



THE ROADMAP FOR DELIVERING HIGH PERFORMING AVIATION FOR EUROPE

European ATM Master Plan

Executive Summary for Airport Operators

Edition 2015



EUROPEAN UNION



EUROCONTROL

Executive Summary

The Stakeholder Executive Summary for Airport Operators has been developed by the Airport Operators experts of the group that has produced the European ATM Master Plan Edition 2015. It is an executive summary with the specific Airport Operators perspective on the Master Plan. In the first part it contains the Executive Summary of the main European ATM Master Plan document.

Executive Summary

What is the European ATM Master Plan?

Within the framework of the Single European Sky (SES), the European Air Traffic Management Master Plan (hereafter referred to as ‘the Master Plan’) is the main planning tool for defining ATM modernisation priorities and ensuring that the SESAR (Single European Sky ATM Research) Target Concept becomes a reality. The Master Plan is an evolving roadmap and the result of strong collaboration between all ATM stakeholders. As the technological pillar of the SES initiative, SESAR contributes to achieving the SES High-Level Goals and supports the SES regulatory framework.

The Master Plan details not only a high-level view of what is needed to be done in order to deliver a high-performing ATM system, but also explains why and by when. It therefore sets the framework for the development activities performed by the SESAR Joint Undertaking (SJU) in the perspective also of the deployment activities to be performed by all operational stakeholders under the coordination of the SESAR Deployment Manager and in accordance with the Deployment Programme to ensure overall consistency and alignment.

Why act now?

ATM is a critical element in the European air transport value chain and key to connecting regions and making Europe a global hub for mobility and prosperity. To ensure the sustainability and competitiveness of aviation, Europe needs to have a clear vision on how to deliver a high-performing ATM system.

Since the 2012 edition of the Master Plan, several significant developments have taken

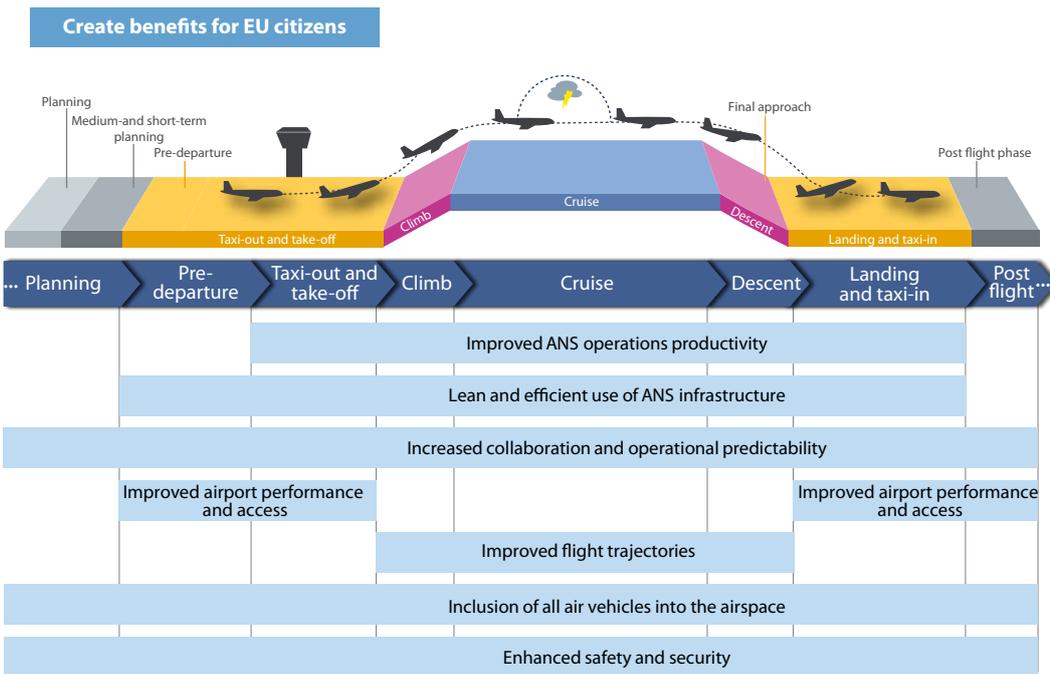
place, such as the availability of the first SESAR Solutions, the start of deployment activities and the significant change to the long term traffic forecast. ATM modernisation therefore needs to reflect a greater focus on increased efficiency and effectiveness while sustaining or even improving the levels of safety and security. At the same time, it must also recognise the need to provide solutions to address critical capacity bottlenecks.

