European Commission

SESAR deployment

Targeted stakeholder consultation

on the establishment of the "Pilot Common Project" supporting the implementation of the European Air Traffic Management Master Plan

(Date of the document: 12 December 2013)

Introduction

1.1 Context

The SESAR project aims to modernise and harmonise the European Air Traffic Management (ATM) System from a technological and operational perspective. It is an essential component of the Single European Sky (SES) initiative and contributes to achieving its high level performance objectives by increasing the capacity of systems while reducing ATM costs and the environmental impact of flights yet increasing the level of safety.

SESAR comprises three interrelated, continuous and evolving collaborative processes:

1. The first process is the *definition* of the content, the priorities and the development and deployment plans of the new ATM systems contributing to the achievement of the SES performance targets. The common roadmap for the development and deployment of these technologies and procedures, linking them to the SES performance objectives, is the **European ATM Master Plan** (Master Plan[1]). It defines the essential operational changes that need to occur in order to achieve the SES performance objectives and also identifies the related functionalities and the actions that operational stakeholders will have to implement at a given time and place.
2. The second process is the *development and validation* of the required technological systems, components and operational procedures of the SESAR concept of operations in accordance with the Master Plan. The SESAR Joint Undertaking (SESAR JU) is the instrument for implementing the development and validation processes. It is a Public-Private Partnership representing a cooperative effort of the major ATM operational stakeholders and the EU to rationalise and focus resources on performance and deployment oriented ATM research and development.
3. The final process is the *deployment* of the SESAR concept of operations resulting in a modernised ATM infrastructure composed of fully harmonised and interoperable components that guarantee high performing ATM in Europe. Deployment comprises the activities and processes related to the industrialisation and implementation of technologies and procedures developed and validated during the previous process.

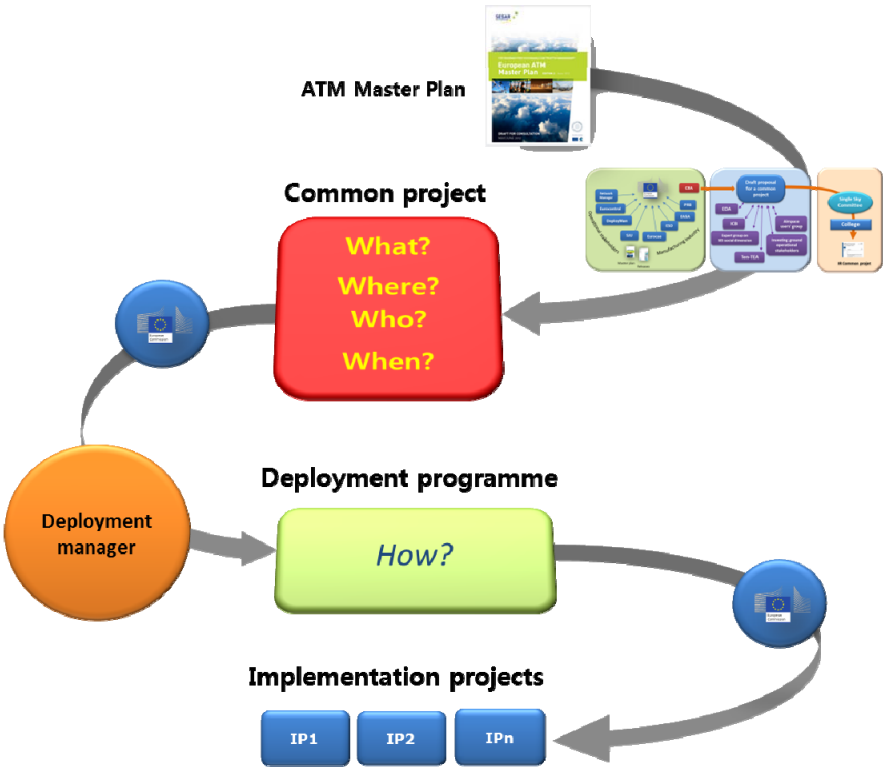
It has been demonstrated that only the timely, synchronised and coordinated deployment of SESAR in accordance with the Master Plan will contribute to achieving the SES performance objectives and the overall economic benefits expected from ATM modernisation. This required setting up appropriate instruments and mechanisms within the SES framework that would: on the one hand, close the loop of the SESAR processes' lifecycle allowing SESAR to fully deliver its benefits from concept to implementation; and on the other hand involve all the relevant stakeholders in a joint effort to deploy a new ATM system. For this purpose, on 3 May 2013 the Commission adopted the **Implementing Regulation (EU) No 409/2013** (The

[1] European ATM Master Plan: http://ec.europa.eu/transport/modes/air/sesar/european_atm_en.htm

Regulation) setting up an EU framework supporting the implementation of the Master Plan. Through this initiative, the Commission has activated the deployment process.

The *Regulation* defines the following instruments to support SESAR deployment:

- **Common Projects**, which aim to deploy ATM functionalities that are considered to be essential contributors to the improvement of the Union's ATM system performance. Common Projects focus on those essential functionalities that are mature for implementation and that demonstrate to have a global positive business case for the European ATM network.
- **governance mechanisms** that ensure a timely, synchronised and coordinated deployment of the SESAR concept of operations and that involve all concerned stakeholders and the relevant EU and Single Sky bodies allocating them clear responsibilities.
- the **Deployment Programme**, which translates the Common Projects into detailed deployment activities;
- **Implementation projects** carried out by operational stakeholders aiming to implement the different components of the Common Projects;
- and finally, **targeted incentives** to support the coordination and the implementation of Common Projects.



In accordance with Article 4 of the *Regulation*, Common Projects aim to deploy in a timely, coordinated and synchronised manner those ATM functionalities (**AFs**) that will achieve the **essential operational changes** defined in the Master Plan. These functionalities need to be **sufficiently mature** for implementation and require a **synchronised deployment**. The selection of the AFs that will constitute Common Projects is therefore based on three criteria:

1) **Contribution to essential operational changes**: the reference for the first criteria is, of course, the Master Plan and its periodic updates;

2) **Maturity for deployment:** For the second criteria, we first need to understand where and when the deployment setup defined in the *Regulation* operates in the SESAR cycle. For this purpose we will refer to the ATM Concept Lifecycle Model (CLM) (Figure 2). The SESAR definition and development processes cover the phases from V0 to V3 and are governed by the SESAR Joint Undertaking (SESAR JU). SESAR deployment processes cover phases V4 and V5. Although Common Projects and the deployment governance mechanisms defined in the *Regulation* focus mainly on the V5 phase, they should interact with and facilitate V4 activities.

   The assessment of the maturity of an AF aims to identify within what phase it is situated and what work remains to be done and examines the results from validation activities in V3 and the progress of industrialisation activities in V4. The *Regulation* defines certification and standardisation processes as part of industrialisation, which is also recognised as an essential enabler for the deployment of AFs.

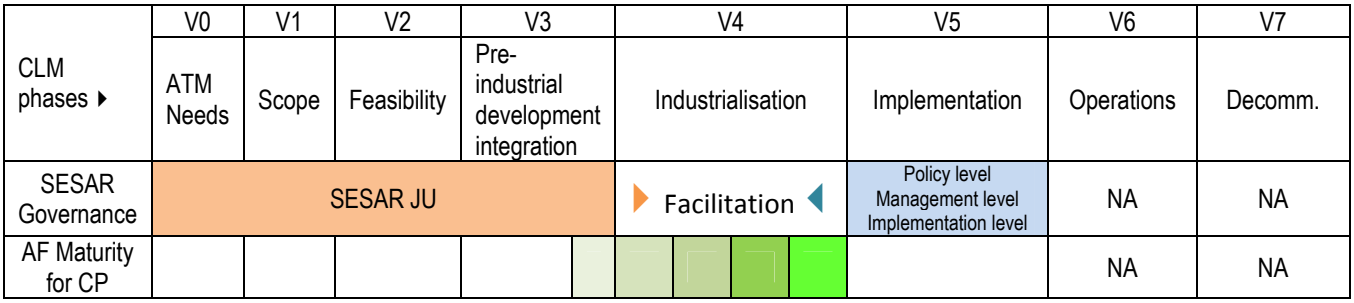


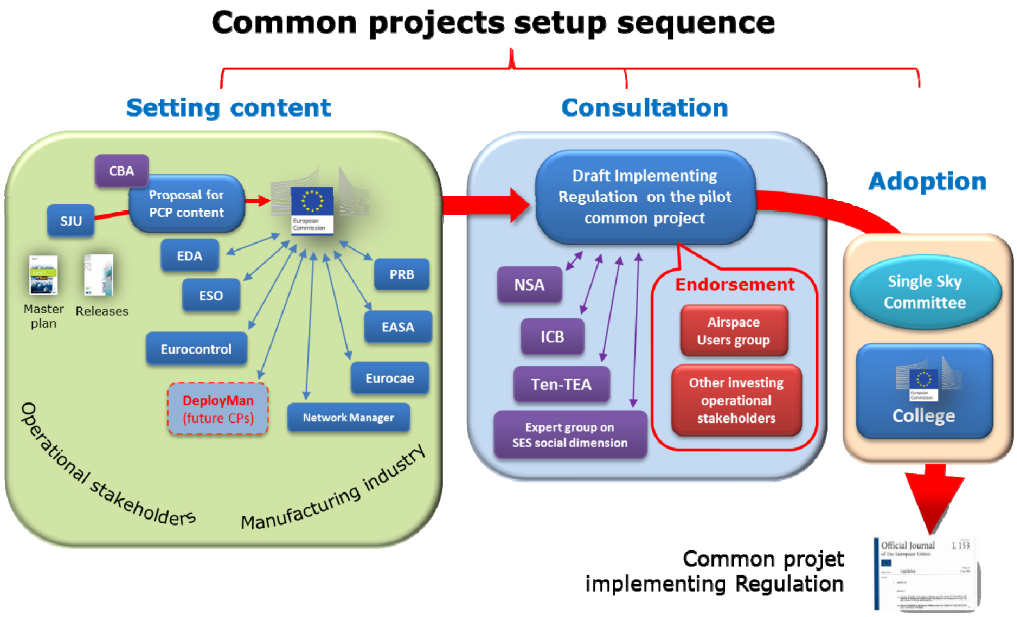
Figure 1

3) **Need for synchronised deployment**: The assessment of the synchronisation criteria is particularly relevant as it constitutes the only difference between AFs that are eligible for inclusion in Common Projects and those that, although bringing benefits to performance and are mature for implementation, do not require synchronisation and pertain mainly to local investment decisions. This assessment takes into account: the existing mandates; the need for solutions leading to standardisation and further automation; the need for preparing infrastructure for the future; the need for synchronisation of the different operational investors; and the existence of a high potential for optimisation through synchronisation.

The SESAR deployment governance, the Deployment Programme and incentives are addressed in more detail in Sections 2 and 4. Nevertheless, to introduce the context in which this consultation paper is issued, it is necessary to explain that, in its role as Policy level of the deployment governance, the Commission is setting up the first Common Project, referred to as the "**Pilot Common Project**" (PCP). In accordance with the *Regulation*, the adoption of the PCP follows three steps:

1. Setting the content
2. Stakeholder consultation and endorsement
3. Institutional consultation and adoption

The Commission will also assess the above-mentioned three-step process in order to better define roles and optimise stakeholder consultations for the future Common Projects.



1.2 The objective of this consultation paper

It is important to note that this consultation paper has been drafted by the Commission's Single European Sky Unit for the purpose of carrying out the above mentioned stakeholder consultation. The objective is to inform stakeholders of our assessment of a proposal for the deployment of an initial set of potential AFs under the *Regulation* and of our orientations for developing a final draft implementing Regulation for the PCP.

The feedback we will receive on this consultation paper is essential for developing the final draft of the PCP. It will be used to better understand and address the concerns and expectations of stakeholders and review, as appropriate, our orientations.

For this purpose we have developed a series of questions that are included in Part IV of this paper. The scope of this consultation is mainly the PCP. Therefore, the questions also focus on the PCP. However, comments on the deployment setup are also welcomed from stakeholders at this stage.

Stakeholders should reply to these questions through a public consultation application available on the Directorate-General for Mobility and Transport website: http://ec.europa.eu/transport/modes/air/sesar/deployment_en.htm.

The **Single European Sky Unit (Unit E2)** of the Directorate for Aviation and International Transport Affairs of DG MOVE is the responsible service for this consultation. Stakeholders may submit questions or documents through the functional mailbox: MOVE-E2-SINGLE-SKY-UNIT@ec.europa.eu. Please indicate in the subject: "PCP consultation".

1.3 Setting the content

The PCP was intended to contain the first set of AFs that, having completed their research, development and validation cycle through the work of the SESAR JU, have demonstrated their readiness for deployment and their capability to produce benefits in particular if they are deployed in synchronisation. For this reason it appeared natural to ask the SESAR JU to develop, on the basis of its work and with the contribution of its underlying partnership, a proposal on the potential scope of the PCP.

The Commission issued a mandate to the SESAR JU on 3 August 2012 requesting to prepare a proposal on the content of the PCP. The mandate specified that the PCP should be based on one or several essential operational changes identified in level 1 of the Master Plan, whose need and maturity were demonstrated taking into account the:

- Technological and economical maturity for implementation stemming in particular from SESAR JU development results;
- Significant contribution to performance;
- Added value, compared to "business as usual" through synchronisation.

We also requested that the technological and operational content of the proposal be supported by:

- the relevant technological and/or operational changes resulting from the R&D activities;
- the demonstration of a global positive CBA, while identifying local/individual negative business cases;
- the definition, for each of the implementation objectives in the PCP project, of a geographical scope (e.g. in terms of target FAB, FIR, TMA, airports) and industrial scope (e.g. in terms of target stakeholders) and a planning, including the relevant air/ground synchronisation dates;
- the identification of links with existing implementing rules or of potential needs for new regulatory actions to facilitate the implementation of the PCP;
- an assessment of compliance with safety requirements;
- an assessment of standardisation needs and timelines;
- an assessment of the potential risks that would hinder the implementation of the PCP and of the possible mitigation measures, such as incentive mechanisms, in particular to address local/individual negative business cases;
- an assessment of global interoperability/coherence with ICAO's Global Air Navigation Plan and Aviation System Blocks Upgrades.

The SESAR JU used its consultation and cooperation mechanisms ensuring the involvement of the relevant stakeholders, including the military, the Network manager, the PRB and Eurocontrol's Directorate Single Sky. Airspace users have also been associated in the elaboration of the CBA.

The SESAR JU's proposal, which was delivered on 6 May 2013, comprised a package of 6 candidate AFs to form the PCP:

AF1 - Extended AMAN and PBN in high density TMAs, which is expected to improve the precision of approach trajectory as well as to facilitate traffic sequencing at earlier stage, thus allowing to reduce fuel consumption and environmental impact in descent/arrival phases;

AF2 - Airport Integration and Throughput, which is expected to improve runway safety and throughput, ensuring benefits in terms of fuel consumption and delay reduction as well as airport and airspace capacity;

AF3 - Flexible Airspace Management and Free Route, which is expected to enable a more efficient use of airspace, thus providing significant benefits linked to fuel consumption and delay reduction;

AF4 - Network Collaborative Management, which is expected to improve the quality and the timeliness of the network information shared by all ATM stakeholders, thus ensuring significant benefits in terms of ANS productivity gains and delay cost savings;

AF5 - iSWIM: ground-ground integration and aeronautical data management & sharing, which consists of a set of services that are delivered and consumed through an IP-based network by SWIM enabled systems, enabling significant benefits in terms of ANS productivity;

AF6 - Initial Trajectory Information Sharing: air-ground integration towards i4D with enhanced Flight Data Processing performances, which is expected to improve predictability of aircraft trajectory for the benefit of airspace users, Network Manager and ANSPs implying less tactical interventions and improved de-confliction situation. This would have a positive impact on ANS productivity, fuel saving and delay variability.

An additional mandate was later issued, on 18 March 2013, to ask the SESAR JU to also assess the potential impact on the 6 AFs of the 9 potential "Centralised services" proposed by Eurocontrol. In fact, the development of these services requires a specific approach to the deployment of ATM systems and their constituents. There was therefore a potential connection between such services and the SESAR JU's work on the PCP. The SESAR JU was asked to identify and assess the interdependencies between the potential AFs in the PCP and the Centralised Services. The results of the assessment are available on DG MOVE's SESAR deployment web page[2].

The Commission has examined the SESAR JU proposal's compliance with the three criteria mentioned above. For the assessment of the maturity of the proposed AFs, we have consulted EASA, EDA, Eurocontrol, Eurocae, ETSI, CEN-CENELEC, focussing on standardisation and certification needs for the PCP and the related processes. We have consulted Eurocontrol services, PRB and Network Manager, to assess the PCP's coherence with the Performance scheme and interoperability issues.

1.4 Stakeholder consultation and endorsement

In accordance with Article 5 of the Regulation, we are consulting the stakeholders on the results of the first step, which are summarised in the present document. This second step of the consultation process aims to confirm the content of the PCP, in particular, our assessment of the proposed AFs' maturity for deployment and the global cost-benefit analysis. For this purpose, this consultation paper is addressed in particular to:

- The civil and military operational stakeholders that are directly concerned with the implementation of the proposed PCP;
- The National Supervisory Authorities;
- The Industry Consultation Body;
- ATM Sectoral social dialogue;
- The Expert group on the social dimension of the Single European Sky; and
- The Network Manager.

[2] http://ec.europa.eu/transport/modes/air/sesar/deployment_en.htm

Moreover, in accordance with Article 5(4) of the *Regulation*, the Commission shall ensure that proposal for the PCP is endorsed by the airspace users and the ground operational stakeholders that are required to implement it. For this purpose, and based on the outcome of the above mentioned wider stakeholder consultation, we will ask the airspace users, through their representative group, and the air navigation service providers and airports directly concerned by the PCP, either individually or through the associations representing them at EU level, to confirm in writing that they can support the proposed PCP in terms of feasibility of its technical content, geographical scope and targeted operational stakeholders, proposed implementation dates and expected costs and benefits.
Based on the results of this consultation and endorsement we will prepare the final draft proposal for submission into the final step, the adoption of the PCP Regulation.

1.5 Institutional consultation and adoption

In the third step, the Commission will adopt the implementing Regulation establishing the PCP after having received a positive opinion from the Single Sky Committee through the "examination" comitology procedure, in accordance with the provisions of Article 15a of the Regulation (EC) 550/2004.

The PCP Regulation should enter into force on the twentieth day after its adoption. On the one hand, it will formalise the obligation to deploy the selected AFs; on the other hand, it will serve as basis for the establishment of the management and implementation levels of the deployment governance, through the selection of the Deployment Manager and of the implementation projects, and of the Deployment Programme.

Part I - Explanatory Memo

Section 1 - The Pilot Common Project

1.1 What is the "Pilot Common Project"?

The PCP constitutes the first batch of technical and/or operational changes to be implemented in the 2014-2024 timeframe for the first time under the deployment governance. The PCP is a special Common Project not just because it is the first one but also because it activates **a new process** and a new way for stakeholders and the Commission to work together to deploy a modernised European ATM infrastructure. In this sense, the process underlying the establishment of the PCP aims to facilitate cooperation amongst operational stakeholders, including the Military, and with the relevant Single European Sky entities.

Moreover, the PCP will have a significant impact on SESAR instruments and processes, such as the Master Plan, the SESAR JU's priority setting and demonstration activities as well as on the standardisation and Regulatory processes. The setup of the PCP proposal is based on an in-depth analysis of the content of the SESAR Research & Development Programme, and in particular of the upcoming SESAR Releases. The necessity to have the various PCP components ready in due time for their deployment, has allowed to identify a need to further secure and prioritise the Programme activities. Consequently, the outcome of the PCP will be used as a top-down input for the definition of the SESAR Releases 4 and 5 and the SJU Member's contributions re-allocation that will be performed by the end of 2013.

The PCP is also an opportunity to connect existing Single European Sky instruments to the technological pillar thus ensuring a coherent and comprehensive approach towards the implementation of the SES.

1.2 The Commission's assessment of the SESAR JU's proposal

The assessment of the SESAR JU's proposal has led, on the one hand, to select those AF components that are compliant with the Common Project eligibility criteria and on the other hand, to make a distinction between AFs on the basis of their maturity. It resulted that the validation activities performed by the SESAR JU do not always provide the necessary assurance of maturity. Consequently, while most of the proposed AFs are deemed to have reached an appropriate level of industrialisation and are or will be ready for deployment in an acceptable timeframe with respect to the Union's 2014-2020 Multi-annual Financial Framework (MFF), for some of them these processes may not have yet started or may require a longer timeframe.

As stated in the previous paragraph, the PCP is also an enabler for activating cooperation and coordination in the SESAR cycle and amongst the stakeholders intervening in the relevant CLM phases described above. In view of ensuring the effective and timely setup of future Common Projects and with the intention to maintain the essential momentum that this process has created, it is proposed to identify in the PCP Regulation:

- the AFs or components of AFs that are mature and whose deployment will be mandatory; and

- those AFs or components of AFs that are not yet sufficiently mature and that should constitute a "binding orientation", namely for the stakeholders that play a role in the related development, validation and industrialisation processes, to prioritise the relevant activities in view of their inclusion in future Common Projects.

Following this approach, the following changes to the SESAR JU's proposal have been operated:

1) It is proposed to exclude **Runway Status Lights activity in AF2** from the PCP. This activity, in fact, does not comply with two eligibility criteria for Common Projects: It is not identified as an essential change in the Master Plan; and it does not require a synchronised deployment. This exclusion is considered to be a minor change that will not affect the assumptions of the CBA underlying the PCP proposal.

2) **iSWIM: ground-ground integration and aeronautical data management & sharing (AF5) and Initial Trajectory Information Sharing: air-ground integration towards i4D with enhanced Flight Data Processing performances (AF6)** are proposed as "binding orientations". Although both AFs contribute to the Master Plan essential operational changes and require synchronised deployment, they lack the maturity required by Article 4(4) of the *Regulation.* Consequently, their deployment is not prescribed as mandatory at this stage. However, these two AFs are considered as runner-up candidates for a later inclusion in the PCP or in a future Common Project once the required level of maturity will have been achieved and assessed through the review process laid down in the PCP Regulation.

Consequently, **AF1, AF2, AF3 and AF4** are proposed for inclusion in the PCP, while **AF5 and AF6** are proposed as "binding orientations" for future potential inclusion in the PCP or in other Common Projects.

1.3 Who does the PCP concern?

SESAR's objective is to modernise the European ATM network that spreads across 28 sovereign national airspaces with the potential to reach beyond the EU border and involve other neighbouring countries within a Pan-European context.

The PCP establishes an obligation for all EU civil and military operational stakeholders, such as air navigation service providers, airport operators and airspace users, to deploy specific ATM functionalities in an identified region and within a determined timeframe. It also applies to other bodies such as the Network Manger, the SESAR JU, EASA, European Standardisation Organisations, Eurocae, etc. for their respective areas of competence.

1.4 What is the impact on the Military?

The military have been preliminarily consulted through the EDA, on the content of the SJU's proposal and a consolidated position has been timely delivered to the Commission.

Military considers the access to airspace a prerequisite to fulfil national obligations as well as those stemming from international treaties (i.e. NATO and EU Lisbon Treaty). Consequently, PCP functionalities should carefully consider this military need.

As opposed to other stakeholders, military decision-making is be based on a more formal and lengthy consultation. Decisions regarding the "military content" of the PCP (and future Common Projects), requires coordination with the national defence planning mechanisms before receiving the formal approval by the Member States. Talks between EDA and other military organisations are facilitating the delivery of more consolidated positions on SESAR. Moreover, the SESAR Military Implementation Forum (SMIF) shows to be more and more able to grasp the technical aspects of SESAR deployment and provide strategic steering and advice to national and international organisations.

Based on the latest military assumptions, PCP impact for the military is expected to be greater than that contained in SJU's proposal both in terms of number of relevant AFs and costs to be incurred.

Although the main impact of PCP is expected in AF 3 and 5, more work is required to evaluate the impact of AF1, 2 and 4.

The impact of AF3 differs significantly amongst Member States depending on the level of civil-military integration in ASM achieved so far; consequently costs implications for the implementation of this AF could differ significantly.

Interface between ATC and Air Defence units is considered an essential requirement for the safe conduct of air policing missions and the related training.

More technical analysis is required to clarify the level and type of exchange of information between SWIM and military Air Command and Control systems (possible interface with the NATO ACCS should be carefully analysed due to security, technical and cost implications).

On the governance aspect of the deployment, the military involvement in the management level remains an outstanding issue to be urgently addressed. The EDA will lead a discussion on this specific point. The options for the Military to participate in the deployment governance and implementation projects are described in Sections 2, 3 and 4.

Finally, the standardisation requirements for the military require a dedicated work to be developed in parallel to the one described in the following paragraph.

1.5 What is the impact on certification & standardisation organisations and processes?

In the first step of the PCP setup, the Commission consulted EUROCAE, the ESO's, EASA, EUROCONTROL, the SJU and ASD on the compatibility of the deployment time-schedule suggested by the SESAR JU and the standardisation and regulation needs of the proposed AFs.

This assessment identified possible delays in the standardisation and regulation activities. These potential delays are summarized in the **Draft Standardisation and Regulation roadmap** (Part V – Section 2).

In addition, the pre-consultation allowed completing estimated delivery times for standards and regulations. The above mentioned Organisations indicated that the delivery of standards and regulations for AF2, MTCD in AF3, AF5 and A6 could be later than what was assumed in the SJU's PCP proposal.

Based on standard and regulation delivery dates, the impact on the PCP deployment time schedule has been assessed taking into account the following sequence of events and corresponding estimated durations:

- Availability of sufficient and relevant material from SESAR JU (starting point, see Part V – Section 1));
- Development of standards (1-3 years as provided by the relevant organisation, see Part V – Section 2);
- Procurement process including preparations (1 year);
- Development of products and factory acceptance tests (1-3 years);
- Site installations and site acceptance tests (1 year);
- Transition to full operational use (1 year).

It should be noted that the delays in the events indicated in the first two bullets may compromise the timely deployment of the PCP.

