, as defined by the Regulation (EU) n. 716/2014 and by the Deployment Programme</td><td colspan="2"></td></tr>
</table>

<table>
<tr><th colspan="3">Risk n.8 – Late definition / failure to establish SWIM governance</th><th>Medium Level Risk</th></tr>
<tr><td>Objectives affected by the risks</td><td colspan="3">Timely and harmonized PCP implementation, associated benefits</td></tr>
<tr><td>Impact</td><td>High</td><td>Probability</td><td>Medium</td></tr>
<tr><td>Consequences / Impacts</td><td colspan="3">Implementation of SWIM-technology could be delayed significantly and/or SWIM interoperability could be substantially impaired due to a lack of SWIM-governance in place.</td></tr>
<tr><td colspan="4">Mitigation Actions</td></tr>
<tr><td colspan="3">To be performed by SESAR Deployment Manager</td><td>Proposed to be performed by other Stakeholders</td></tr>
<tr><td colspan="3">Completed:
Following a specific task by European Commission, SDM has established and chairs a dedicated SWIM Governance Focus Team, with the involvement of Network Manager, SESAR Joint Undertaking and the Project Manager of the significant project submitted in the Framework of CEF Call 2015, called “SWIM Governance Deployment” (not awarded by EC).
The Focus Team members supported SDM in drafting a SWIM Governance strategy detailing an action plan to timely implement it, now featured within the present version of the DP.

To be performed:
Execution of the relevant actions in accordance to what detailed in the Action Plan reported in the published “SWIM Governance Strategy” document.</td><td>To be performed:
Airports, ANSPs, Airspace users, Military and MET services to propose a common project related to SWIM Governance for CEF Call 2016.</td></tr>
</table>

<table>
<tr><th colspan="3">Risk n.9 – Risk at overall AF6: Initial Trajectory Information Sharing
NEW RISK</th><th>Medium Level Risk</th></tr>
<tr><td>Objectives affected by the risks</td><td colspan="3">Timely PCP implementation, associated benefits</td></tr>
<tr><td>Impact</td><td>Medium</td><td>Probability</td><td>Medium</td></tr>
<tr><td>Consequences / Impacts</td><td colspan="3">DLS is an essential prerequisite to business trajectory (i4D in PCP and 4D later) which is the backbone of SESAR operational concept. In short, no DLS would mean no SESAR, no SESAR benefits and failure to achieve SES high level goals.</td></tr>
<tr><th colspan="4">Mitigation Actions</th></tr>
<tr><th colspan="2">To be performed by SESAR Deployment Manager</th><th colspan="2">Proposed to be performed by other Stakeholders</th></tr>
<tr><td colspan="2">Completed:
SDM has developed the “SDM Data-Link Service Implementation Strategy” which is now part of the Deployment Programme.
To be performed:
In addition to defining a deployment strategy, SDM will coordinate its execution as “DLS implementation project manager”. SDM will therefore act “in substitution” of a Technical Service of a potential future DLS provision organisation as long as not ready to take over.</td><td colspan="2">On-going:
SJU - SDM are cooperating specifically on datalink to share and align validation results, deployment views and possible deployment approaches.
To be performed:
For 2016 CEF Call, the SDM strongly encourages the submission of implementation projects as described in chapter 4.7 of the “SDM Data-Link Service Strategy”.</td></tr>
</table>

Risk n.10 – Late delivery of IOP SESAR Solutions	NEW RISK		Medium Level Risk
Objectives affected by the risks	Timely PCP implementation, associated benefits		
Impact	Medium	**Probability**	Medium
Consequences / Impacts	The PCP regulation requires the provision of flight information exchanges through two different SWIM Technical Infrastructure (TI) profiles: • Yellow TI profile for Flight information exchanges which do not require real time performance; • Blue TI profile for the network intensive and real time exchanges of tactical Flight information data between ACCs and the Network Manager. The Blue profile is currently encountering some delays in its operational validation and consequently the update of ED 133 is being postponed until these validations are over. The initial IOP (iIOP) from SESAR 1 will serve as the basis for validating the PCP IOP standard which will be published in 2020 by EUROCAE as ED-133 Revision. The ED-133 update proposals will be provided by the SJU in the form of a deliverable. These deliverables will feed the work of EUROCAE WG-59 who will remain in charge of publishing ED-133 revision A in 2020.		

