

SESAR: DELIVERING BENEFITS TO EU AVIATION



1. SESAR: delivering benefits to EU Aviation

1.1 The Single European Sky pillars

Air Traffic Management is a **pivotal component of the European air transport industry**, which is in turn one of the **strongest drivers of economic growth**, trade and mobility for the European Union. A safe, efficient and integrated ATM infrastructure at European level is a necessary **enabler** to ensure that European aviation sector maintains its overall competitiveness and continue to deliver the **highest standards of services to EU citizens**.

The creation of a single aviation market, the availability for passengers of an unprecedented choice of air travel opportunities, the significant developments witnessed by aviation at global level in the last 20 years, and most importantly the remarkable air traffic growth experienced across Europe have contributed to build a **highly challenging scenario**, urgently **asking for EU joint and extensive action**: the **Single European Sky (SES)** initiative is the answer to such call.

The Single European Sky is an ambitious initiative launched by European Commission in 2004 to reform the architecture of the European Air Traffic Management as a whole, in order to **cope with sustained air traffic growth** under the **safest, most cost-and-flight-efficient and environmentally friendly conditions**.

The push towards increasing efficiency and competitiveness of the Air Traffic Management in Europe was confirmed by the **definition of four High-level Goals**, which set the optimum performance levels to be reached and drive the efforts to achieve them:

- Enable a **3-fold increase in capacity**, by reducing delays both on the ground and in the air;
- Enable a **10% reduction of the effects of the air transport on the environment**, in terms of CO₂ and noise emissions;
- **Reduce the costs of ATM Services** to Airspace Users across Europe **by at least 50%**;
- Improve **safety performances** by a factor of 10.



Fig. 1 - Single European Sky High-level Goals

Since its inception and through its different phases, the effort to achieve such challenging objectives has been the blend of two principal **interlinked streams of activities**:

- the **institutional stream**, aiming at building the adequate **regulatory framework to enforce growth and the improvement of the overall performance**, rationalizing and harmonizing the institutional landscape;
- the **technological stream**, targeting the **industrial development and implementation of an innovative and interoperable ATM infrastructure throughout Europe**, that enables the achievement of the identified performance objectives.

In order to build such technological infrastructure, a pivotal enabler is represented by the **harnessing and integration of the widespread expertise and resources** from the whole ATM community, joining forces towards the modernization of systems, operations and procedures at European level.

The **SESAR (Single European Sky ATM Research) Programme** was set up as the main channel to coordinate such a harmonized modernization effort which **involves and engages civil and military operational stakeholders**, from the Airspace Users to Air Navigation Service Providers, from Manufacturers to the ATM industry, from Staff Associations to National Supervisory Authorities, from Airport Operators to the Network Manager.

1.2 SESAR: at the core of the modernization of ATM infrastructure

SESAR aims at **defining, developing and finally deploying innovative technological and operational solutions** (i.e. SESAR solutions) that would lead to **increase the European ATM capacity, reduce costs** and positively **impact on the environment**, maintaining the **highest safety standards**.

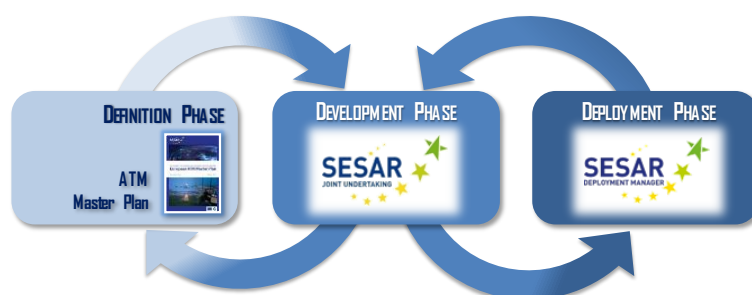


Fig. 2 - The SESAR phases

Since its establishment in 2004, the SESAR Programme has been structured and **conducted through three interconnected phases**:

- the **Definition Phase**, aiming at identifying the **expected performance requirements of the next generation ATM systems**, as well as the **most suitable solutions** to achieve them. These activities are also complemented by the definition of a high-level plan to organize the subsequent activities, which resulted in the first European ATM Master Plan in 2008;
- the **Development Phase**, which consequently puts in place the necessary **Research and Development activities** to produce the necessary technological elements, identified during the Definition Phase;
- the **Deployment phase**, aiming at **deploying** throughout Europe **the results of the ATM solutions developed and validated by the SESAR Joint Undertaking**. It is through such phase that SESAR results are progressively deployed, finally allowing the achievement of the performance improvements that contribute to the High-level Goals of the SES initiative.