The impact on the deployment time schedule affects:

- The start of investment (corresponds to the start of the CFT process)
- The industrialisation completion date (corresponds to the development of products and the completion of factory acceptance tests)
- The start of deployment (corresponds to the full operational use at the first site)
- The end of deployment (corresponds to the full operational use at the last site)

For the **industrialisation completion date**, two possible scenarios were considered:

1. The manufacturing industry accepts to start industrialisation in parallel with the development of standards (1 year before the standards delivered) pending the signature of the first contract with operational stakeholders;
2. The manufacturing industry starts the industrialisation activities upon signature of the first contract with the operational stakeholders. It should be noted that this scenario could delay the deployment process by two years.

The draft Standardisation and Regulation roadmap shows both the "**PCP proposed date**", from the SJU proposal, and the "**Alternative dates**", which have been calculated for both scenarios.

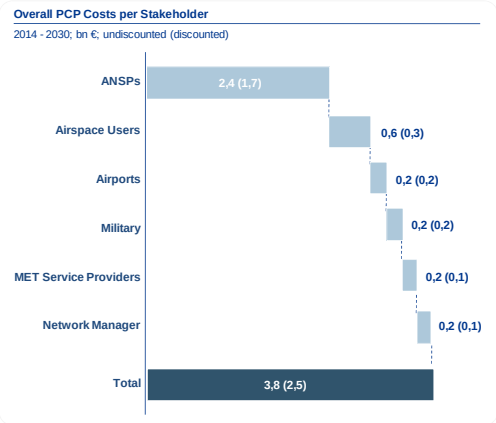
The assessment results can be summarised as:

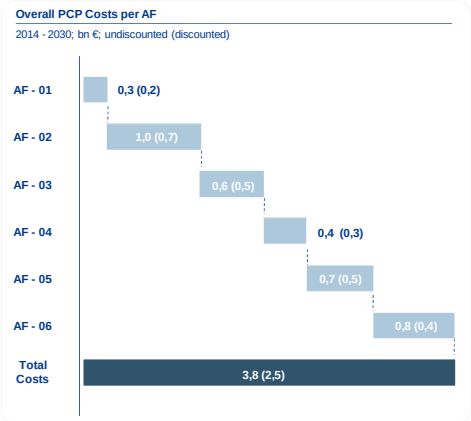
- PCP time-schedule could be feasible for AF1 and, subject to confirmation that the respective investments can start in 2014 for some geographical areas, for AF3 (except MTCD) and AF4;
- PCP time-schedule could need to be extended for AF2, MTCD in AF3, AF5 and AF6.

The assessment suggests the need for further consultation on the standardisation and regulation needs and on the deployment time schedule also to confirm the indicative dates for industrialisation. The table in Part V-Section 2 will be reviewed following this consultation and will be annexed to the PCP Regulation.

1.6 How much will the PCP cost?

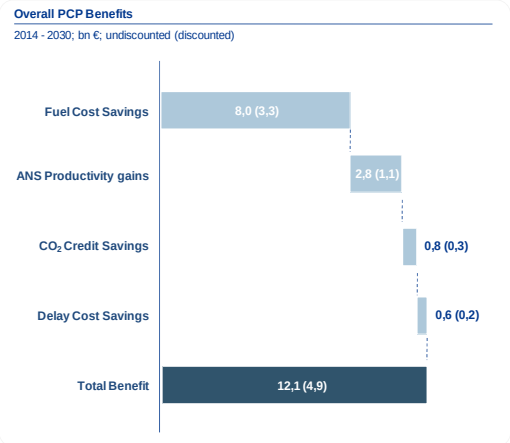
The overall deployment investments for the proposed 6 AFs, over the period 2014-2024, is estimated to be EUR 2.5 billion shared amongst ANSP (64%), Airspace users (16%), airport operators (5%) and Network Manager, Military and MET service providers (5% respectively).

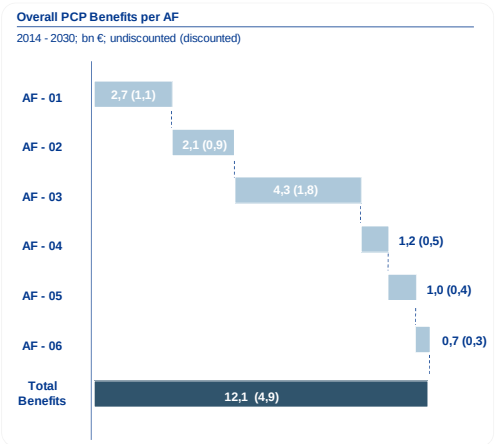




1.7 What are the expected benefits of the PCP?

The SESAR JU's assessment anticipates that the proposed PCP could globally bring performance gains in the order of EUR 4.9 billion most of which result from reduction of fuel burn (66%) and ANS productivity gains (23%).





For detailed analysis, please refer to Part V-Section 3 and the SESAR deployment web page: http://ec.europa.eu/transport/modes/air/sesar/deployment_en.htm.

1.8 How and when will the PCP enter into force?

The PCP will be adopted in the form of a Commission implementing *Regulation* making it binding in all EU Members States.

1.9 What will the Commission implementing Regulation on the PCP contain?

The Commission implementing Regulation on the PCP (PCP Regulation) will consist of:

- the general legal provisions in the main body;
- an Annex with the overall description of each AF, of its connection with the Master Plan essentials, of its requirements for synchronised deployment, of the operational and technical scope - including the system requirements, the geographical scope, the identification of the impacted stakeholders and deployment target dates, the essential prerequisites and the interdependencies with other AFs;
- Appendixes with information on supporting material to be provided by SJU for standardisation and regulation phase, standardisation and regulation roadmap and cost-benefit analysis.

The PCP Regulation will not address specific aspects of the future calls for proposals for the Deployment Manager or for the implementation projects, which will take place in the framework of the Connecting Europe Facility (CEF) and which will be subject to CEF procedures.

The key legal provisions in the main body of the PCP Regulation will be:

a) Subject matter, objective and scope

The objective of the PCP Regulation will be to set up the PCP, in application of Article 15a(3) of Regulation (EC) No 550/2004 and to identify a first set of ATM functionalities in accordance with Article 4 of the *Regulation*.

b) Definitions

The PCP Regulation will use the definitions in Article 2 of Regulation (EC) No 549/2004 and in Article 2 of the *Regulation*. Some additional definitions of concepts not defined by the EU law or whose definitions may need more detail may need to be provided, in particular on Airport – Collaborative Decision Making (A-CDM), Airport Operations Plan (AOP), high and very high capacity centres and Network Operations Plan (NOP).

c) Mandatory deployment of ATM functionalities

The PCP Regulation intends to make the deployment of the following AFs mandatory:

1) Extended Arrival Management and Performance Based Navigation in the High Density Terminal Manoeuvring Areas;

2) Airport Integration and Throughput;

3) Flexible Airspace Management and Free Route;

4) Network Collaborative Management;

The deployment of the ATM functionalities should take place in line with the provisions of the Annex of the PCP Regulation.

d) Establishing binding Orientations

AF5 and AF6 have not been included in the PCP because they do not present at this time the appropriate level of maturity in terms of validation and industrialisation. However, considering that they contribute to the essential operational changes in the Master Plan and that they require synchronised deployment, they are flagged as candidates for later inclusion in the PCP or in other Common Projects. For this purpose the PCP Regulation prescribes that the operational stakeholders, the Network Manager, the SESAR JU, the European Aviation Safety Agency (EASA), the European Standardisation Organisations (ESOs) and Eurocae shall take these functionalities duly into account when planning and performing development, validation and industrialisation activities and when planning future investments, with the aim to bring them to the required level of maturity that will allow their deployment by the indicative deployment target date specified in the Part II.

The decision on making their deployment mandatory will be taken on the basis of the results of the review process described below in sub-paragraph h).

e) Operational procedures

The PCP Regulation will require the operational stakeholders and the Network manager to implement also the associated operational procedures needed for putting all the AFs into service and operating them.

f) Support to industrialisation and validation

The PCP Regulation will require that the SESAR JU, EASA, ESOs and Eurocae jointly cooperate in view of ensuring the timely and coordinated availability of the regulatory, standardisation and technical documents that are necessary to implement the PCP. This process should also consider the need to ensure good coordination with a parallel military standardization mechanism to be undertaken under the auspices of the relevant military standardization authorities.

g) Monitoring

The Commission will monitor the implementation of the PCP and its impact on the performance of the European ATM Network in accordance with Article 6 of the *Regulation, inter alia* through:

i) Planning and associated reporting tools set up under the Master Plan;

ii) the performance plans, in particular through the information specified in Article 11(3)(c), Article 11(5), Annex II, Point 2 and Annex III of the Commission Implementing Regulation (EU) No 390/2013;

iii) the reporting tables on air navigation costs, in particular through the information specified in Annex II, Table 1, line 3.8 and Point 2(m), Annex VII, Table 3, lines 2.1 to 2.4 of the Commission Implementing Regulation (EU) No 391/2013;

iv) reporting tools associated to the Network Operation Plan, in particular the description of the plans and actions to be implemented at network and local level as specified in Annex V, 5 and 6 of Commission Regulation (EU) No 677/2011

v) the Deployment Manager, who shall monitor the execution of the Deployment Programme and the implementation projects, selected by the Commission in accordance with Article 10 of the *Regulation,* through the framework partnership referred to in Article 9(5) of the *Regulation* and any other cooperative arrangement concluded with the implementation level.

vi) Implementation plans of Functional Airspace Blocks aimed at ensuring compliance with Article 9a of Regulation (EC) No 550/2004 and Article 2(25) of Regulation (EC) No 549/2004.

h) Review

The Commission will review the content of the PCP Regulation in the light of technological developments in ATM and the progress achieved in the deployment of the AFs. In particular, the review shall assess the following aspects:

a) progress in the deployment of the mandatory AFs retained in the PCP and the degree of maturity achieved by the AFs identified as “binding orientations”;

b) the use of incentives for implementing the PCP;

c) the contribution of the PCP to the achievement of the performance targets;

d) the actual costs and benefits of the PCP.

Based on the results of the review, the Commission may amend the PCP Regulation, its Annex and the Appendixes, following the same procedure as for its initial adoption.

1.10 Who will be responsible for its implementation?

The PCP will be implemented in accordance with the Deployment Programme through a number of implementation projects. The Deployment Manager is responsible for the timely and synchronised execution of the Deployment Programme and the overall coordination of the implementation projects.

The actors in the implementation level, composed of civil and military operational stakeholders that carry out the implementation projects, are contractually responsible for executing their projects.

1.11 What happens if stakeholders do not implement the PCP?

Member States will be obliged to ensure that civil and military operational stakeholders are duly informed of the PCP Regulation, which will be legally binding in its entirety and directly applicable in all EU Member States.

In the case that the relevant operational stakeholders do not deploy the PCP's AFs, different measures can be taken:

a) Enforcement of implementation projects referred to in Article 10 of the Regulation:

- **Reduction of the grant awarded to the implementation project**

  The projects co-funded from the EU budget will be covered by the grant agreements, to which CEF Regulation and Financial Regulation and its implementing rules apply. The grant agreements will allow the Commission/TEN-T EA in case of poor, partial or late implementation of a project to reduce the grant initially provided to it. The reduction may in certain cases amount to a complete withdrawal of the funding.

  The management of the funds awarded under the CEF Regulation will follow the principle "use it or lose it". This means that in case the funds will not be used by a project by a certain date, such funds will be reallocated to other projects.

  It is important to note that in case of non-performance by beneficiary of a grant, the financial liability towards the Commission remains with that individual defaulting beneficiary.

- **Administrative penalties and financial penalties**

  In case of serious breach of obligations by the grant beneficiary, administrative penalties and/or financial penalties may be imposed by the Commission/TENTEA. Administrative penalties consist in the exclusion from all contracts and grants financed by the Union budget for up to 5 years. Financial penalties amount to 2% to 10% to the value of the contribution to the beneficiary concerned. These penalties may be imposed in addition to the reduction of the grant mentioned above. In the event of another infringement within five years following the establishment of the first infringement, the period of exclusion may be extended to 10 years and the percentage range of the financial penalty may be increased to 4% to 20%.

b) Enforcement of obligations not implemented through projects co-funded from EU budget

- Member States will be responsible for enforcing obligations under the PCP Regulation that will not be executed through projects co-funded from EU budget.

- Member States are required by Regulation (EC) no 549/2004, Article 9, to lay down dissuasive penalties for infringements of any measure within the SES regulatory framework. The PCP Regulation will form part of the SES regulatory framework and the obligation on Member States to put in place dissuasive penalties therefore applies also in relation to this Regulation.

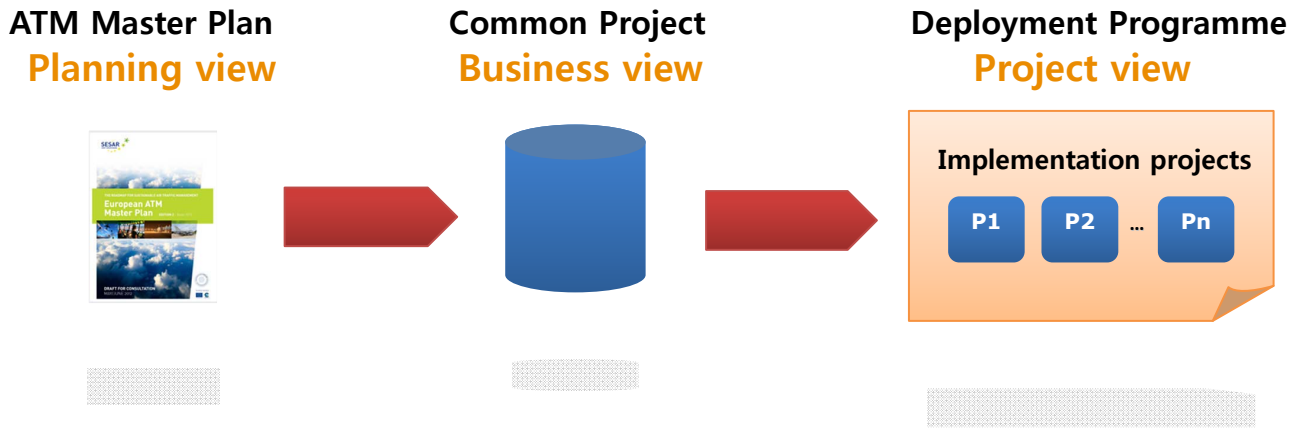
c) Enforcement via performance and charging scheme

- Certain obligations under the PCP Regulation will be met through the performance and charging schemes. For example, starting from Reference Period 2, the Commission shall assess the performance targets contained in the performance plans taking into account the expected benefits (such as productivity gains of ANSPs) achievable by the deployment of the ATM functionalities through Common Projects.

Section 2 - The Deployment Programme

2.1 What is the Deployment Programme?

As defined in Section 2 of the *Regulation*, the Deployment Programme is detailed & structured planning of all deployment activities that are necessary to implement Common Projects.



In simple terms, we can say that whereas Common Projects define "what" will have to be deployed, "where" and "when" it should be deployed and by "whom", the Deployment Programme will define in detail "how" this will be done.

The Deployment Programme will be the binding work programme for all those operational stakeholders that intend to propose and carry out implementation projects (see Section 3).

In developing the Deployment Programme, the Deployment Manager shall cooperate closely with the Network Manager, the military coordinator[3] and the SESAR JU to ensure coherence and appropriate prioritisation with respect to the Master Plan, the NSP and the NOP and military concerns. The Deployment Manager should also consider the most efficient means of deploying the AFs including through non-local or centralised deployment.

2.2 Who approves the Deployment Programme and when?

The Deployment Manager will propose to the Commission a draft Deployment Programme for the PCP. The Deployment Programme will describe in detail how the PCP will be implemented identifying the related implementation projects, the operational stakeholders that will carry them out, the planning of actions and the estimated costs.

[3] The term "military coordinator" is a generic definition of the entity entrusted by the military for the identification of the military part of the deployment program.

Once the Deployment Programme is approved and the implementation projects selected, the Deployment Manager shall be responsible for the overall coordination of the implementation projects and their compliance with the Deployment Programme. The implementation level will be responsible for the execution of the individual implementation projects.

The Network Manager shall be involved in the implementation level as appropriate to ensure the required coherence and timely implementation of Network Manager functions and systems projects.

2.3 What is the impact of the Interim Deployment Programme (IDP) on the PCP?

The Interim Deployment Steering Group (IDSG) was established on 29 February 2012. It is the transitional arrangement to steer the implementation of short-term essential SESAR deployments that have been identified as critical to performance, and to achieve early benefits at European level.

The central task of the IDSG is delivery of the IDP, as derived from the Master Plan, and is achieved primarily through the adoption of recommendations (adopted through consensus by group members) and oversight of their implementation through the production of an Execution Progress Report.

The IDSG will cease to exist when the Deployment Manager is nominated and operational; transitional arrangements for the shift from IDSG to full deployment are to be agreed in 2014. Although the IDP is a functional and comprehensively agreed document, it was developed on the basis of the Master Plan, which is not fully cognisant of the needs of the PCP (which was unknown at that time). The IDSG is therefore reviewing the content of the IDP and preparing a gap analysis to ensure the Deployment Manager is equipped with an accurate picture of what has been achieved both by the IDSG in delivering the SESAR baseline, and what has been omitted in establishing the baseline for the PCP.

The IDP addresses two prerequisites for the PCP: STAM for AF4; and data link for AF6. The PCP Regulation does not transfer the IDP into the PCP. However, if necessary, the coordination of PCP related activities in the IDP could be transferred under the coordination of the Deployment Manager in the call for the Deployment Manager.

Section 3 - The implementation projects

The general criteria for the implementation projects that will be published in the related call for proposals will prescribe that:

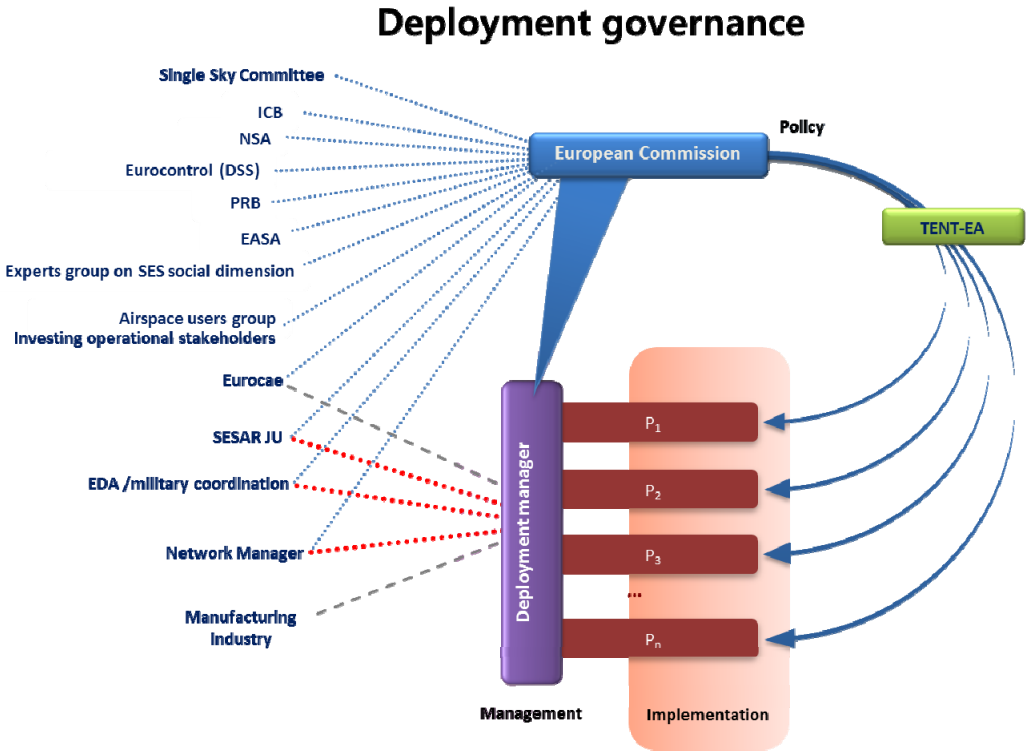
- Any implementation project selected to implement a Common Project should start[4] at the latest by end 2020 (i.e. end of the Union's 2014-2020 Multi-annual financial framework);
- Implementation activities shall start within a defined maximum period after the approval of the Deployment Programme;
- Each AF shall have a deadline for its deployment;
- All EU financial support to an implementation project shall stop at the latest on the date on which the Common Project or the part of it to which the implementation project refers to, is meant to be deployed;
- EU co-funding rates for implementation projects will be adjusted in accordance with the provisions of Article 4(6)(b) of the *Regulation*.

The projects implementing the PCP that are not included in the Deployment Programme will not be considered as **implementation projects** as they will not be selected by the Commission in accordance with Article 10 of the Regulation. The Deployment Manager will not manage these projects and will not be responsible for them. Nevertheless, the Deployment Manager may cooperate with such projects on a voluntary basis.

The projects that do not implement the PCP (or future Common Projects) but that nevertheless aim to deploy SESAR, could be eligible for CEF funding depending on availability of funds and if they fulfil requirements published by TEN-T EA as part of the annual or multiannual CEF calls for proposals. These projects are outside the scope of the *Regulation.*

[4] By start of implementation project is meant a signature of a specific grant agreement or a grant agreement.

Section 4 - Governance



4.1 What is the role of the Policy level?

The **Policy level is** led by the European Commission and is responsible for the setup and adoption of Common Projects, selection of the Deployment Manager, approval of the Deployment Programme, selection of the implementation projects and the allocation and management of EU incentives for Common Projects.

4.2 What is the role of the management level?

The Management level is under the sole responsibility of the Deployment Manager whose role and responsibilities are defined in Article 9 of the *Regulation*. The main tasks are summarised in the following table:

Article 9 of the *Regulation*	Activities in practice
Developing, proposing, maintaining and implementing the Deployment Programme	On the basis of Common Projects, the Deployment Manager will be requested to draft a Deployment Programme, or amendments to it, and propose it to the Commission for approval. The Deployment Manager ensures the timely and effective implementation of the Deployment Programme, namely through the internal cooperation agreement (see §4.7) or any other governance and cooperation arrangements concluded with the actors in the implementation level.
Ensuring effective management of risks and conflict of interest	The Deployment Manager shall establish governance and cooperation mechanisms, which shall be part of the above mentioned agreement, and arrangements that aim to avoid conflict of interest in the decision making, monitoring, reporting and administrative processes. These mechanisms should be effective and transparent and include alert and mitigation actions.
Advising the Commission on issues related to the implementation of Common Projects	The Deployment Manager is responsible for monitoring the implementation of the Deployment Programme and for taking the necessary actions to mitigate risks that may hinder its timely and effective implementation. In this context, an intervention of Policy level may be necessary, for example to adapt a Common Project, the Framework Partnership or the Deployment Programme. This task could therefore translate in a proposal for an amendment of the Action plan, of the Deployment Programme, an amendment of individual specific grant agreements (See §4.6) or in the suggestions made to the Commission for an amendment of the Common Projects or on other issues related to them.
Associating the operational stakeholders that are required to implement Common Projects	The Deployment Manager identifies the potential civil and military operational stakeholders needed to implement a Common Project and prepares, with them, a proposal for the Deployment Programme or any amendments to it and agrees on the appropriate cooperation arrangements.
Establishing mechanisms and decision-making processes that	The Deployment Manager shall establish an internal cooperation agreement (see §4.7) between the partners

ensure efficient synchronisation and overall coordination of the implementation projects and the related investment in line with the Deployment Programme	of the Deployment Manager and any other cooperation arrangements established with actors of the implementation level.
Advising the Commission on issues related to the setting up of new Common Projects	This obligation may translate in the sharing of lessons learned and suggestions on various aspects related to setting up of new Common Projects.
Implementing Commission decisions and ensuring and monitoring their implementation by the implementation level	The Commission decisions will be executed through the FPA, the specific grant agreements and grant agreements.
Identifying the most appropriate financing mechanisms combining public and private funding	This activity takes place as part of the preparation of the Deployment Programme and the applications for implementation projects. The Deployment Manager may also assess other possible means of financing for Common Projects other than EU funding (e.g. deployment fund).
Monitoring implementation of the Deployment Programme	The Deployment Manager will receive the reporting from implementation projects and on that basis will monitor if projects are on track, their compliance with the technical specifications of the Deployment Programme, the proper synchronisation of projects, the effectiveness of the cooperation mechanisms put in place with the Network Manager, the military coordinator and the SESAR JU.
Reporting to the Commission	On the basis of the information resulting from the monitoring task the Deployment Manager will report to the Commission.
Ensuring appropriate coordination with National Supervisory Authorities.	On the basis of a Deployment Programme, liaise with NSAs (through a suitable mechanism, such as the NCP) to include regulators' comments on the deployment of implementation projects.

4.3 Who can join the Deployment Manager and how?

The *Regulation* establishes that the Deployment Manager shall be composed of groupings of operational stakeholders or individual operational stakeholders – including from third countries – that carry out at least one implementation project or a part of it.

Members of the Deployment Manager must be legal entities. They must undertake to fulfil the obligations defined in Article 9 of the *Regulation* and conclude a Framework Partnership Agreement (see § 4.6) with the Commission.

4.4 Establishment of the Deployment Manager through the framework partnership

The framework partnership instrument has been chosen as the appropriate tool for the establishment and financing of the Deployment Manager. In the architecture of the framework partnership the members of the Deployment Manager are the partners forming the framework partnership. Consequently, the framework partnership is the Deployment Manager and therefore we will refer to the members of the Deployment Manager as **partners**.

The Commission will launch the procedure for the selection of the partners through an **open call for proposals** immediately after the adoption of the PCP. The PCP and the relevant requirements set out in the *Regulation* will be the reference for the selection procedure. The interested parties will have to submit an application in compliance with the call's terms of reference, which will contain the exclusion, selection and award criteria.

Due to the high number of operational stakeholders concerned by the PCP project the Commission encourages applications from groupings or associations that can represent a "critical mass" of operational stakeholders capable of associating further partners at a later stage.

As far as the military are concerned, the Commission welcomes a direct contribution by the EDA in the Deployment Manager, although an association in the management level through a dedicated cooperation arrangement can also be considered. Irrespective of the decision preferred, a military coordinator must ensure an effective coordination with or within the Deployment Manager.

The applicants in the call for proposals will be requested to jointly propose an **action plan** that indicates in detail how they intend to fulfil the tasks referred to in Article 9 of the *Regulation*, also with regard to possible future Common Projects, including the cooperation arrangements they intend to put in place among themselves. In addition, applicants may be requested to submit an initial Deployment Programme. Once the Action Plan and initial Deployment Programme are approved by the Commission, the Deployment Manager will be established with the successful candidates through a **Framework partnership agreement** (see § 4.6). The approved action plan and initial Deployment Programme will form an integral part of the said agreement.