Mitigation Actions

To be performed by SESAR Deployment Manager	Proposed to be performed by other Stakeholders
On-going: Work in collaboration with SJU in order to monitor the on-going work, considering the priorities set by the PCP in terms of content and time, to synchronise the IOP validation and deployment roadmaps. Inform the SJU on deployment perspective and criticalities. **To be performed:** Once the solution is ready, assess the industry's readiness for implementation.	**On-going:** SJU has set up an IOP Task Force to mitigate the risk including a close monitoring of the new roadmap as follow: an initial IOP will be delivered end 2016 within SESAR 1 framework and the complementary R&D is integrated into SESAR 2020 for a delivery of the complete SESAR Solution in 2018. SJU will continue to inform SDM on the progress of these actions

<table>
<tr><td colspan="3">Risk n.11 – Lack of product development NEW RISK</td><td>Medium Level Risk</td></tr>
<tr><td>Objectives affected by the risks</td><td colspan="3">Timely PCP implementation, associated benefits</td></tr>
<tr><td>Impact</td><td>Medium</td><td>Probability</td><td>Medium</td></tr>
<tr><td>Consequences / Impacts</td><td colspan="3">The industrialisation decision for developing the expected capabilities may not be made by the manufacturers if an adequate return on investment is not envisaged, even if the standards are available. This might be the case, in particular, for airborne functions where a mandate is not put in place.</td></tr>
<tr><td colspan="4">Mitigation Actions</td></tr>
<tr><td colspan="3">To be performed by SESAR Deployment Manager</td><td>Proposed to be performed by other Stakeholders</td></tr>
<tr><td colspan="3">On-going:
Activate cooperative arrangements and/or other means of cooperation with the Manufacturing Industry, in order to align expectations and share a common view of the capabilities required for deployment.
To be performed:
Identify alternative funding and financing mechanisms to support this development.</td><td></td></tr>
</table>

Risk n.12 – Deployment of SESAR Solutions leads to unaddressed cyber-security vulnerabilities (NEW RISK)		High Level Risk	
Objectives affected by the risks	Timely PCP implementation, associated benefits		
Impact	High	**Probability**	Medium
Consequences / Impacts	Contrary to the traditional ATM systems, that used to work as a network of bespoken systems, the level of automation and interoperability within ATM, besides the usage of COTS systems and open standards, has increased. Moreover, the interactions between traditional actors and also with new ones have also grown. These changes and technological improvements may, however, introduce vulnerabilities into the systems in the form of cyber-security risks, which is even more significant with the introduction of internet based solutions. As even low impact incidents could erode trust in the system, the implementation roadmap must ensure that delivered solutions are secure as a whole, thanks to a secure integration into operational ATM systems (including legacy systems), contributing as a result to a resilient European ATM system.		
Mitigation Actions			
To be performed by SESAR Deployment Manager		**Proposed to be performed by other Stakeholders**	
On-going: DP2016 has identified those families which present a need of cybersecurity standards and regulations. The available cybersecurity standards and regulations can be found in Chapter 3 of this document.		**To be performed:** EC to ensure efforts on ATM cyber-security are coordinated, and assess policy options for strengthening cyber-security and resilience. SJU to establish principles and processes for ensuring that cyber-security and resilience is included appropriately within the SESAR work programme.	

Risk n.13 – Full Operational Capability misalignment		NEW RISK	Medium Level Risk
Objectives affected by the risks	Timely PCP implementation, associated benefits		
Impact	Medium	**Probability**	Medium
Consequences / Impacts	Dependencies between Families may cause misalignment between their Full Operational Capability target dates. For example, whilst some sub-functionalities in AF2 are supposed to be implemented by 2024, they are also a pre-requisite for another AF/sub-AF to be deployed by 2021.		

Mitigation Actions	
To be performed by SESAR Deployment Manager	**Proposed to be performed by other Stakeholders**
On-going: Identify dependencies amongst Families which may cause misalignment between their FOC target dates. Inform applicants about the consequences and SDM proposed mitigation strategies. Liaise with EC to present the results of the analysis and the possible impact on timely and full PCP deployment.	