What’s new in the 2015 edition of the Master Plan?

Mindful of these developments, this edition of the Master Plan:

- introduces a vision for the future European ATM system;
- presents the first wave of SESAR deployment, such as the Pilot Common Project (PCP) ⁽¹⁾, and details the Key Features of R & D activities (SESAR 2020);
- provides new deployment scenarios for elements that are sufficiently mature to be brought into the deployment pipeline;
- makes explicit reference to remotely-piloted aircraft systems (RPAS) and rotorcraft as airspace users, as well as to cybersecurity elements within ATM;
- incorporates the results of a more comprehensive military involvement;
- reflects synergies and consistencies with the Deployment Programme and the Network Strategy Plan.

⁽¹⁾ Commission Implementing Regulation EU No 409/2013 specified the requirements for common projects. Common projects aim to deploy in a timely, coordinated and synchronised way ATM functionalities that are mature for implementation and that contribute to the Essential Operational Changes identified in the European ATM Master Plan (2012 edition). The first of these common projects is the Pilot Common Project (PCP).



What is the vision of the 2015 Master Plan?

Building on the 2012 edition of the Master Plan, this edition outlines the vision to achieve ‘high-performing aviation for Europe’ by 2035. The vision reflects the goals captured in the SES II initiative, which calls for ‘more sustainable and better performing aviation’⁽²⁾ and Flightpath 2050 — Europe’s Vision for Aviation⁽³⁾, which states that in 2050, ‘The European aviation community leads the world in sustainable aviation products and services, meeting the needs of EU citizens and society’.

The vision builds on the notion of ‘trajectory-based operations’ and relies on the provision of air navigation services (ANS) in support of the execution of the business or mission trajectory — meaning that aircraft can fly their preferred trajectories without being constrained by airspace configurations. This vision is enabled by a progressive increase of the level of automation support, the implementation of virtualisation technologies as well as the use of standardised and interoperable systems. The system infrastructure will gradually evolve

with digitalisation technology, allowing air navigation service providers (ANSPs), irrespective of national borders, to plug in their operations where needed, supported by a range of information services. Airports will be fully integrated into the ATM network level, which will facilitate and optimise airspace user operations. Going beyond 2035 towards 2050, performance-based operations will be implemented across Europe, with multiple options envisaged, such as seamless coordination between ANSPs or full end-to-end ANS provided at network level.

Furthermore, it is widely recognised that to increase performance, ATM modernisation should look at the flight as a whole, within a flow and network context, rather than segmented portions of its trajectory, as is the case today. With this in mind, the vision will be realised across the entire ATM system, offering improvements at every stage of the flight.

Reaching the performance ambition will also require a change in the way that solutions are deployed, as well as possible evolutions in the way services are provided. Through a four-phase approach, this change would see the high-level architecture gradually moving from locally specific architecture to a more interoperable, common and flexible service provision infrastructure at regional or network level (see Chapter 2).

⁽²⁾ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of Regions on SES II, COM(2008) 389/2, 25 June 2008.

⁽³⁾ Report of the High-Level Group on Aviation Research, 2011, EUR 098 EN.

SESAR's performance ambition



What is the ATM performance ambition for Europe?

The performance ambition supported by SESAR is aspirational and refers to the performance capability that may be achieved if SESAR Solutions are made available through R & D activities, deployed in a timely and, when needed, synchronised way and used to their full potential. While acknowledging that the performance gains at local level will also depend on local conditions, it shows that significant performance gains can be achieved in Europe in a number of key areas, namely the environment, capacity, cost efficiency,

operational efficiency, in addition to safety and security. The ambitions described are compared to the situation in 2012 and rely on the optimal development and deployment of a series of operational changes through SESAR Solutions (see Chapter 3).