The partners may decide to form one legal entity that would then become a single partner of the Commission. It is also possible that some operational stakeholders will form one legal entity and this entity will become partner in the framework partnership alongside with partners who will not join this single legal entity.

The operational stakeholders who will not be involved in the Deployment Manager but who will nevertheless be concerned by the Common Project may join it later, for example, at the occasion of the calls for implementation projects. The conditions governing the accession of new operational stakeholders to the existing Deployment Manager need to be transparent and safeguard an equal treatment of applicants. This requirement nevertheless does not preclude internal governance mechanisms where different partners may assume different roles in order to ensure efficient distribution of management and other responsibilities. The acceding partners may therefore agree with existing partners not to assume the same management or other responsibilities. Indeed, the internal governance mechanisms, including the distribution of tasks, remain entirely within the responsibility of partners to the framework partnership and the Commission should not intervene in them as far as the principles of transparency and equal treatment of applicants are respected.

The candidate partners will have to demonstrate that they will ensure an appropriate coordination and cooperation with the Network Manager, the SESAR JU and the military.

4.5 EU financial support to the Deployment Manager

The Deployment Manager may be funded through levying an amount from the grants awarded to implementation projects in proportion to management, coordination, monitoring and reporting efforts needed. The partners participating in the Deployment Manager may agree among themselves to fund these efforts at a higher rate than the funding rates laid down in the funding programme (*e.g.: 50% in the Connecting Europe Facility*) but nevertheless within the total envelop awarded to the projects. This way would allow covering 100% of the costs of the Deployment Manager.

The Commission is examining alternative ways for providing financial support to the Deployment Manager.

4.6 The Framework partnership

A framework partnership is a long-term cooperation mechanism that the Commission establishes with selected beneficiaries called **partners**. The framework partnership can be considered as a contractual “Public-Private Partnership” that does not necessarily require that partners group in a single legal entity. In case the partners do not form one legal entity, each of them will have a contractual relationship with the Commission. If the partners create one single legal entity, only this entity will have a contractual relationship with the Commission.

A Framework partnership is particularly suitable when the Commission intends to work on a regular and stable basis with certain entities, which in the case of Common Projects are the operational stakeholders required to implement the Common Projects. A framework partnership simplifies management and procedures allowing management of several grants under one structure, it offers a more stable and regular arrangement in the interests of group work and higher technical standards.

As the partners are potential beneficiaries of Union grants, the framework partnership is established and governed by two legally binding instruments:

- The **Framework partnership agreement** (FPA), which sets out the conditions governing the award of grants to partners on the basis of an action plan and jointly agreed general objectives;
- **Specific grant agreement**(s) that, based on the FPA, lead to a Union grant to the partners.

A FPA is awarded by the Commission as a grant, meaning that partners are selected on the basis of a call for proposals open to all potentially interested and eligible entities. The call specifies the objectives pursued, especially concerning the envisaged partnership, the expected duration of the partnership, the award conditions, the arrangements for financing and the eligibility, selection and award criteria.

The Commission may award Specific grant agreements in three ways:

- **By publishing an open call for proposals:** The call for proposals is open to all applicants who meet the required criteria;
- **By launching a restricted call for proposals** for partners for whom the planned type of action is contained Deployment Programme annexed to the framework partnership agreement. Only those partners who meet the required criteria may be awarded specific grants, following assessment of the proposals.
- **Through direct awarding of a grant (without a call for proposals)** when it does not compromise the principles of transparency of the award procedure and equality of treatment for potential grant beneficiaries, meaning the cases set out as exceptions to calls for proposals. Under this procedure, a grant maybe awarded directly to:
    - Partners with a monopoly for the type of action envisaged (or identified in the basic act as recipient of a grant in this field);
    - Partners for actions with specific characteristics that require a particular type of body on account of its technical competence, its high degree of specialisation or its administrative power, on condition that the actions concerned do not fall within the scope of a call for proposals.

The main limitation with regard to the establishment of a framework partnership is that it may not be used in such a way that the purpose or effect is contrary to the principles of transparency or equal treatment of applicants.

Framework partnership does not give any exclusivity right to the partners (i.e. potential beneficiaries) with regard to grants related to the type of action covered by the framework partnership agreement. In case the type of project at stake may be implemented by other entities than the partners, the Commission should launch an open call for proposals not restricted to the partners. Indeed, in this case limiting eligibility to the partners, thus reserving grants to previous beneficiaries, would be against the principle of equal treatment.

The framework partnership does not prevent a partner from participating in other Commission calls for proposals related to projects outside the action plan drawn up for the framework partnership agreement, as any other entity wishing to apply. Also, under one framework partnership, it is possible to award grants originating from different Union funding programmes.

4.7 Internal cooperation agreement

In case there is more than one partner in the framework partnership, partners shall agree on how they will operate and co-ordinate, including all internal aspects related to the management and the implementation of the projects. Their agreement can be formalised in a legally binding *internal cooperation agreement*. This agreement is different from FPA as it binds only the partners among themselves and the Commission is not a party to it. It is not necessary that the internal cooperation agreement is concluded among all the partners. Nevertheless, all partners remain responsible to make appropriate internal arrangements for the proper implementation of grants awarded to them. The internal cooperation agreement as well as any other internal arrangement needs to respect the *Regulation*.

4.8 Coordinator function within the Deployment Manager

The partners in the Framework partnership shall also agree on setting up or appointing a **coordinator**. The coordinator is a "tool" that constitutes a contact point for the Commission (or the TEN-T EA) and carries out the following tasks for the Deployment Manager:

a) monitor that the action plan and actions are implemented in accordance with the FPA and the Specific agreements;

b) be the intermediary for all communications between the partners and the Commission, except where provided otherwise in the FPA or a Specific agreement, and, in particular, the coordinator shall:

   i) provide the Commission/TEN-T EA with the information related to any change in the name, address, legal representative as well as in the legal, financial, technical, organisational or ownership situation of any of the partners or of its affiliated entities, or to any event likely to affect or delay the implementation of an action, for which a specific grant was awarded, of which the coordinator is aware;

   ii) bear responsibility for supplying all documents and information to the Commission/TEN-T EA which may be required under the FPA or a Specific Agreement, except where provided otherwise in the FPA or Specific Agreement; where information is required from the other partners, the coordinator shall bear responsibility for obtaining and verifying this information before passing it on to the Commission/TEN-T EA;

c) make the appropriate arrangements for providing any financial guarantees required under the FPA or a Specific agreement;

d) establish the requests for payment in accordance with the FPA and the Specific agreements;

e) where it is designated as the sole recipient of payments on behalf of all of the partners, ensure that all the appropriate payments are made to the other partners without unjustified delay;

f) bear responsibility for providing all the necessary documents in the event of checks and audits initiated before the payment of the balance.

The coordinator is nevertheless not financially responsible for the proper execution of the implementation projects. In fact, each partner and each affiliated entity are financially responsible for the part of the project they are executing, up to the amount they have actually received as the contribution from the Commission.

4.9 Forms of participation in the Deployment Manager Framework partnership

Operational stakeholders may participate in the work of the Framework partnership in different capacities:

a) **Partners** that sign the FPA and the specific grant agreements. They can either be individual legal entities (such as individual ANSPs, airspace users, airports, …) or they can be legal entities grouping these individual entities (such as associations or networks of the individual entities). They claim reimbursement of costs according to the rules and funding rates established in the specific grant agreements.

b) **Entities affiliated to partners** that do not sign the FPA, or the specific grant agreements. They can be either the legal entities that have established together one legal entity (who becomes the partner) for the purpose of implementing the action (e.g. special purpose vehicle, joint venture, European Economic Interest Grouping (EEIG), …); or, they can be legal entities who have a link with the partner, notably legal or capital link, which is neither limited to the action nor established for the sole purpose of its implementation (e.g. members of an association, network members, daughter companies, ...). A purely contractual relationship established for the purpose of implementing the action would therefore not satisfy this condition. The affiliated entities claim reimbursement of costs according to the same rules and funding rates as partners via the partner to which they are affiliated.

c) **Subcontractors**, who do not sign the FPA or the specific grant agreements, but they have a contract with a partner or affiliated entity for the supply of goods, services or works. They are paid by the partner/affiliated entity 100% of the agreed price. The partner/affiliated entity then claims reimbursement of these subcontracting costs according to the funding rates defined in the specific grant agreement.

d) **Third parties,** who do not sign the FPA or the specific grant agreements. They receive a grant ("in cascade") from one of the partners. The criteria that partners use for attributing these cascading grants need to be defined in the FPA/specific grant agreements between the partner and the Commission in order to avoid the exercise of discretion by the partner. **A grant in cascade may amount to a maximum of EUR 60.000 to one third party**.

4.10 Who can join the implementation level and how?

Any operational stakeholder (legal entity) that is required to implement a Common Project, or a part of it, and intends to comply with the Deployment Programme can be part of the implementation level.

After the selection of the Deployment Manager and the approval of the Deployment Programme, the TEN-T Executive Agency (TEN-T EA) will launch a call for proposals, on behalf of the Commission, for the selection and funding of PCP **implementation projects** under the rules and procedures of the Connecting Europe Facility (CEF) to implement the Deployment Programme. The call will define the selection and award criteria and will be open to the operational stakeholders that are partners of the Deployment Manager as well as to those that are not.

According to the *Regulation*, partners of the Deployment Manager must participate in at least one implementation project. If their projects are selected, they will be awarded a CEF grant through a specific grant agreement under the FPA.

If their projects are selected, the operational stakeholders who are not involved in the Deployment Manager may decide to join the Deployment Manager by subscribing to the FPA under the same conditions as the existing partners. In this case they will be awarded a specific grant agreement under the FPA for their implementation projects. If they decide not to be part of the Deployment Manager, the will be awarded a grant agreement under the CEF.

The variable geometry inherent in the architecture of the framework partnership thus provides for openness and flexibility, which is needed for adaptations to the evolving circumstances (new Common Projects), while guaranteeing the necessary continuity for the work of the Deployment Manager.

4.11 What is the sequence leading from the adoption of the PCP to the selection of the implementation projects?

1) The Commission adopts the PCP Regulation.
2) The Commission launches a Call for proposals for the Deployment Manager.
3) The Commission selects partners for the Deployment Manager on the basis of their application, which includes proposal for an "Action plan". The operational stakeholders may be required to submit an initial Deployment Programme as a part of their application.
4) The Commission and selected operational stakeholders sign the Framework Partnership Agreement establishing the Deployment Manager.
5) The Commission requests the Deployment Manager to propose a final draft Deployment Programme.
6) The Deployment Manager prepares a final draft Deployment Programme associating, if necessary, new operational stakeholders.
7) The Commission approves the Deployment Programme.

8) TENT-EA launches a call for proposals for implementation projects to implement the Deployment Programme.

9) The Commission/TENT-EA awards grants to selected projects and signs specific grant agreements with the relevant Deployment Manager partners and grant agreements with non-partners.

10) If necessary, the Commission may at this stage enlarge the Framework partnership to include new partners amongst the new operational stakeholders associated by the Deployment Manager and that request to accede to the Deployment Manager.

Section 5 - The PCP and other Single European Sky instruments

The PCP is an implementation instrument for the technological pillar of the SES. As such, it is connected with/affected by other SES instruments such as the National Supervisory Authorities, the Network Manager, the Network Strategy Plan and Network Operations Plan, the Performance and Charging schemes, etc.

5.1 The Network Manager

The Network Manager is a major stakeholder in the implementation of the SES. Established by Regulation 677/2011 to perform the tasks necessary for the execution of the network functions (e.g. design of the European route network, air traffic flow management and coordination of scarce resources), Network Manager has been up and running since the end of 2011[5]. It also provides support to operational stakeholders for the deployment of ATM/ANS systems and procedures in accordance with the Master Plan[6]. Moreover the Network Manager supports operational stakeholders in the deployment and implementation of its plans[7].

With a consistent overview of the Network, the Network Manager is very well placed to ensure coherence of the NSP and NOP with the Deployment Programme. The Network Manager also assists the Commission in the setup, adoption and implementation of Common Projects and will cooperate with the Deployment Manager to ensure coherence of the Deployment Programme with the NSP and NOP. Coincidentally, the Network Manager is positioned to monitor the performance improvements achieved through the deployment of SESAR technologies at Implementation Project level.

It is essential to establish clear roles and tasks for the Network Manager and the Deployment Manager as well as detailed arrangements for coordination. A close link between the Deployment Manager and the Network Manager will enable a feedback loop to inform the medium to long-term deployment process. The Network manager will also play a key role in advising the Deployment Manager in the preparation of the Deployment Programme and its updates and in the prioritization of activities in order to ensure optimal performance in network operations, in particular for AFs whose scope covers the entire EATM network. It will also support network-wide deployment projects through common actions as defined in the NSP.

While the Deployment Manager will be responsible for coordinating the deployment of SESAR technologies at management level, the Network Manager will be responsible for monitoring of operational aspects related to the network, especially in areas of airspace design and management, ATFCM and scarce resources. A close cooperation will ensure that operational and technical deployment are appropriately synchronised. This approach will

[5] Commission Regulation (EU) No 677/2011 of 7 July 2011 laying down detailed rules for the implementation of air traffic management (ATM) network functions, OJEU L185 of 15.7.2011

[6] Idem, Article 4.1 (i)

[7] Idem, Article 4.3 (b)

allow the Network Manager to fulfil its role in the achievement of the network operational performance.

With regard to the implementation level, the Network Manager role is essential for the deployment of the Network Manager functions and systems part of the common projects. The collaborative decision making process and the supporting working arrangements should be used and may be adapted to that purpose. The Deployment Manager shall use these existing structures (Article 9(4)(d) of the *Regulation)*.

5.2 The Network Strategy Plan (NSP)

The NSP is a planning tool that defines the strategic objectives of the network, in particular the guiding principles for the network operation and its long-term perspective with the objective of achieving the network performance targets. The current NSP for 2013-2019, formally approved by the Commission in 2012[8], is being revised to define the strategic objectives for RP2.

In accordance with Article 4(6)(e) of the *Regulation*, Common Projects will take into account the relevant deployment elements in the NSP while the ATM functionalities in the PCP will provide an input to the NSP for the period 2015-2019 in such a way that there will be a strong correlation between the Strategic Objectives of the NSP in terms of "required deployment of technology"[9] and the ATM functionalities highlighted in the PCP. The Network operations concept for 2020 will define the need for the integration of selected ATM functionalities. This will ensure a consistency between the technical and operational aspects of the network.

5.3 The Network Operations Plans (NOP)

The NOP is a detailed plan that implements at operational level the NSP; it is updated regularly. Based on traffic forecasts, the NOP identifies the capacity of the network, individual ACCs needs, and operational performance forecasts and operational enhancement plans and actions at network and local level[10].

The NOP will subsequently take into consideration the new NSP, the Network and FAB performance plans developed and implemented in the context of the second reference period, and the PCP. On the other hand, in accordance with Article 4(6)(e) of the *Regulation* Common Projects will also take into account the relevant deployment elements in the NOP. It is the intention of the Commission to use the NOP to contribute to the monitoring of the implementation of the PCP.

[8] Commission Decision C(2012)9604 of 19.12.2012
[9] Commission Regulation (EU) No 677/2011, annex IV, 6.1
[10] Commission Regulation (EU) No 677/2011, annex V, 5 and 6

5.4 The National Supervisory Authorities (NSA)

The *Regulation* provides in Article 8(3) that the Commission at the policy level of deployment governance shall be assisted by the bodies within the single European sky regulatory framework, including by the National Supervisory Authorities. The *Regulation* further provides in its Article 9(2)(j) that the Deployment Manager shall ensure appropriate coordination with National Supervisory Authorities.

NSAs assist the Commission at Policy level to set-up, adopt and monitor the implementation of Common Projects, in particular to ensure that regulatory and supervisory issues (such as safety and security) are duly taken into account. NSAs shall also provide input on any identified negative impact of ATM functionalities at national or FAB level during the consultation preceding the adoption of Common Projects.

Moreover, NSAs will contribute to the deployment process based on their central role in the drawing up, monitoring and overseeing the **performance plans** (Article 11(3)(c) of Regulation (EU) 390/2013). Starting from the second reference period, performance plans will need to detail the relevance of ANSP's investments to Common Projects. Consequently, NSAs shall ensure that ANSPs give due priority in their investments to the deployment of the ATM functionalities identified in the PCP and future Common Projects.

The active preparation of the performance plans for the second reference period and the approval of the PCP regulation will run in parallel in the first semester of 2014. It will be up to the NSAs to monitor and oversee the implementation process at local/FAB level. It is the reason why the coordination between the NSAs and the Deployment Manager (as set in Article 9(2)(j) of the *Regulation*) will be important as regards the critical aspects of the development and implementation of the Deployment Programme, such as the synchronisation of investments and the monitoring of the deployment.

5.5 Performance and charging scheme

The revised performance and charging Regulations[11] establish a close link between performance and charging policies with investments policies to accelerate the implementation of SESAR technologies. Furthermore, new investments and major overhaul of existing ATM systems that have an influence on the level of performance of the European ATM network have to be consistent with the implementation of the European ATM Master Plan, in particular, through Common Projects.

Monitoring of investment and capital expenditure (CAPEX) was already done for the first time for the year 2012. However, as from the second performance reference period (RP2 from 2015 to 2019), there will be a step change in respect to scrutiny of CAPEX. Performance plans for RP2 will entail a detailed description and justification of investments costs, their nature and contribution to performance targets[12]. The Commission will assess these descriptions to ensure that investments are consistent with the implementation of the ATM Master Plan in general and Common Projects in particular[13].

[11] Commission Regulation (EU) No 390/2013 and (EU) No 391/2013
[12] Article 11(3)(c), Article 11(5) and Annex II, Point 2 of the performance Regulation
[13] Article 14(1) of the performance Regulation and Annex IV, Point 1(e) of the performance Regulation

Ultimately, the Commission will be able to reject a performance plan if the investments foreseen are deemed unsatisfactory in this regard[14]. The investments necessary to the deployment of the Pilot Common Project are expected to be contained and described in the performance plans for RP2. Furthermore, investments in new ATM systems and major overhauls of existing systems shall not be eligible for cost recovery if they are not consistent with the Master Plan and the Common Projects[15]. More generally, the annual CAPEX reporting[16] will be more detailed, allowing the Commission to monitor the effective deployment of the Common Project capabilities.

In order to avoid unjustified profits, the charging Regulation foresees that public funding for investments is deducted as "other revenue" from the costs chargeable to airspace users[17]. The deduction of this "other revenue" shall be made either as a one-off reduction in the year following reception of the subsidy, or spread over the duration of the depreciation of the corresponding asset. The choice will have to be explicit and traceable. The depreciation of the subsidised asset shall be made on its total book value, including appropriate cost of capital.

Incentives in the form of modulation of ANS charges may also be possible through allocation of EU funding in the form of a direct reduction of the charge billed for equipped aircrafts. In this way, the EU funding would benefit directly airspace users concerned with no administrative burden beyond the facilitation of the identification of the equipped aircraft. Such system could be handled, for example, on behalf of the Commission by the entity that is billing and collecting the air navigation charges.

In addition, in accordance with the provisions of Article 16(2) of the charging Regulation, Member States can also modulate charges on a non-discriminatory and transparent basis to accelerate the deployment of SESAR ATM technologies, in particular to give incentives to equip aircraft with systems included in Common Projects.

5.6 Functional Airspace Blocks (FAB)

According to the *Regulation*, synergies shall be sought, as far as possible, between SESAR deployment and FABs. Article 3 of the *Regulation* suggests that the operational stakeholders may participate in the Deployment Manager through FAB structures. The PCP will thus provide an opportunity to operational stakeholders to reinforce their cooperation within FABs as well as between the FABs. Well-functioning cooperation at the level of FABs could then add value to the synchronisation efforts of the Deployment Manager.

According to Annex II, Point 2.2 (iv) of the performance Regulation (EU) No 390/2013, the description of investments in the performance plans is expected to detail the synergies achieved at FAB level, in particular in terms of common infrastructure and common procurement.

[14] Articles 14(3) and (4), 15(3) to (5) and Annex IV, Point 1(e) of the performance Regulation
[15] Article 6(4) of the charging Regulation
[16] Article 3(3)(i) of the performance Regulation and Point 2(m) of Annex II of the charging Regulation
[17] Article 2(10), Point 2.2(x) of Annex IV, Point 2.2(x) of Annex V, line 5.3 in the Table 2 of Annex VI, lines 2.1 to 2.4 in Table 3 of Annex VII of the charging Regulation, Article 14(2) of the Commission Implementing Regulation (EU) No 409/2013

a) FAB requirements

Under the terms of Article 9a of Regulation (EC) No 550/2004, all Member States were requested to implement FABs by 4 December 2012 at the latest, meeting a range of substantive requirements including in particular:

- Optimum use of airspace - Article 9a(2)(b) of Regulation (EC) No 550/2004
- Optimised air navigation services - Article 2(25) of Regulation (EC) No 549/2004
- Optimum use of resources - Article 9a(2)(d) of Regulation (EC) No 550/2004
- Geographical coverage based on operational requirements irrespectively of national borders - Article 2(25) of Regulation (EC) No 549/2004.

Since no Member State has managed to meet all of these criteria, **EU Pilot** [18] cases were launched against all EU Member States, who have been requested to provide the Commission by 30 November 2013 with **implementation plans** identifying corrective actions and projects that, if successfully implemented later on, could eventually remove areas of non-compliance.

b) Expected FAB implementation plans and links to PCP

It is expected that the implementation plans will include, for each FAB, the following elements that are directly or indirectly related to either of the AFs identified in the PCP:

FAB	Activity	Related AF
NEFAB	– Northern European Free Route Airspace	AF3
	– including connectivity with TMAs and adjacent areas	AF1
	– Cross-border sectorisation	AF3
	– Common Flexible Use of Airspace implementation and Military Airspace Design	AF3
	– Joint trajectory	(AF6)
	– and conflict management concept	AF3 (AF6)
DANISH/SWEDISH FAB	– Northern European Free Route Airspace	AF3
	– including connectivity with TMAs and	AF1

[18] The EU Pilot project was introduced by the Commission with a number of volunteer Member States in 2008 with the aim of improving the cooperation between Member States and the Commission on issues concerning the **conformity** of national law with EU law or the **correct application of EU law**. As a general rule, EU Pilot is used as a **first step to try to clarify or resolve problems**, so that, if possible, formal infringement proceedings can be avoided. Currently 27 Member States are participating in EU Pilot.

	adjacent areas	
	– Dynamic sector configuration management	AF3
	– Enhance interface with ORESUND TMA	AF1
BALTIC FAB	– Optimise ATFM service provision	AF3
	– Coordination of AIS provision	(AF5)
	– Common Airspace Design (AF3)	AF3
UK/IRELAND FAB	– Extended AMAN in Queue Management, cross-border and with FABEC	AF1, AF2
	– Extension of IFAX MTCD in UK, with a view to convergence with MINSEP MTCD in Shannon FIR	AF3
	– Consultation on London TMA, also used for Point Merge, building on ENSURE	AF1
	– Free Routeing in Ireland	AF3
	– Implementation of ITEC FDP at Prestwick in winter 2015/2016, enabling dynamic sectorisation and gradually extending free routeing	AF3
SOUTHWEST FAB	– Free Routeing 2014, 2017 with Brest, 2018 in Santa Maria	AF3
	– Redesign of TMAs to PBN standards: MAD, BCN, CAN, and in PT	AF1, AF2
	– Harmonisation of flight division in cross-border sectorisation	AF3
	– Collaboration on FDP both En-Route and APP	AF1, AF3
FABEC	– Airspace projects and plans on Free Routeing airspace	AF3
	– Common position on seamless upper airspace, building on MUAC	AF3
DANUBE FAB	– Night Free Routeing above FL 105 in RO and FL 245 in BG, November 2013	AF3
	– Free Routeing 2016	AF3
	– 2 cross-border sectors: expand RO in East of FAB. BG in central and West	AF3
	– Tentative night free routeing with FABCE	AF3

FABCE	– Implementation of airspace plan to create sector families in cross-border sectorisation	AF3
	– Night free routeing; free routeing from 2019 above an FL to be defined, simulation and validation exercises for staff acceptance	AF3
	– Project 1: airspace procedures	AF3
	– Project 3: integrate ASM/ATFCM processes	AF3
BLUEMED	– Free Routeing with MTCD and FDP enhancements	AF3
	– RNP procedures with lots of airports identified	AF1, AF2
	– Airport CDM (AF2)	AF2

c) Risks identified

In relation to paragraph b) above, the following risks were identified:

- Depending on geographical area, some activities may not necessarily have the level of maturity required by Article 4(2) of Regulation (EU) No 409/2013, for example:
    - Free Routing in FABCE is planned to be achieved in 2019, in DANUBE in 2016, and in BLUEMED in 2017, In SOUTHWEST Free Routeing is not planned to cover the eastern part of Spain, in UK/IRELAND Free Routeing in the UK requires a system upgrade in Prestwick for 2016.
    - In FABEC, several operational projects have been put on hold because of charging issues yet to be resolved at political level.

Section 6 - Third Country participation

The Regulation and the PCP Regulation are not binding in non–EU Members States. However, the PCP, as it may also be for future Common Projects, does affect a number of third countries who could, voluntarily and on the basis of existing agreements with the EU, comply with these Regulations.

Therefore, subject to these agreements, to their acceptance to comply with the mentioned Regulations and conditions that will be set out in the procedures leading to the setup of the SESAR governance, entities from third countries may participate in the management and implementation levels of the SESAR governance.

Furthermore, if the relevant EU funding Programmes allow it, the entities from third countries that intend to present implementation projects in accordance with the Deployment Programme and under the coordination of the Deployment Manager, may receive EU funding for their implementation.

Section 7 - Interoperability of the PCP

7.1 What are the Interoperability requirements?

According to Regulation No 552/2004 all systems and constituents and operational procedures within the EATMN should meet the "essential requirements", among which notably "seamless operation" and "safety". The deployment of the AFs in the PCP will need to comply with this obligation.