Risk n.14 – Lack of buy-in of the DP 2016 from Operational Stakeholders			Medium Level Risk
Objectives affected by the risks	Timely PCP implementation, timely release of associated benefits		
Impact	High	**Probability**	Low
Consequences / Impacts	Lack of buy-in of DP 2016 would require negatively affect the level of engagement and involvement in the Deployment of the Pilot Common Project and in the overall ATM modernization effort. Such low engagement could result in lower investments (or no investments), thus affecting the overall implementation of the PCP.		

Mitigation Actions	
To be performed by SESAR Deployment Manager	**Proposed to be performed by other Stakeholders**
In progress SDM has successfully set up the Stakeholder Consultation Platform in order to consult, involve and engage all operational stakeholders impacted by the Pilot Common Project regulation. Dedicated thematic sub-groups meeting and Steering Group meeting have been regularly met. During the consultation process, the DP 2016 Intermediate and Final Draft took on board most of the comments and suggestions formulated during the first and second consultation cycle. An additional cycle of consultation has been performed before the release of the final release of DP 2016 in September, in order to discuss and take on board comments coming from the operational stakeholders.	

7. FUTURE EVOLUTIONS OF THE DP

7. Future Evolutions of the DP

This Chapter looks forward at the **future releases of the Deployment Programme** and aims at anticipating the major features of its annual updates, both content and process wise.

The drafting process of the Deployment Programme 2017 will be inspired by the **same principles that underpinned the delivery of both DP 2015 and DP 2016**; to this end, the **cooperative effort undertaken with SESAR Joint Undertaking, European Defence Agency and Network Manager** will be carried out also for the upcoming release, aiming at coordinating the different views and building a more robust and reliable document. SDM will also liaise with all **other relevant non-operational stakeholders** involved within the Deployment Phase, capitalizing on their specific role and expertise, and accordingly to the content included in the respective Cooperative Arrangements.

Moreover, it is embedded within the overall SDM approach that the **operational stakeholders**, being the true recipients and beneficiaries of the Programme itself, shall **continue to be involved as much as possible**. It is therefore envisaged to further improve and streamline the current Consultation Process, with specific regard to the activation of the Stakeholders Consultation Platform to consult and gather comments/feedback from operational stakeholders.

Although not altering its structure or the role of the most relevant sections, Deployment Programme 2017 will represent a valuable improvement of the DP 2016 from a content point view; as it was done for the 2016 edition, all of the Programme sections will undergo a review/update process, with the clear and durable objective of supporting the readers in their deployment of the Pilot Common Project throughout Europe. To this end, whilst all sections will be reviewed, the main envisaged updates are reported below:

- **Project View**: as it was performed in DP 2016, all Families description will be checked and – if necessary – updated, with specific regard to the level of readiness for implementation; taking into account the status of deployment across Europe, the potential improvement of the technological maturity of the elements associated to the Families (e.g. progress in the validation of activities, availability of standards and/or AMCs, etc.), it will be evaluated whether some of the "Low" or "Medium" readiness-marked Families could evolve to a higher level.
  Furthermore, depending on the progress of the implementation activities (both within and outside the CEF framework), the list of gaps, and the associated percentage of coverage will be updated and refined.

- **Performance View:** the Performance View of the Programme will be constantly updated within the future yearly releases, following the approach presented within Chapter 4 of the present document. In this perspective, both the assessment of the overall contribution to performance and the cost-benefit analyses associated to projects awarded in the CEF Call 2015 will be featured in DP 2017, starting from its Initial Draft.

- **Monitoring View**: the monitoring exercise launched by SDM on March 4th is expected to be carried out on a yearly basis, aiming at "*monitoring implementation*

of the Deployment Programme" (Regulation (EU) n. 409/2013, art. 9(h)". As such, this exercise will be performed again in 2017, engaging all operational stakeholders involved in the implementation of the Pilot Common Project and aiming at reporting on the progress of the overall PCP implementation, both taking into account the deployment activities performed within and beyond the CEF framework. Such update will be reported also in the Annex C of the Programme.
Moreover, as in DP 2016, the monitoring view will include the most relevant elements and information stemming from the coordination and synchronization activities performed by SDM with regard to the Implementation projects awarded in the framework of the 2014 and 2015 CEF Transport Call.