What is needed to achieve this performance ambition?

The technical evolution of the future system is now closely connected to these performance ambition levels. In order to deliver, SESAR will enable a step change in system capabilities

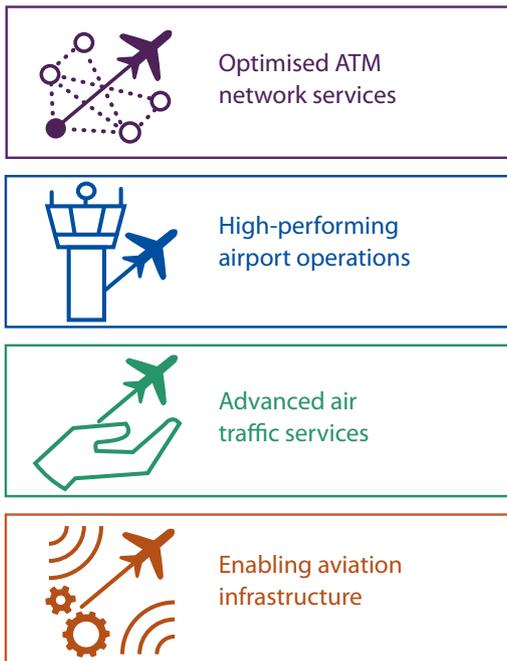
What is needed to achieve the performance ambition?

<p>01001011 11010101 01010 01101 10010</p>	<p>Automation support</p> <p>Automation and use of data communications</p>	<p>10100 0011011 01011 01101 111 1010011 10100 11101</p>	<p>Integrated systems</p> <p>Lean and modular systems, easily upgradable and interoperable</p>
<p>1010 00 1 10 10 0011</p> <p>1001 11 0</p>	<p>Integration of all vehicles</p> <p>All air vehicles fully integrated in ATM environment (incl. RPAS)</p>	<p>111 101 010</p> <p>11 01 01 1011</p>	<p>Sharing of information</p> <p>Information shared digitally via data services</p>
<p>11010010 100101 1011 01</p>	<p>Flight- and flow-centric operations</p> <p>Airspace users fly their preferred business and mission trajectory in a flow and network context</p>	<p>111 101</p> <p>111 101</p>	<p>Virtualisation</p> <p>Virtualisation allowing more dynamic resource allocation</p>

by 2035 with higher levels of automation, digitalisation and virtualisation.

The Master Plan identifies the related changes and groups them according to whether they are already in place, in the pipeline towards deployment, or planned as part of future R & D activities (see Chapter 4).

These changes are categorised according to four areas of ATM (Key Features):



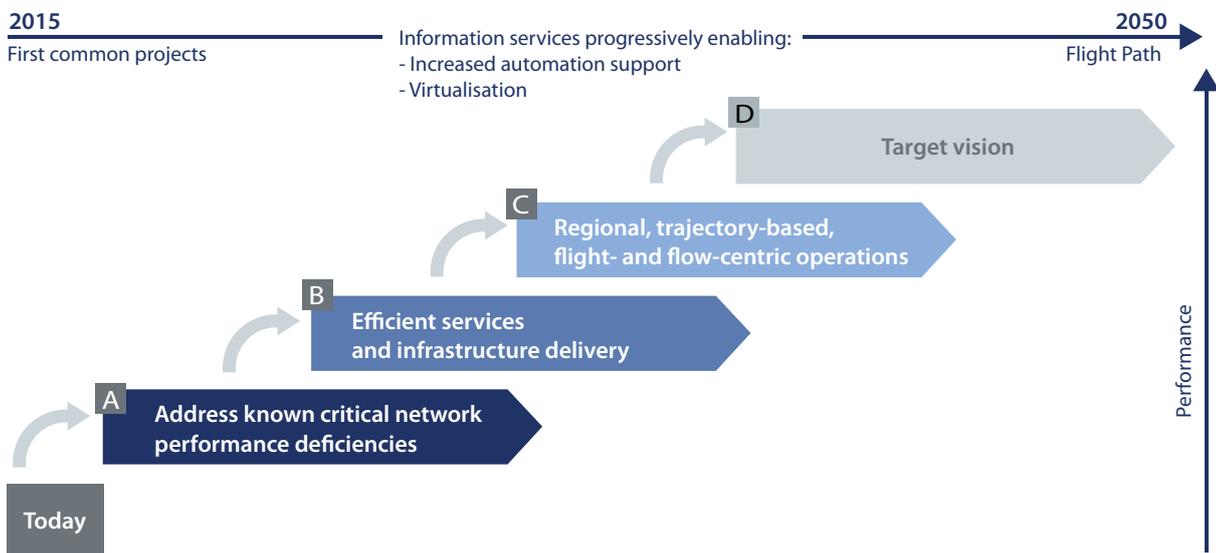
Further operational changes relating to RPAS and cybersecurity are also featured in the Master Plan. Key to success is the ATM workforce, which the Plan underlines as an integral part of the overall ATM system, and as the most critical source of its performance, safety and resilience. As in past and present operations, ATM performance will remain the result of a well-designed interaction between human, procedural, technological, environmental and organisational aspects.