The interoperability requirements of the proposed AF's were taken into account during the development phase of SESAR and during the PCP elaboration by the SESAR JU. The pre-consultations by the Commission with EUROCAE, the ESO's, EASA, EUROCONTROL, the SJU and ASD allowed to refine the standardisation and regulation needs and related time schedule. It is understood that the existence of standards and regulatory elements facilitate the verification of interoperability obligations. However, it is not deemed to be necessary to have standards and regulatory elements for each new or updated AF in the PCP considering that “seamless operation” and “safety” can be verified by other means.

The outcome of the Commission’s Step 1 consultations is reflected in the draft Standardisation and Regulation roadmap (See Part V-Section 2). Additional comments/questions were received at the end of the above mentioned consultation on whether potential interoperability risks exist and whether we need additional standards or regulation material to further mitigate such risks. Only part of these questions wes discussed during the above-mentioned consultation with standardisation organisations.

As indicated in Part I – Section 1.5, the assessment suggests the need for further consultation on the standardisation and regulation needs and on the deployment time schedule also to confirm the indicative dates for industrialisation. The table in Part V-Section 2 will be reviewed following this consultation and will be annexed to the PCP Regulation.

There will be time to finalise the interoperability aspects for AF5 and AF6, which are defined as "binding orientations", also covering the specific required standards or the targeted ICAO provisions that would ensure an alignment between the Master Plan and the ICAO ASBU evolution, in particular for the definition and timeframe of ATN B2 (in relation to AF6) and for the definition of the FIXM (in relation to AF5). These critical activities are identified in the standardisation and regulation roadmap.

7.2 Coherence with ICAO

Modernisation of the ATM system in Europe should, as far as needed, be based on global interoperability. Cooperation is established with other regions, like via the Memorandum of Cooperation between the EU and US on research and development in civil aviation, related to SESAR and the US programme NextGen, and for global interoperability at ICAO level.

ICAO based the GANP/ASBU to a large extent on the input from SESAR and the USA plan NextGen. During this process, The Master Plan was updated and aligned with the ICAO Global Air Navigation Plan (GANP), and it's Aviation System Block Upgrades (ASBU). The GANP, including the ASBU, has been endorsed by the 38th ICAO Assembly, early October 2013.

The GANP/ASBU will be reviewed, in principle, by each ICAO Assembly, in a three years cycle, leading to 2016. The ATM Master Plan will be reviewed by 2015, in time to give additional input to ICAO.

Not every region in the world and not every State has the same need and not at the same time to modernise its ATM system. But when doing so, it should be compliant with the PCP for Europe and with global interoperability requirements of ICAO.

The Commission, in cooperation with the European organisations as SESAR JU, EASA and EUROCONTROL and based on the ATM Master Plan, is delivering input to ICAO to develop an ICAO Standardisation Road Map, supporting the work of the GANP/ASBU. This cooperation will continue, to achieve that developments in Europe remain in line with the ICAO Standards.

The existing SES and EASA regulations have taken existing ICAO Standards into account. To a certain extent main parts of ICAO Annexes to the ICAO Convention are included in EU SES regulations, to further enhance harmonisation and standardisation in Europe.

Reference for each AF to the ICAO GANP and ASBU modules:

- **AF1**: PBN and AMAN covered in AF1 relate directly to the priorities expressed in the ICAO GANP and to Baseline (B0) ASBU modules B0-APTA “Optimization of Approach Procedures including Vertical Guidance” and B0-RSEQ “Improve Traffic Flow through Sequencing (AMAN/DMAN)” although with a higher ambition level. AF1 also contributes, along with AF 2 to the Block 1 module B1-RSEQ “Improved Airport operations through Departure, Surface and Arrival Management”.
- **AF2**: AF2 corresponds to elements of the Block 1 ASBU modules B1-RSEQ “Improved Airport operations through Departure, Surface and Arrival Management” and module B1-ACDM “Optimized Airport Operations through Airport-CDM” as defined in the ICAO GANP. AF2 also builds towards the more advanced Block 2 module B2-WAKE “Advanced Wake Turbulence Separation (Time-based)”.
- **AF3**: AF3 supports the deployment of Free Route Operations as outlined in the ICAO GANP and corresponds to Block 1 modules B1-FRTO “Improved Operations through Optimized ATS Routing”.
- **AF4**: AF4 corresponds to Block 1 modules B1-NOPS “Enhanced Flow Performance through Network Operational Planning” and builds towards more advanced Block 2 module B2-NOPS “Increased User Involvement in the Dynamic Utilization of the Network”.
- **AF5**: AF5 corresponds to the Initial deployment of SWIM as described in the ICAO GANP and the Block 1 module B1-SWIM. “Performance Improvement through the application of System-Wide Information Management (SWIM)” and B1-FICE “Increased Interoperability, Efficiency and Capacity through Flight and Flow Information for a Collaborative Environment Step-1 (FF-ICE/1) application before Departure”. Other ASBUs requiring data exchange can also be supported by SWIM.
- **AF6**: AF6 provides the first step towards the ASBU Block 1 module B1-TBO “Improved Traffic Synchronization and Initial Trajectory-Based Operation

Section 8 - Incentives

8.1 How will the Connecting Europe Facility support the PCP?

The main EU funding mechanism for the PCP will be the **Connecting Europe Facility** (CEF). SESAR deployment fully complies with the objectives of the **CEF Programme** and in particular with the definition of projects of common interest supported under the Programme. SES and SESAR are defined as horizontal priorities on the "Core network". The projects supported under the CEF Programme can encompass their entire lifecycle from feasibility studies to implementation and evaluation making the CEF programme particularly suited to support SESAR deployment.

The CEF can support a multitude of actions comprising purchase, supply and deployment of components, systems and services including software, development, construction and installation activities and activities needed to prepare project implementation from feasibility to validation studies, including software, and other technical support measures to define and develop projects and decide on their financing.

The CEF can be implemented through one or more forms of financial aid, in particular, **grants, procurements and financial instruments** such as:

- equity instruments, such as **investment funds** with a focus on providing risk capital for actions contributing to projects of common interest;
- loans and/or guarantees facilitated by risk-sharing instruments, including enhancement mechanism to project bonds.

The Commission has requested an amount of EUR 3 billion for the period 2014-2020, most of which will be dedicated to the implementation of Common Projects.

The funding rates under the CEF are 50% of eligible costs for studies and for implementing infrastructure: 20% of eligible costs for airborne equipment and 50% for ground equipment.

In order to ensure synchronisation of the deployment of the ATM functionalities identified in the Common Projects, the Commission does not intend to award any financial aid for the deployment of the PCP or future Common Projects that are not compliant with the Deployment Programme or that are not under the coordination of the Deployment Manager.

<table>
<tr><td rowspan="2">CLM phases ▸</td><td>V0</td><td>V1</td><td>V2</td><td>V3</td><td>V4</td><td colspan="2">V5</td><td>V6</td><td>V7</td></tr>
<tr><td>ATM Needs</td><td>Scope</td><td>Feasibility</td><td>Pre-industrial development integration</td><td>Industrialisation</td><td colspan="2">Implementation</td><td>Operat.</td><td>Decom.</td></tr>
<tr><td>SESAR Governance</td><td colspan="4">SESAR JU</td><td></td><td colspan="2">Policy level
Management level
Implementation level</td><td>NA</td><td>NA</td></tr>
<tr><td>AF Maturity for CP</td><td></td><td></td><td></td><td></td><td></td><td colspan="2"></td><td>NA</td><td>NA</td></tr>
<tr><td rowspan="2">EU funding streams 2014-2020</td><td colspan="4">SESAR JU 2 work programme</td><td>Prep. Common Projects</td><td>Common Projects</td><td>other</td><td>NA</td><td>NA</td></tr>
<tr><td colspan="4">H2020</td><td colspan="3">CEF</td><td>NA</td><td>NA</td></tr>
</table>

Figure 2 – Summary of EU funding streams for the SESAR project

The Commission may modulate EU funding for implementation projects in order to provide higher support where synchronisation efforts are more effective (common procurement, coordination at FAB level, etc.).

EU funding shall be treated by the beneficiaries in compliance with the performance and charging Regulations, as detailed in Paragraph 5.5 above.

Other incentive mechanisms, such as the modulation of route charges and EIB loans, are still being assessed at this stage and may be made available during the implementation of the PCP.

Part II - Technical specifications of the PCP

AF 1 - Extended Arrival Management and Performance Based Navigation in high density Terminal Manoeuvring Areas

Overall description	Extended Arrival Management (AMAN) and Performance Based Navigation (PBN) in high density Terminal Manoeuvring Areas (TMAs) improves the precision of the approach trajectory and facilitates air traffic sequencing at an earlier stage. The extended AMAN supports 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 and the early de-confliction of arrival streams into multiple airports. PBN in high density TMAs covers the development and implementation of fuel efficient and/or environmental friendly procedures for arrival and departure (Required Navigation Performance 1 Standard Instrument Departures (RNP 1 SIDs), Standard Arrival Routes (STARs)) and approach (Required Navigation Performance Approach (RNP APCH)). This functionality is composed of three sub-functionalities: 1) Arrival Management extended to en-route Airspace 2) Arrival Management into Multiple Airports 3) Enhanced Terminal Airspace using RNP-Based Operations
Master Plan	AF1 includes part of the Step 1 Essential Operational Change for the "Traffic Synchronisation" Key Feature as defined in the Master Plan (version 2012)
Synchronisation	AF1 requires coordinated deployment due to the potential network performance impact of delayed implementation in the targeted airports. From a technical perspective the deployment of targeted system and procedural changes needs to be carefully synchronized to ensure that the performance objectives are met. This synchronization of investments will involve multiple airport operators and air navigation service providers. Furthermore synchronization during the related industrialisation phase will be necessary (supply industry in particular).

1. Operational and technical scope

a) Arrival Management extended to en-route Airspace

Description	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 may be conducted in the en-route and early descent phases.

	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. The existing techniques to manage the AMAN constraints, in particular Time to Lose or Gain and Speed Advice may be used to implement this functionality.
System Requirements	– AMAN systems shall provide arrival sequence time information into en-route ATC systems up to 180-200 nautical miles from the arrival airport. – ATC systems of upstream air traffic service (ATS) units shall manage AMAN constraints. Data exchange, data processing and information display at the relevant controller working positions in the ATS units shall support the management of arrival constrains. Data exchange between ATS units may be achieved with existing technology pending the implementation of System-Wide Information Management (SWIM) services.

b) Arrival Management into Multiple Airports

Description	Arrival Management into Multiple Airports extends the arrival management horizon into the en-route phase including multiple airports and the integration of departing traffic. It does not include the linking of arrival and departure management.
System Requirements	AMAN systems shall serve multiple airports to provide simultaneous optimisation of traffic streams into different airports, based upon specific prioritization criteria.

c) Enhanced Terminal Airspace using RNP-Based Operations

Description	Enhanced Terminal Airspace using RNP-Based Operations consists of the implementation of environmental friendly procedures for arrival/departure and approach using PBN in high-density TMAs, as specified in the following navigation specifications: – SIDs and STARs using the RNP 1 specification with the use of the Radius to Fix (RF) path terminator – Required Navigation Performance Approach with Approach Procedure with Vertical guidance (RNP APCH with APV). Enhanced Terminal Airspace using RNP-Based Operations includes: – RNP 1 SIDs, STARs and transitions (with the use of the Radius to Fix (RF) attachment) – RNP APCH (with Lateral Navigation (LNAV), Lateral Navigation/Vertical Navigation (LNAV/VNAV) and Localiser

	Performance with Vertical guidance (LPV) minima)
System Requirements	– ATC systems and ATC Safety Nets shall enable the Terminal Area and Approach PBN operations. – RNP 1 operations require aircraft conformance to a track-keeping accuracy of +/- 1 nautical mile for at least 95% of flight time and on-board performance monitoring, alerting capability and high integrity navigation databases. – For RNP APCH, the Lateral and Longitudinal Total System Error (TSE) of the airborne navigation systems shall comply with the EASA AMC 20-27. – RNP 1 as well as RNP APCH capability requires inputs from GNSS. – Vertical Navigation in support of APV may be provided by GNSS SBAS or by barometric altitude sensors.

2. Geographical scope

Extended AMAN and PBN in high density TMAs shall be operated at the following airports:

Region	State	Airport
EU Member States	Austria	Vienna
	Belgium	Brussels
	Denmark	Copenhagen
	France	Paris-CDG Paris-Orly Nice
	Germany	Frankfurt Munich Düsseldorf Berlin
	Ireland	Dublin
	Italy	Milan-Malpensa Rome-Fiumicino
	The Netherlands	Amsterdam
	Spain	Madrid-Barajas Barcelona Palma
	Sweden	Stockholm-Arlanda
	United Kingdom	London-Heathrow London-Gatwick London-Stansted Manchester
EFTA Member States	**Norway**	*Oslo*[19]
	Switzerland	*Zurich*[20]

Other Third countries	**Turkey**	*Istanbul*

3. Impacted stakeholders and deployment target dates

ATS providers shall ensure that ATS units providing ATC services within the terminal airspace of the airports referred to § 2 operate Extended AMAN and PBN in high density TMAs as from 1 January 2024.

4. Essential prerequisites

There are no prerequisites for this functionality. Nevertheless, an existing AMAN implementation will facilitate the operational integration of this AF.

5. Interdependencies with other ATM functionalities

Data exchange between ATS units, in particular concerning Extended AMAN, shall be implemented using System Wide Information Management (SWIM) services where iSWIM functionality referred to in AF-5 is available.

Downlink trajectory information as specified in AF-6, where available, shall be integrated into the AMAN.

AF 2 - Airport Integration and Throughput

Overall description	Airport Integration and Throughput facilitates the provision of approach and aerodrome control services by improving runway safety and throughput, enhancing taxi integration and safety and reducing hazardous situations on the runway. This functionality is composed of five sub-functionalities: 1) Departure Management Synchronised with Pre-departure sequencing; 2) Departure Management integrating Surface Management Constraints; 3) Time Based Separation for Final Approach; 4) Automated Assistance to Controller for Surface Movement Planning and Routing; 5) Airport Safety nets.
Master Plan	AF2 includes part of the Step 1 Essential Operational Change for the "Airport Integration and Throughput" Key Feature as defined in the Master Plan (version 2012)
Synchronisation	AF2 requires coordinated deployment due to the potential network performance impact of delayed implementation in the targeted airports. From a technical perspective the deployment of targeted system and procedural changes needs to be carefully synchronized to ensure that the performance objectives are met. This synchronization of investments will involve multiple airport operators and air navigation service providers. Furthermore synchronization during the related industrialisation phase will be necessary (supply industry and standardization bodies in particular).

1. Operational and technical scope

a) Departure Management Synchronised with Pre-departure sequencing

Description	Pre-departure management consists of metering the departure flow to a runway by managing Off-block-Times (via Start-up-Times), which take account of the available runway capacity. In combination with Airport – Collaborative Decision Making (A-CDM), Pre-departure management reduces taxi times, increases CFMU-Slot adherence and predictability of departure times. Departure management aims at maximising traffic flow on the runway by setting up a sequence with minimum optimised separations. 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, etc.).
System Requirements	– Departure Management (DMAN) and A-CDM systems shall be integrated and shall support optimised pre-departure sequencing with information management systems for airspace users (Target Off Block Time (TOBT) feeding) and airport (contextual data feeding). – DMAN systems shall elaborate a collaborative sequence and provide both target Start-up approval time (TSAT) and a target take-off time (TTOT). TSAT and TTOT shall take into account variable taxi times and shall be updated according to the actual aircraft take-off. DMAN systems shall provide the air traffic controller with the list of TSAT and TTOT for the aircraft metering.

b) Departure Management integrating Surface Management Constraints

Description	The departure sequence at the runway shall be optimised according to the real traffic situation reflecting any delay off gate or during taxi to the runway. Advanced Surface Movement Guidance and Control Systems (A-SMGCS) shall provide optimised taxi-time and improve departure sequence acceptance by monitoring of real surface traffic and by consistent management between departure sequence and taxi route.
System Requirements	– DMAN systems shall take account of variable and updated taxi times to calculate the TTOT and TSAT. Interfaces between DMAN and A-SMGCS routing shall be developed. – DMAN integrating A-SMGCS constraints using Electronic Flight Strips (EFSs) with an advanced A-SMGCS routing function shall be integrated into flight data processing systems for departure sequencing and routing computation. An A-SMGCS routing function shall be deployed.

c) Time-Based Separation for Final Approach

Description	Radar separation minima and vortex separation parameters shall be integrated in a Time-based Separation (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.
System	– The flight data processing and AMAN systems shall be compatible with the TBS support tool and able to switch between time and

Requirements	distance based wake turbulence radar separation rules. – The controller working position shall integrate the TBS support tool with safety nets to support the air traffic controller, in order to calculate TBS distance respecting minimum radar separation using actual glide-slope wind conditions. – The TBS support tool shall provide automatic monitoring and alerting on non-conformant final approach airspeed behaviour, automatic monitoring and alerting of separation infringement and automatic monitoring and alerting for the wrong aircraft being turned on to a separation indicator. – The TBS support tool and associated controller working position shall calculate Indicator distance, display Indicator distance on controller displays and include radar and vortex spacing requirements. – Safety nets capturing automatic monitoring and alerting of separation infringement shall support TBS operations.

d) Automated Assistance to Controller for Surface Movement Planning and Routing

Description	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 and of DMAN sequence for aircraft and vehicles operating on the movement area. 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.
System Requirements	– 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.

e) Airport Safety Nets

Description	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 and 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 the Electronic Flight Strip (EFS). 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 tools shall alert air traffic controllers when aircraft and vehicles deviate from ATC instructions, procedures or route. The air traffic controller instructions available electronically (EFS) shall be integrated with other data such as flight plan, surveillance, routing, published rules and procedures. The integration of this data shall allow the system to monitor the information and when inconsistencies are detected, an alert shall be provided to the air traffic controller (for example no push-back approval).
System Requirements	– Airport Safety Nets shall integrate A-SMGCS surveillance data and controller runway related clearances. Airport Conformance Monitoring shall integrate A-SMGCS Surface Movement Routing, surveillance data and controller routing clearances. – A-SMGCS shall include the advanced routing and planning function referred to in § 1.c) and 1.d) to enable conformance monitoring alerts. – 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 for them. – The controller working position shall host warnings and alerts with an appropriate human-machine interface including support for cancelling an alert. – EFSs shall integrate the instructions given by the air traffic controller with other data such as flight plan, surveillance, routing, published rules and procedures.

2. Geographical scope

Departure Management Synchronised with Pre-departure sequencing, Departure Management integrating Surface Management Constraints, Automated Assistance to Controller for Surface Movement Planning and Routing and Airport Safety Nets shall be operated at the following airports:

Region	State	Airport
EU Member States	Austria	Vienna
	Belgium	Brussels
	Denmark	Copenhagen
	France	Paris-CDG Paris-Orly Nice
	Germany	Frankfurt Munich Düsseldorf Berlin
	Ireland	Dublin
	Italy	Milan-Malpensa Rome-Fiumicino
	The Netherlands	Amsterdam
	Spain	Madrid-Barajas Barcelona Palma
	Sweden	Stockholm-Arlanda
	United Kingdom	London-Heathrow London-Gatwick London-Stansted Manchester
EFTA Member States	**Norway**	*Oslo*[21]
	Switzerland	*Zurich*[22]
Other Third countries	**Turkey**	*Istanbul*

Time Based Separation for Final Approach shall be operated at the following airports:

Region	State	Airport
EU Member States	Austria	Vienna
	Denmark	Copenhagen
	France	Paris-Orly
	Germany	Frankfurt Munich Düsseldorf
	Ireland	Dublin
	Italy	Milan-Malpensa Rome-Fiumicino
	The Netherlands	Amsterdam Schiphol
	Spain	Madrid-Barajas
	United Kingdom	London-Heathrow London-Gatwick Manchester

EFTA Member States	Norway	*Oslo*[23]
	Switzerland	*Zurich*[24]
Other Third countries	Turkey	*Istanbul*

3. Impacted stakeholders and deadline

ATS providers and airport operators providing services at the airports referred to in §2 shall operate:

- Departure Management Synchronised with Pre-departure sequencing as from 1 January 2021;
- Departure Management integrating Surface Management Constraints as from 1 January 2021;
- Time Based Separation for Final Approach as from 1 January 2024;
- Automated Assistance to Controller for Surface Movement Planning and Routing as from 1 January 2024;
- Airport Safety Nets as from 1 January 2021.

4. Essential prerequisites

The following prerequisites are required:

- EFS, A-CDM and initial DMAN for Departure Management Synchronised with Pre-departure sequencing;
- EFS, initial DMAN and A-SMGCS level 1 & 2 for Departure Management integrating Surface Management Constraints;
- EFS for Time based separation;
- EFS and A-SMGCS level 1 & 2 for Automated Assistance to Controller for Surface Movement Planning and Routing;
- EFS and A-SMGCS surveillance for Airport Safety Nets.

5. Interdependencies with other ATM functionalities

There are no interdependencies with other ATM functionalities.

AF 3 - Flexible Airspace Management and Free Route

Overall description	Flexible Airspace Management and Free Route allows airspace users to freely plan a route between fixed published entry and exit points, with the possibility to route via intermediate (published or unpublished) way points, without reference to the published European route network, subject to airspace availability. Free Route may be deployed both through the use of permanent Directs (DCTs), published within the fixed-route network, and through Free Route Airspace (FRA), where airspace users are free to define and fly via user-defined points and segments not previously published. This functionality is composed of three sub-functionalities: 1) Airspace Management and Advanced Flexible Use of Airspace 2) Free Routing 3) Medium Term Conflict Detection with Conflict Resolution Advisories and Conformance Monitoring
Master Plan	AF3 includes part of the Step 1 Essential Operational Change for the "Moving from Airspace to 4D Trajectory Management" Key Feature as defined in the Master Plan (version 2012)
Synchronisation	AF3 requires coordinated deployment 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 needs to be carefully synchronized to ensure that the performance objectives are met. This synchronization of investments will involve multiple civil and military air navigation service providers, airspace users and the Network Manager. Furthermore synchronization during the related industrialisation phase will be necessary (supply industry in particular).

1. Operational and technical scope

a) Airspace Management and Advanced Flexible Use of Airspace

Description	Airspace Management (ASM) and Advanced Flexible Use of Airspace (A-FUA) aims to provide the possibility to define at short notice ad hoc airspace structures in response to airspace user requirements. Changes in airspace status shall be shared with all concerned users, in particular Network Manager (ASM, Initial Flight Plan Processing System (IFPS) and Air Traffic Flow and Capacity Management (ATFCM) function), air navigation service providers and airspace users (FOC/WOC). ASM procedures and processes shall cope with an environment where airspace is managed dynamically with no fixed-route network. Data-sharing shall be enhanced by the availability of airspace

	structures in support of a more dynamic ASM and FRA implementation. ASM solutions shall support all airspace users, including enabling the alignment of Free Route Airspace (FRA), CDR & DCT availability. These ASM solutions shall be based on forecast demand received from the Network Manager.
System Requirements	– The ASM support system shall support the fixed and conditional route networks currently in place, as well as DCTs, FRA and dynamic sector configurations. The system shall be able to respond to changing demands for airspace. Enhancements to the NOP shall be achieved through a cooperative decision-making process between all involved operational stakeholders. The system shall support cross-border activities, resulting in shared use of segregated airspace regardless of national boundaries. – Airspace configurations shall be accessible via the Airspace Data Repository (ADR), which shall contain the up-to-date and foreseen airspace configurations, to allow airspace users to file and modify their flight plans based on timely and accurate information. – The ATC system shall support flexible configuration of sectors so that their dimensions and operating hours can be optimised according to the demands of the NOP. – The system shall allow a continuous assessment of the impact of changing airspace configurations on the network. – The ATFCM system shall be able to interact with the ASM and ATC systems to perform Demand Capacity Balancing (DCB) and enable appropriate and timely ATFCM measures to be implemented, either across the network or locally through Short Term ATFCM Measures (STAM). – ATC systems shall correctly depict changing sectorisation, the activation and de-activation of dynamic airspace blocks and the change of a volume of airspace from a fixed route network to FRA. – The IFPS shall be modified to reflect the changes in the definition of airspace and routes so that the routes, flight-progress and associated information are available to ATC systems. – The ASM, ATFCM and ATC systems shall interface to military ATC systems in a way that allows the provision of air navigation services based on a common understanding of the airspace and traffic environment. The military ATC systems shall be modified to enable this functionality. – Centralised AIS systems, such as the EAD, shall make available information on changes to airspace status to all involved operational stakeholders in a timely manner. This enables planning to be undertaken based on accurate information relevant to the time of the planned operations. Local AIS systems shall enable this

	capability and the upload of changing local data. – Through the integration of Airport Operations Plan (AOP) and Network Operations Plan (NOP) as specified in AF4, operational stakeholders shall be able to interface with the NOP. Interfaces shall be defined to allow dynamic data to be sent to operational stakeholder systems, and for those stakeholders to be able to communicate information in an accurate and timely manner. The systems of these stakeholders shall be modified to enable these interfaces.

b) Free Routing

Description	Free routing is the ability of an airspace user to plan or re-plan a route according to user-defined segments. Free Route Airspace (FRA) is airspace where there is no fixed-route network. Within FRA airspace users shall be able to follow user-preferred routes. Entry and exit to FRA shall be via defined way-points which themselves form part of the adjacent fixed-route network. Outside FRA dedicated where there is a fixed-route network, a limited free-routing capability shall be enabled by publishing 'directs' (DCT), which will allow airspace users to fly directly between published way-points without following an entire published route. DCT availability may be subject to traffic demand and/or time constraints. DCTs shall be published in aeronautical publications and shall be available for flight planning. FRA shall be published in aeronautical publications and has a defined Volume of Interest (VOI) with lateral, vertical and if necessary temporal limits. Where FRA is established only between published hours, a fixed-route network shall be established for those times when FRA is not active.
System Requirements	– Network management systems shall implement: o Flight plan processing and checking for DCTs and FRA; o IFPS routing proposals based on FRA; o dynamic sector configuration and re-routing; o ATFCM planning and execution within FRA; o calculation and management of traffic loads. – ATC systems shall implement the following: o Flight data processing system, including HMI, to manage trajectory/flight planning without reference to the fixed ATS network; o Flight planning systems to support FRA and cross-border

	operations; o ASM/ATFCM to manage dynamic sector configuration and FRA; o ATC support tools, including Conflict Detection Tools (CDT), Conflict Resolution Assistant (CORA), Conformance Monitoring, and APW for dynamic airspace volumes/sectors. – ATC systems may receive and utilise updated flight data coming from an aircraft (ADS-C EPP) where data link functionality is available. – Airspace users' systems shall implement flight-planning systems to manage dynamic sector configuration and FRA.

c) Medium Term Conflict Detection (MTCD) with Conflict Resolution Advisories and Conformance Monitoring

Description	
System Requirements	– The Conformance Monitoring and Conflict Resolution systems shall operate in FRA, DCT and A-FUA. – Trajectory prediction and de-confliction shall support an automated MTCD tool adapted to operate in FRA, DCT and A-FUA. – FDPS shall support FRA, DCT and A-FUA. – The controller working position shall support the operating environments, as appropriate.

