EUROPEAN
COMMISSION

Brussels, 1.2.2021
SWD(2021) 9 final

COMMISSION STAFF WORKING DOCUMENT

Accelerating the modernisation of the Union's air traffic management infrastructure through more effective common projects

Accompanying the document

Commission Implementing Regulation

on the establishment of the Common Project One supporting the implementation of the European Air Traffic Management Master Plan provided for in Regulation (EC) No 550/2004 of the European Parliament and of the Council, amending Commission Implementing Regulation (EU) No 409/2013 and repealing Commission Implementing Regulation (EU) No 716/2014

Concluding the pilot phase of the SESAR deployment framework

{C(2021) 448 final}

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1. INTRODUCTION

In 2004, the European Union set out to modernise and harmonise the management of air traffic in Europe. This objective gave birth to the *Single European Sky* (SES) initiative[1]. The SES combines economic regulation and technological innovation measures in a legal framework that defines provisions, mechanisms and implementing bodies, which are largely driven by partnerships involving a wide range of aviation stakeholders.

This document addresses the technological dimension of the SES represented by the SESAR (Single European Sky Air traffic management Research) project and will focus, in particular, on - the deployment phase of the project's underlying innovation cycle, which is described in the next section. One of the main deployment instruments of this framework[2], which has been in force since 2013, are the common projects. They are Commission implementing Regulations that mandate the synchronised implementation of selected essential air traffic management (ATM) functionalities that are developed and validated within the mentioned innovation cycle.

The first common project, called the *Pilot Common Project* [3] (PCP), was launched in 2014 and, as its name suggests, it was very much a pilot experience for common projects and for the deployment framework. The Commission services started to review the implementation of pilot common project in 2017. The review extended to the entire deployment framework and to other phases and processes of the innovation cycle; such as the R&D, validation and industrialisation processes. Overall, the review highlighted the need for a more dynamic ATM modernisation process driven more by operational and economic needs. On the one hand, the review pointed to the lack of maturity of some solutions underlying ATM functionalities and the absence of effective enforcement measures as contributing to delays in implementing the pilot common project. On the other hand, it also allowed to identify functionalities that did not fully comply with the requirements of common projects, namely in terms of not providing significant benefits for the ATM network or not requiring synchronised implementation throughout the network. The audit performed by the European Court of Auditors (ECA) in 2019[4], complemented this review and its recommendations provided an important input to it.

This staff working document summarises the results of the review and presents a way forward to ensure a faster and more effective modernisation of the Union's ATM infrastructure. In particular, this document accompanies and supports a new Commission Implementing Regulation establishing the "Common Project One (CP1)" improving and replacing the pilot common project.

2. THE SESAR PROJECT

The SESAR project aims to modernise Europe's air and ground ATM infrastructure and operational procedures thus contributing to a smarter, more sustainable, better connected and accessible air transport. It is an essential enabler for the broader SES initiative. SESAR defines, develops and deploys interoperable ATM solutions aiming to optimise the management of air traffic enabling airspace users to fly safely the most efficient

[1] Regulations of the European Parliament and Council (EC) N° 549/2004, N° 550/2004, N° 551/2004 and N° 552/2004.

[2] Commission Implementing Regulation (EU) N° 409/2013.

[3] Commission Implementing Regulation (EU) N° 716/2014.

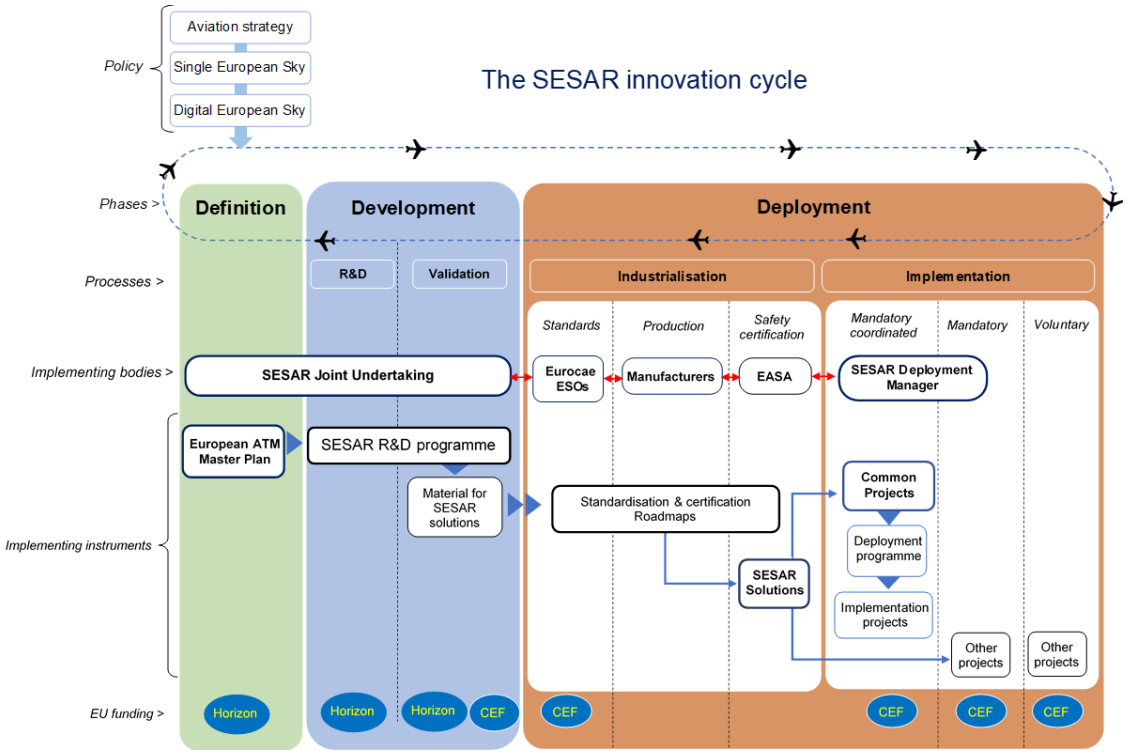
[4] ECA Special report No 11/2019

trajectories and to ensure the safe integration of new flying vehicles (such as drones) in all classes of airspace .

The SESAR project is implemented through an *innovation cycle* comprising three interrelated phases: definition, development and deployment, the latter includes the industrialisation and implementation processes (see Figure 1). These phases are driven by partnerships (SESAR Joint Undertaking and SESAR Deployment Manager) involving air navigation service providers (ANSP), airport operators, airspace users, research organisations, academia, ground and airborne equipment manufacturers, professional staff representatives, institutional and SES bodies (European Defence Agency, European Union Aviation Safety Agency, Network Manager) and intergovernmental organisations (EUROCONTROL and the European Space Agency). A dedicated legal framework defines governance and implementing mechanisms and financial incentives.

Although SESAR is a European project, it has gained global recognition as a reference in ATM modernisation. SESAR solutions are exported worldwide and contribute to the standardisation work in the International Civil Aviation Organisation (ICAO). SESAR has provided European industry the opportunity to lead technological innovation in a sector with significant potential for economic growth.

Figure 1. The SESAR Innovation Cycle



Definition phase

The *European ATM master plan*[5] defines the SESAR vision for a modern, interoperable and efficient ATM in Europe. It identifies the essential operational changes that need to occur throughout the European ATM network and the relevant R&D and deployment objectives for its achievement. In particular, the 2020 edition of the European ATM Master Plan defines the *Digital European Sky* as the expression of the SESAR vision for a modern and efficient ATM system to be achieved by 2035. The Digital European Sky

[5] https://www.atmmasterplan.eu/

focuses on the performance of systems and services rather than on technology and addresses the double challenge of digitalisation and decarbonisation of air transport.

Development phase

The Development Phase performs all ATM-related research and development with the related validation activities identified in the European ATM Master Plan. It delivers *SESAR Solutions*[6], which are new or improved operational procedures and technologies that contribute to the modernisation of the European and global ATM system. Each solution includes a range of documentation, including: operational services and environment descriptions; safety, performance and interoperability requirements; technical specifications; safety and security assessments; regulatory recommendations and human and environmental performance reports.

The *SESAR Joint Undertaking*[7] (SJU) is a pioneering public-private partnership that acts as the single Union body responsible for managing the SESAR development phase.

Deployment phase

The deployment phase includes the industrialisation and implementation processes and was activated in 2014 with the adoption of the PCP[8], the appointment of the SESAR Deployment Manager (SDM) and the approval of the deployment programme. The PCP mandates the synchronised implementation of six ATM functionalities throughout the European ATM network.