What is the timeline for deployment?

The operational changes are enabled through improvements to technical systems, procedures, human factors and institutional changes supported by standardisation and regulation.

The Master Plan includes roadmaps of the identified changes, ensuring that their deployment is planned in a performance-driven and synchronised way (e.g. between ground and air deployments) to maximise the benefits gained. The Master Plan also gives targeted dates for deployment; however, these are subject to further considerations after validation and proper identification of supporting business cases.

Four-phase approach to improvements



Delivering expected benefits	
Direct and quantifiable benefits for European ATM and aviation	Benefits for EU economy and society
<ul style="list-style-type: none"> - ANS productivity: reduced en-route and TMA costs per flight - Operational efficiency for airspace users: reduced fuel burn and flight time - Capacity: reduced delays, increased network throughput and throughput at congested airports - Environment: reduced CO₂ emissions - Safety and security: high standards 	<ul style="list-style-type: none"> - Industrial leadership in ATM and aviation at the forefront of innovation - A more competitive EU aviation industry in the global aviation landscape - Increased mobility with a lower environmental impact - Significant contribution to EU GDP and job creation - High standards in terms of safety, security and social standards

What are the expected costs and benefits?

The realisation of the vision will not only bring significant direct and quantifiable performance gains to ATM and aviation, but it will also mean benefits for the EU economy and society in general, as described.

In terms of cost savings, the Master Plan estimates important improvements in several areas, depending on how SESAR is deployed. Two options are put forward: on the one hand an optimised deployment scenario with greater integration of the ATM infrastructure, and on the other hand a local deployment scenario.

It is estimated that cost savings and the value of all performance benefits would amount to annual recurring benefits ranging potentially from EUR 8 billion to EUR 15 billion per year in 2035, compared to a scenario where SESAR would not be deployed. These savings imply higher levels of coordination on how and where to invest, as well as the early application of standardisation and harmonisation of procedures. More critically, these savings also rely on the deployment of infrastructure with a long-term horizon which is optimised at network level, amounting to a total investment in the range of EUR 18 billion to EUR 26 billion in the period up until 2035 (see Chapter 6).

Why is the Master Plan important for global interoperability?

Aviation is a global industry and interoperability together with global harmonisation are key for its safe and sustained growth. The EU-US Memorandum of Cooperation (MoC) provides the framework for SESAR and FAA's NextGen coordinated approach in particular with regards to the International Civil Aviation Organisation's (ICAO) harmonisation efforts. This latest update of the Master Plan is timely as it will serve to contribute to the update of the ICAO's Global Air Navigation Plan (GANP) and the Aviation System Block Upgrades (ASBUs) in 2016.

The Master Plan: a shared and maintained strategy for the evolution of European ATM

The Master Plan is a regularly updated plan (every 2-3 years) which involves all stakeholders. It represents the strategy for the performance-driven evolution of the European ATM system for institutional as well as industrial players.

The Master Plan's successful implementation is a key enabler for high-performing aviation in Europe, providing increased connectivity, supporting sustainable economic growth and promoting European industrial leadership at a global level.