2. Geographical scope

Flexible Airspace Management and Free Route shall be provided and operated in the airspace for which the Member States are responsible above flight level 310 in the ICAO EUR region.

3. Impacted stakeholders and deadline

Network Manager, air navigation service providers and airspace users shall operate:

- DCT as from 1 January 2018;
- FRA as from 1 January 2022.

4. Essential prerequisites

There are no prerequisites for this functionality.

5. Interdependencies with other ATM functionalities

FRA and DCT shall be supported by Network management systems specified in AF4.

AF 4 - Network Collaborative Management

Overall description	Network Collaborative Management (Flow & Network Operations Plan (NOP)) improves the European ATM network performance, notably capacity and flight efficiency through exchange, modification and management of trajectory information. Flow Management shall move to a Cooperative Traffic Management (CTM) environment, optimising the delivery of traffic into sectors and airports and the need for Air Traffic Flow and Capacity Management (ATFCM) measures. This functionality is composed of four sub-functionalities: 1) Enhanced Short Term ATFCM Measures; 2) Collaborative NOP; 3) Calculated Take-off Time to Target Times for ATFCM purposes; 4) Automated Support for Traffic Complexity Assessment.
Master Plan	AF4 includes part of the Step 1 Essential Operational Change for the "Network Collaborative Management & Dynamic Capacity Balancing" Key Feature as defined in the Master Plan (version 2012)
Synchronisation	AF4 requires coordinated deployment 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 needs to be carefully synchronized to ensure that the performance objectives are met. This synchronization of investments will involve multiple air navigation service providers and the Network Manager. Furthermore synchronization during the related industrialisation phase will be necessary (supply industry and standardization bodies in particular).

1. Operational and technical scope

d) Enhanced Short Term ATFCM Measures

Description	Tactical capacity management using Short Term ATFCM Measures (STAM) shall ensure a close and efficient coordination between ATC and the network management function. Tactical capacity management shall implement STAM using cooperative decision-making to manage flow before flights enter a sector.
System Requirements	ATFCM planning shall be managed at network level by the Network Manager and at local level by the flow management position to support hot-spot detection, execution of STAM, network assessment and continuous monitoring of network activity. ATFCM planning at network and local level shall be coordinated with each other.

e) Collaborative NOP

Description	The Network Manager shall implement Collaborative NOP. The Collaborative NOP shall be updated through data exchanges between Network Manager and operational stakeholder systems in order to cover the entire trajectory lifecycle. Airport constraints and weather and airspace information shall be integrated into the NOP. Where available, the airport constraints shall be derived from the AOP. The development of a Collaborative NOP shall focus on the availability of shared operational data and shall be able to be read and modified by operational stakeholders participating in managing and operating the network.
System Requirements	– An access authorisation mechanism shall be implemented to ensure that operational stakeholders can only access data within the NOP for which they are authorised. Query mechanisms shall be available to provide all operational stakeholders with operational information to support their needs. – Operational stakeholder ground systems shall be adapted to interface with network management systems. AOP systems shall interface with the NOP systems. – Interface between operational stakeholder systems and network management systems shall be implemented using System-Wide Information Management (SWIM) services once available.

f) Calculated Take-off Time to Target Times for ATFCM purposes

Description	Target Times of Arrival (TTA) shall be applied to selected flights for ATFCM purposes to manage ATFCM at the point of congestion rather than only at departure. Where available, the TTA shall be derived from the Airport Operations Plan (AOP). TTAs shall be used to support airport arrival sequencing processes in the en-route phase.
System Requirements	– Network Manager's systems shall support target time sharing. Systems shall be able to adjust Calculated Take-off Times (CTOTs) based on refined and agreed TTAs at the destination airport. AMAN systems shall enable TTAs to be integrated into the AOP for subsequent integration into the NOP. – Flight data processing systems may need to be adapted in order to process downlinked trajectory data (ADS-C EPP).

g) Automated Support for Traffic Complexity Assessment

Description	Planned trajectory information, network information and recorded analytical data from past operations shall be used for predicting traffic complexity and potential overload situations, allowing mitigation

	strategies to be applied at local and network levels. Extended Flight Plan (EFPL) shall be used to enhance complexity assessments if available.
System Requirements	– ETFMS and IFPS systems shall deal with dynamic sectorisation, route configuration and to calculate and manage traffic loads and complexity at flow management position and network level. – The flight data processing systems shall interface with the NOP. – Flight planning systems shall support EFPL once available. – ASM/ATFCM tools shall be able to manage different airspace availability and sector capacity, including A-FUA (as specified in AF3), Route Availability Document (RAD) adaptation and STAM.

2. Geographical scope

Network Collaborative Management shall be deployed in the EATMN, including in military ATC centres in Member States where civil-military operations are not integrated[25].

3. Impacted stakeholders and deadline

Operational stakeholders and the Network Manager shall operate Network Collaborative Management as from 1 January 2022.

4. Essential prerequisites

There are no prerequisites for this functionality. Nevertheless, an existing STAM phase 1 implementation will facilitate the operational integration of this AF.

5. Interdependencies with other ATM functionalities

Network management systems shall make use of AMAN as specified in AF1.

Where available, AOP system shall make use of DMAN as specified in AF2.

Network management systems shall support Flexible use of airspace and free routing as specified in AF3.

Information exchange requirements shall use SWIM as specified in AF5 once available.

Downlink trajectory information as specified in AF6, where available, shall be integrated into the NOP.

Part III - “Binding orientations”

AF 5 - Initial System Wide Information Management

Overall description	System Wide Information Management (SWIM) concerns the development of services for information exchange. SWIM comprises standards, infrastructure and governance enabling the management of information and its exchange between operational stakeholders via interoperable services. Initial System Wide Information Management (iSWIM) supports information exchanges that are built on standards and delivered through an IP-based network by SWIM enabled systems. It consists of: 1) Common infrastructure components 2) SWIM Technical Infrastructure and Profiles 3) Aeronautical information exchange 4) Meteorological information exchange 5) Cooperative network information exchange 6) Flight information exchange
Master Plan	AF5 includes part of the Step 1 Essential Operational Change for the "SWIM" Key Feature as defined in the Master Plan (version 2012)
Synchronisation	AF5 requires coordinated deployment 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 service delivery changes needs to be carefully synchronized to ensure that the performance objectives are met. This synchronization will necessary to enable changes targeted within AF1-4 as well as future CPs. Synchronization is required across all ATM ground stakeholders (civil/military air navigation service providers, airspace users –for AOC systems- , airport operators, MET Service Providers and the Network Manager. Furthermore synchronization during the related industrialisation phase will be necessary (supply industry and standardization bodies in particular).

1. Operational and technical scope

a) Common infrastructure components

Description	Common infrastructure components are: – The registry, which shall be used for publication and discovery of information regarding service consumers and providers, the logical information model, SWIM enabled services, 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.

b) SWIM Technical Infrastructure and Profiles

Description	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. – Yellow SWIM TI Profile, which shall be used for any other ATM data (aeronautical, meteorological, airport etc.).

c) Aeronautical information exchange

Description	Operational stakeholders shall implement services for exchange of aeronautical information as indicated in the table below using the yellow SWIM TI Profile. Service implementations shall be compliant to the Aeronautical Information Reference Model (AIRM), the AIRM Foundation Material and the Information Service Reference Model (ISRM) Foundation Material. (see table 1)
System Requirements	ATM systems shall be able to use the Aeronautical information exchange services.

Information Exchange	NM	ANSP Civil	ANSP Military	AP OPR Civil	AP OPR Military	AU Civil Airline Operational Control	AU Military Wing Operations Centre	MET Service Provider	SWIM TI Profile
Notification of the activation of an Airspace Reservation/Restriction (ARES)	U	U	P						Yellow
Notification of the de-activation of an Airspace Reservation/Restriction (ARES)	U	U	P						Yellow
Pre-notification of the activation of an Airspace Reservation/Restriction (ARES)	U	U	P						Yellow
Notification of the release of an Airspace Reservation/Restriction (ARES)	U	U	P						Yellow
Provides aeronautical information feature on request. Filtering possible by feature type, name and an advanced filter with spatial, temporal and logical operators.	U	P, U	U	U	U	U	U		Yellow
Query Airspace Reservation/Restriction (ARES) information	U	P, U	U	U	U	U	U		Yellow
Provide Aerodome mapping data	U	P, U		U		U			Yellow
Airspace Usage Plans (AUP, UUP) - ASM level 1 and 2	P,U	P,U	P,U			U	U		Yellow
Proviides aeronautical information feature on request. Filtering possible by feature type name and an advanced filter with spatial, temporal and logical operators.	P, U	P, U	U						Yellow
Provides aeronautical information feature on request. Filtering possible by feature type name and an advanced filter with spatial, temporal and logical operators.	P, U	P, U	U	U	U	U	U		Yellow
D-Notams	U	P,U	U	P,U	U	U	U		Yellow
Airspace Usage Plans (AUP, UUP) - ASM level 3	U	P,U	P,U	U	U	U	U		Yellow
Airport Maps	U	U	U	P,U	U	U	U		Yellow

Table 1 - (P: Provider, U: User)

d) Meteorological information exchange

Description	Operational stakeholders shall implement services for exchange of meteorological information as indicated in the table below using the yellow SWIM TI Profile. Service implementations shall be compliant to the AIRM, the AIRM Foundation Material and the ISRM Foundation Material. (See table 2)
System Requirements	ATM systems shall be able to use the MET information exchange services.

Information Exchange	NM	ANSP Civil	ANSP Military	AP OPR Civil	AP OPR Military	AU Civil Airline Operational Control	AU Military Wing Operations Centre	MET Service Provider	SWIM TI Profile
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)		U		U		U		P	Yellow
Provide Volcanic Ash Mass Concentration	U	U	U	U	U	U	U	P	Yellow
Specific MET info feature service	U	U	U	U	U	U	U	P	Yellow
Winds aloft information service	U	U	U	U	U	U	U	P	Yellow
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 capabiliity mainly targets a "time to decision" horizon between 20 minutes and 7 days.	U			U	U	U	U	P	Yellow
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 capabiliity mainly targets a "time to decision" horizon between 20 minutes and 7 days.	U	U	U	U	U	U	U	P	Yellow
Meteorological information supporting Netowork 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 capabiliity mainly targets a "time to decision" horizon between 20 minutes and 7 days.	U	U	U			U	U	P	Yellow
Hazardous meteorological conditions in the context of decisions that should have an effect on execution and short term planning.	U			U,P	U	U	U	C	Yellow

Table 2 - (P: Provider, C: Contributor, U: User)

e) Cooperative network information exchange

Description	Operational stakeholders shall implement services for exchange of cooperative network information as indicated in the table below using the yellow SWIM TI Profile. Service implementations shall be compliant to the AIRM, the AIRM Foundation Material and the ISRM Foundation Material. (see table 3)
System Requirements	The Network Manager Portal shall support all operational stakeholders in exchanging data electronically with the Network Manager. The Network Manager Portal shall support the choice of the operational stakeholders between a pre-defined online access, or connect their own applications using the system-to-system (B2B) web-technology based services.

Information Exchange	NM	ANSP Civil	ANSP Military	AP OPR Civil	AP OPR Military	AU Civil Airline Operational Control	AU Military Wing Operations Centre	MET Service Provider	SWIM TI Profile
Maximum airport capacity based on current and near term weather conditions				U				P	Yellow
Synchronisation of Network Operations Plan and Airport Operations Plan at a specific airport.	P, U			P, U					Yellow
Regulations	P	U	U						Yellow
Slots	P					U	U		Yellow
Short term ATFCM measures	P	U		U		U			Yellow
ATFCM congestion points	P	U		U		U			Yellow
Restrictions	P	U	U			U	U		Yellow
Free route validation	P	U	U			U	U		Yellow
Network and Airport Operation Plans	P,U			P,U					Yellow
Network and En-Route Approach Operation Plans	P,U	P,U							Yellow

Table 3 - (P: Provider, U: User)

f) Flight information exchange

Description	Flight information shall be exchanged during the pre-tactical and tactical phases by ATC systems and Network Manager. Operational stakeholders shall implement services for exchange of flight information as indicated in the table below using the indicated SWIM TI Profile. Service implementations shall be compliant to the AIRM, the AIRM Foundation Material and the ISRM Foundation Material. (See table 4)
System Requirements	ATC systems shall make use of the flight information exchange services.

Information Exchange	NM	ANSP Civil	ANSP Military	AP OPR Civil	AP OPR Military	AU Civil Airline Operational Control	AU Military Wing Operations Centre	MET Service Provider	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.	P,C,U	P,C,U							Blue
Share Flight Object information. Flight Object includes the flight script composed of the ATC constraints and the 4D trajectory.	P,C,U	P,C,U							Blue
Validate flight plan and routes	P	U	U	U	U	U	U		Yellow
Flight plans, 4D trajectory, flight performance data, flight status	P	U	U	U	U	U	U		Yellow
Flights lists and detailed flight data	P	U	U	U	U	U	U		Yellow
Flight update message related (departure information)	P	P,U	U	U	U	U	U		Yellow

Table 4 - (P: Provider, C: Contributor, U: User)

2. Geographical scope

iSWIM functionality shall be deployed in the EATMN as indicated in the table:

	ANSPs	Airports	Military ANSPs	Airspace Users	MET providers
Cooperative network information exchange	All very high and high capacity need centres, TMAs and Towers	Geographical scope as referred to in AF1§2	-	AOC system providers	-
Aeronautical information exchange	All very high and high capacity need centres, TMAs and Towers	Geographical scope as referred to in AF1§2	All centres in the Member States that have non-integrated civil/military service provision[26]	AOC system providers	-
Meteorological information exchange	All very high and high capacity need centres, TMAs and Towers	Geographical scope as referred to in AF1.2	All centres in the Member States that have non-integrated civil/military service provision	AOC system providers	All MET providers
Flight information exchange	All very high and high capacity need centres & TMAs	-	-	-	-

3. Impacted stakeholders and deadline

Operational stakeholders and MET providers referred to in §2 shall provide and operate the iSWIM as of 1 January 2025.

4. Essential prerequisites

To support the blue SWIM TI Profile, very high and high capacity centres shall be connected to Pan-European Network Services (PENS).

5. Interdependencies with other ATM functionalities

SWIM services enable the AMAN functionality as described in AF1 A-FUA as described in AF3, Network Collaborative Management functionality as described in AF4 and 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 to in AF6.

The implementation of SWIM infrastructure and services will facilitate the information exchange for all mentioned AFs.

AF 6 - Initial Trajectory Information Sharing

Overall description	Initial Trajectory Information Sharing (i4D) consists of the improved use of target times and trajectory information, including the use of on-board 4D trajectory data by the ground ATC system, implying fewer tactical interventions and improved de-confliction situation.
Master Plan	AF6 includes part of the Step 1 Essential Operational Change for the "Moving from Airspace to 4D Trajectory Management" Key Feature as defined in the Master Plan (version 2012) as well as indirectly supporting other Key Features addressed by the other AFs through the use of shared trajectory information
Synchronisation	AF6 requires coordinated deployment 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 service delivery changes needs to be carefully synchronized to ensure that the performance objectives are met. This synchronization will necessary to enable changes targeted within AF1, 3 and 4 as well as future CPs. Synchronization is required across all air navigation service providers, the Network Manager and airspace users (air-ground synchronization need). Furthermore synchronization during the related industrialisation phase will be necessary (supply industry, standardization and certification bodies in particular).

1. Operational and technical scope

Description	Target times and 4D trajectory data shall be used to enhance ATM system performance. Target times (TTO/TTA) shall be used in ATFCM constraints. The ATFCM target time (TTO or TTA) may be used as input for arrival sequencing. Trajectory information and target times shall be enhanced by the use of air-ground trajectory exchange.
System Requirements	– Aircraft shall down-link trajectory information using ADS-C Extended Projected Profile (EPP). The trajectory data shall be automatically down-linked from the airborne system to the ATM system according to the contract terms. – Data link communications ground systems shall support ADS-C (downlink of aircraft trajectory using EPP). – Flight data processing systems and controller working positions shall make use of downlinked trajectories. FDP to FDP trajectory exchange between ATS units shall be supported using flight object exchange as defined in AF5.

2. Geographical scope

Initial Trajectory Information Sharing shall be deployed in all ATS units providing air traffic services within the airspace for which the Member States are responsible.

3. Impacted stakeholders and deadline

ATS providers shall ensure that they enable Initial Trajectory Information Sharing as from 1 January 2025.

The Deployment Manager shall ensure that at least 20% of the aircraft operating within the airspace for which the Member States are responsible corresponding to at least 45% of flights operating in Europe, are equipped with the capability to downlink aircraft trajectory using ADS-C EPP as from 1 January 2026.

4. Essential prerequisites

The essential pre-requisite is the data link capability that is also required to meet the CIR 29/2009 on data link services.

5. Interdependencies with other ATM functionalities

The down-linked aircraft trajectory may be used to enhance the AMAN functionality described in AF1.

Downlink trajectory information may be integrated into the Enhanced Short Term ATFCM Measures calculation and the Automated Support for Traffic Complexity Assessment as specified in AF3.

Downlink trajectory information may be integrated into the NOP as specified in AF4.

Part IV - Questionnaire

Section 1 - Questions

A targeted stakeholder consultation on the establishment of the "Pilot Common Project" supporting the implementation of the European Air Traffic Management Master Plan including an on-line questionnaire has been made available on the Directorate-General for Mobility and Transport website:
http://ec.europa.eu/transport/modes/air/sesar/deployment_en.htm and is open until 31/01/2014.

We invite you to read the consultation paper explaining the context of the PCP and the accompanying documents before answering the questionnaire.

The **Single European Sky Unit (Unit E2)** of the Directorate for Aviation and International Transport Affairs of DG MOVE is the responsible service for this consultation. Stakeholders may submit questions through the functional mailbox: MOVE-E2-SINGLE-SKY-UNIT@ec.europa.eu. Please indicate in the subject: "PCP consultation".

Part V - Support material

Supporting material for the industrialisation phase

The indicative supporting material for the industrialisation phase produced by the SESAR JU includes the relevant parts of:

- Operational concept and requirements (OSED, SPR, INTEROP)
- Validation results
- Technical specifications

Other support material is available on the Directorate-General for Mobility and Transport web page: http://ec.europa.eu/transport/modes/air/sesar/deployment_en.htm

Section 1 - Supporting material for the standardisation and industrialisation phase

AF	What	Available Documentation as of 01/10/2013	When not available today, final version of V3 Documentation	Final V3 Documentation Planned Delivery Date
AF1				
AF1: TS-0303	AMAN into multiple airports		05.04.02-D04-Final OSED	Q4 2014
			05.04.02-D05-Final SPR	Q4 2014
AF1: TS-0305-A	AMAN extended to En-Route	05.06.04-D32-OSED a preliminary version is available; an updated version was delivered on 22/07/2013 and is under review at the SJU	Updated version of 05.06.04-D32-OSED in Release 5	Q2 2015
		05.06.04-D34-SPR/INTEROP a preliminary version is available	Updated version of 05.06.04-D34-SPR/INTEROP in Release 5	Q2 2015
AF1: AOM-0603, AOM-0605	PBN in high density TMAs	05.07.04-D13-OSED		Available today
		05.07.04-D08-SPR		
		05.06.03-D08-OSED	05.06.03-D22-OSED	Q4 2013
		05.06.03-D12-Advanced Procedures	05.06.03-D20-Aircrew Operating Procedures and Training Report	Q2 2014
		9.09-D08-TS		Available today
		06.08.05-D04-OSED		
AF2				
AF2: TS-0202, TS-0203 (PCP related elements)	DMAN synchronised with Pre-departure sequencing	06.08.04-D13-OSED	06.08.04-D17- Final OSED	Q3 2014
		06.08.04-D14-SPR	06.08.04-D18-Final SPR	Q3 2014
		06.08.04-D80-INTEROP	06.08.04-D82-Final INTEROP	Q3 2014
		10.09.01-D02 - Phase 1 – System requirement	10.09.01-D37 - Phase 1 – System requirement	Q3 2014
		10.09.02-D02-002 - System requirement - Phase A	10.9.2-D16-System requirement - Phase B	Q2 2014
		12.03.05-D02 - Phase 1 – System Requirements Specification	12.03.05-D35 - Technical Specification	Q3 2014
		12.04.04-D01 - System requirements definition (Phase 1)	06.08.04-D29-Final OSED	TBC

		06.08.04-D21-OSED	06.08.04-D30-Final SPR	TBC
		12.03.05-D08-001 - Phase 2 - Initial system Requirement Specification	06.08.04-D84-Final INTEROP	TBC
			10.09.01-D37 - Phase 1 – System requirement	Q3 2014
			10.9.2-D16-System requirement - Phase B	Q2 2014
			12.03.05-D16-002- Technical Specification	Q4 2015
			12.04.04-D11-System requirements definition STEP 2 (Phase 2)	Q4 2015
AF2: AO-0205, AUO-0104-A	DMAN integrating A-SMGCS Constraints and Automated Assistance to Controllers for A-SMGCS	06.07.02-D73-OSED	OFA04.02.01 Final OSED	Q1 2015
		06.07.02-D37-OSED for advanced functions	OFA04.02.01 Final SPR	Q2 2015
		06.07.02-D74-SPR	OFA04.02.01 Final INTEROP	Q2 2015
		06.07.02-D75-INTEROP	12.03.03-D14-TS	Q2 2014
		12.03.03-D08-TS	12.05.03-D10-TS	Q2 2014
		12.05.03-D04-TS		Available today
AF2: AO-0303	TBS for Final Approach	06.08.01-D05-OSED		Available today
		06.08.01-D06-SPR		
		10.04.04-D02-TS		
		12.02.02-D03-TS		
AF2: AO-0104-A	Airport Safety Nets	06.07.01-D22-OSED (Conformance monitoring)	06.07.01-D32 - Final OSED	Q4 2015
		06.07.01-D23-SPR (Conformance monitoring)	06.07.01-D33- Final SPR	Q4 2015
		06.07.01-D16-OSED (Conflicting ATC Clearances)	12.03.02-D35 - Final TS	Q2 2014
		06.07.01-D17-SPR (Conflicting ATC Clearances)	12.05.02-D23 - Final TS	Q1 2014
		12.03.02-D18-TS		Available today
		12.05.02-D12-TS		
AF3				
AF3: CM-0204 (Now is CM-0205 after DS11)	MTCD & TC	04.07.02-D07-OSED	04.07.02-D29-OSED	Q2 2015
		04.07.02-D08-SPR	04.07.02-D30-SPR	Q2 2015
		10.04.01-D06-TS	10.04.01-D18-TS	Q1 2014

AF3: AOM-0206-A; AOM-0202-A	FUA	07.05.02-D02-OSED	07.05.02-DXX-OSED	Q2 2015
		07.05.02-D04-SPR	07.05.02-DXX-SPR	Q2 2015
		07.05.02-D03-INTEROP	07.05.02-DXX-INTEROP	Q2 2015
		13.02.01-D02-TS	13.02.01-D139-TS	Q3 2013
		13.02.01-D141-TS	13.02.01-D142-TS	Q3 2013
AF3: AOM 0501, AOM-0502, AOM-0403-A	Free Routes	07.05.03-D02-OSED	07.05.03-D39-OSED	Q4 2013
			07.05.03-D03-INTEROP	Q4 2013
AF4				
AF4: DCB-0208	CTOT to TTA for ATFCM	07.06.05-D35-OSED	07.06.05-D03-OSED	Q1 2014
			07.06.05-D04-SPR	Q1 2014
			13.02.03-D79-TS	Q1 2014
AF4: DCB-0103-A	Collaborative NOP	07.06.01-D01-OSED	07.06.01-D39-Final OSED	Q4 2014
AF4: CM-0103-A	Traffic Complexity Management Tool	04.07.01-D04-OSED		Available today
		04.07.01-D05 Operational requirements		Available today
		04.07.01-D07-SPR		Available today
		04.07.01-D09-INTEROP		Available today
		10.08.01-D02-TS		Available today
AF4: DCB-0205, DCB-0308	Enhanced STAM	07.06.05-D35-OSED	07.06.05-D03-OSED	Q1 2014
			07.06.05-D04-SPR	Q1 2014
			13.02.03-D79-TS	Q1 2014
AF4: AUO-0203-A	Extended FPL with 4D trajectory	07.06.02-D01-OSED	07.06.02-D36-OSED	Q2 2014
			07.06.02-D03-SPR	Q2 2014
		11.01.02-D01-OSED, SPR, INTEROP - FOC		Available today
		13.02.01-D10-TS	13.02.01-D145-TS	Q1 2014
AF5				
AF5	Flight Information		10.02.05- D27-IOP ATC System Requirements – Final Release for Phase 1	Q4 2014
AF5	Meteo	11.02.01-D12-OSED		Available today
		11.02.01-D13-SPR		Available today

		11.02.01-D14-INTEROP		Available today
		11.02.02-D01-TS		Available today
AF5	SWIM Foundation	08.03.02-D04 D8.3.2.D04 AIRM-ISRM Registry - Operational Requirements and Demands concerning ATM information Catalogue and Registry Services	08.03.02-D05 D8.3.2.D05 Security and Runtime Registry - Operational Requirements and Demands concerning ATM information Catalogue and Registry Services	Q1 2014
		08.03.02-D19 AIRM-ISRM Registry - Operational Requirements and Demands concerning ATM information Catalogue and Registry Services (update)		Available today
			08.01.03-D07 Third Major Release of the AIRM + AIRM rulebook	Q3 2013
			08.01.03-D09 Fourth Major Release of the AIRM + AIRM rulebook	Q3 2015
			Service rulebook out of the 08.03.10-D12 ISRM Iteration #10	Q1 2015
			Service rulebook out of the 08.03.10-D13 ISRM Iteration #11	Q3 2015
AF5	SWIM Technical Infrastructure	Swim profile definition v2.1	14.01.03-D36 SWIM Profiles for Step 3 - Iteration 3.0	Q2 2014
			14.01.03-D38 SWIM Profiles for Step 3 - Iteration 3.1	Q2 2015
			14.01.04-D42 SWIM-TI Technical Specification 3.0	Q4 2014
			14.01.04-D43 SWIM-TI Technical Specification 3.1	Q3 2015
AF5	SWIM Security		14.02.02-D23 SWIM Security Risk Assessment update for iteration 3.0	Q2 2013
			14.02.02-D26 SWIM security spec-design for iteration 3.0	Q1 2014
			14.02.02-D28 SWIM Security Risk Assessment update for iteration 3.1	Q4 2014
			14.02.02-D29 SWIM security spec-design iteration 3.1	Q4 2014
AF5	Governance		08.01.01-D23 IM Functions (governance specifications) V3	Q2 2014

			08.01.01-D26 IM Functions (governance specifications) V4	Q1 2015
		08.01.01-D43 SWIM Compliance		Available today
AF6				
AF6	Initial Trajectory Information Sharing	04.03-D12-OSED, SPR and INTEROP	05.06.01-D83-Final OSED	Q2 2014
		05.06.01-D67-OSED	05.06.01-D84-Final SPR	Q2 2014
		05.06.01-D68-SPR	05.06.01-D85-Final INTEROP	Q2 2014
		10.09.04-D10-TS		Available today
		10.07.01-D02-TS		Available today
		9.01-D01 & 9.01-D02		Available today

Section 2 - Draft standardisation and regulation roadmap

Part I-Section 1.5 describes the impact of standardisation and regulation activities on the PCP. The following table covers the standards and regulations that should be developed in the context of PCP and therefore complements the information provided in the mentioned Section 1.5.