Industrialisation process

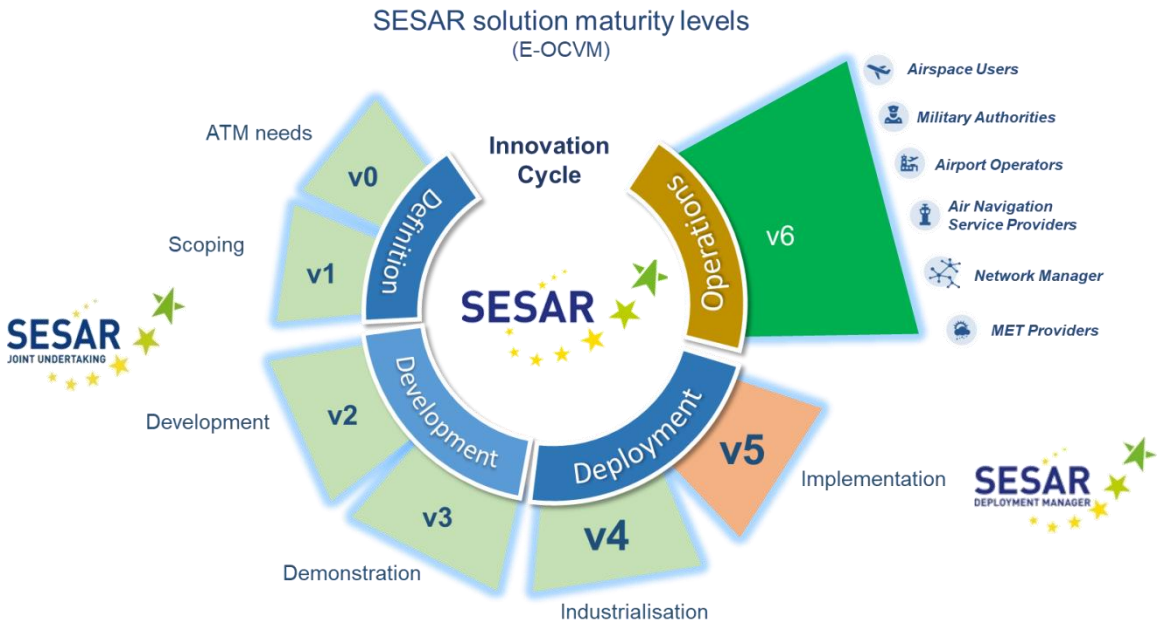
Most of the SESAR solutions require the development of standards to prepare them for industrial production before they are integrated to existing ATM systems. These processes constitute the industrialisation process of the innovation cycle. This phase does not have a central European coordinator. However, there are efforts amongst the SESAR partners to draw up an industrialisation strategy aiming to creating the necessary preconditions for SESAR solutions to obtain the so-called "V4 maturity" (see Figure 2) that ensures a smooth and timely transition to the deployment phase. However, the future JU will be tasked to coordinate closely with EASA in order to support EASA with preparing the regulatory measures for the SESAR technologies, in line with the EASA Basic Regulation and its implementing rules.

[6] https://www.sesarju.eu/activities-solutions

[7] Council Regulation (EC) N° 219/2007; https://www.sesarju.eu/

[8] Commission implementing regulation (EU) N° 716/2014

Figure 2. Maturity levels in the SESAR innovation cycle



Implementation process

Once validated and industrialised, new ATM technologies and operational procedures should be implemented in the operational environments to reap performance and economic benefits.

The process of implementation of ATM solutions can be organised as:

- **Voluntary**, when they are undertaken by early movers or are more adapted to local needs where they bring most benefits;
- **Mandatory by regulation**, when they are expected to be implemented within a certain timeframe across a broad geographical scope to generate network benefits but can still be implemented locally and individually without specific coordination at Union level;
- **Mandatory by regulation and coordinated** when, because of their significant impact on network performance, the need to ensure their timely deployment and address potential local business cases, also require coordination and synchronisation.

Examples of mandatory but not coordinated implementation are other Commission implementing regulations that have mandated certain technologies, such as Performance Based Navigation (PBN), Data-link Services (DLS), ADS-B, etc. Unlike common projects, these regulations are not a direct outcome of the SESAR project and their implementation is not coordinated in a similar manner as for common projects.

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The SESAR deployment framework established under European Commission Implementing Regulation (EU) N° 409/2013 addresses the third category and aims to mandate the synchronised implementation of essential ATM functionalities based on

SESAR solutions. The framework comprises three main instruments: common projects, deployment governance and the deployment programme.

3. COMMON PROJECTS

Common projects are Commission Implementing Regulations mandating the compulsory coordinated and synchronised implementation of specific ATM functionalities for which the underlying solutions comply with three criteria:

1) they contribute to achieving an "essential operational change" defined in the European ATM Master Plan;
2) they are ready for implementation;
3) they require synchronised implementation.

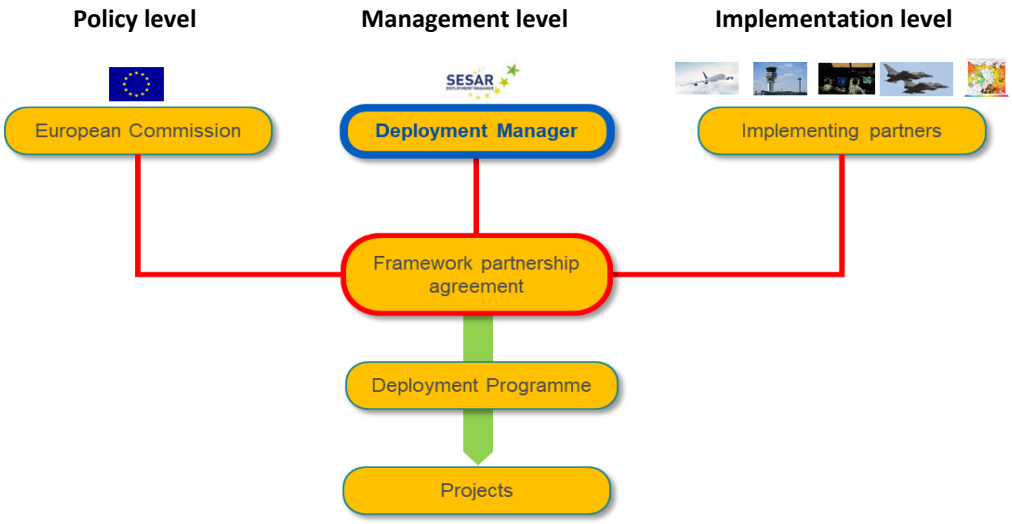
The fact that an ATM functionality or a SESAR solution is not included in a common project does not imply that it does not produce benefits for European ATM. Common projects should include only functionalities that are mature for implementation (understood as having completed the V4 industrialisation stage) and have a high potential to provide benefits at network level, thus requiring synchronised implementation.

Although common projects may be supported with Union funding, they are not, per se, funding programmes. Their implementation is obligatory regardless of any Union funding. Common projects provide an opportunity to use Union funding programmes to encourage early investment from stakeholders and mitigate deployment aspects for which the cost-benefit analysis is less positive.

4. SESAR DEPLOYMENT GOVERNANCE

SESAR Deployment is a process of cooperation and mutual consensus amongst stakeholders, the Commission, Members States and SES bodies on what needs to be deployed, where, by who, by when and how. This process is managed through a three-level governance illustrated in figure 3.

Figure 3. SESAR Deployment Governance



The content of the common projects is developed and proposed by European ATM stakeholders through the SJU and the SDM. The European Commission assesses the proposed content and the consensus it achieves and adopts, after endorsement of Member States through a comitology procedure involving the Single Sky Committee, a legally

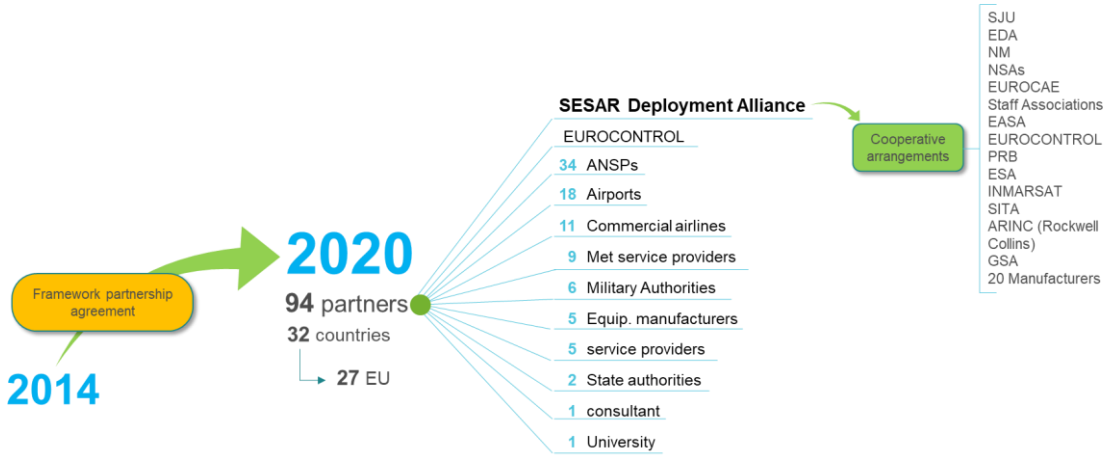
binding implementing regulation mandating the deployment of the selected functionalities.

