



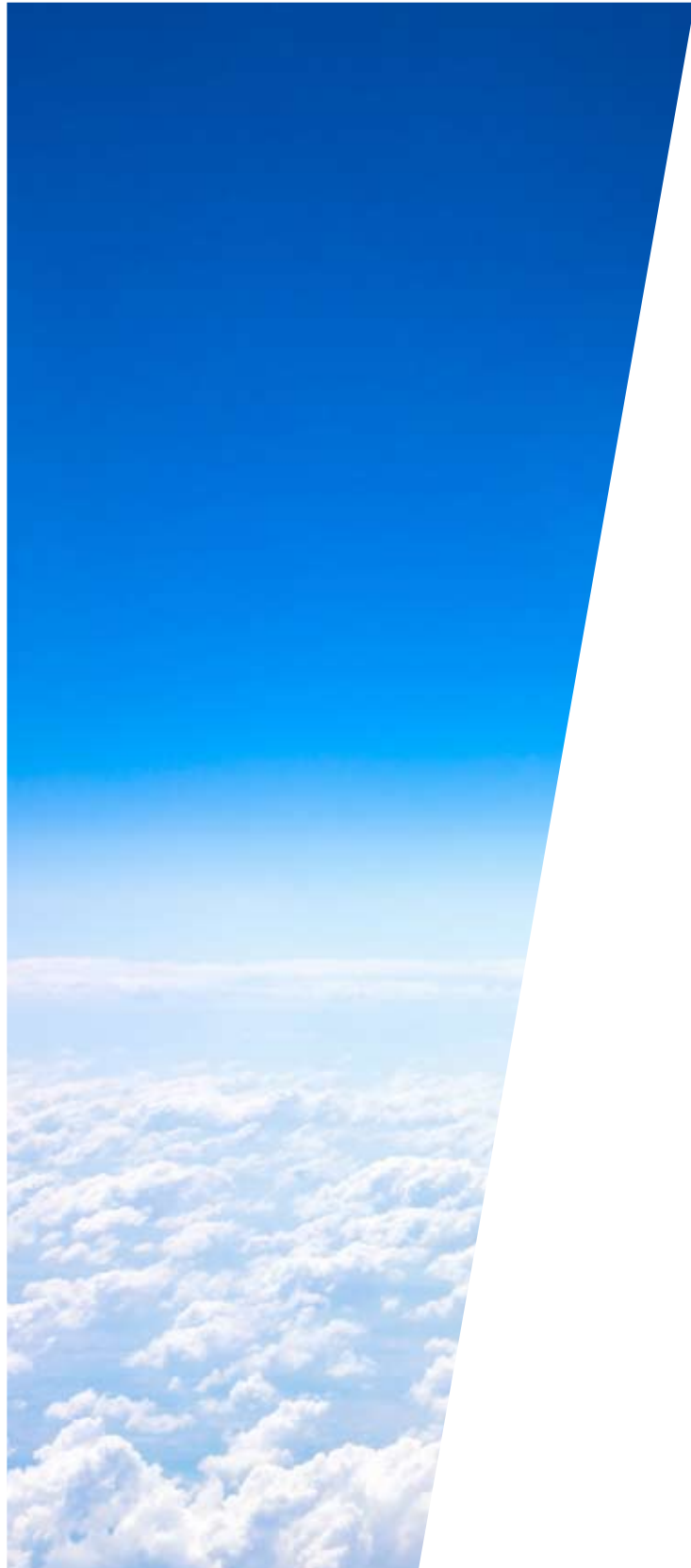
# Today's partners for Tomorrow's aviation



founding members



# Key figures



**2.1 billion**

euros invested in R&D  
during the development phase

**20.4 million**

yearly flight movement by 2030 predicted  
by Eurocontrol = twice the current figure

**8-14 min**

of gain per flight on average

**300-500kg**

of reduction in fuel per flight on average

**945kg-1575kg**

reduction of CO<sub>2</sub> emissions on average

**15 initial members**

from the industry

# Welcome word

“Aviation has made fantastic progress in the last 50 years and traffic has more than doubled in the last 20 years. To cope with the growing demand for air travel, air traffic management has also improved. But not sufficiently, as technologies are becoming old and saturated. Soon, the cost of technical shortcomings will become a real issue, and the technological gap between Air Traffic Management and the other industrial fields (telecommunications, space, IT, etc.) may become impossible to bridge. As far as technologies are concerned, ATM is at a crossroads. The SESAR Programme is the only way forward.”