PCP = Proposed PCP date

(a1) = Alternative date first scenario

(a2) = Alternative date second scenario

ATM Functionality	Standardisation activities	Standardisation organisation	Standards delivery by the organisation	Regulatory Activities	Regulatory organisation	Regulatory delivery by the organisation	Start Investment	Industrialisation completion date (industry	Start Deployment	End Deployment
AF1										
AMAN into multiple airports	There is no prerequisite. Industry may decide to develop a standard later to optimise benefits.			No specific need identified			**2015** PCP	2016(a1)	**2018** PCP	**2023** PCP
AMAN extended to En-Route	There is no prerequisite. Industry may decide to develop a standard later to optimise benefits.			No specific need identified			**2015** PCP	2016(a1)	**2018** PCP	**2023** PCP
PBN into high density TMAs	No specific need identified	ICAO	Available	(1) EASA regulatory material on PBN incorporating Doc 9613 (2) PBN Implementing rule	(1) EASA (2) EC	(1) 2016 (2) 2016	**2015** PCP	2016(a1)	**2018** PCP	**2023** PCP

ATM Functionality	Standardisation activities	Standardisation organisation	Standards delivery by the organisation	Regulatory Activities	Regulatory organisation	Regulatory delivery by the organisation	Start Investment	Industrialisation completion date (industry	Start Deployment	End Deployment
AF2										
DMAN synchronised with Pre-departure sequencing	(1) Updated Airport CDM Standards (2)Update operational document of EURONTROL	(1) Eurocae (2)Eurocontrol	Not Planned (1) Estimate 2017 (2) Estimate 2015	CS/AMC on Airport CDM	ESOs/ /EASA	Not Planned o estimate 2018 o	**2014** PCP 2018(a1)		**2015**PCP 2020(a1) 2020(a2)	**2020** PCP 2025(a1) 2027(a2)
DMAN integrating A-SMGCS constraints and Automated Assistance to Controllers for A-SMGCS	(1) Updated Eurocae Standard on A-SMGCS levels 1&2 and extended (2) Updated operational documents Eurocontrol	(1) Eurocae (2)Eurocontrol	Not Planned (1) Estimate 2017 (2) Estimate 2017	CS/AMC Updated ASMGCS	ESOs/ /EASA	Not Planned o stimate 2018	**2014** PCP 2018 (a1)	2019 (a1) 2021 (a2)	**2018** PCP 2020 (a1) 2022 (a2)	**2023** PCP 2025 (a1) 2027 (a2)
TBS for final approach	Standard on TBS tools Performance Specifications	Eurocontrol	Not planned Estimate 2015	AMC on Time Based separation (procedures and functions)	EASA	Not Planned Estimate 2016	**2014** PCP 2016 (a1)	2017 (a1) 2019 (a2)	**2017** PCP 2019 (a1) 2021 (a2)	**2021** PCP 2025 (a1) 2027 (a2)
Airport Safety Nets	Update of A - SMGCS Standards	Eurocae	Not planned Estimate 2017	(1) CS/AMC Updated A-SMGCS (2) AMC on procedures to be harmonised at European level	(1) ESOs/ EASA (2) EASA	Not planned (1) Estimate 2018 (2) Estimate 2018	**2014** PCP 2018 (a1)	2019 (a1) 2021 (a2)	**2015** PCP 2020 (a1) 2022 (a2)	**2020** PCP 2025 (a1) 2027 (a2)

ATM Functionality	Standardisation activities	Standardisation organisation	Standards delivery by the organisation	Regulatory Activities	Regulatory organisation	Regulatory delivery by the organisation	Start Investment	Industrialisation completion date (industry	Start Deployment	End Deployment
AF3										
MTCD & TC	There is no prerequisite. It would be advisable to update MTCD specification to include enhanced FUA and free route	Eurocontrol	Not planned Estimate 2016	No specific need identified			**2014** PCP 2015 (a1)	2018 (a1) 2020 (a2)	**2017** PCP 2020 (a1) 2022 (a2)	**2021** PCP 2024 (a1) 2026 (a2)
FUA	No specific need identified			No specific need identified			**2014** PCP	2015(a1)	**2017** PCP	**2021** PCP
Free Routes	No specific need identified			No specific need identified			**2014** PCP	2015(a1)	**2017** PCP	**2021** PCP
AF4 > It has been assumed in the PCP proposal that the specification related to interface between the Network Manager and operational stakeholders' systems will be made available by the Network Manager and would become binding reference documents for the PCP implementation.										
CTOT to TTA for ATFCM	No specific need identified			No specific need identified			**2014** PCP	2015(a1)	**2017** PCP	**2021** PCP
Collaborative NOP	No specific need identified			No specific need identified			**2014** PCP	2015(a1)	**2017** PCP	**2021** PCP
Traffic Complexity Management Tool	No specific need identified			No specific need identified			**2014** PCP	2015(a1)	**2017** PCP	**2021** PCP
Enhanced STAM	No specific need identified			No specific need identified			**2014** PCP	2015(a1)	**2017** PCP	**2021** PCP
Extended FPL with 4D trajectory	No specific need identified			No specific need identified			**2014** PCP	2015(a1)	**2017** PCP	**2021** PCP
AF5										

ATM Functionality	Standardisation activities	Standardisation organisation	Standards delivery by the organisation	Regulatory Activities	Regulatory organisation	Regulatory delivery by the organisation	Start Investment	Industrialisation completion date (industry	Start Deployment	End Deployment
Flight Information	(1) Specification/Standard containing ICAO FIXM including Flight Object related services payload (2) Update of ED-133 Flight Object	(1) Eurocontrol (2) Eurocae	(1) 2015 (2) Initial Standard (Baseline) 2015. Final Standard 2017	There is no prerequisite PCP results might be used to update at a later stage COTR IR; OLDI CS; FMTP IR; FMTP CS; AMHS CS.			**2014** PCP 2018 (a1)	2019 **(a1)** 2021 **(a2)**	**2018** PCP 2021 (a1) 2023 (a2)	**2024** PCP 2027 (a1) 2029 (a2)
Meteo	Standard for ground sharing of Weather Data (WXXM)	Eurocontrol	Available (2013)	No specific need identified			**2014** PCP 2015 **(a1)**	2017 (a1) 2019 (a2)	**2016** PCP 2019 **(a1)** 2021 **(a2)**	**2024** PCP 2027 **(a1)** 2029 **(a2)**
SWIM Foundation	(1)Standard/ Specification on AIRM (2)Standard/specification on AIRM Rulebook (3)Standard/specification on Service Rulebook (4) Standard/specification on SWIM Registry	Eurocontrol	2015	No specific need identified			**2014** PCP 2016 (a1)	2017 **(a1)** 2019 **(a2)**	**2016** PCP 2019 **(a1)** 2021 **(a2)**	**2024** PCP 2027 **(a1)** 2029 **(a2)**
SWIM Technical Infrastructure	Standard/specification on SWIM profile definition	Eurocontrol	2015	No specific need identified			**2014** PCP 2016 (a1)	2017 **(a1)** 2019 **(a2)**	**2016** PCP 2019 **(a1)** 2021 **(a2)**	**2024** PCP 2027 **(a1)** 2029 **(a2)**

ATM Functionality	Standardisation activities	Standardisation organisation	Standards delivery by the organisation	Regulatory Activities	Regulatory organisation	Regulatory delivery by the organisation	Start Investment	Industrialisation completion date (industry	Start Deployment	End Deployment
SWIM Security	There is no prerequisite PCP results might be used to elaborate SWIM security standards at a later stage. Nevertheless, it is strongly advisable to elaborate: - Technical Report on Security Requirements for Flight Object Services - Technical Report on Security Requirements for Meteo Services	CEN	Not Planned Estimate 2014	No prerequisite Nevertheless it is strongly advisable to produce Version 2 of EN 16495 accommodating content of technical reports from 2014 and the relevant outcome from SWIM security risk assessment	CEN	Not Planned Estimate 2017	**2014** PCP		**2016** PCP	**2024** PCP
Governance	There is no prerequisite			IR on rights and obligations for SWIM stakeholders to provide a legal framework for service provision	EASA	2017	**2014** PCP 2017 (a1)	2017(a1)	**2016** PCP 2019 (a1)	**2024** PCP 2027 (a1)
AF6										
Initial Trajectory Information Sharing	Standard on DL ATN B2 There are no other prerequisites however the following is recommended: (1) Update of ED-75 to support Initial 4D navigation capabilities as	Eurocae (1),(2) and (4):	2014	(1)Full regulatory package on DL Operations (2) Updated CS on DL	(1) EASA (2) ESOs	(1) 2018 (2) Not planned Estimate 2016	**2016** PCP 2018(a1)	2019 (a1) 2021 (a2)	**2018** PCP 2021 (a1) 2023 (a2)	**2024** PCP 2027 (a1) 2029 (a2)

ATM Functionality	Standardisation activities	Standardisation organisation	Standards delivery by the organisation	Regulatory Activities	Regulatory organisation	Regulatory delivery by the organisation	Start Investment	Industrialisation completion date (industry	Start Deployment	End Deployment
	part of the package with EPP (2) Update standards on CPDLC to support implementation of the full trajectory exchange service including CPDLC elements in support of ADS-C EPP (3) PCP results might be used to update ICAO Doc 9880, Doc 9776, ICAO GOLD and PANS/ATM (4) In order to optimize the expected benefits and ensure harmonization, it could be considered a certain level of standardization of procedures for ground systems interrelation	Eurocae								

Section 3 - Essential parameters of the cost-benefits analysis

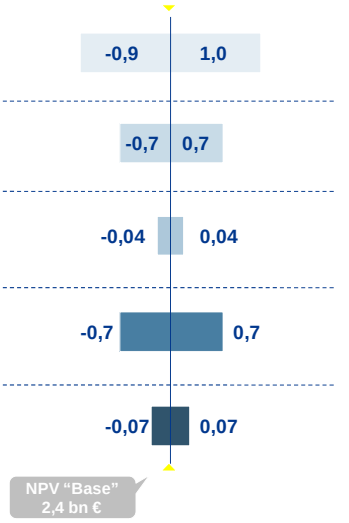
1. Summary of the results

The cost-benefit analysis (CBA) shows that an on-time and synchronized implementation of the PCP as a package of ATM Functionalities would generate over the period 2014 to 2030 a Net Present Value (NPV) amounting to 2,4 billion €, with a 9 year payback period.

Such Net Present Value is derived considering an overall cost of 3,8 billion € (2,5 billion €, discounted) undertaken by the involved stakeholders and benefits amounting to 12,1 billion € (4,9 billion €, discounted) over the considered time-frame. The PCP will also generate further benefits which, although not monetised, have a positive impact in terms of safety, variability of airline operations or on the travel experience of passengers. In particular, such non-monetised benefits are the consequence of an increase in Airspace capacity by 21%, an increase in Airport capacity by 4% and a decrease in Variability by 11%. In addition, the PCP will bring macro-economic benefits to the European economy that were not quantified in the CBA.

The sensitivity analysis shows that the global CBA remains positive even with a 0% growth scenario, severe cost overruns and/or lower performance gains:

Sensitivity Drivers	Value used	Range	Impact on PCP Net Present Value 2014 - 2030; bn €;
Air Traffic Growth	1,5%	0% - 3%	-0,9 / 1,0
Fuel and CO_2 Savings	2,1%	1,6% - 2,5%	-0,7 / 0,7
Delay Cost Savings *(Reduction of delay length and Reduction of delayed flights)*	12,2% - 9,8%	9,8% - 5,7% 14,7% - 7,8%	-0,04 / 0,04
PCP Investment Costs - Ground	100%	130% - 70%	-0,7 / 0,7
PCP Investment Costs - Airborne	100%	130% - 70%	-0,07 / 0,07



2. Assumptions

Impacted stakeholders and ATM functionalities

The cost-benefit analysis covers the "Package" of 6 ATM functionalities and stakeholders categories referred to in Annex.

Reference time period

Reference time period is 2014-2030.

Geographical scope

The geographical scope is equal to the geographical scope of the European ATM Master Plan and covers all European Civil Aviation Conference (ECAC) countries[27].

Discount rate

A discount rate of 8% was assumed.

Traffic evolution

The air traffic scenario used for the PCP Impact Assessment has been projected over the 2014 - 2030 time period assuming a 1,5% yearly growth rate, starting from the 2013 value as reported in STATFOR Medium Term Forecast 2012-2019 (EUROCONTROL, February 2013).

Non-local deployment

For the purpose of the PCP CBA, it has been assumed that an initial set of SWIM services and Network Operations Planning capabilities will be deployed at non-local (central or regional) level, however not at this stage to their fullest extent.

Types of costs taken into account

- procurement costs, including costs associated to: system design, HW and SW, implementation and project management activities, safety activities (including the approval process from NSA side) and Integration costs;
- training costs, including costs for training "first wave" delivery referred to a single ATM functionality unit (or sub-functionality unit where applicable);
- procedures costs, including costs attached to the definition of procedures for starting the operations of a given ATM functionality (or sub-functionality where applicable) in one site.

Number of investment instances

- ANSPs:

ATM Functionality	ANSPs					
	ACCs		TMAs		Towers	
	VHCn / HCn	MCn / LCn	VHCn / HCn	MCn / LCn	VHCn / HCn	MCn / LCn
AF-01 Extended AMAN and PBN in high density TMAs						
AMAN System upgrade for e-AMAN			20			
ATS System upgrade for e-AMAN	16					
PBN Airspace/Procedures/ATS-System			20			
AF-02 Airport Integration and Throughput Functionalities						
DMAN A-CDM					25	
TBS					17	
Airport safety Net					25	
CWP and A-SMGCS Optimised Routing					25	
RWSL					16	
AF-03 Flexible Airspace Management and Free Route	22	39				
AF-04 Network Collaborative Management (Flow & NOP)	22	39				
AF-05 iSWIM functionality						
Flow Management & FPL	22		20		23	
Aeronautical & Airspace	22		20		23	
Meteo	22		20		23	
SWIM Infrastructure & Administration						
Flight Object	22		20			
AF-06 Initial Trajectory Information Sharing (i4D)	22	39				

  - where ACCs were divided into following groups:

- Very High Capacity needs (VHCn) / High Capacity needs (HCn): above 200 movements per hour (22 ACCs by 2019)
- Medium Capacity needs (MCn) / Low Capacity needs (LCn): under 200 movements per hour (39 ACCs by 2019)

- TMAs were divided into following groups:
  - Very High Capacity needs (VHCn) / High Capacity needs (HCn): above 60 movements in peak hour (20 TMAs by 2019)
  - Medium Capacity needs (MCn) / Low Capacity needs (LCn): under 60 movements in peak hour (146 TMAs by 2019)

- Airspace users:

ATM Functionality	Airspace Users		
	Ground	Airborne	
	AOC	Retrofit	Forward fit
AF-03 Flexible Airspace Management and Free Route	**5**		
AF-05 iSWIM functionality			
Flow Management & FPL	**5**		
Aeronautical & Airspace	**5**		
Meteo	**5**		
SWIM Infrastructure & Administration			
Flight Object			
AF-06 Initial Trajectory Information Sharing (i4D)		**4.576**	**5.453**

- airborne investments in terms of retrofit and forward fit aircraft:

		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
FORWARD FIT														
AF - 06	Total number of a/c forward fitted	80	80	317	317	317	317	575	575	575	575	575	575	575
	Single Aisle	80	80	165	165	165	165	334	334	334	334	334	334	334
	Long Range			90	90	90	90	179	179	179	179	179	179	179
	Regional			62	62	62	62	62	62	62	62	62	62	62
		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
RETROFIT														
AF - 06	Total number of a/c retrofitted	170	170	530	530	530	530	1058	1058					
	Single Aisle	170	170	345	345	345	345	689	689					
	Long Range			185	185	185	185	369	369					
	Regional													
Number of equipped aircraft		250	250	847	847	847	847	1.633	1.633	575	575	575	575	575
Cumulated Number of equipped aircraft		250	500	1.347	2.194	3.041	3.888	5.521	7.154	7.729	8.304	8.879	9.454	10.029
% of Total Fleet equipped		1%	2%	6%	9%	12%	15%	21%	27%	28%	29%	30%	31%	32%
% of Total Flights equipped		2%	6%	12%	18%	28%	38%	47%	58%	60%	61%	62%	62%	63%

- Airport operators:

ATM Functionality	Airport Operators	
	Airports	
	VHCn / HCn	MCn / LCn
AF-02 Airport Integration and Throughput Functionalities		
DMAN A-CDM	**25**	
TBS		
Airport safety Net	**25**	
CWP and A-SMGCS Optimised Routing		
RWSL	**15**	
AF-04 Network Collaborative Management (Flow & NOP)	**25**	**106**
AF-05 iSWIM functionality		
Flow Management & FPL	**25**	
Aeronautical & Airspace	**25**	
Meteo	**25**	
SWIM Infrastructure & Administration		
Flight Object		

- where airports were divided into following groups:
  - Very High Capacity needs (VHCn) / High Capacity needs (HCn): above 150.000 movements per year (25 Airports by 2019)
  - Medium Capacity needs (MCn) / Low Capacity needs (LCn): under 150.000 movements per year (106 Airports by 2019)

- Military:

ATM Functionality	Military	
	ACCs	
	VHCn / HCn	MCn / LCn
AF-03 Flexible Airspace Management and Free Route	**22**	
AF-05 iSWIM functionality		
Flow Management & FPL		
Aeronautical & Airspace	**22**	
Meteo	**22**	
SWIM Infrastructure & Administration		
Flight Object	**22**	

  - no military airborne investments are expected

- MET Service Providers:

ATM Functionality	MET Service Providers		
	Local coverage	National coverage	Regional coverage
AF-05 iSWIM functionality			
Flow Management & FPL			
Aeronautical & Airspace			
Meteo	**25**	**44**	**1**
SWIM Infrastructure & Administration			
Flight Object			

  - investments would be expected to take place at:
    - airports level, for MET services with local coverage
    - national level, for MET services with national coverage
    - regional level, for MET services covering the entire EU Airspace

Unit costs of ATM functionalities per stakeholder category:

– ANSPs:

ATM Functionality	ANSPs				
	ACCs		TMAs		Towers
	VHCn / HCn Unit cost (mln €)	MCn / LCn Unit cost (mln €)	VHCn / HCn (Separeted) Unit cost (mln €)	VHCn / HCn (Integrated) Unit cost (mln €)	VHCn / HCn Unit cost (mln €)
AF-01 Extended AMAN and PBN in high density TMAs					
AMAN System upgrade for e-AMAN		**5,0**	**5,0**	**5,0**	
ATS System upgrade for e-AMAN	**4,6**				
PBN Airspace/Procedures/ATS-System		**4,0**	**4,0**	**4,0**	
AF-02 Airport Integration and Throughput Functionalities					
DMAN A-CDM					**11,1**
TBS					**17,0**
Airport safety Net					**2,3**
CWP and A-SMGCS Optimised Routing					**5,3**
RWSL					**3,1**
AF-03 Flexible Airspace Management and Free Route	**15,4**	**3,9**			
AF-04 Network Collaborative Management (Flow & NOP)	**10,2**	**2,6**			
AF-05 iSWIM functionality					
Flow Management & FPL	**0,8**		**0,8**	**0,5**	**0,3**
Aeronautical & Airspace	**0,8**		**0,8**	**0,5**	**0,3**
Meteo	**0,8**		**0,8**	**0,5**	**0,3**
SWIM Infrastructure & Administration					
Flight Object	**4,6**		**4,6**	**2,6**	
AF-06 Initial Trajectory Information Sharing (i4D)	**8,8**	**2,2**			

Network Manager costs are included in the costs of ANSPs (see ATM Functionality specific section for details)

– Airspace users:

ATM Functionality	Airspace Users			
	Ground	Airborne		
	AOC Unit cost (mln €)	Retrofit Unit cost for old aircraft (k €)	Retrofit Unit cost for new aircraft (k €)	Forward fit Unit cost (k €)
AF-03 Flexible Airspace Management and Free Route	**1,6**			
AF-05 iSWIM functionality				
Flow Management & FPL	**0,5**			
Aeronautical & Airspace	**2,4**			
Meteo	**0,3**			
SWIM Infrastructure & Administration				
Flight Object				
AF-06 Initial Trajectory Information Sharing (i4D)				
Single Aisle		**50.019**	**32.588**	**32.588**
Long Range		**50.019**	**32.588**	**32.588**
Regional		**-**	**-**	**285.000**

N.B. Regarding retrofit unit costs reported in the table above, “Retrofit unit cost for old aircraft” has been applied to aircraft built before 2011 while “Retrofit unit cost for new aircraft” has been applied to aircraft built between 2012 and 2015. Furthermore, cost linked to the implementation of the Commission Regulation (EU) No. 29/2009 (data-link services) and expected cost linked to the upcoming Commission Implementing Regulation on Performance Based Navigation (PBN) have been excluded from the PCP cost assessment as these were considered as a part of deployment baseline (prerequisites).

– Airport Operators:

ATM Functionality	Airport Operators	
	Airports	
	VHCn / HCn Unit cost (mln €)	MCn / LCn Unit cost (mln €)
AF-02 Airport Integration and Throughput Functionalities		
DMAN A-CDM	**2,8**	
TBS		
Airport safety Net	**0,6**	
CWP and A-SMGCS Optimised Routing		
RWSL	**4,9**	
AF-04 Network Collaborative Management (Flow & NOP)	**1,0**	**0,3**
AF-05 iSWIM functionality		
Flow Management & FPL	**0,3**	
Aeronautical & Airspace	**0,3**	
Meteo	**0,1**	
SWIM Infrastructure & Administration		
Flight Object		

– Military:

ATM Functionality	Military
	ACCs
	VHCn / HCn Unit cost (mln €)
AF-03 Flexible Airspace Management and Free Route	**6,5**
AF-05 iSWIM functionality	
Flow Management & FPL	
Aeronautical & Airspace	**2,0**
Meteo	**0,5**
SWIM Infrastructure & Administration	
Flight Object	**0,5**

– no military airborne investments are expected

Monetised benefits

(a) Fuel Savings

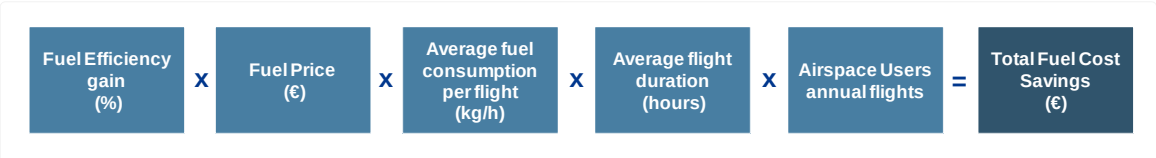
(1) Description

– result from flying less Network Manager, e.g. fewer manoeuvres to resolve conflicts, direct routes across sectors/centres/FABs, better descent profiles

(2) Overall performance gain

– 85,8 kg per flight (-2,1%) spread across ECAC traffic

(3) Calculation method



– where:

  – Fuel Efficiency gain = Annual Fuel Efficiency benefit due to the PCP;

  – Fuel Price = Fuel Price forecasts estimated on the basis of data provided by IATA;

  – Average fuel consumption per flight = 2.872 kg per hour for Scheduled Airlines and 770 kg per hour for Business Aviation;

  – Average flight duration = 1,45 hours for Scheduled Airlines and 1,50 for Business Aviation;

- Airspace Users annual flights = 90% of total air traffic in Europe (80% for Scheduled Airlines plus 10% for Business Aviation);

- The fuel price values used for the Impact Assessment exercise are referred to Jet Fuel and have been estimated based on the latest forecast provided by IATA. Such data have been converted from USD/barrel to €/tonne on the basis of the following assumptions:
  - Barrel-tonne conversion factor: 7,88;
  - USD/€ exchange rate: 0,75.
- The estimated evolution of fuel prices over the PCP time horizon, as resulting from the above mentioned assumptions, is shown in the following table.