In other words, by combining all expertise and resources of the European ATM stakeholders, the SESAR Programme was set up to build **a common and agreed roadmap to steer modernization efforts, coordinating research and development activities**, leading to a **synchronized deployment** of technologies that - in the end - enable the achievement of the SES objectives.

The Definition Phase

The roadmap to support operational stakeholders and to ensure that the SESAR concept becomes an operational reality in the longer run is represented by the **European ATM Master Plan**, which outlines the **overall vision and performance ambitions for the future ATM system** (within a timeframe up to 2035, also with an outlook to 2050). The ATM Master Plan outlines those **operational changes that are required** to support the full achievement of the Single European Sky initiative and constitutes the **overarching reference for the whole SESAR project**, ensuring a deployment and performance oriented R&D.

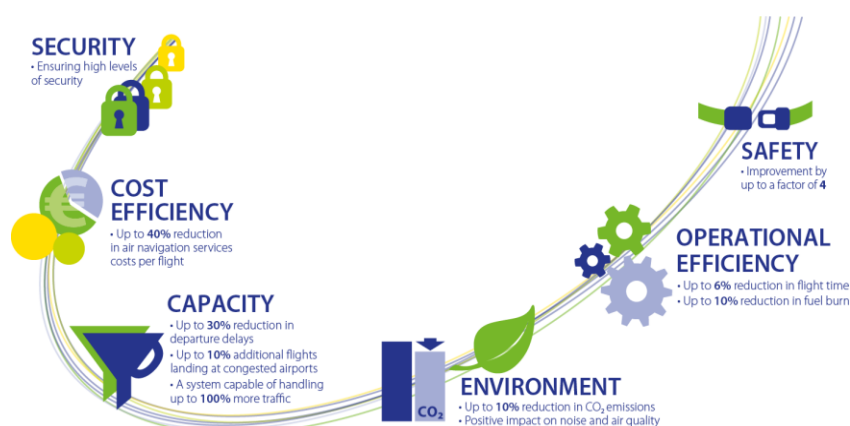


Fig. 3 - SESAR performance ambitions

Within the ATM Master Plan, the **aspirational performance ambitions** of SESAR have been defined by identifying the **performance gains** stemming from the **deployment of the SESAR Solutions**, thus

outlining the expected contribution to the High-Level goals (safety, environment, capacity, cost efficiency), along with the contribution to new **performance areas (operational efficiency and security)**¹.

The **definition phase has also the responsibility to maintain the European ATM Master Plan and expand its time horizon and scope** in the light of R&D and implementation progress as well as new ATM priorities (e.g. UAS, cyber security).

The Development Phase

Building on the ATM Master Plan, the **SESAR Joint Undertaking** is in charge of **coordinating the research, development and validation activities**, aiming at developing **new equipment, systems and standards** that help converging towards the SESAR Target identified in the Definition Phase.

Under SJU oversight, the development phase aims at ensuring that specific groups of **ATM operational functions or services** – included within the ATM Master Plan – reach an **appropriate level of maturity for implementation**. The SESAR Joint Undertaking published a first edition of the **SESAR Solutions**, drawing together more than 60 SESAR Solutions so far delivered by SESAR JU members and partners to modernize Europe's air traffic management system.

Developed in line with the European ATM Master Plan these solutions serve as a basis for deployment activities and further research in SESAR 2020. They address all parts of the ATM value chain, from airports, air traffic services to the network, as well as the underlying systems architectures and technological enablers, which are validated in real day-to-day operations. **Several of these solutions are already in operation**, demonstrating SESAR's role in transforming Europe's ATM network into a modern, cohesive and performance-based operational system.

The **ATM functionalities** – proven their positive contribution to the Network performance, that they have an overall positive business case and the need and added value of a synchronized deployment at European level – will be included in **Common Projects**, i.e. a **Regulation issued by the European Commission**, following the assistance of the appropriated SES bodies², and consulting both Airspace Users and ground operational stakeholders.

A first set of SESAR Solutions was packaged by decision of the European Commission into a **Pilot Common Project (PCP)**. These Solutions, translated into ATM functionalities, are ready for industrialization and for synchronized deployment across Europe.

The **SESAR Deployment Programme** is working to ensure that solutions delivered by the SESAR JU enter into everyday operations across Europe, resulting in significant benefits for airspace users and the environment.