- **Risks and Mitigation Actions:** in accordance to its remit, SDM will continue to monitor and report on the high-level risks that might affect the implementation of the Deployment Programme and the achievement of the associated performance benefits; in this respect, the current list of risks and the progress of the associated mitigation actions will be constantly monitor and – if needed – expanded and enriched;

Furthermore, all **Annexes** of the Programme will be updated and enhanced.

8. LIST OF ACRONYMS

8. List of Acronyms

Acronym	Meaning
A-CDM	Airport-Collaborative Decision Making
AA	Activity Areas
ACC	Area Control Center
ACG	Austro Control
ACH	ATC flight plan Change Message
ACSP	Air Communication Service Provider
ADIDS	Aeronautical Data Information Display System
ADP	Aéroports de Paris
ADQ	Aeronautical Data Quality
ADS-B	Automatic Dependent Surveillance – Broadcast
ADS-C	Automatic Dependent Surveillance – Contract
ADV	German Airports Association
AERODB	Aeronautical Database
AF	ATM Functionalities
AFP	ATC Flight Plan
AFR	Air France
AFUA	Advanced Flexible Use of Airspace
AGDL	Air Ground Data Link
AIDA	Aeronautical Information Data-handling-system Austria
AIM	Aeronautical Information Management
AIRM	Aeronautical Information Reference Model
AIS	Aeronautical Information Service
AIX	Aeronautical Information Exchange
AIXM	Aeronautical Information Exchange Model
AMAN	Arrival MANager
AMC	Acceptable Means of Compliance
AMHS	ATS Messages Handling System
ANS-CR	Air Navigation Services of Czech Republic
ANSP	Air Navigation Service Provider
AO	Aircraft Operator
AOBT	Actual Off-Block Time
AOC	Airline Operations Communication
AoI	Area of Interest
AOP	Airport Operations Plan
AoR	Area of Responsibility
APCH	Approach
APL	ATC flight PLan message
APOC	Airport Operations Centre
APP	Approach Control
APV	Approach Procedure with Vertical guidance
APW	Area Proximity Warning
ARES	Airspace Reservation/Restriction
ARINC	Aeronautical Radio Inc.
ARO	Air Traffic Services Reporting Office
ASM	AirSpace Management
ASMA	Arrival Sequencing and Metering Area
A-SMGCS	Advanced Surface Movement Guidance and Control Systems
ASR	Action Status Reports
ATC	Air Traffic Control

Acronym	Meaning
ATCO	Air Traffic Control Officer
ATFCM	Air Traffic Flow and Capacity Management
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
ATMN	Air Traffic Management Network
ATN	Aeronautical Telecommunication Network
ATS	Air Traffic Services
AU	Airspace User
AUP	Airspace Usage Plans
AUR	Airspace Usage Requirements
AVOL	Aerodrome Visibility Operational Level
B2B	Business to Business
BAF	Bundesaufsichtsamt für Flugsicherung (German National Supervisory Authority)
BF	Briefing Facility
BHANSA	Bosnia and Herzegovina Air Navigation Services Agency
CAA	Civil Aviation Authority
CANAC	Belgocontrol Air Traffic Control Center
CASA	Civil Aviation Safety Authority
CAUTRA	Coordinateur Automatique de Trafic Aérien/ French Legacy Automated Computer System for Air Traffic
CBA	Cost And Benefit Analysis
CCD	Continuous Climb Departures
CCL	Croatia Control
CCO	Continuous Climb Operations
CDA	Continuous Descent Approaches
CDG	Paris-Charles De Gaulle
CDM	Collaborative Decision Making/Management
CDO	Continuous Descent Operations
CDR	Conditional Route
CDT	Conflict Detection Tools
CEF	Connecting Europe Facility
CFMU	Central Flow Management Unit
CHMI	Common Human Machine Interface
COHOR	Association pour la coordination des horaires (French Airport Slot Allocator)
COOPANS	COOPeration between Air Navigation Service providers
CORA	Conflict Resolution Assistant
CPA	Common Procurement Agreement
CPDLC	Controller-Pilot Data-Link Communications
CPH	Copenhagen Airport Code
CPR	Correlated Position Report/Correlative Position Radar
CSP	Communication Service Providers
CTOT	Calculated Take-Off time
CWP	Controller Working Position
DCB	Demand Capacity Balancing
DCT	Direct Routings
DEP	Departure/Depart/Departure message
DFS	Deutsche Flugsicherung GmbH
DHMI	Devlet Hava Meydanlari Isletmesi
DK-SE	Denmark-Sweden Functional Airspace Block
DLS	Data Link Services