The SDM is responsible for developing and monitoring the implementation of the deployment programme and coordinating and synchronising the related implementation projects. The deployment manager function is attributed by the Commission through a call for proposals. For the period 2014 – 2020 the SESAR Deployment Alliance AISBL (SDA) holds this function.

The implementation level consists of the operational stakeholders that are required to implement the common projects and the relevant implementation projects.

All three levels are bound through the *framework partnership agreement*, which is a long term contractual arrangement in which all partners commit to deploy or support the deployment of common projects in accordance with the deployment programme. The framework partnership agreement is also the contractual basis for allocating Union funds to the SDM and to the implementation projects. SDA has been able to involve significant number of ATM stakeholders into the activities of the SDM (see figure 4).

Figure 4. Evolution of the SESAR Deployment Partnership



5. DEPLOYMENT PROGRAMME

Common project regulations define *what* needs to be deployed, *where*, *when* and by *who*. The deployment programme defines *how* to deploy. It translates the common projects into a common and consistent work plan and implementation projects and defines how those projects and the related investments should be synchronised.

The deployment programme is developed by the SDM and approved by the Commission. It is an integral part of the framework partnership agreement.

6. THE PILOT COMMON PROJECT

6.1. Establishment of the PCP

The PCP is the first and, to date, the only common project adopted by the Commission. As the name suggests, it is a "pilot" exercise representing the first attempt to implement SESAR solutions in a coordinated manner. It has also acted as a testbed for the governance and incentive mechanisms supporting the SESAR deployment framework.

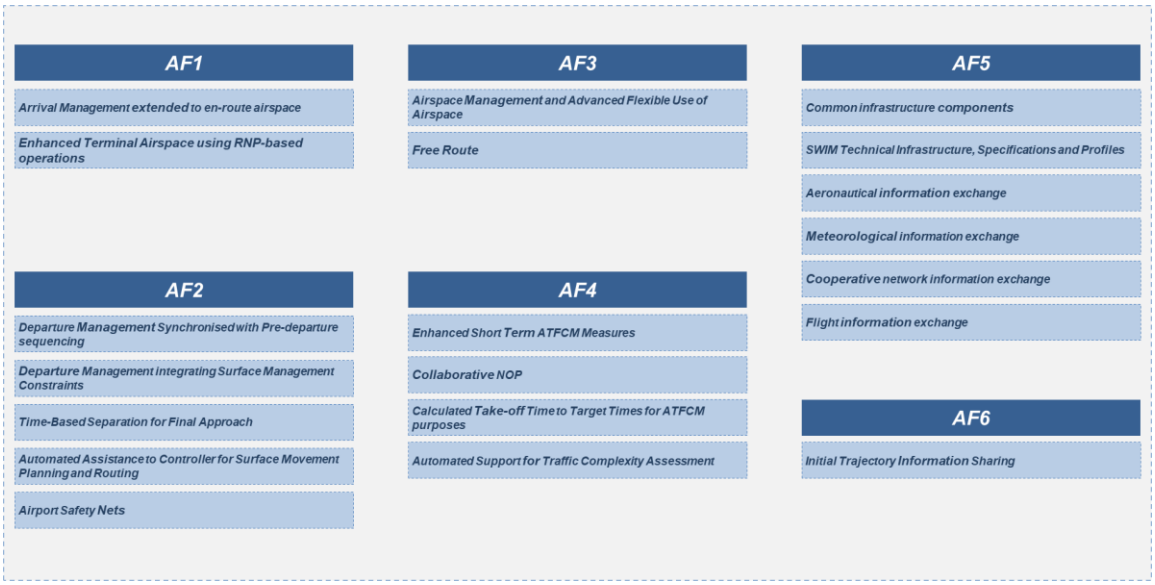
The PCP mandates synchronised implementation of six ATM functionalities (AFs) described in Table 1.

Table 1. The content and the timeline of the PCP

ATM Functionality	Relevant stakeholders[9]	Due date[10]
Extended Arrival Management and Performance Based Navigation in the High Density Terminal Manoeuvring Areas (AF1)	ANSPs and Network Manager	2024
Airport Integration and Throughput (AF2)	ANSPs and airports	2021-2024
Flexible Airspace Management and Free Route (AF3)	ANSPs, Network Manager and airspace users	2018-2022
Network Collaborative Management (AF4)	ANSPs, airports, Network Manager and airspace users	2022
Initial System Wide Information Management (AF5)	ANSPs, airports, Network Manager and airspace users	2025
Initial Trajectory Information Sharing (AF6)	ANSPs, Network Manager and airspace users	2025-2026

Each of these AFs is further divided into Sub-AFs, which have specific geographical scopes, technical requirements and implementation deadlines. The PCP included 20 Sub-AFs (see Figure 5).

Figure 5. The PCP Sub-AFs



7. INCENTIVES FOR THE IMPLEMENTATION OF THE PCP AND THE POSSIBILITIES OF NEW INCENTIVES

SESAR implementation projects require high financial risk-taking. As a result, operators are inclined to be reactive rather than proactive ("last mover advantage"). Because of specific nature and high value for network performance of common projects, the SESAR deployment framework aims to support “early movers” and mitigate the inherent risks.

[9] Not all the mentioned stakeholders are affected, since the PCP also defines a geographical scope of applicability.

[10] Each ATM functionality may be composed by two or more sub-functionalities. The deployment target date may differ for each.

The deployment governance is in itself an incentive for stakeholders to coordinate and coordinate their projects and investments for common projects. The SDM provides effective project management for such large scale projects and serves as a central interlocutor with the Commission and other institutional and SES bodies. Moreover, the deployment framework also provides for the possibility to fund the SDM and the implementation projects as well as for exploring and exploiting other incentive mechanisms such as modulation of charges or financing instruments proposed by the European Investment Bank.

SESAR is a priority in the Connecting Europe Facility (CEF)[11] programme, which earmarked EUR 2,5 billion (grants and loans) to support SESAR deployment projects under the Union's 2014-2020 Multiannual Financial Framework.

Between 2014 and 2019, the Innovation and Networks Executive Agency (INEA) launched seven calls for proposals addressing SESAR deployment that resulted in the awarding of approximately EUR 1.6 billion from the CEF, in the form of grants (awarding up to 20% reimbursement of eligible costs for airborne equipment and up to 85% for ground infrastructure) and blending facilities.

- EUR 1.3 billion were awarded to 345 PCP related implementation projects for a total investment from ATM stakeholders of EUR 3 billion;
- EUR 300 million were awarded to other ATM modernisation projects.

SDM is responsible for identifying the most appropriate financing mechanisms combining public and private funding for deployment. However, it has been difficult to develop attractive mechanisms because ANSPs, airports and airlines can usually benefit from good lending terms and conditions from the private debt market, even from public financing in the case of ANSPs.

SDM signed a cooperation agreement with the European Investment Bank (EIB) to launch a "Test Case" under CEF Call 2017. Airspace Users were the main candidates that would be able to receive 100% project financing compared to 20% of grants and bridge the time gap between operational benefits, when ground investments are achieved, and repayments of the loans (through a grace period). EIB would lend to an intermediary bank, itself spreading the total loan across airlines who were encouraged to submit their project descriptions. However, the level of interest remained very low and the required critical mass of investment of EUR 50million to successfully pursue the implementation of the Test Case was not achieved.

The launch of a CEF Transport Blending Call in February 2017, with an envelope of EUR 40 million for ATM, only attracted one project proposed by an ANSP, confirming that ATM community was a priori not attracted by financing mechanisms as another type of incentive. It should be noted that the PCP, which was the subject of the investments, addresses mostly ground infrastructure. However, future common projects with a greater focus on airborne implementations could generate a shift of interest towards airspace users. To secure continued investments in ATM modernisation during and after the COVID crisis, stakeholders will require strong financial support beyond what the Union can provide through direct grants and facilitations related to managing those grants. SDM will continue cooperating with the EIB to facilitate access to new instruments.