The Deployment Phase

The final result of the SESAR Programme is represented by the **deployment via local implementation projects of the innovative solutions** identified in the ATM Master Plan, **developed and validated through the SJU-coordinated activities**, on the basis of the provisions set forth within the Common Projects.

The modernization of the European ATM system – after its careful planning, its journey towards an adequate level of maturity and its formalization into the Commission Regulation – finally **becomes an operational reality** through the aforementioned steps.

It is therefore within the Deployment phase that the **operational changes are actually deployed** across Europe, delivering those improvements that lead to the expected performance benefits.

In order to make sure that the implementation is highly synchronized and coordinated, the *deployment phase* – steered by a dedicated **Deployment Programme** – requires the fruitful cooperation of **European**

¹ It is worth mentioning that the achievement such aspirational performance ambitions is strictly related to the availability of SESAR Solutions through R&D activities, their timely and, when needed, synchronized deployment and their operational use at full potential.

² According to Article 5 of Regulation (EU) no. 409/2013, the Network Manager, the European Aviation Safety Agency, the Performance Review Body, the SESAR Joint Undertaking, Eurocontrol, the European standardization organisations, Eurocae and the SESAR Deployment Manager. These bodies shall then involve the operational stakeholders and the manufacturing activities.

Commission, of the **SESAR Deployment Manager** and of **operational stakeholders**, according to the overall framework defined within Regulation (EU) no. 409/2013.



Fig. 4 - SESAR Programme: from High-level Planning to Performance Improvements

1.3 The Governance of SESAR Deployment Phase

Article 7 (2) of Regulation (EU) no. 409/2013 clearly states that the overall **governance structure of the SESAR Deployment Phase** is composed of three levels: “**policy level, management level and implementation level**”. Such three-layered structure identifies the involved stakeholders, openly defines their role and allocates them clear responsibilities:

- 1) **European Commission**, assisted and supported by the appropriate SES institutions and organizations, is responsible for the **oversight of the deployment of SESAR**, ensuring that the latter is carried out in line with the SES framework and supports the public interest. This means that – following the adoption of Common Projects through Regulations binding for Member States³ – EC is also in charge of **managing the Union funds** to support its implementation through the appropriate funding Programmes, whilst also identifying the appropriate **incentives mechanisms to support the deployment activities**. Most importantly, the European Commission is in charge of selecting the SESAR Deployment Manager, which is the body responsible for the **management level**.
- 2) **SESAR Deployment Manager**, which is composed of groupings of operational stakeholders, is in charge of **effectively managing the deployment across Europe**, essentially through the development, proposal, maintenance, implementation and monitoring of the **SESAR Deployment Programme**, which constitutes the “*operational view*” of the Common Projects.
- 3) The overall arrangement of the SESAR Deployment Phase is completed by the **operational stakeholders**, which are bound by the relevant Regulation to implement **the Common Projects at local, regional and Network level**, in accordance to the provisions set forth in the Deployment Programme. Such implementation can be supported and boosted by the relevant Union funding programmes.

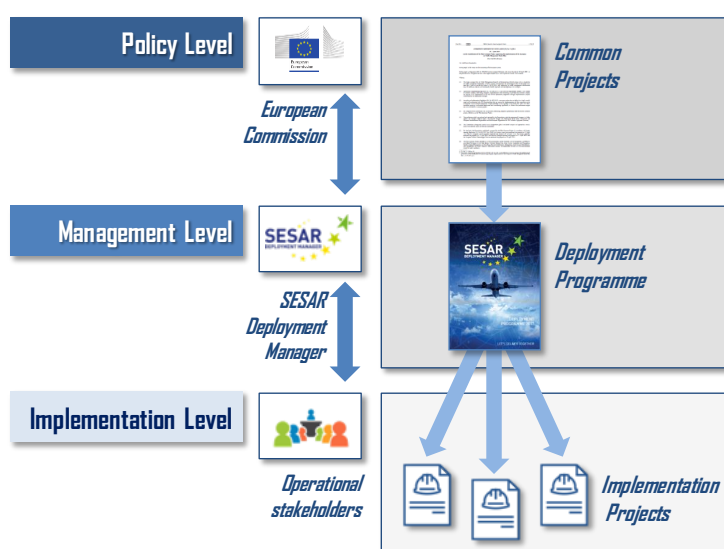


Fig. 5 - The Governance of the SESAR Deployment Phase

³ The geographical scope of the Pilot Common Project also extends over non-EU Member States (e.g. Switzerland and Norway) that are included within its geographical scope and have committed to implement the Single European Sky through bilateral and multilateral agreements