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Jet Fuel - €/tonne	797,0	818,4	830,7	842,6	854,0	866,6	878,7	889,0	893,0	896,3	900,0	903,6	906,2	908,6	911,4	913,7	916,2

(b) CO2 Savings

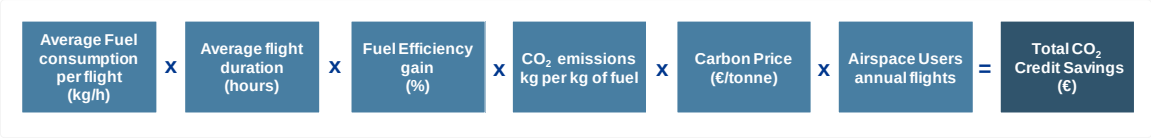
(1) Description

- originate from fuel savings; are monetised in terms of EU Emission Allowances, or EUAs (credits allocated to the companies covered by the EU Emission Trading Scheme; each credit representing the right to emit 1 tonne of carbon dioxide)

(2) Overall performance gain

- 270,1 kg per flight (-2,1%) spread across ECAC traffic

(3) Calculation method



- where:
  - Average fuel consumption per flight = 2.872 kg per hour for Scheduled Airlines and 770 kg per hour for Business Aviation;
  - Average flight duration = 1,45 hours for Scheduled Airlines and 1,50 for Business Aviation;
  - Fuel Efficiency gain = Annual Fuel Efficiency benefit due to the PCP;
  - CO2 emissions kg per kg of fuel = 3,1 kg;
  - Carbon Price = Carbon Prices forecast estimated on the basis of data provided by IATA;
  - Airspace Users annual flights = 90% of total air traffic in Europe (80% for Scheduled Airlines plus 10% for Business Aviation).
- The carbon price values used for the Impact Assessment have been estimated on the basis of data provided by IATA, converted from USD/tonne to €/tonne according to the exchange rate used in the exercise (i.e. 0,75).

– The estimated evolution of carbon prices over the PCP time horizon is shown in the following table.

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Carbon price - €/tonne	4,3	5,6	7,4	9,8	13,0	17,1	22,6	23,3	23,9	24,6	25,4	26,0	26,9	27,6	28,4	29,3	30,1

– In particular, the envisaged carbon price evolution takes into account the following assumptions:

  – the 2014 price forecast reflects the current price level for EUAs maturing in 2014;

  – 2020 and 2030 price forecasts have been derived on the basis of data provided by IEA;

  – Straight-line appreciation has been applied over the 2014-2020 and 2020-2030 time frames.

(c) ANS Productivity gains

(1) Description

– benefits for ANSPs in terms of Cost Effectiveness expected to be achieved through ATCO productivity increases of 12%

(2) Overall performance gain

– 3,2%

(3) Calculation method

– where:

  – ANS average Charge per flight in 2012 = 878;

  – ANS Productivity gain = ANS cost reduction achieved through ATCOs Productivity increase due to the PCP;

  – Annual flights = total air traffic in Europe.

– the weight of staff cost on air navigation service total cost taken into account for calculation is 27% (source: PRU 2011) and ANS Productivity gains have been derived by multiplying ATCO Productivity increases by 27%.

(d) Delay Savings

(1) Description

– consist of Tactical and Strategic Delay savings for Airspace Users stemming from a reduction in Delay length and Delayed Flights. Tactical Delay savings come from reducing the unpredictable delay exceeding the delay buffer foreseen in the flight plan; Strategic Delay savings come from reducing the delay buffer foreseen in the flight plan

(2) Overall performance gain

– reduction of delay length of 12,2% and reduction of delayed flights of 9,8%

(3) Calculation method

– the estimation of Delay Savings relies on the assumption that without the airspace capacity increases enabled by the PCP, there will be a shortage of capacity leading to growing delays from 2018 onwards.

– delays would be impacted in two ways:

  – by reducing the percentage of delayed flights;

  – by reducing the average delay length per delayed flight.

– the evolution of these two delay metrics during the 2014-2030 time period, with and without PCP implementation:

Scenario with PCP																	
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Delayed flights (%)	10,0%	10,0%	10,0%	10,0%	9,9%	9,8%	9,7%	9,6%	9,5%	9,4%	9,3%	9,2%	9,1%	9,1%	9,0%	8,9%	8,8%
Ave delay per delayed flight	10,00	10,00	10,00	10,00	10,10	10,20	10,30	10,40	10,51	10,61	10,72	10,82	10,93	11,04	11,15	11,26	11,37
Scenario without PCP																	
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Delayed flights (%)	10,0%	10,0%	10,0%	10,0%	10,0%	10,0%	9,9%	9,9%	9,9%	9,9%	9,9%	9,8%	9,8%	9,8%	9,8%	9,8%	9,7%
Ave delay per delayed flight	10,00	10,00	10,00	10,00	10,22	10,45	10,67	10,89	11,12	11,35	11,57	11,80	12,03	12,26	12,49	12,72	12,95

– Delay Savings, are categorized in:

  – Tactical Delay Savings, which refer to the reduction of unpredictable delays on the day of operations that exceeds the delay buffer foreseen in the flight plan;

  – Strategic Delay Savings, which refer to the reduction of delay that is included in airline schedules (flight plan).

– For the PCP Impact Assessment purpose, Tactical Delay has been assumed to represent 80% of total delays.

– calculation of Tactical Delay Cost Savings:

where:

- Tactical Delay per Delayed Flight without PCP = average delay minutes per delayed flight in the case the PCP is not deployed;
- Delayed flights without PCP = percentage of delayed flights on total number of flights in the case the PCP is not deployed;
- Tactical Delay per Delayed Flight with PCP = average delay minutes per delayed flight in the case the PCP is deployed;
- Delayed flights without PCP = percentage of delayed flights on total number of flight in case the PCP is not deployed;
- Average Cost of Tactical Delay = 31,4 € per minute;
- Airspace Users annual flights = 80% of total air traffic in Europe assumed to be covered by Scheduled Airlines;

– Calculation of Strategic Delay Cost Savings:

where:

- Strategic Delay per Delayed Flight without PCP = average delay minutes per delayed flight in the case the PCP is not deployed;
- Delayed flights without PCP = % of delayed flights on total number of flight in the case the PCP is not deployed;
- Strategic Delay per Delayed Flight with PCP = average delay minutes per delayed flight in the case the PCP is deployed;
- Delayed flights without PCP = % of delayed flights on total number of flight in case the PCP is not deployed;
- Cost of Strategic Delay = 20,9 € per minute;
- Airspace Users annual flights = 80% of total air traffic in Europe assumed to be covered by Scheduled Airlines.

– With regard to the monetisation of Tactical Delay Cost Savings, further assumptions have been considered:

- Cost of delay “high” (cost associated to tactical delays exceeding 15 minutes) = 45,5 € per minute;
- Cost of delay “low”= 25,4 € per minute;
- Delay resulting in “high” cost = 30%.

– The cost categories taken into account in determining the costs of Tactical and Strategic delays are reported in the table below.

Cost Category	Tactical Delay				Strategic Delay	
	Low		High		All	
	Ground (€/min)	Airborne (€/min)	Ground (€/min)	Airborne (€/min)	Ground (€/min)	Airborne (€/min)
Fuel Cost	0,1	15,6	0,1	15,6	1,0	18,8
Maintenance Cost	0,5	1,0	0,5	1,0		11,2
Crew Cost	7,3	7,3	8,8	8,8	9,0	9,0
Airport Charges	0,4	0,0	0,5	0,1	0,0	0,0
Rental and leases	0,0	0,0	0,0	0,0	10,9	10,9
Passenger Compensation	15,5	15,5	27,8	27,8	0,0	0,0
Percentage Ground vs Airborne	90%	10%	50%	50%	100%	0%
Percentage Low vs High	70%		30%			
TOTAL	25,4		45,5		20,9	

where:

- Ground = Cost per minute of delay occurring during ground handling;
- Airborne = Cost per minute of delay occurring during actual flight time;
- Fuel Cost = additional fuel burned during tactical delay and strategic delay plus higher aircraft weight due to extra fuel foreseen for strategic delay;
- Maintenance Cost = higher planned maintenance cost for strategic delay as maintenance scheduled on increased planed flight time rather than actual flight time;
- Crew Cost = flight and cabin crew salaries and expenses that could be saved per minute of delay saved;
- Airport Charges = airport charges that could be saved per minute of delay saved;
- Rentals and leases = rentals and leases of flight equipment (full cost of fleet financing) that could be saved per minute of delay saved;
- Cost of passenger compensation and rebooking for missed connections that could be saved per minute of delay saved;
- Percentage Ground vs. Airborne = % of tactical delay occurring during ground handling and flight time respectively;
- Percentage Low vs. High = % of delay applying to the Low respectively to the High category.

- Delay Savings have been allocated to ATM functionalities on the basis of their respective contribution to the PCP Airspace Capacity Benefit.

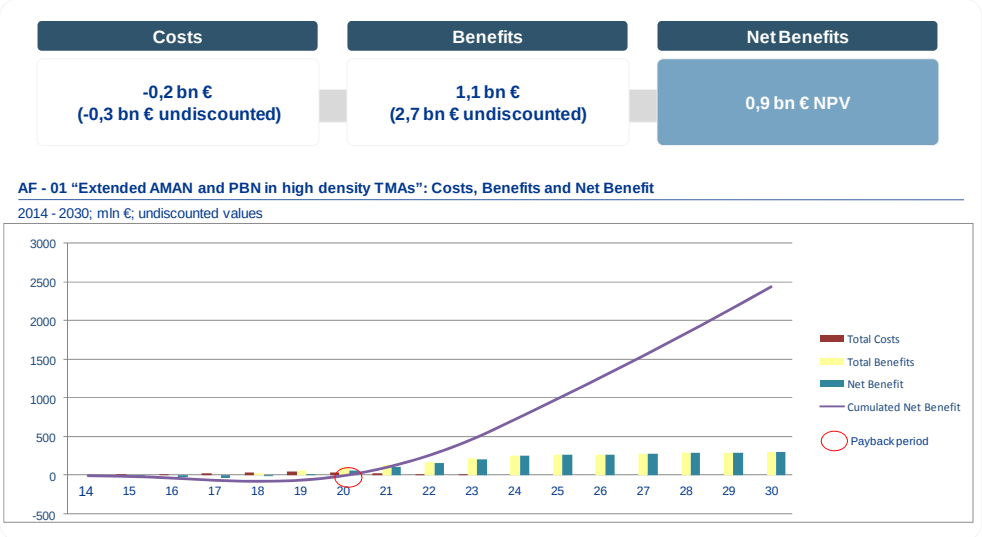
3. Overview of estimated cost and benefits

All values are in discounted values unless specified otherwise. Benefits distribution is expressed in Net Present Value (NPV) and the cost distribution is expressed in percentages in proportion to total investment. For the purpose of this appendix, by Start of investment is meant when first project costs start to accrue for one stakeholder (includes e.g. procurement preparation activities), by End of investment is meant when last project cost is accounted for by all required stakeholders, by Start of deployment is meant when deployment is finalised at least by one stakeholder and by End of deployment is meant when deployment is finalised by all required stakeholders.

3.1 Extended AMAN and PBN in high density TMAs

NPV:

– 0,9 billion €, with a 6 years overall pay-back period, calculated on the basis of the following distribution of costs and benefits:

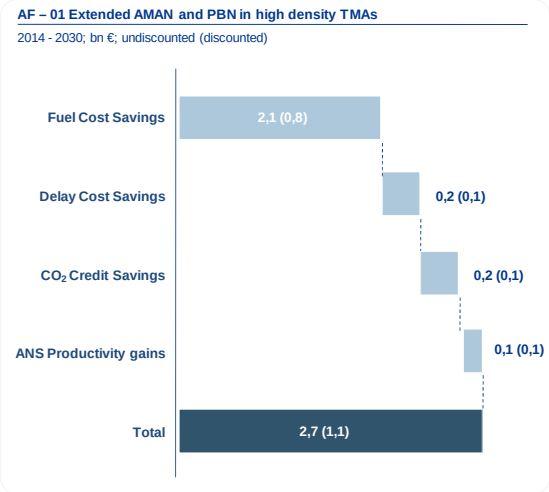


Total benefit

– 1,1 billion € (2,7 billion € undiscounted)

Sources of benefits

– fuel cost savings (79%)
– delay related benefits (8%)
– CO2 Credit Savings (8%)
– ANS Productivity gains (5%)

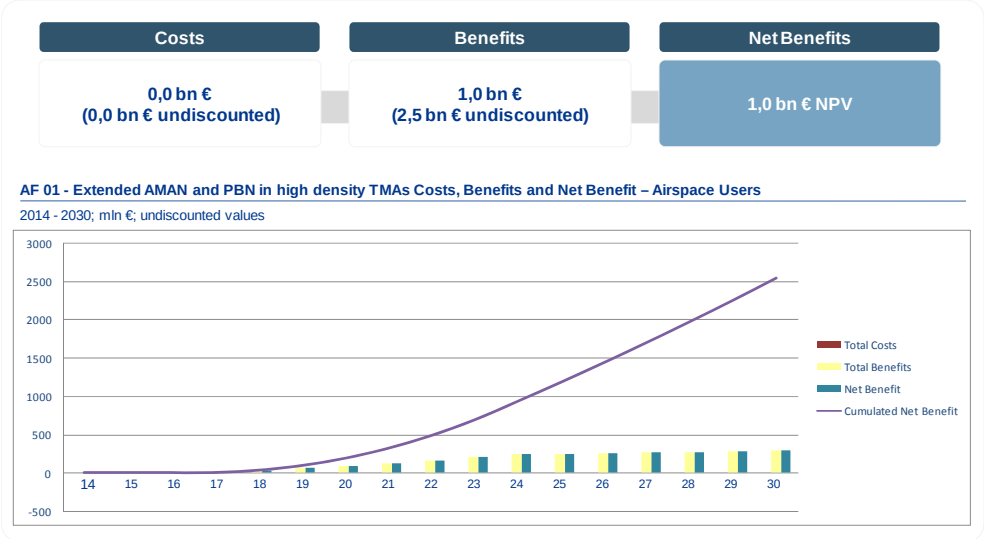


Costs distribution

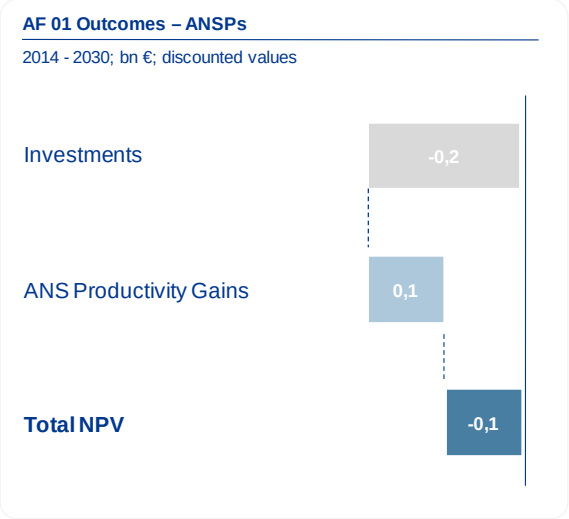
– 0,2 billion € (0,3 billion € undiscounted) of which 100% to be borne by ANSPs

Benefits distribution:

– Airspace Users: 1,0 billion €



– ANSPs: -0,1 billion €



The expected deployment dates

Start of Investment	End of Investment	Start of Benefit	Full Benefit	Start of Deployment	End of Deployment
2015	2023	2018	2024	2018	2023

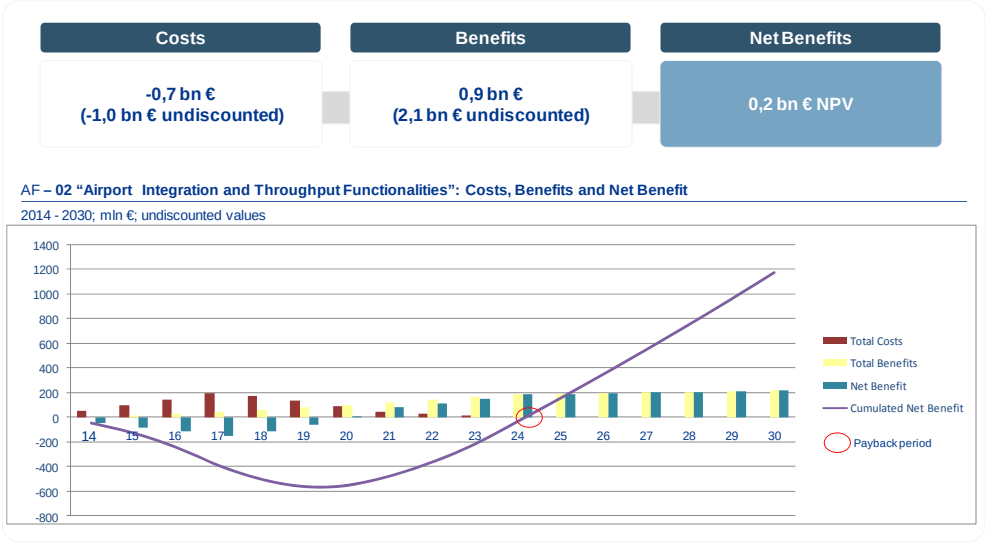
The expected deployment dates related to sub-functionalities

Sub-systems	Start of Investment	End of Investment	Start of Deployment	End of Deployment
AMAN System upgrade for e-AMAN	2015	2023	2018	2023
ATS System upgrade for e-AMAN	2015	2023	2018	2023
PBN Airspace/Procedures/ATS-System	2015	2023	2018	2023

3.2 Airport Integration and Throughput Functionalities

NPV

– 0,2 billion €, with a 11 years overall pay-back period, calculated on the basis of the following distribution of costs and benefits:

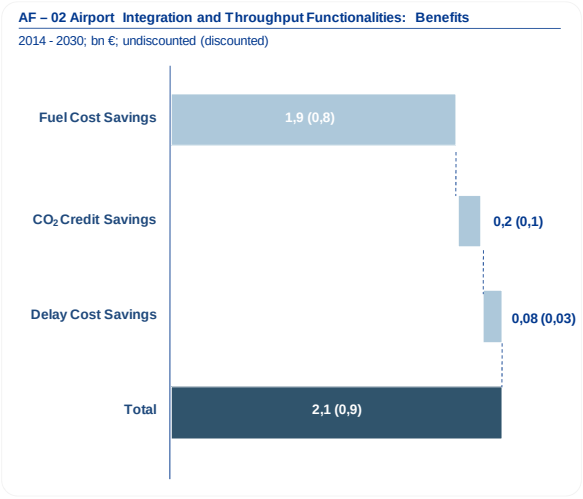


Total benefit

- 0,9 billion € (2,1 billion € undiscounted)

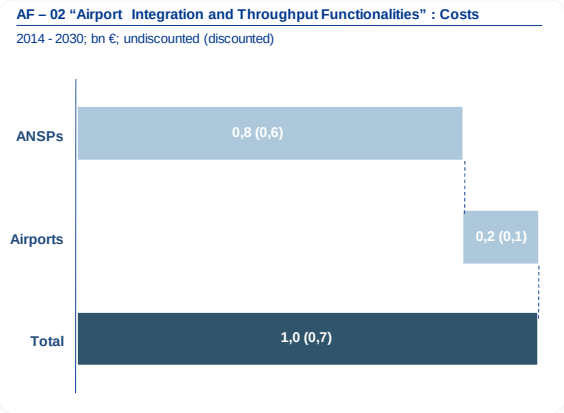
Sources of benefits

- fuel cost savings 0,8 billion € (1,9 billion € undiscounted)
- CO2 emissions reduction 0,1 billion € (0,2 billion € undiscounted)
- Delay cost savings 0,03 billion € (0,08 billion € undiscounted)



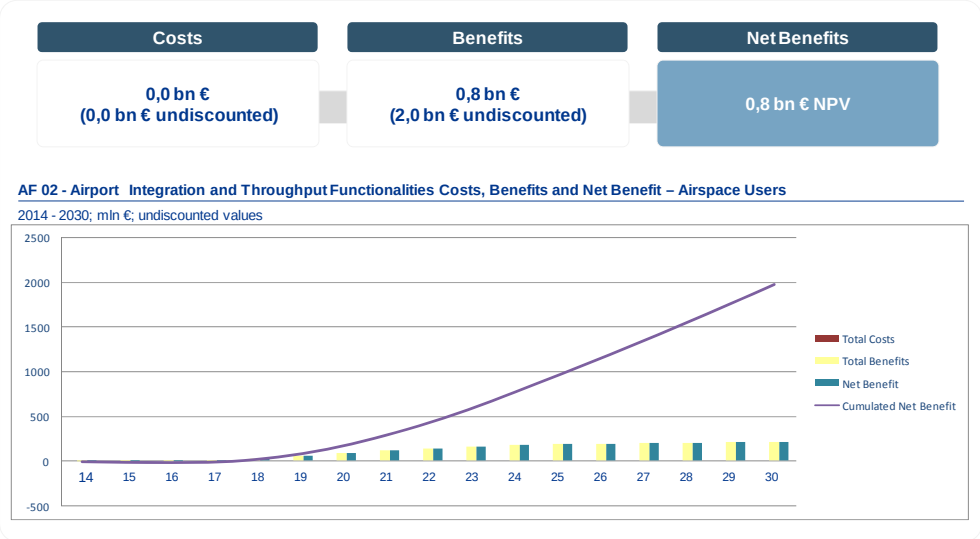
Cost distribution

- ANSPs: 84%
- Airport Operators: 16%



Benefits distribution

– Airspace Users: 0,8 billion €



– ANSPs: -0,6 billion €

– Airports: -0,1 billion €

The expected deployment dates

Start of Investment	End of Investment	Start of Benefit	Full Benefit	Start of Deployment	End of Deployment
2014	2023	2015	2024	2015	2023

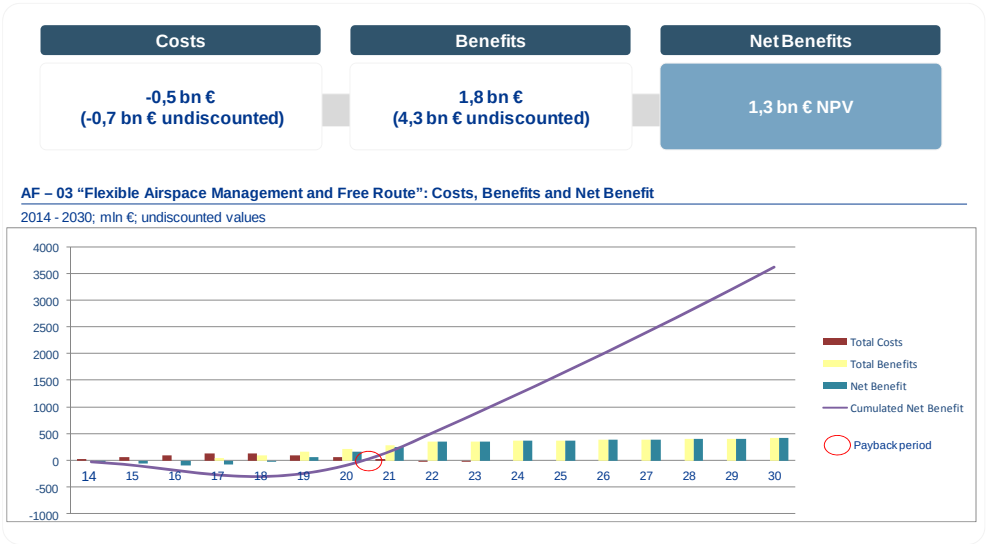
The deployment dates related to sub-functionalities

Sub-systems	Start of Investment	End of Investment	Start of Deployment	End of Deployment
DMAN A-CDM	2014	2020	2015	2020
Time Based Separation	2014	2023	2017	2023
Airports Safety Nets	2014	2020	2015	2020
CWP and A-SMGCS Optimised Routing	2014	2023	2018	2023
Runway Status Lighting Systems	2014	2020	2015	2020

3.3 Flexible Airspace Management and Free Route

NPV

– 1,3 billion €, with a 7 years overall pay-back period, calculated on the basis of the following distribution of costs and benefits:

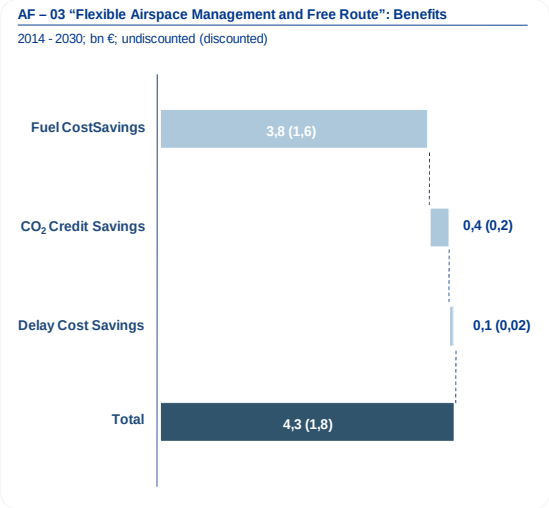


Total benefit

– 1,8 billion € (4,3 billion € undiscounted)

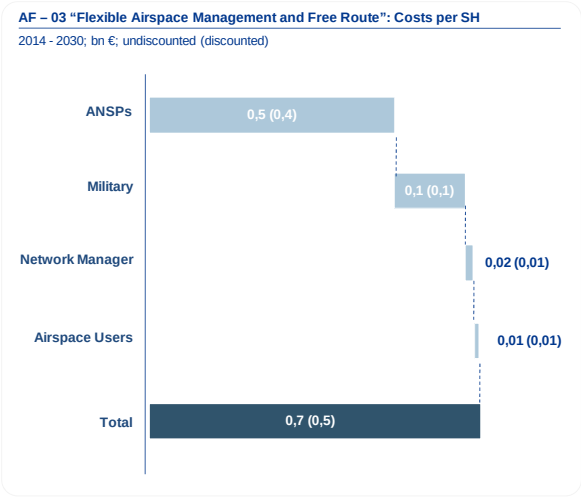
Sources of benefits

- fuel costs savings 1,6 billion € (3,8 billion € undiscounted)
- CO2 emissions reduction 0,2 billion € (0,4 billion € undiscounted)
- Delay cost savings 0,02 billion € (0,1 billion € undiscounted)