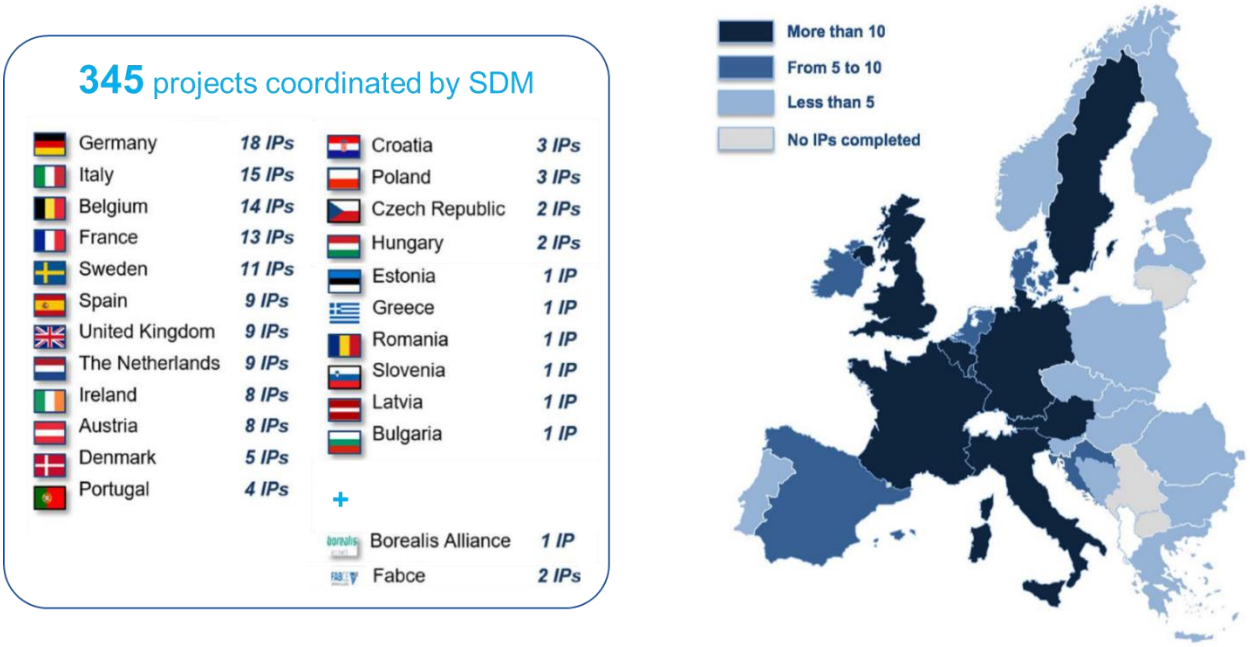
[11] Regulation (EU) No 1316/2013 of the European Parliament and of the Council of 11 December 2013 establishing the Connecting Europe Facility, amending Regulation (EU) No 913/2010 and repealing Regulations (EC) No 680/2007 and (EC) No 67/2010

8. PROGRESS IN THE IMPLEMENTATION OF THE ATM FUNCTIONALITIES INCLUDED INTO THE PCP

SDM has managed altogether 345 implementation projects, of which 145 were completed by the end of 2019. These projects cover all regions of Europe (see Graph 6). See Annex 1 for three examples of projects co-financed by the European Union and coordinated by the SDM.

Thematically the progress in PCP implementation has been variable. This is due to variable level of maturity of solutions included into the PCP. The PCP implementation reporting by SDM indicates that for AF 1 "Extended Arrival Management and Performance Based Navigation in the High Density Terminal Manoeuvring Areas", 88% of core activities planned in the PCP deployment programme have been completed or are ongoing. The same rate for AF 6 "Initial Trajectory Information Sharing" stands at 3%. For AF 5 "Initial System Wide Information Management SWIM" as a whole, progress stands at 57%. However, within it, progress on Cooperative Flight Information Exchange stands at only 10%.

Figure 6. Member States involved in SESAR implementation projects (IPs)



8.1. The impact of the COVID-19 pandemic on ATM modernisation

The COVID 19 outbreak in Europe has significantly reduced the demand for ATM and airport services. In April 2020, the flight activity was reduced up to 90 % in Europe. This has led to reduced incomes of many ATM stakeholders and consequently their capacity to invest into technological upgrades.

SDM carried out a survey among all PCP project partners. This survey concluded that the COVID-19 crisis will likely impact that 90% of project partners' investments into ATM modernisation, with many projects being delayed until further notice in an effort to preserve operational stakeholders' cash-flow. However, the same survey indicated that 78% of the respondents are committed to continue ATM modernization and consider SESAR deployment as a key enabler to meet the SES high-level goals.

The COVID-19 crisis has accentuated the need to pay special attention to the compliance of any solution underlying an AF with the three criteria defining common projects,

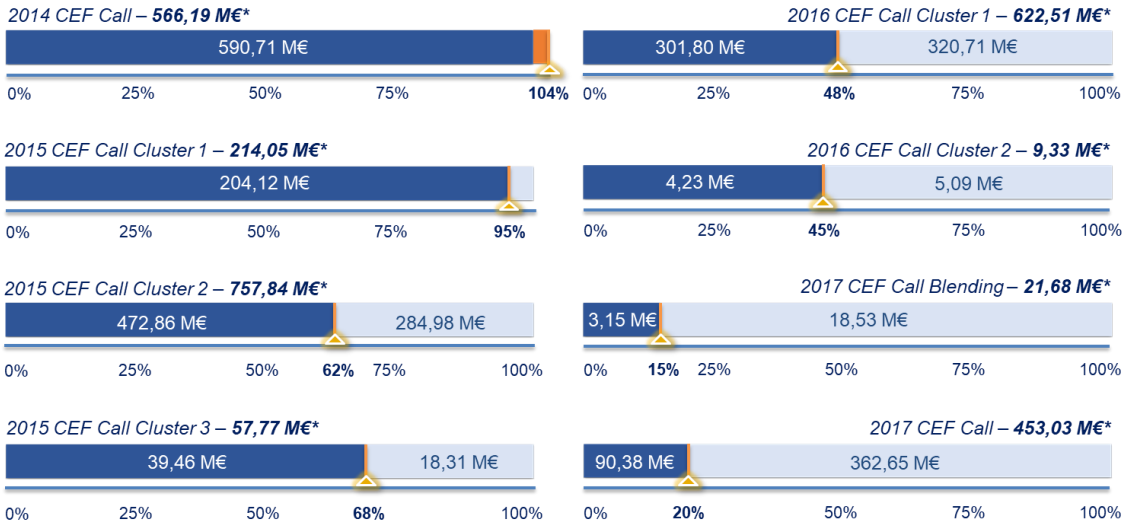
before being mandated to be deployed by the relevant ATM stakeholders in the European ATM network. This needs to be taken into account for the revision of the PCP.

9. THE COSTS AND BENEFITS RESULTING FROM THE DEPLOYMENT OF ATM FUNCTIONALITIES

According to the CBA, the cost for implementing the six PCP AFs is estimated to be EUR 4 billion. The case for investment into innovative technologies by ANSPs should derive from the requirements of the Performance Scheme[12], which sets efficiency targets. For airspace users and airports, the requirements in common projects set the timeframe and the obligations to invest into SESAR solutions.

By the end of 2019, EUR 1,71 billion, that is 63% of total eligible costs, have been allocated to implementation activities. The eligible costs consumption per CEF calls is illustrated on Figure 7. As of 2020, all projects from the initial CEF call of 2014 have been finalised. Projects supported from later calls are in majority still ongoing. The project partners have until the year 2022 to commit eligible costs for their projects.