Stakeholder Executive Summary Airport Operators

The Airport Perspective

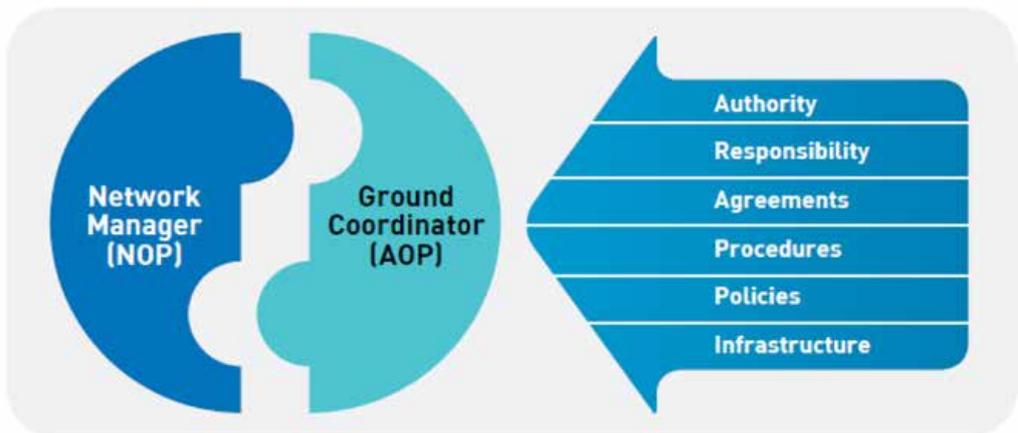
The latest forecast of traffic growth still sees a significant increase of IFR movements between now and 2030 in Europe. Airports need to accommodate additional aircraft movements and at the same time manage arrivals and departures safely, efficiently and minimising the environmental impact. Today, a number of European airports are already operating at or close to their current operational limits requiring more efficient operations. Additional measures to increase efficiency and sustainability are required whilst improving the overall level of safety.

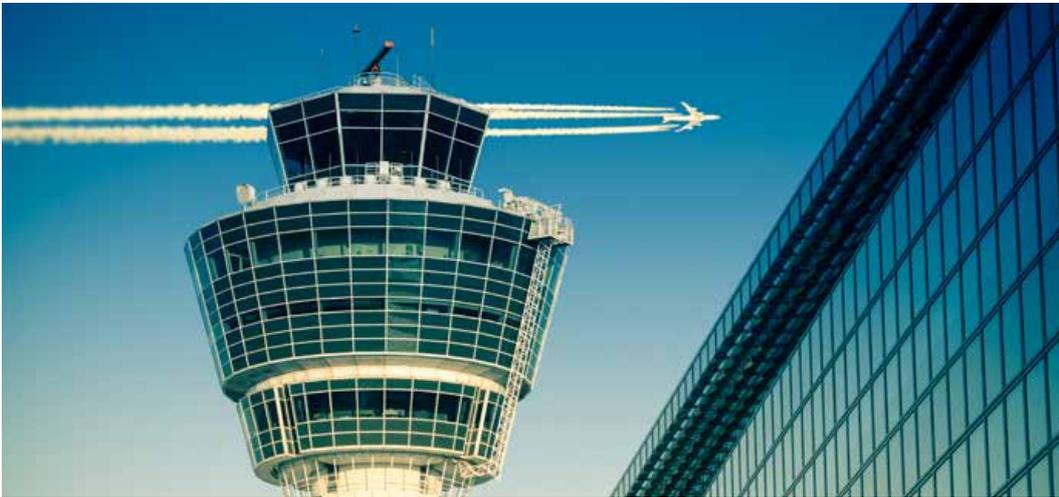
Construction of additional runways is increasingly difficult in Europe therefore airports must optimise their existing runway capacity and infrastructure as much as they can and improve their environmental performance to build a “licence to grow”. At the same time economic pressure is reducing margins for airlines and airports, so business growth needs to be achieved through efficiency and a performance-driven operation enabled through SESAR solutions.