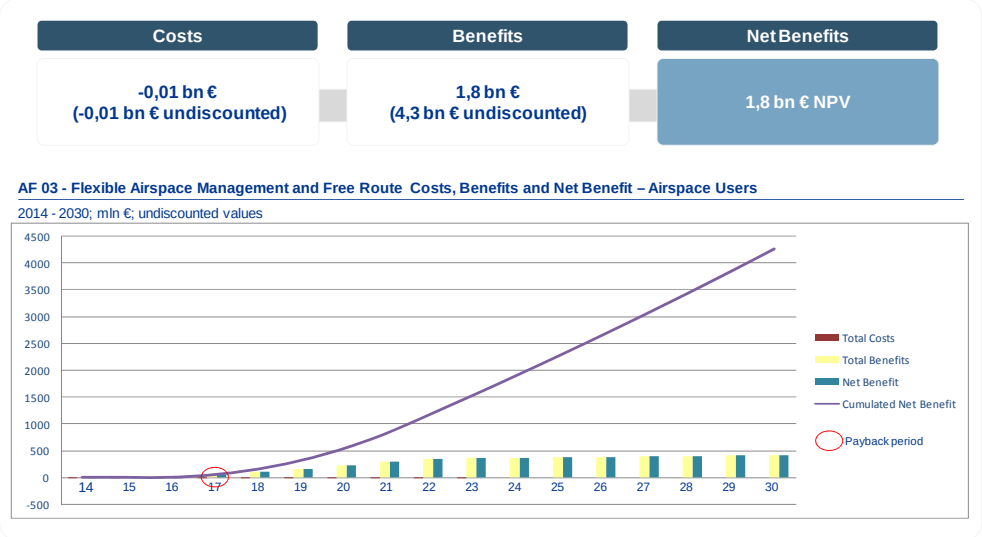
Cost distribution

- ANSPs 75%
- Military 22%
- Network Manager 2%
- Airspace Users (ground investment) 1%



Benefits distribution

- Airspace Users: 1,8 billion €



- ANSPs: -0,4 billion €
- Military: -0,1 billion €
- Network Manager: -0,01 billion

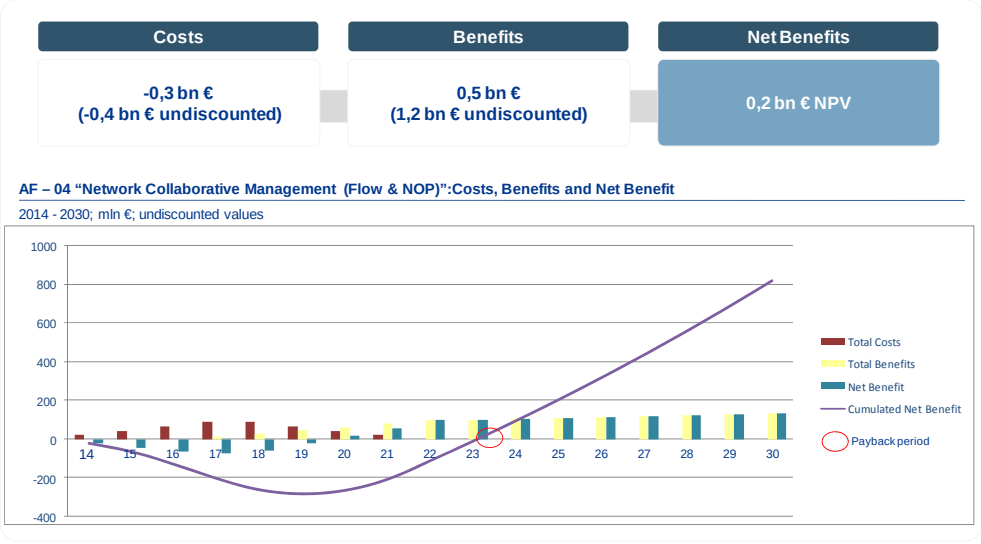
The expected deployment dates

Start of Investment	End of Investment	Start of Benefit	Full Benefit	Start of Deployment	End of Deployment
2014	2021	2017	2022	2017	2021

3.4 Network Collaborative Management (Flow & NOP)

NPV

- 0,2 billion €, with a 10 years overall pay-back period, calculated on the basis of the following distribution of costs and benefits:

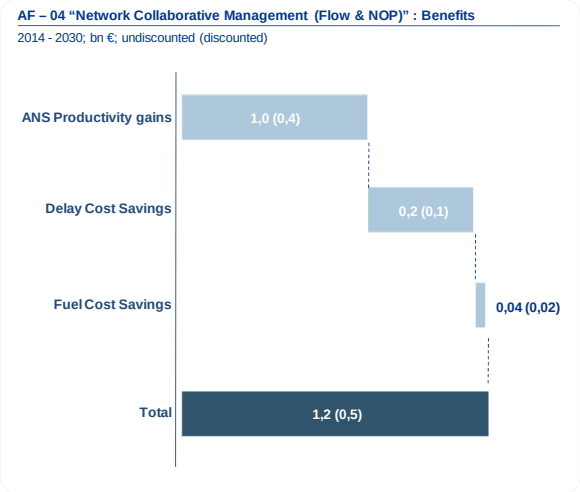


Total benefit

- 0,5 billion € (1,2 billion € undiscounted)

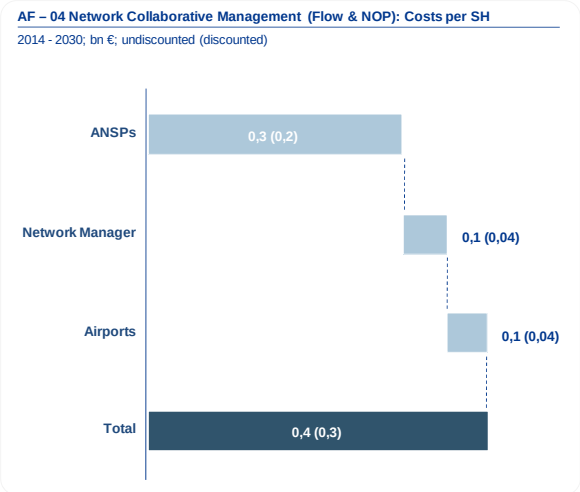
Benefit distribution

- ANS productivity gains 0,4 billion € (1,0 billion € undiscounted)
- delay cost savings over 0,1 billion € (0,2 billion € undiscounted)
- fuel costs savings 0,02 billion € (0,04 billion € undiscounted)
- CO2 emissions reduction 0,1 million tonnes



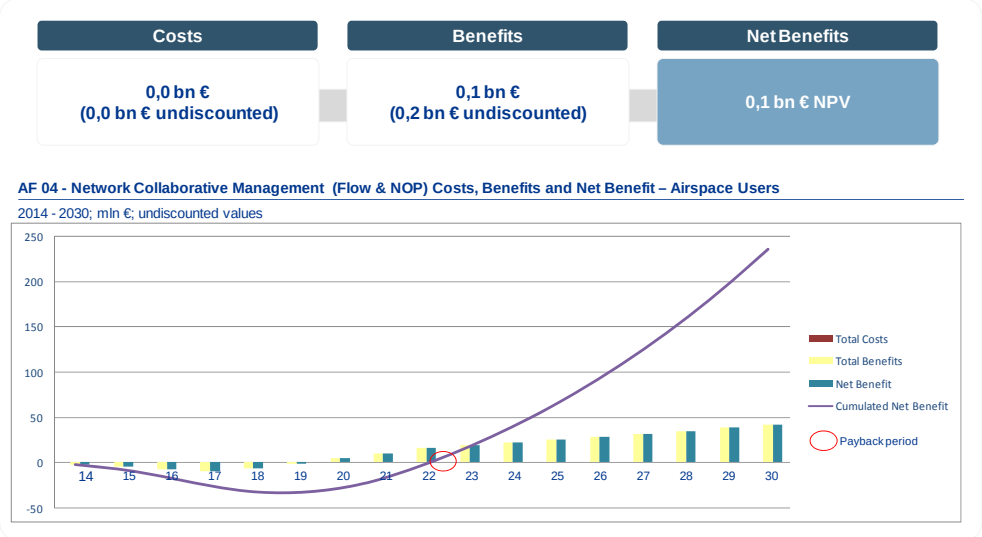
Cost distribution

- ANSPs: 75%
- Network Manager: 13 %
- Airport Operators: 12 %



Benefits distribution

- Airspace Users: 0,1 billion €



- ANSPs: 0,2 billion €
- Airports: -0,04 billion €
- Network Manager: -0,04 billion €

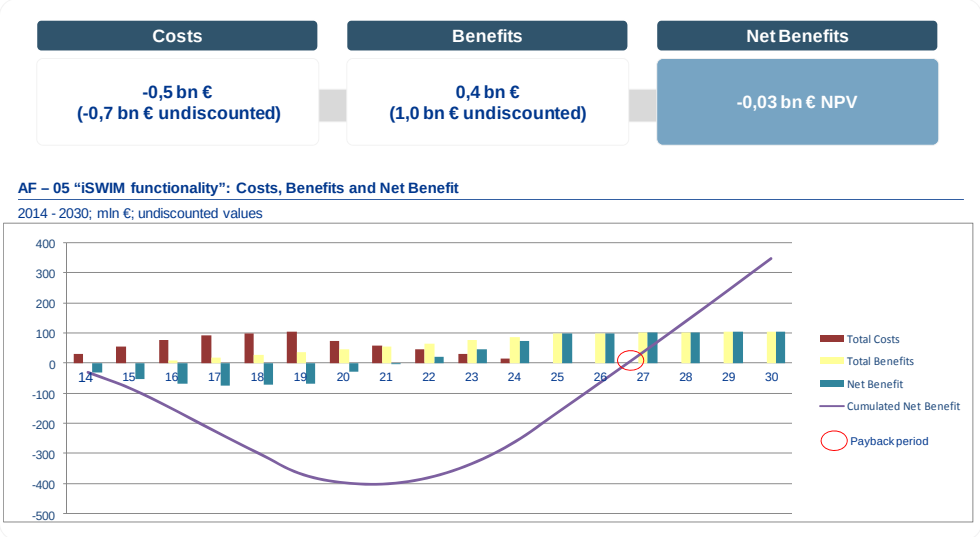
The expected deployment dates

Start of Investment	End of Investment	Start of Benefit	Full Benefit	Start of Deployment	End of Deployment
2014	2021	2017	2022	2017	2021

3.5 iSWIM functionality

NPV

- -0,03 billion €, with a 13 years overall pay-back period, calculated on the basis of the following distribution of costs and benefits:



Total benefit

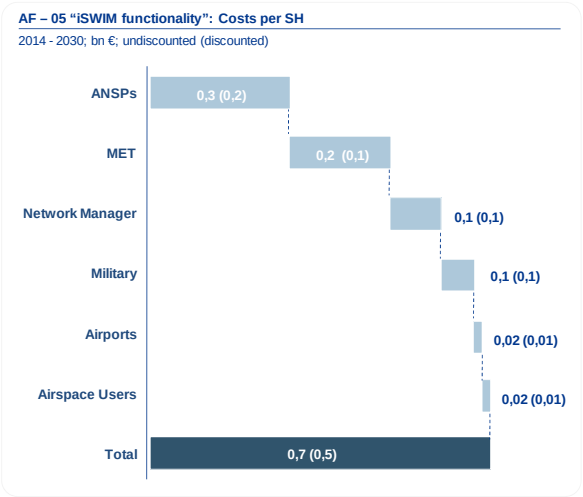
- 0,4 billion € (1,0 billion € undiscounted)

Benefit distribution

- ANS productivity gains 0,4 billion € (1,0 billion € undiscounted)

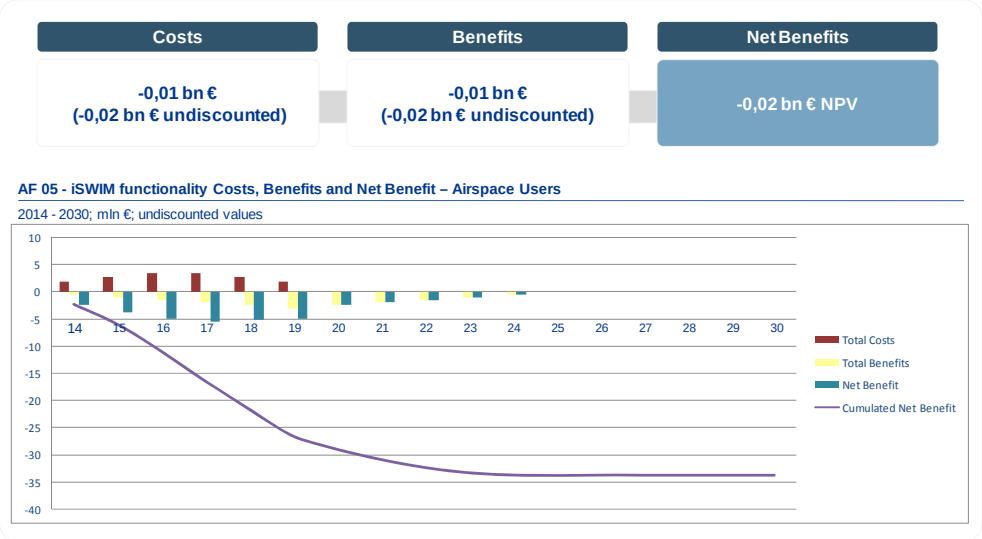
Cost distribution

- ANSPs: 41%
- MET Service Providers: 29%
- Network Manager: 15%
- Military: 10%
- Airport Operators: 3%
- Airspace Users (ground investment): 2%

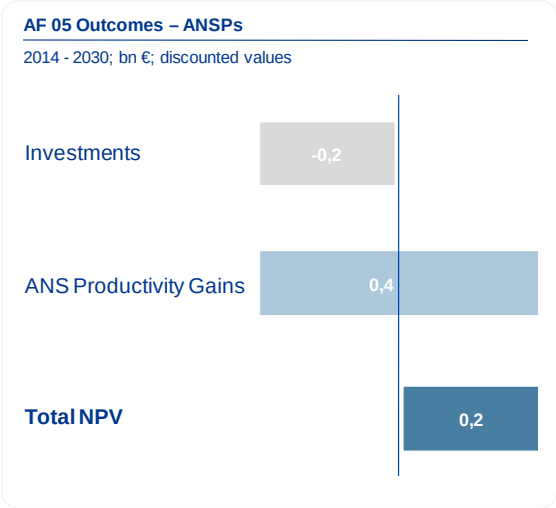


Benefits distribution

– Airspace Users: -0,02 billion €



– ANSPs: 0,2 billion €



– Airport Operators: -0,01 billion €
– Met Service providers: -0,1 billion €
– Military: -0,1 billion €
– Network Manager: -0,1 billion €

The expected deployment dates

Start of Investment	End of Investment	Start of Benefit	Full Benefit	Start of Deployment	End of Deployment
2014	2024	2016	2025	2016	2024

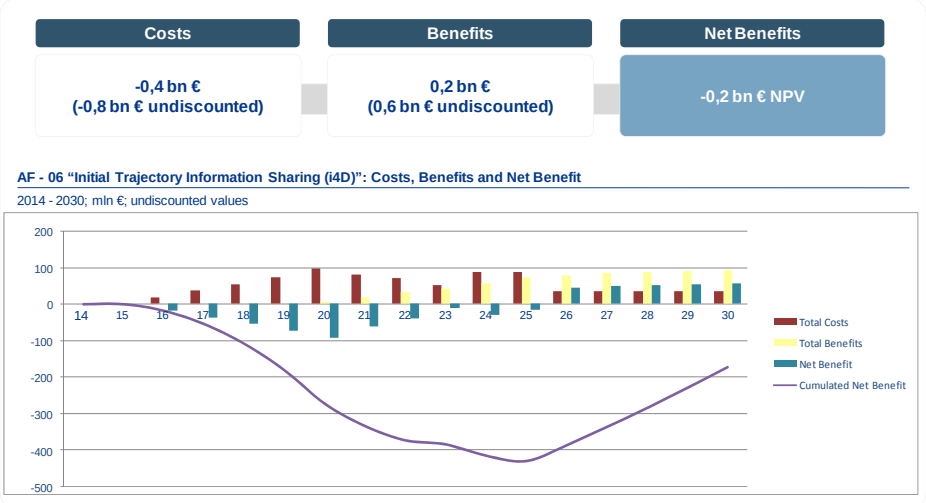
The expected deployment related to sub-functionalities

Sub-systems	Start of Investment	End of Investment	Start of Deployment	End of Deployment
Flow Management and Flight Planning	2014	2024	2016	2024
Aeronautical and Airspace	2014	2024	2016	2024
Meteo	2014	2024	2016	2024
SWIM Infrastructure & Administration	2014	2024	2016	2024
Flight Object	2014	2024	2018	2024

3.6 Initial Trajectory Information Sharing

NPV

– -0,2 billion €, calculated on the basis of the following distribution of costs and benefits:



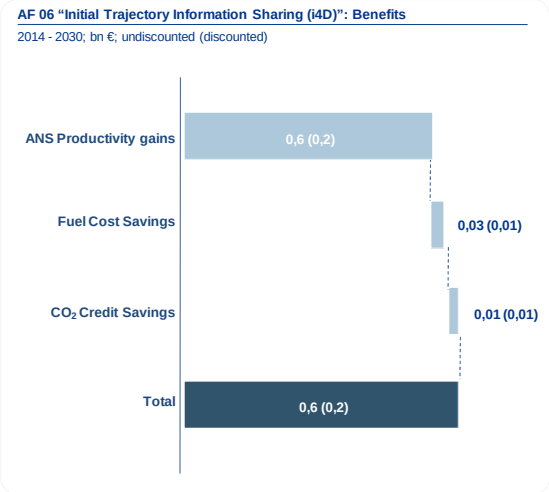
Total benefit

– 0,2 billion € (0,6 billion € undiscounted)

Sources of benefits

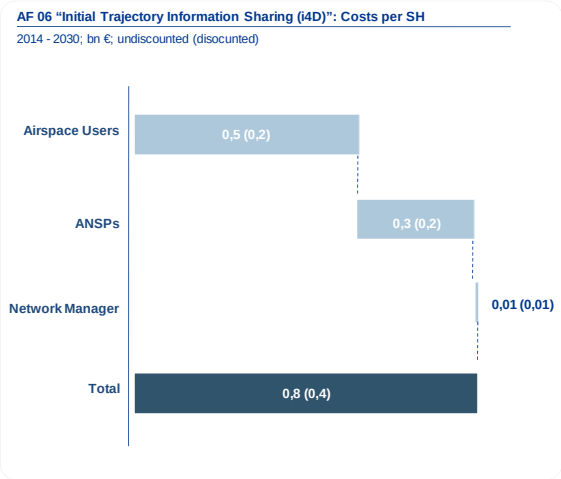
– ANS Productivity gains 94%

- fuel cost savings 5%
- CO2 1% savings



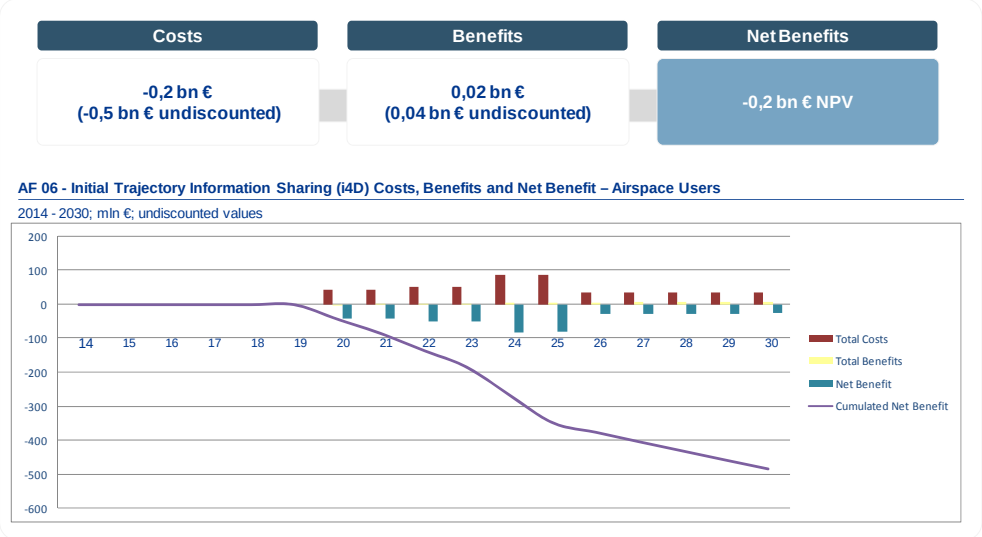
Cost distribution

- Airspace Users (airborne investment): 66%
- ANSPs: 33%
- Network Manager: 1%



Benefits distribution

- Airspace Users: -0,2 billion €



– ANSPs: 0,1 billion €

– Network Manager: -0,01 billion €

The expected deployment dates

	Start of Investment	End of Investment	Start of Benefit	Full Benefit	Start of Deployment	End of Deployment
Ground	**2016**	**2022**	**2018**	**2024**	**2018**	**2024**
Airborne	**2018**	**2025**	**2018**	**2030**	**2018**	**2025**

Glossary

ACC	Area Control Centre
ACCS	Air Command and Control systems
A-CDM	Airport - Collaborative Decision Making
AD	Air Defence
ADR	Airspace Data Repository
ADS	Automatic Dependent Surveillance
ADS-C EPP	ADS-contract Extended Projected Profile
AF	ATM Functionality
A-FUA	Advanced Flexible Use of Airspace
AIRM	Aeronautical Information Reference Model
AIS	Aeronautical Information Service
AMAN	Arrival Management
AMC	Acceptable Mean of Compliance
AMHS	Air Traffic Services Message Handling System
ANS	Air Navigation Services
ANSP	Air Navigation Service Provider
AOC	Airline Operations Centre
AOP	Airport Operations Plan
AP OPR	Airport Operator
APV / Baro	Approach Procedure with Vertical Guidance / Barometric
APW	Area Proximity Warning
ARES	Airspace Reservation/Restriction
ASBU	Aviation System Block Upgrade
ASD	AeroSpace and Defence Industries Association of Europe
ASM	Airspace Management System
A-SMGCS	Advanced Surface Movement Guidance and Control Systems
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ATFCM	Air Traffic Flow and Capacity Management
ATFM	Air Traffic Flow Management
ATM	Air traffic Management
ATN	Aeronautical Telecommunications Network
ATS	Air Traffic Services
ATSU	Air Traffic Service Unit
AU	Airspace User
AUP	Airspace Usage Plan
AWACS	Airborne Warning and Control System
CAPEX	Capital Expenditure
CBA	Cost-Benefit Analysis
CDM	Collaborative Decision Making
CDR	Conditional Route
CDT	Conflict Detection Tools
CEF	Connecting Europe Facility
CEN	Comité Européen de Normalisation
CENELEC	Comité Européen de Normalisation Electrotechnique
CFMU	Central Flow Management Unit
CFT	Call For Tender
CIR	Commission Implementing Regulation

CLM	Concept Lifecycle Model
CORA	Conflict Resolution Assistant
COTR	Co-Ordination and Transfer
CP	Common Project
CPDLC	Controller Pilot DataLink Communications
CS (#1)	Certification Specification
CS (#2)	Centralised Services
CTM	Cooperative Traffic Management
CTOT	Calculated Take-Off Time
CWP	Controller Working Position
DCB	Demand Capacity Balancing
DCT	Permanent Direct
DG MOVE	Directorate General for Mobility and Transport
DL	DataLink
DLS	DataLink Services
DMAN	Departure Management
EAD	European AIS Database
EASA	European Aviation Safety Agency
EATM	European Air Traffic Management
EATMN	European Air Traffic Management Network
EC	European Commission
ECAC	European Civil Aviation Conference
ECTL	Eurocontrol
EDA	European Defence Agency
EDTIB	European Defence Technology and Industrial Base
EEIG	European Economic Interest Group
EFPL	Extended Flight Plan
EFS	Electronic Flight Strip
ESO	European Standardisation Organisations
ETFMS	Enhanced Tactical Flow Management System
ETSI	European Telecommunication Standard Institute
EUA	European Emission Allowance
EUROCAE	European Organisation for Civil Aviation Equipment
FAB	Functional Airspace Blocks
FDP	Flight Data Processing
FDPS	Flight Data Processing System
FIR	Flight Information Region
FIXM	Flight Information eXchange Model
FL	Flight Level
FMS	Flight Management System
FMTP	Flight Message Transfer Protocol
FOC	Flight Operations Centre
FPA	Framework Partnership Agreement
FPL	Flight Plan
FRA	Free Route Airspace
FUA	Flexible Use of Airspace
GANP	Global Air Navigation Plan
GAT	General Air Traffic
GNSS	Global Navigation Satellite System
HCn	High Capacity needs

HMI	Human Machine Interface
i4D	initial Trajectory Information Sharing
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
ICB	Industry Consultation Body
IDP	Interim Deployment Group
IDSG	Interim Deployment Steering Group
IEA	International Energy Agency
IFPS	Initial Flight Plan Processing System
ISRM	Information Service Reference Model
iSWIM	Initial System Wide Information Management
JU	Joint Undertaking
LARA	Local and Regional ASM
LCn	Low Capacity needs
LNAV	Lateral Navigation
LPV	Localiser Performance with Vertical Guidance
MCn	Medium Capacity needs
MET	Meteorology Information
MTCD	Medium Term Conflict Detection
MUAC	Maastricht Upper Area Control Centre
NCP	NSA Coordination Platform
NextGen	Next Generation Air Transportation System
NM	Network Manager
NOP	Network Operations Plan
NPV	Net Present Value
NSA	National Supervisory Authorities
NSP	Network Strategy Plan
OAP	Operational Air Traffic
OLDI	On-Line Data Interchange
OSED	Operational Services and Environment Description
PANS	Procedure for Air Navigation Services
PBN	Performance Based Navigation
PCP	Pilot Common Project
PENS	Pan-European Network Services
PKI	Public Key Infrastructure
PPP	Public-Private Partnership
PRB	Performance Review Body
PRU	Performance Review Unit
RAD	Route Availability Document
RBT	Reference Business Trajectory
RF	Radius to Fix
RNP	Required Navigation Performance
RNP APCH	Required Navigation Performance Approach
RP2	2nd Reference Period
RWSL	RunWay Status Light
SBAS	Satellite Based Augmentation System
SES	Single European Sky
SESAR	Single European Sky ATM Research
SID	Standard Instrument Departure
SJU	SESAR Joint Undertaking

SMIF	SESAR Military Implementation Forum
SPR	Service Provision Regulation
STAM	Short-Term ATFCM Measures
STAR	Standard Arrival Route
SWIM	System Wide Information Management
TBS	Time-Based Separation
TC	Tactical Controller
TEN-T EA	Trans-European Transport Network Executive Agency
TI	Technical Infrastructure
TMA	Terminal Manoeuvring Area
TOBT	Target Off Block Time
TSAT	Target Start-up Approval Time
TSE	Total System Error
TTA	Target Time of Arrival
TTO(T)	Target Take-Off Time
VHCn	Very High Capacity needs
VHF	Very High Frequency
VNAV	Vertical Navigation
VOI	Volume of Interest
WOC	Wings Operations Centre
WP	Work Package

End of document