Figure 7. Total eligible costs invested within the 345 EU co-financed PCP implementation projects



Source: SESAR Deployment Manager, reporting 1Q2020

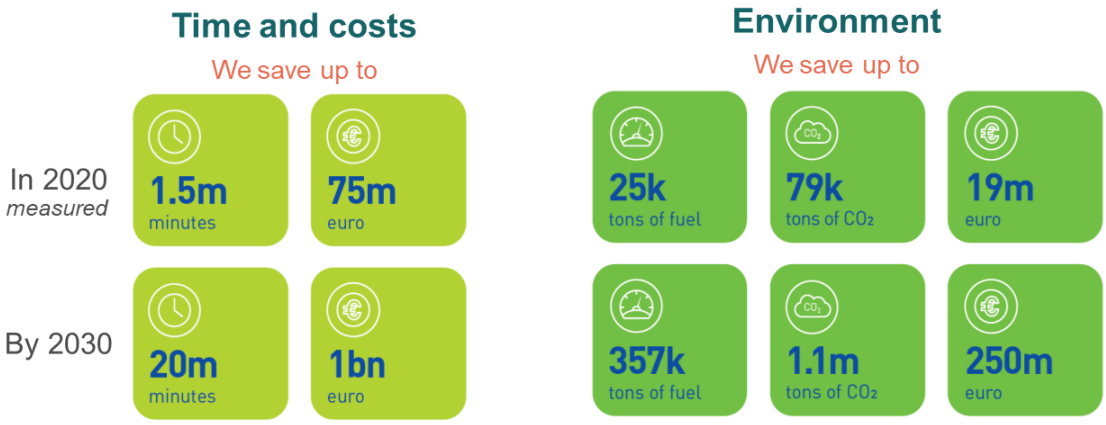
Out of these projects, 75% have been co-financed by the European Union, while 24% are fully covered by ATM stakeholders. The progress could have been even faster but maturity issues and delays in development of industry wide standards have affected several Sub-AFs.

9.1. PCP implementation has brought about benefits for ATM stakeholders, passengers and citizens

The PCP implementation has brought first results by reducing ATM costs and providing time savings for passengers. This has helped to reduce environmental impact of the European aviation sector. By the end of 2020, 150 projects will be in operation and will bring short and long term benefits which are visualised on Graph 8.

Figure 8. First results of PCP implementation

[12] Commission Implementing Regulation (EU) No 390/2013 of 3 May 2013 laying down a performance scheme for air navigation services and network functions



9.2. PCP implementation has created jobs

The implementation of the PCP has led to a joint operation by the ATM stakeholders all over Europe. Altogether 16 000 people from 1300 companies have been working on PCP related projects between 2014 and 2020. The SESAR deployment also constitutes an important potential for creating new employment opportunities over the next 10 years. According to an estimation made by the SDM, investments in the PCP (and future CP1) could create 78.000 new jobs including direct employment on project implementation and indirect and induced opportunities.

Of the companies currently involved in PCP implementation, 85% fall into the category of small and medium sized enterprises (SMEs). In total, 72% of the scope of the PCP is currently covered by implementation projects.

10. PROGRESS IN THE DEVELOPMENT OF REFERENCE AND SUPPORTING MATERIAL

The Commission has published the updates of the lists of supporting material for standardisations and industrialisation and the related roadmaps on its website: https://ec.europa.eu/transport/modes/air/sesar/deployment_en

These updates are provided by the SDM in its regular reporting documents on the progress of implementation of the PCP.

A new cost-benefit analysis supporting the CP1 proposal will also be published on the same web site.

11. THE NEED FOR ADAPTING THE PCP

The initial implementation of the deployment framework under the 2014-2020 multiannual financial framework constitutes a pilot exercise that has allowed to test its mechanisms through the PCP, the SDM, the SESAR deployment programme and over 300 implementation projects. As required by the underlying Regulation, the Commission has reviewed the implementation of the PCP and of the framework Regulation. The review highlighted the positive impact on SESAR deployment and a number of shortcomings in the implementation of the deployment framework that the Commission must now address. The Commission launched the review of the PCP in 2017, within 18 months of the approval of the first full deployment programme, as required. The review was integrated in a wider reflection on different mechanisms of the SESAR project.

11.1. PCP implementation has been thoroughly analysed

- The ATM Master Plan provides the context and vision for SESAR development and deployment phases. Any analyses of the PCP and the design of the future common projects need to take into account the principles of the ATM Master Plan. The 2020 edition of the Master Plan[13] improves the description of the essential operational changes needed in the Union's ATM systems, to address the main challenges of a technological and digital evolution. It integrates the recommendations from the European Airspace Architecture Study, which highlights the important role for ATM data service provision. The ATM master plan update will also ensure consistency with the Network Strategy plan and, for the first time, alignment with EASA's European Plan for Aviation Safety (EPAS).
- SDM has reported regularly on the state of SESAR deployment and implementation of the PCP. This reporting provides useful information on the progress and emerging operational problems, such as delays and cost increases affecting individual projects and the PCP as a whole. SDM reports regularly on the actual costs and benefits resulting from the deployment of ATM functionalities including the identification of any local or regional negative impact for any specific category of operational stakeholders. Based on this experience, SDM has supported the work on designing the CP 1.
- The Commission services and INEA have carried out a series of on-site visits to CEF project partners in order to obtain first-hand experience from the ATM stakeholders about the PCP implementation. More than 20 such visits have taken place, which form an important part in the knowledge-based and situational awareness of the Commission services designing the next phase of common projects.
- The ECA published a report[14] on the SESAR deployment phase. It was the second audit in the sequence on SESAR related issues. In its recommendations, ECA invites the Commission to:
    - Improve the focus of common projects and reinforce their effectiveness;
    - Review the Union's financial support to ATM modernisation;
    - Clarify the role of the deployment manager in preparing and submitting funding applications;
    - Ensure appropriate monitoring of the performance benefits delivered by ATM modernisation;
    - Develop a mandatory system of modulation of route charges applicable to ground and airborne stakeholders.
    - The Council followed the ECA report with its own assessment of the SESAR deployment and a series of recommendations to the Commission. The Council invited the Commission to review the PCP in the light of the ECA's recommendations and to explore the means for improving the effectiveness of common projects within the SESAR innovation cycle, while maintaining the momentum already initiated by the Pilot Common Project.

[13] The Administrative Board of the SESAR Joint Undertaking approved the 2020 edition of the European ATM Master Plan on the 17th of December 2019

[14] Special Report No 11/2019 "Special report no 11/2019: The EU's regulation for the modernisation of air traffic management has added value – but the funding was largely unnecessary

- The European Parliament in its SJU 2018 discharge decision[15] called the Commission to follow up on the ECA recommendations on SESAR deployment. The European Parliament endorsed all ECA recommendations, including the ones calling for improvements in the effectiveness and implementation of the common projects.
- PCP and deployment activities in general have been analysed also by external experts working on different SESAR related topics. For example, common projects and their link to SESAR development phase is analysed in the development of the SESAR Industrialisation Strategy, enforcing the link between the Development and Implementation phases of the SESAR project.

11.2. Main conclusions from the PCP review

The information gathered and consultations with ATM stakeholders have led to the conclusion that while the PCP has brought and will continue delivering benefits in the form of cost and time savings and reduced impact of aviation to the environment, issues concerning maturity and the speed of implementation need to be addressed:

- **PCP includes certain solutions that are not mature for implementation** – It resulted that some solutions included into the PCP were not ready for implementation at the time of adoption of the regulation and have not yet reached the V4 maturity level (see Figure 2). Progress on AF 4, AF 5 and AF 6 is reduced as standards or technologies that act as the prerequisites for implementation are missing. All of the solutions affected are important elements in the SESAR vision of achieving the *Digital Single Sky* and are prerequisites for number of future SESAR solutions. New measures are needed to manage the maturity risk and provide assurance to the ATM stakeholders concerning realistic implementation deadlines for all solutions.
- **Certain implementation deadlines are no longer realistic** – PCP set implementation deadlines for all Sub-AFs. They range between 1 January 2018 and 1 January 2026. The deployment of several solutions should be finalised by end of 2020. At the end of the review, SDM reported that AF 3 (Free Route airspace) and two solutions from AF 2 (2.1 and 2.2 on Departure Management) are on course to meet their respective targets as set out in the PCP. However, delays for other AFs and sub-AFs are expected because of the extraordinary circumstances raising from the COVID 19 pandemic. Therefore, several Sub AFs, which are mature for implementation, will need an updated timeline for that.
- **Certain solutions included into PCP do not provide significant network benefits –** One of the criteria for any solution to be included into a common project is the need for a synchronised implementation as a prerequisite for network-wide benefits. The PCP experience has shown that this requirement, as defined in the Regulation (EU) N° 409/2013, has been interpreted in many ways. For example, the criteria of synchronised implementation has been considered to be met when two projects have been carried out in sequence in one location by the local ANSP and airport. Other projects have combined 10 airports working in cooperation to develop digital interaction solutions. Certain solutions, especially related to improvements to ATM in airports, provide significant local benefits but have a limited impact on network performance. These SESAR solutions should

[15] European Parliament decision of 13 May 2020 on discharge in respect of the implementation of the budget of the SESAR Joint Undertaking for the financial year 2018 (2019/2100(DEC))

be supported, also financially if possible, but they would not need to be mandated for obligatory deployment within common projects.