Acronym	Meaning
DLS IR	Data Link Services Implementing Rule
DMAN	Departure Manager
D-NOTAM	Digital Notification To Airman
DP	Deployment Programme
DPI	Departure Planning Information
DSNA	Direction de Services de la Navigation Aérienne -
EAD	European AIS Database
EANS	Estonian Air Navigation Services
EASA	European Aviation Safety Agency
EASCG	European ATM Standardisation Coordination Group
EASI	EAD AIM Systems Integration
EATM	European Air Traffic Management
EC	European Commission
ECAC	European Civil Aviation Conference
ECIT	EAD Connection Interface Terminal
EDA	European Defence Agency
EDDF	Frankfurt am Main International Airport Code
EDDL	Düsseldorf International Airport Code
EFD	ETFMS Flight Data
EFPL	Extended Flight Plan
EFS	Electronic Flight Strips
EGS	External Gateway System
EHAM	Amsterdam Schiphol Airport Code
EIB	European Investment Bank
ENAV	Ente Nazionale Assistenza al Volo – Italian ANSP
E-OCVM	European Operational Concept Validation Methodology
EPP	Extended Project Profile
ERATO	En Route Air Traffic Organizer
ERNIP	European Route Network Improvement Plan
ESSIP	European Single Sky Implementation Plan
ETFMS	Enhanced Traffic Flow Management System
eTOD	Electronic Terrain and Obstacle Data
EUR/NAT	European/North Atlantic
EUROCAE	European Organization for Civil Aviation Equipment
FAA	Federal Aviation Administration
FAB	Functional Airspace Block
FABEC	Functional Airspace Block Europe Central
FAT	Factory Acceptance Test
FBZ	Flight Plan Buffer Zones
FDP	Flight Data Processing
FDPS	Flight Data Processing System
FF ICE	Flight and Flow Information for a Collaborative Environment
FIR	Flight Information Region
FIXM	Flight Information Exchange Model
FMS	Flight Management System
FMTP	Flight Message Transfer Protocol
FOC	Full Operational Capability
FPA	Framework Partnership Agreement
FPL	Flight Plan
FRA	Free Route Airspace
FSA	First System Activation
FT	Fast Track

Acronym	Meaning
FUA	Flexible Use of Airspace
FUM	Flight Update Message
G/G	Ground/Ground
GAT	General Air Traffic
GBAS	Ground Based Augmentation System
GHG	Green House Gas
GMCS	Ground Manoeuvre Camera System
GNSS	Global Navigation Satellite System
HCAA	Hellenic Civil Aviation Authority – Greek ANSP
HMI	Human Machine Interface
IAA	Irish Aviation Authority
iAOP	Initial Airport Operations Plan
IBS	Integrated Briefing System
ICAO	International Civil Aviation Organization
iCAS	iTEC centre automation system
IDP	Interim Deployment Program
IDSG	Interim Deployment Steering Group
IEPR	IDP Execution Progress Report
IFPS	Integrated Initial Flight Plan Processing System
IFR	Instrument Flight Rules
ILS	Instrument Landing System
INEA	Innovative Network and Energy Agency
IOP	Interoperability
IP	Implementation Projects
IR	Ice On Runway
IRMP	Integrated Roadmap
ISRM	Information Service Reference Model
iSWIM	Initial System Wide Information Management
iTEC	Interoperability Through European Collaboration
IWXXM	ICAO Meteorological Information Exchange Model
KNMI	Koninklijk Nederlands Meteorologisch Instituut - Royal Netherlands Meteorological Institute
KPI	Key Performance Indicator
LAMP	London Airspace Management Program
LAT	Latitude
LEBL	Barcelona International Airport Code
LEMD	Barajas International Airport Code
LEPA	Son Sant Joan Airport Code
LFV	Luftfatsverket – Swedish ANSP
LGS	Latvijas Gaisa Satiksme – Latvian ANSP
LH	Lufthansa
LIDO	Lufthansa Integrated Dispatch Operation
LIMC	Milano-Malpensa Airport Code
LIRF	Roma-Fiumicino Airport Code
LPV	Localizer Performance with Vertical guidance
LSSIP	Local Single Sky Implementation Plan
LVNL	Luchtverkeersleiding Nederland (Netherland ANSP)
MDI	Minimum Departure Intervals
METAR	METeorological Air Report
METCE	Modèle pour l'Échange des informations sur le Temps, le Climat et l'Eau
MLAT	Multilateration system
MoC	Means of Compliance