Needs for Airports and the Air Traffic Management Network

The airport vision is that the Airport is fully considered and integrated into the entire ATM network. Airports are to be seen as a strong and collaborative partner in the delivery of performance for the passengers, airlines and local communities. This can be realised in the airport’s role as the Ground Coordinator, using collaborative procedures to engage with airport stakeholders and as the point of contact for the Network Manager. It is only through collaboration that the needs of the European ATM stakeholder community will be realised. Therefore, moving from (local) Airport Collaborative Decision Making (A-CDM) to the integration of airports into the ATM network is a viable element in this concept. This can be done by linking the Airport Operations Plan (AOP) with the Network Operations Plan (NOP) and this is expressed by the identification of the “airport transit view” which is linking the airborne trajectories with the turn-round phase at airports.

AOP - NOP integration





Improvements in the predictability and stability in planning the day of operations is needed to optimise the use of existing resources. This will delay the need for financial investments in additional physical airport resources or where political and environmental constraints prevent airport expansion. Due to these limits, airports are also fully oriented to a common goal of global ATM network efficiency.

This will be achieved through a number of Business Services which, when fully integrated, allow a continuous improvement of efficiency across all airport stakeholders. The solution will be scalable in order to permit its implementation across the broadest possible spectrum of airport environments present in Europe.

The main elements of these Business Services are:

Airport Operations Plan:

a local information sharing platform integrated with the Network Operations Plan. This platform extends the timeframe of focus beyond the current A-CDM concept to address pre- and post-tactical operational timeframes. The AOP also captures landside, passengers, baggage and

cargo operations as key performance drivers for the airport, whereas current A-CDM basically covers aircraft operations.

Airport Performance Monitoring:

addresses the multi-aircraft / pan-airport environment and incorporates the planning timeframe. Current A-CDM predominantly focuses on single aircraft operations on the day of execution only. The airport performance monitoring activity will also provide warnings and alerts to airport stakeholders against key performance indicators and trigger levels agreed collaboratively with the airport stakeholders through an airport performance steering activity.

Airport Performance Management:

taking proactive, collaborative performance decisions based on the multi-aircraft / pan-airport status. Current A-CDM predominantly focuses on tactical management of single airport operations. Proactive performance management at an airport will address the performance areas of predictability, safety, flexibility, capacity and environment.

Post Operations Analysis:

Driving a continuous learning cycle through analysis of the observed performance, causes of change and management decisions taken. The results of this analysis are then incorporated into improvements to the airport performance monitoring and airport performance management functions via the airport performance steering activity.

The specific developments addressing the airport Key Performance Areas (KPAs) are:

- **Predictability:** performance prediction tools allowing optimisation of the operation such as coupled AMAN-DMAN; inclusion of variable taxi times derived from the A-SMGCS routing system with consideration of real-time traffic; time-based arrival separation;
- **Safety:** development of additional safety nets; A-SMGCS to provide surveillance, planning, routing and guidance for aircraft and vehicles;
- **Flexibility:** extension of the collaborative procedures developed in the current A-CDM concept into a full performance management process through the Airport Operations Centre (APOC);

- **Capacity:** optimal use of the available RWY and TWY resources; demand and capacity balancing; improved weather resilience including de-icing management and reclassification of LVP; flexible and dynamic use of wake turbulence separations;
- **Environment:** through planning and management of operations against the AOP, movements into the airport can be sequenced through target time operations thereby eliminating non-optimal holding and queuing.

These KPAs are the pillars of the SES which is implemented with ambitious targets of efficiency improvement, each actor needing to interact with the others to obtain the best results. To support this improvement in operational efficiency, accurate and reliable data exchange between all concerned stakeholders is needed and should be achieved through System Wide Information Management (SWIM).



Deployment View

Existing initiatives (Deployment Baseline)

Airports have experienced constraints in their operations for some time. Together with airlines and their local ANSP, airport operators have launched many initiatives to increase airport capacity and operational efficiency while at the same time improving safety.

In addition to local airside capacity enhancement initiatives, many airports have increased their level of safety through implementation of A-SMGCS Level 1 & 2 and measures from the European Action Plan for the prevention of runway incursions and excursions (EAPPRI & EAPPRE) and enhanced operational efficiency by implementing Electronic Flight-Strip Systems and Airport-CDM. However the implementation level across Europe is by no means homogeneous, yet.