- **There is a weak link between the PCP and the Performance Plans –** The introduction of the PCP was expected to have significant positive impact on the capacity of the ANSPs to reach the performance targets set in national Performance Plans. However, the PCP implementation has been largely separate from the performance planning under the respective implementing regulation. There is no mechanism on how the potential benefits from the common projects could help the ANSPs to reach their performance targets. This link could be increased if the deadlines in common projects would be synchronised with the reference periods of performance planning. This would provide clarity for the ANSPs about their investment needs arising from the common projects but also performance benefits from introduction of new technologies.
- **There are no specific tools to improve results in respect of on time implementation of the common projects** – Common projects set targets and obligations to airport operators, airspace users, the Network Manager, ANSPs and other service providers. Where these targets and obligations fail to be complied with, the Commission may initiate infringement proceedings against any Member State who has failed to comply with its own duties in this respect. No other means are currently available for the purposes of improving results in this area. The smooth and timely implementation of the common projects would benefit from effective, transparent, proportionate measures that are aimed at ensuring compliance of all ATM stakeholders.
- **The deployment manager plays an essential role as coordinator of broader implementation activities -** The implementation of the PCP has highlighted the added value of a strong and efficient programme management function, supported by a wide buy-in from operational stakeholders, going beyond the scope of the PCP to include also essential technological enablers and stronger cooperation and coordination with other phases and processes of the innovation cycle.

11.3. From PCP to CP1

The PCP has provided significant amount of knowledge and experience. However, the "pilot" phase of the first common project, should now come to its end. Through the review process, which takes into account the sources of feedback, the PCP should be transformed into "Common Project One" (CP1). CP1 will contain only those ATM functionalities and sub-functionalities that are confirmed to be compliant with the criteria defined in Regulation (EU) N° 409/2013.

In particular, the "Maturity" criterion requires that Sub AFs included in a common project must be mature for implementation. This means that the relevant operational stakeholders have or are in a position to launch procurement processes, install and put into service equipment, systems and the related operational procedures as of the entry into force of the common project Regulation.

Moreover, the need for synchronised implementation must be demonstrated. The analysis must show that the AFs and Sub AFs can generate greater and earlier benefits for the European Air Traffic Management Network if their deployment is synchronised over the network, rather than locally or randomly. Synchronisation requires defining a geographical scope, a common planning and target dates, including for transitional measures, for a pre-defined group of ATM stakeholders.

Following the adoption of the CP1 implementing regulation, the deployment programme will need to be updated accordingly and shall define how the synchronisation should be achieved. The relevant implementation projects shall be setup on that basis.

Consequently, all AFs or parts of AFs in the PCP that have been reviewed as: (1) not contributing to the ATM Master Plan essential operational changes; (2) not having reached the appropriate level of industrialisation that would allow the start of their implementation by the end of Reference Period 3; (3) not requiring synchronised implementation at network level, should no longer be mandated under a common project implementing regulation and therefore should be excluded from CP1.

There is a need to maintain the development and deployment momentum generated by the PCP and to encourage continued and increased efforts amongst stakeholders to bring some key SESAR solutions to the necessary level of maturity for implementation, as quickly as possible. For this purpose, there should take place a mid-term maturity check that would evaluate if a certain solution would be mature for deployment within the CP 1 timeframe or should be postponed to a subsequent common project.

CP1 should be supported by a Cost Benefit Analysis that should consider the impact of unsynchronized implementation (at network level) of the individual AFs/Sub-AFs of CP1 and of the CP1 as a whole, and clearly identify potential negative business cases at geographical or stakeholder's level, compared to the benefits at network level. Common Project 1 should be equally implemented by the EEA Member States and other third countries whose airspace is closely linked to the ones of the European Union Member States.

12. CONTENT AND THE UNDERLYING PRINCIPLES OF THE CP1 PROPOSAL

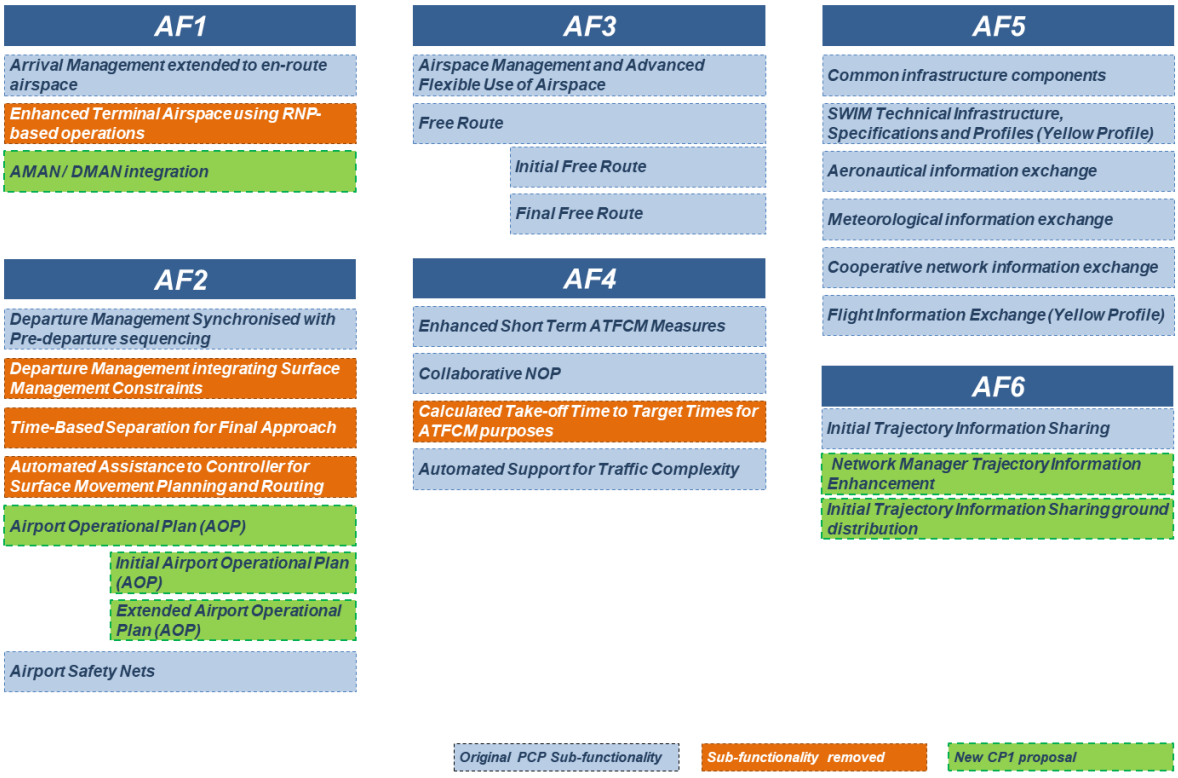
12.1. The content of the CP1

The Commission services have asked the SDM, in cooperation with the SJU, EASA and EUROCAE to propose the content of CP1 that will comply with the above mentioned criteria and to perform a CBA to support it. Figure 8 represents the proposed content of the CP1.

The main proposed changes to the PCP per ATM functionalities are the following:

- **AF 1 Extended Arrival Management, Performance Based Navigation and Integrated AMAN/DMAN in the High-Density Terminal Manoeuvring Areas** –A new Sub-AF AMAN/DMAN integration for 9 European airports is added as new Sub-AF coming as a proposal elaborated by SJU in order further enhance the environmental and efficiency gains from deploying AMAN and DMAN. Enhanced Terminal Airspace using RNP-based operations will be excluded due to entry into force of a dedicated EU implementing regulation;
- **AF 2 - Airport Integration and Throughput** – The Sub-AF Departure Management Synchronised with Pre-departure sequencing implementation deadline would be prolonged from 1 January 2021 to 1 January 2022. Airport Safety Nets implementation deadline should be prolonged from 1 January 2021 to 1 January 2024. Departure Management integrating Surface Management Constraints and Time-Based Separation for Final Approach would be removed from AF2 due to maturity and synchronization issues. Airport Operations Plan would be added as new Sub-AF proposed by the SJU and supported by the operational partners.