Acronym	Meaning
MONA	MONitoring Aids
MPLS	MultiProtocol Label Switching
MSP	Multi-Sector Planner
MTCD	Medium Term Conflict Detection
MUAC	Maastricht Upper Area Control Centre
NATS	National Air Traffic Services (UK ANSP)
NAV Portugal	Navegação Aérea de Portugal (Portuguese ANSP)
NAVIAIR	Navigation Via Air
NCE	Nice Côte d'Azur Airport
NEFAB	Northern Europe Functional Airspace Block
NG-AATMS	Next Generation Austrian Air Traffic Management System
NM	Network Manager
NMOC	Network Manager Operation Center
NMS	Network Manager Systems
NOP	Network Operations Plan
NOTAM	Notification To Airman
NPA	Non Precision Approach
NSA	National Supervisory Authority
NSP	Network Strategy Plan
OAT	Operational Air Traffic/ Outside Air Temperature
ODS	Operational input and Display System
OLDI	On-Line Data Interchange
OPMET	Operational Meteorological
OTMV	Occupancy Traffic Monitoring Values
PBN	Performance Based Navigation
PCP	Pilot Common Project
PD	Project Definition
PDP	Preliminary Deployment Programme
PDS	Pre-Departure Sequencing
PENS	Pan European Network Service
PIREP	Pilot Reports
PKI	Public Key Infrastructure
PMU	PENS Management Unit
PSSG	PENS Steering Group
QoS	Quality of Service
RAAS	Runway Awareness and Advisory Systems
RAD	Route Availability Document
RF	Radius to Fix
RIMS	Runway Incursion Monitoring System
RNP	Required Navigation Performance
ROMATSA	Romanian Air Traffic Services Agency
ROPS	Runway Overrun Prevention System
RVR	Runway Visual Range
RWY	Runway
SAT	Site Acceptance Test
SBAS	Satellite Based Augmentation System
SCP	Stakeholders Consultation Platform
SDH	Synchronous Digital Hierarchy
SDM	SESAR Deployment Manager
SES	Single European Sky
SESAR	Single European Sky ATM Research
SGA	Specific Grant Agreement

Acronym	Meaning
SID	Standard Instrument Departure
SITA	Société Internationale de Télécommunications Aéronautiques
SJU	Single European Sky ATM Research Joint Undertaking
SLA	Service Level Agreement
SMAN	Surface manager
SMGCS	Surface Movement Guidance and Control Systems
SMR	Surface Movement Radar
SO	Strategic Objective
SSR	Secondary Surveillance Radar
STAM	Short Term ATFCM Measures
STAR	Standard Arrival Route/ Standard instrument arrival
STCA	Short Term Conflict Alert
SWIM	System Wide Information Management
SYSCO	System Supported Coordination
TA	Transition Altitude
TAF	Aerodrome Forecast
TAWS	Terrain Avoidance and Warning System
TBS	Time Based Separation
TCT	Tactical Controller Tool
TFR	Traffic Flow Restriction
TI	Technical Infrastructure
TMA	Terminal Manoeuvring Area
TSAT	Target Start-up Approval Times
TSE	Total System Error
TTG	Time To Gain
TTL	Time To Lose
TTOT	Target Take Off Times
TWR	Tower
UAC	Upper Area Control
UDPP	User Driven Prioritisation Process
UIR	Upper Flight Information Region
UUP	Updated Airspace Use Plan
VDGS	Visual Docking Guidance System
VDL	VHF Digital Link
VGS	VHF Ground Stations
VHF	Very high frequency
VNAV	Vertical Navigation
VPA	Variable Profiles Areas
VTS	Vehicle Tracking System
WAN	Wide Area Network
WBS	Work Breakdown Structure
WBT	Web Based Training
WIP	Work in progress
WMO	World Meteorological Organisation
WOC	Wing Operations Centre
WP	Work Package
WSDL	Web Service Definition Language
WXCM	Weather Exchange Conceptual Model
WXXM	Weather Information Exchange Model
WXXS	Weather Information Exchange Schema