Pilot Common Project (PCP)

To achieve this homogenous deployment for the most relevant airports in Europe the EC has issued the Implementing Regulation IR 716/2014 on the "Pilot Common Project". It defines several key elements derived from the baseline and SESAR solutions that have to be deployed by the 25 airports in the geographical scope until 2021/2024. The airports in the scope of the regulation will be eligible for up to 50% of funding for their implementation projects by INEA and the elements to be implemented that affect airports include:

- Extended Arrival Management
- RNP based operations in the TMA
- Departure Management integrated with A-CDM and A-SMGCS
- Time Based Separation for Final Approach
- Automated Assistance for Surface Routing and Planning
- Airport Safety Nets

- Airport Integration into the Network through AOP/NOP integration, and
- Initial System Wide Information Management (i-SWIM)

The responsibility for implementation of a certain functionality can vary locally between airport operator and ANSP depending on legal provisions of the respective Member State.

To assure a synchronised deployment and maximum buy-in of the affected stakeholders the SESAR Deployment Manager (SDM) started operations in January 2015 as an industrial partnership between all implementing stakeholders to jointly manage future deployment cycles. Airport operators are represented through the SESAR Deployment related Airport Grouping (SDAG). One goal is to manage the critical link to other ATM stakeholders (e.g. airspace users, ANSPs, Network Manager and ground handlers) with different business models, moving from fragmented operations to a more communicated and collaborative approach.

Master Plan Deployment View

The ATM Master Plan Edition 2015 builds on the PCP elements. To avoid duplication with the Deployment Programme issued by the SDM the Master Plan also describes deployment scenarios beyond the PCP. To support a synchronised deployment of SESAR developments, roadmaps for all stakeholder groups were developed.

These include for airports:

- Approach & Departure Separations
- Controlled Time of Arrival (CTA)
- LVPs using GBAS
- Remote Tower
- Collaborative Airport Planning
- User-Driven Prioritisation Process (UDPP)
- Digital Integrated Briefing
- Integrated Surface Management
- Enhanced Airport Safety Nets
- Airport Safety Nets Vehicles

Most of these enhancements are potential candidates for future deployment. However, the list of airports in the scope for the deployment of these enhancements may change from the 25 airports currently in the scope of the PCP. The implementation will depend on different airport characteristics such as overall amount of traffic, complexity of the airport, saturation and level of delay, the network impact and also on the complexity of the TMA where the airport is located.

Global interoperability will be assured through the involvement in ICAO's initiative to enhance Air Traffic Management (known as "Aviation System Block Upgrade").

Business View

As any economically responsible company airport operators make investments if the business case is positive. This can either be from a financial perspective or from operational aspects which give competitive advantage like reduced minimum connecting times or satisfying conditions for passengers using the airport facilities. In case of negative business cases or low traffic with limited investment capacity, airports are less likely to make the investments and as a consequence, other financing or funding mechanisms need to be found.

- Certain systems/tools are needed at many airports for network benefits independent of local benefits at an airport;
- Others are only implemented if local benefit exists;
- In the case where there are no local benefits incentives, possibly have to be developed to motivate airport operators to implement the tools and systems required and NSAs to influence airports to implement the tools and systems required.

Risks

A number of risks related to the implementation of the ATM Master Plan have been identified. From the Airport Operators' point of view, the most critical concerns are:

- Delays in the implementation of the Deployment Baseline;
- The Environmental objective is not reached;
- A delay of the standardisation and, where applicable, regulation can put the entire deployment sequence at risk;
- A delay in the development and deployment of System Wide Information Management (SWIM) may put the timely integration of airports in the ATM Network at risk;
- Stakeholders are unable to supply data due to commercial and legal concerns;
- Failure to manage Human Performance (Human Factors, Competency and Change Management) issues in the development and implementation of the ATM Target Concept (Master Plan risk 13);
- Complexity of new processes leading to a risk if they are not well controlled and validated (especially in the case of the new tools which will automate many functions) (additional risk).





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