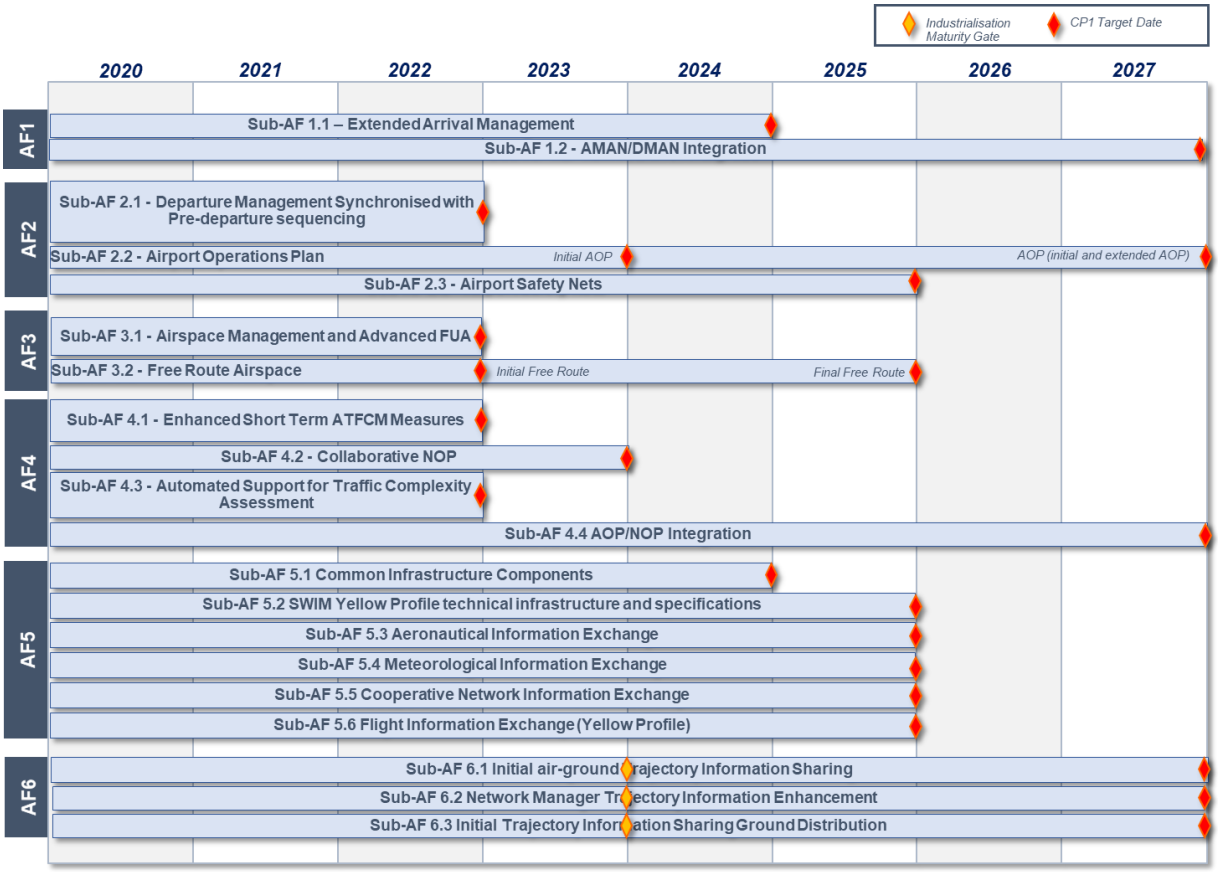
Figure 9. The Content of Common Project 1



- **AF 3 - Flexible Airspace Management and Free Route Airspace** – The Free Route airspace implementation would be split into two phases: Initial FRA to be implemented with time limitations and airspace constraints by 1 January 2022 and Final FRA including Cross-Border dimension and TMAs connectivity by 1 January 2025.
- **AF 4 - Network Collaborative Management** - Calculated Take-off Time to Target Times for ATFCM purposes would be removed from AF4 due to maturity issues. The target time in planning is in use but would no longer be obligatory due to the non-validation of the use of target time in execution.
- **AF 5 - System Wide Information Management (SWIM)** - SWIM Yellow profile would be allocated a new implementation target date in year 2025.
- **AF 6 - Initial Trajectory Information Sharing** - „Downlink of the trajectory data to the ground systems"; „The distribution of the data on the ground" and "Network Manager Trajectory Information Enhancement" would be split into three different Sub-AFs. Industrialisation target date given for the use and distribution of the data on the ground would be by the end of 2023. The deployment target date for AF 6 would be prolonged to the end of 2027.

The changed content would also lead to updated implementation deadlines. For those Sub-AF included into the PCP which are not be carried over to CP1, deployment obligation will discontinue. However, the partners are expected to finalise the EU co-financed deployment projects as foreseen. The implementation deadlines for new and remaining Sub AFs is presented in Figure 9.

Figure 10. Common Project 1 timeline



12.2. Other changes proposed for the CP1

CP1 requires and inspires adaptations to current deployment mechanisms defined in Regulation (EU) N° 409/2013 so they will apply to all future common projects. These adaptations tackle the weaknesses that were detected as a result of the PCP review and will be introduced using the CP1 Regulation as the legal means to modify Regulation (EU) N° 409/2013.

The main proposed changes are:

- **Synchronised implementation is defined as a recognised operational need for all relevant ATM stakeholders to implement AFs**. Synchronisation criteria will remain a prerequisite for any solution to be included in common projects. The synchronisation criteria represents the need for simultaneous and obligatory implementation of a solution in a wide geographical area.
- **Setting a fixed timeline for common projects synchronised with the Reference Periods for performance planning** –all new solutions included into common projects are expected to be available for installation in short term and require universal and simultaneous Europe wide implementation. Each common project shall have a fixed final delivery date. Any solution which would fail to reach such maturity but is still considered as essential for European ATM, would be a priority candidate for a subsequent common project. The final implementation deadline for Common Project One will be 31 December 2027, which will be in line with the currently foreseen final year of Reference Period 4. In this way, all benefits arising from the implementation of the common project, would be available in the subsequent Reference Period and could be taken into account in drawing up the Performance Plans for the next period.

- **Introducing industrialisation target dates** – For Sub-AFs that have long implementation deadlines i.e. projects that run through the whole duration of the specific common project, there will be two different deadlines. The Industrialisation target date sets the end of the standardisation and certification processes by which any solution should be available for procurement and installation. The implementation target date is the point in time by which the specific technology should have been deployed by the relevant ATM stakeholders. The industrialisation maturity gate mechanism will involve EASA, EUROCAE, ANSPs, airspace users and other relevant stakeholders. For CP1 the industrialisation target dates would apply for solutions in AF 6 (See Figure 9).

12.3. Ensuring timely implementation of common projects

Common projects deliver their benefits only if all relevant stakeholders fulfil their deployment obligations. Any deviation will lead to potential short term benefit from not carrying out the investment obligation and long term failure in delivering the network effects of the technologies mandated by the common projects. The ECA has recommended to the Commission to examine ways to reinforce the effectiveness of common projects, which go beyond the current possible application of an infringement procedure laid down Article 258 of the Treaty on the Functioning of the EU, for example by introducing a mandatory modulation of air navigation charges mechanism. The Council supported this recommendation by inviting the Commission to find means to make the implementation of common project more effective.

Under the current regulatory framework, there are generally two means of ensuring the timely implementation of common projects: incentives and disincentives.

One the one hand, the deployment governance framework, in general, and CEF funding, in particular, provide strong incentives for common projects. An alternative incentive could be a discount-based modulation of charges, by offering lower air navigation charges to airspace users equipped with the required ATM functionalities. However, introduction of modulation of charges based on offering discounts is impracticable due to the complexity it would add to the charging scheme. This is mainly due to the need for compensation mechanisms to be established for the associated reduction in revenues for ANSPs caused by route charge differentiation for airspace users.

On the other hand, according to Article 9 of SES framework Regulation (Regulation (EC) 549/2004), the Member States are required to establish dissuasive, effective and proportionate penalties for infringements to the SES Regulations and their implementing acts, in particular but not exclusively, by airspace users and service providers. These penalties should therefore be applied to all ATM stakeholders subject to obligations in the common projects.

The Commission services have explored other possible disincentives or penalties, such as a levy-based modulation of charges or a fixed charge/levy to be added to the route charges, possible penalties based on performance losses due to non-implementation of common projects and the mentioned mandatory modulation of charges mechanism (serving both as incentive for airspace users and disincentive for ANSPs) in the performance and charging scheme. Any of these proposals would need to be enacted in the appropriate legal instruments some of which are currently under review.

For Union funded implementation projects, contractual penalties for non-performance can be included in the grant agreements and the Commission could implement a digressive co-funding rate to discourage late movers (see the section below).