Appendix 1 – List of services covering Regulation (EU) No. 716/2014

This Appendix contains a list of services that provide partial coverage of the Commission Implementing Regulation (EU) No 716/2014. It links the information exchanges listed in the regulation to the services developed in the context of SESAR 1 or to the services deployed or planned by NM, where applicable. The list is based on an interpretation of the PCP. It is compiled as guidance for stakeholders.

These services are considered a starting point for PCP coverage in AF5. Note that it lies in the nature of SWIM that the service definitions will evolve through SWIM Governance based on stakeholder requirements. Thus adaptations of the service implementations could be needed.

Information exchange requirement stated in PCP	DP 2016 Family	Service resulting from SESAR 1	NM B2B service in Release 20 / NM B2B service in the NM Roadmap (Release 21 - 2017, Release 22 - 2018)
AIM Domain			
Notification of the activation of an Airspace Reservation/Restriction (ARES)	#5.3.1 #3.1.1/2/3	ARES Activation	
Notification of the de-activation of an Airspace Reservation/Restriction (ARES)	#5.3.1 #3.1.1/2/3	ARES Deactivation	
Pre-notification of the activation of an Airspace Reservation/Restriction (ARES)	#5.3.1 #3.1.1/2/3	ARES Preactivation	
Notification of the release of an Airspace Reservation/Restriction (ARES)	#5.3.1 #3.1.1/2/3	ARES Release	
Query Airspace Reservation/Restriction (ARES) information	#5.3.1 #3.1.1/2/3	ARES Query	
Airspace Usage Plans (AUP, UUP) - ASM level 1, 2 and 3	#5.3.1 #3.1.1/2/3		ASM Level 1 part 1: Airspace/Airspace Structure already available ASM Level 2 fully covered by Airspace/Airspace Availability services ASM Level 1 part 2: Event Planning service planned for Release 22 ASM level 3 planned for Release 22
Provides aeronautical information feature on request. Filtering possible by feature type, name and an advanced filter with spatial, temporal and logical operators.	#5.3.1 #1.2.2	Aeronautical Information Feature	
Provide Aerodrome mapping data	#5.3.1 #1.2.2	Aerodrome Map Information	
D-Notams	#5.3.1		

Information exchange requirement stated in PCP	DP 2016 Family	Service resulting from SESAR 1	NM B2B service in Release 20 / NM B2B service in the NM Roadmap (Release 21 - 2017, Release 22 - 2018)
MET Domain			
Meteorological prediction of the weather at the airport concerned, at a small interval in the future: - wind speed and direction - the air temperature - the altimeter pressure setting - the runway visual range (RVR)	#5.4.1	AirportMETNowcast[43] (ICAOMETLocalReport) (METAR) (TAF)	
Provide Volcanic Ash Mass Concentration	#5.4.1	VAMCInformation[44]	
Specific MET info feature service	#5.4.1	[45]	
Winds aloft information service	#5.4.1	MET Gridded Forecast	
Meteorological information supporting <u>Aerodrome ATC & Airport Landside process or aids</u> involving the relevant MET information, translation processes to derive constraints for weather and converting this information in an ATM impact. The system capability mainly targets a "time to decision" horizon between 20 minutes and 7 days.	#5.4.1	SNOWTAM METAR ICAOMETLocalReport AirportMETObservation AirportMETForecast AirportMETNowcast TAF AirportMETAlert AirportMETInducedCapacityReduction	
Meteorological information supporting <u>En Route / Approach ATC process or aids</u> involving the relevant MET information, translation processes to derive constraints for weather and converting this information in an ATM impact. The system capability mainly targets a "time to decision" horizon between 20 minutes and 7 days.	#5.4.1	METHazardEnrouteForecast METHazardEnrouteObservation MET Gridded Forecast	

[43] Only the AirportMETNowcast service covers all the parameters mentioned in the regulation. Note that EUMETNET does not use Nowcasts anymore, so the service might be replaced.
[44] This service has only been identified and was not implemented
[45] While the *Specific MET Info Feature* service is mentioned explicitly in the regulation, it overlaps with the 3 generic MET information categories below.