12.4. Union funding and SESAR deployment

Union funding may be allocated to CP1 implementation once the EU adopts its long term budget for the period 2021-2027 and the new CEF programme will be implemented. The future CEF programme and the calls for proposals, launched by INEA under that programme, will define the priorities and the criteria for selecting and awarding funding to CP1 implementation projects. The SESAR deployment programme will be a key reference for establishing the priorities for future CEF funding to common projects.

As the aim is to reward "early movers", future direct financial support could become digressive when approaching the legal deadline for implementation. Once the deadlines have expired, the above mentioned contractual penalties should be activated.

13. CONCLUSION

The experience of PCP has shown that there is a significant benefit for the European ATM arising from the joint effort of deploying SESAR solutions in a coordinated and synchronised manner. This positive experience should continue as the objective of achieving a Digital Single Sky is still to be reached by the entire European ATM community.

Rectifying identified issues in the PCP and adapting, accordingly, some elements of the SESAR deployment framework, allow closing the "Pilot" phase of the framework and paves the way for the CP1 and to the subsequent common projects. Focussing on mature solutions provides assurance to ATM stakeholders that are expected to invest in the deployment SESAR solutions. Introducing industrialisation maturity target dates provides necessary flexibility to deal with on time implementation risks.

The PCP review has confirmed that the common projects are suitable policy tools for upgrading the European ATM infrastructure. However, the concept needs fine-tuning and the CP1 aims to introduce significant improvements in the SESAR deployment framework.

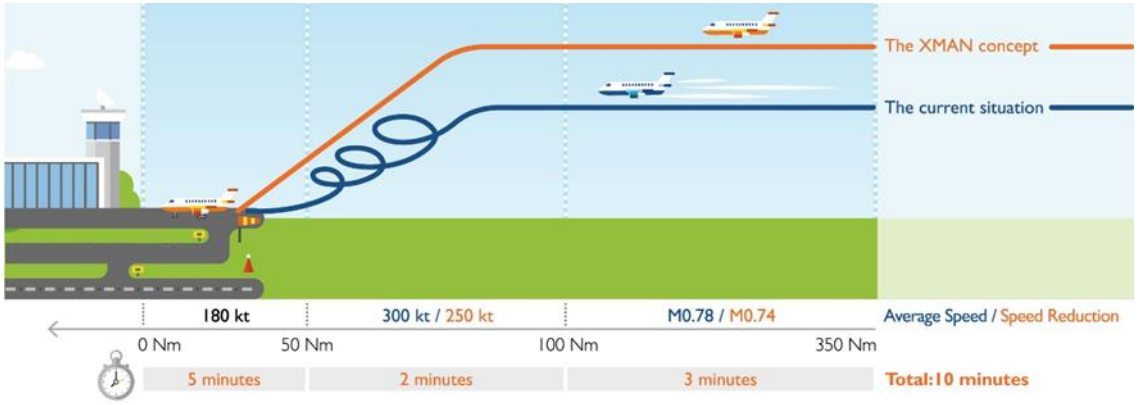
ANNEX 1 - EXAMPLES OF EU CO-FINANCED PCP IMPLEMENTATION PROJECTS

1. Extended AMAN in Czech Airspace (1 February 2016 – 2 November 2018).

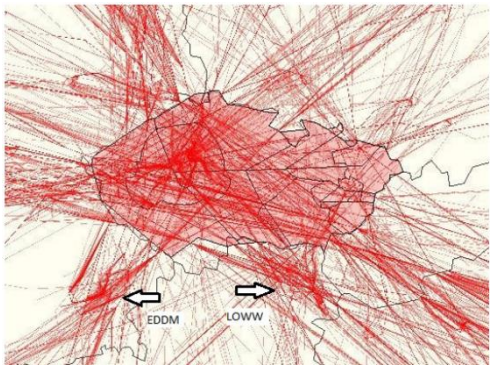
Implementing Partner: Air Navigation Services of the Czech Republic (ANS CR)

Whilst in the past aircraft were often forced into "holding" stacks around the airport due to congestion or to unavailability of runways, Extended AMAN allows Air Traffic Controllers to sequence incoming flights way before the beginning of descent to the ground (up to 350 Nautical Miles, in some cases), and to inform pilots on how to adjust their aircraft speed accordingly.

Early use of aircraft speed control and adjustment for sequencing purposes absorbs some of the queuing time, whilst enabling the reduction of fuel burn for arriving flights, which translates into both the decrease of carbon emissions in the area surrounding the airport and to significant savings for Airspace Users.



This Implementation Project is part of a joint effort named the XMAN initiative from major Air Navigation Service Providers (Belgocontrol, DFS, DSNA, MUAC, LVNL, Skyguide) to ensure a coordinated implementation of Extended AMAN in the central part of Europe around some of the busiest European airports, such as: Amsterdam, Barcelona, Berlin, Dusseldorf, Frankfurt, London, Munich, Nice, Paris, Vienna and Zurich. Together, these airports welcome more than 500 million passengers on an annual basis and correspond to the backbone of the European Air Traffic Management network.



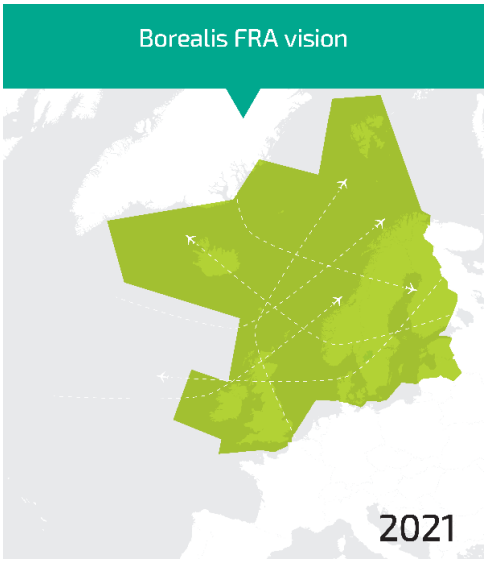
The Implementation Project 2015_196_AF1_B – completed in early November 2018 – was an important step for the full operational use of Extended AMAN in Munich, as more than 35.000 arrival flights per year are directly managed by the ANS CR, the Czech Air Navigation Service Provider, when flying towards the airport. By virtue of this project, the sequencing of approaching aircraft can now effectively start already when they are flying within the Czech Republic airspace, allowing for an optimal planning and reducing delays at arrival. Furthermore, the completion of the project also represented a key enabler for the upcoming adoption of Extended AMAN also in the airspace surrounding Berlin and Vienna airports.

As part of this project, in full cooperation with the bordering ANSPs, ANS CR upgraded some specific features of its ATM systems, adapted the ATCOs working positions, and trained all the involved staff to make sure that the implementation of the Extended AMAN was safely performed, with no critical disruption to the ATM operations. Additional updates and enhancements of the Czech ATM systems are still on-going under the coordination of the SESAR Deployment Manager, also thanks to EU public funding support.

2. Borealis Free Route Airspace (Part 1)

(1 January 2014 – 25 July 2017)

Implementing Partners: Avinor Flysikiring, ANS Finland, Irish Aviation Authority, LGS, EANS, LFV, NATS, Naviair



The Borealis Free Route Airspace is a wide-range modernisation programme aimed at allowing flights to fly their preferred route as close as possible within the whole Northern European airspace by 2021, thanks to the adoption of new technologies and an increased collaboration between national Air Navigation Service Providers.

Thanks to this programme, airspace users will be allowed to **freely plan** and choose their preferred routes when flying across the skies of Denmark, Estonia, Finland, Iceland, Ireland Latvia, Norway, Sweden and the United Kingdom, without the conventional constraints of a fixed route network and of a rigid airspace structure.

By enabling Airspace Users with flight profiles which are shorter, more direct and as aligned as possible with their business needs, the Borealis initiative will allow a significant decrease in fuel burnt by airlines (around 46.000 tons per year), which in turn would translate in a reduction of the environmental footprint of air traffic across the Northern Europe skies, especially in terms of carbon emissions.

It is anticipated that the programme will enable savings for around 145.000 tons of CO^2 on an annual basis, without detriment to the current safety standards. At the same time, it will allow €15 million of annual savings in management costs for the involved ANSPs, thanks to the performance enhancement of the ATM systems and to new and more efficient operational procedures.

Several ANSPs cooperated to implement the cross-border Free Route Airspace between Denmark, Estonia, Finland, Latvia, Norway and Sweden. This means that airlines entering the European airspace from the Russian border are now allowed to fly shorter and more direct routes all above Scandinavia, as if in one single airspace.