Information exchange requirement stated in PCP	DP 2016 Family	Service resulting from SESAR 1	NM B2B service in Release 20 / NM B2B service in the NM Roadmap (Release 21 - 2017, Release 22 - 2018)
MET Domain			
Meteorological information supporting Network Information Management process or aids involving the relevant MET information, translation processes to derive constraints for weather and converting this information in an ATM impact. The system capability mainly targets a "time to decision" horizon between 20 minutes and 7 days.	#5.4.1	SNOWTAM METAR ICAOMETLocalReport AirportMETObservation AirportMETForecast AirportMETNowcast TAF AirportMETAlert METHazardEnrouteForecast METHazardEnrouteObservation MET Gridded Forecast	

Information exchange requirement stated in PCP	DP 2016 Family	Service resulting from SESAR 1	NM B2B service in Release 20 / NM B2B service in the NM Roadmap (Release 21 - 2017, Release 22 - 2018)
Network Domain			
Regulations	#5.5.1		Flow/Measures/Regulations provide read access to regulations
			Services for write access to regulations planned for Release 20.5 Services for scenarios planned for Release 21 Services for reroutings planned for Release 21
Slots	#5.5.1		ATFM slot data exchange services planned for Release 22
Short term ATFCM measures (STAM) -- see also AF #4.1.1	#5.5.1 #4.1.1/2		Planned for Release 21
ATFCM congestion points	#5.5.1		Planned for Release 22
Restrictions	#5.5.1		Airspace/AirspaceStructure/Restrictions feature
Network and En-Route Approach Operation Plans	#5.5.1		Airspace/AirspaceStructure/ - Sector Configuration Plan - Runway Configuration Plan - OTMV Plan - Capacity Plan - Traffic Volume Activation Plan
			Network Events planned for Release 22
Maximum airport capacity based on current and near-term weather	#5.5.1	Airport MET Induced Capacity Reduction	
AOP NOP synchronisation	#5.5.1 #4.2.4 #2.1.3 #2.1.4		Flight/Flight Management/DPI[46] services
			Arrival Planning Information, Extended Departure Planning Information, AOP strategic plan services are planned for Release 22
Airspace Structure, Availability and Utilisation	#5.5.1		Airspace/AirspaceStructure
			Airspace/AirspaceAvailability

[46] These services are considered to be a starting point. It will evolve based on AF2 (family 2.1.4 Initial AOP) and AF4 (family 4.2.2 Interactive Rolling NOP and family 4.2.4 AOP-NOP Information Sharing).

Information exchange requirement stated in PCP	DP 2016 Family	Service resulting from SESAR 1	NM B2B service in Release 20 / NM B2B service in the NM Roadmap (Release 21 - 2017, Release 22 - 2018)
Flight Domain			
Various operations on a flight object: Acknowledge reception, Acknowledge agreement to FO, End subscription of a FO distribution, Subscribe to FO distribution, Modify FO constraints, Modify route, Set arrival runway, Update coordination related information, Modify SSR code, Set STAR, Skip ATSU in coordination dialogue.	#5.6.2	ATC Flight Object Control	
Share Flight Object information. Flight Object includes the flight script composed of the ATC constraints and the 4D trajectory.	#5.6.2	Shared Flight Object	
Validate flight plan and routes	#5.6.1		Flight/FlightPreparation services available in ICAO 2012 format and EFPL format
			FIXM 4.0 services planned for Release 21
Flight plans, 4D trajectory, flight performance data, flight status	#5.6.1 #4.2.3		Flight/FlightFiling services in ICAO 2012 format EFPL format services are in OPS pilot phase
Flights lists and detailed flight data	#5.6.1		Flight/FlightManagement services
Flight update message related (departure information)	#5.6.1		Flight update messages Flight/Flight Management/DPI services
Link to other AF			
Arrival constraints exchange between ATS Units	#1.1.2	Arrival Management Information	
		Departure Planning Information	
ADS EPP downlink and distribution	#6.1.1	Report Aircraft Trajectory	
		Shared Flight Object	

Notes

SESAR
DEPLOYMENT MANAGER

Funded by the
European Union

www.sesardeploymentmanager.eu