**Patrick Ky**, Director of the SESAR Joint Undertaking



## The Single European Sky

The Single European Sky is an ambitious initiative launched by the European Commission in 2004 to reform the architecture of European air traffic management (ATM). It proposes a legislative approach to meet future capacity and safety needs at a European rather than a local level. The Single European Sky initiative is the only way to provide a uniform and high level of safety and efficiency over Europe's skies.

“SESAR is a truly new approach to ATM modernisation, providing guidance and leadership to all ATM –related activities in Europe.”

**Daniel Calleja**, Director Air Transport Directorate –  
European Commission/Chairman of the SESAR JU Administrative Board

### Key objectives are:

- to restructure European airspace as a function of air traffic flows
- to create additional capacity; and
- to increase the overall efficiency of the air traffic management system.

SESAR (Single European Sky ATM Research) is the technological dimension of the Single European Sky. It will help create a “paradigm shift”, supported by state-of-the-art and innovative technology.



# Programme & Goals

## A programme for all and with all air transport actors

SESAR aims to eliminate the fragmented approach to European ATM, transform the ATM system, synchronise all stakeholders and federate resources.

For the first time, all aviation players are involved in the definition, development and deployment of a pan-European modernisation project.

### SESAR, an ambitious phased programme

- The SESAR Definition Phase (2005-2008) delivered the SESAR ATM Master Plan. It was developed by a representative group of ATM stakeholders. The plan, based on future aviation requirements, identified the actions, from research to implementation, needed to achieve SESAR goals.
- The SESAR Development Phase (2008 - 2013) will produce the required new generation of technological systems, components and operational procedures as defined in the SESAR ATM Master Plan and Work Programme.
- The SESAR Deployment Phase (2014-2020) will see the large-scale production and implementation of the new air traffic management infrastructure composed of fully harmonised and interoperable components guaranteeing high-performance air transport activities in Europe.

The SESAR Joint Undertaking (SJU) was created under European Community law on 27 February 2007, with EUROCONTROL and the European Community as founding members, in order to manage the SESAR Development Phase.

The aim of the SESAR Joint Undertaking is to ensure the modernisation of the European air traffic management system by coordinating and concentrating all relevant research and development efforts in the Community.

The SESAR JU also benefits from the strong interest of an initial group of 15 organisations (AENA, Airbus, Alenia Aeronautica, DFS, DSNA, ENAV, Frequentis, Honeywell, INDRA, NATMIG, NATS (En route) Limited, NORACON, SEAC, SELEX, SELEX Sistemi Integrati and Thales) with experience in the ATM sector as services or equipment providers. The said organisations are able to offer the specialist expertise of aircraft manufacturers, national air navigation services providers, airport operators and equipment manufacturers. This makes the SESAR Joint Undertaking a truly international public-private partnership.

### Ambitious goals and benefits

SESAR aims to develop the new-generation air traffic management system capable of ensuring the safety and fluidity of air transport over the next 30 years. Through an open system design and dedicated international activities, SESAR will be compatible with similar global initiatives such as NextGen; the sister initiative from across the Atlantic.

The key performance targets for 2020 are:

- enable a threefold increase in capacity
- improve safety by a factor of 10
- reduce by 10% the environmental impact per flight
- cut ATM costs by 50%

### What is in it for me?

In addition to its contribution to European Gross Domestic Product growth (€ 470 billion p.a.)\*, there are direct benefits for:

- Airlines: meet demand with a better quality of service, better flight profiles and hence lower fuel consumption
- Air navigation service providers (ANSP): provision of a better quality of service at a lower unit cost for airspace users
- Airports: service provision in bad weather conditions, optimised operations
- Passengers: provision of a better service at a lower cost with increased safety
- General public: a more environment friendly system (reduced contribution to global warming) with less noise

### Change is in the Air

Key to the SESAR Concept is the "Business/Mission Trajectory" principle in which the airspace users, air navigation service providers and airport operators define together, through a collaborative process, the optimal flight path from gate to gate.

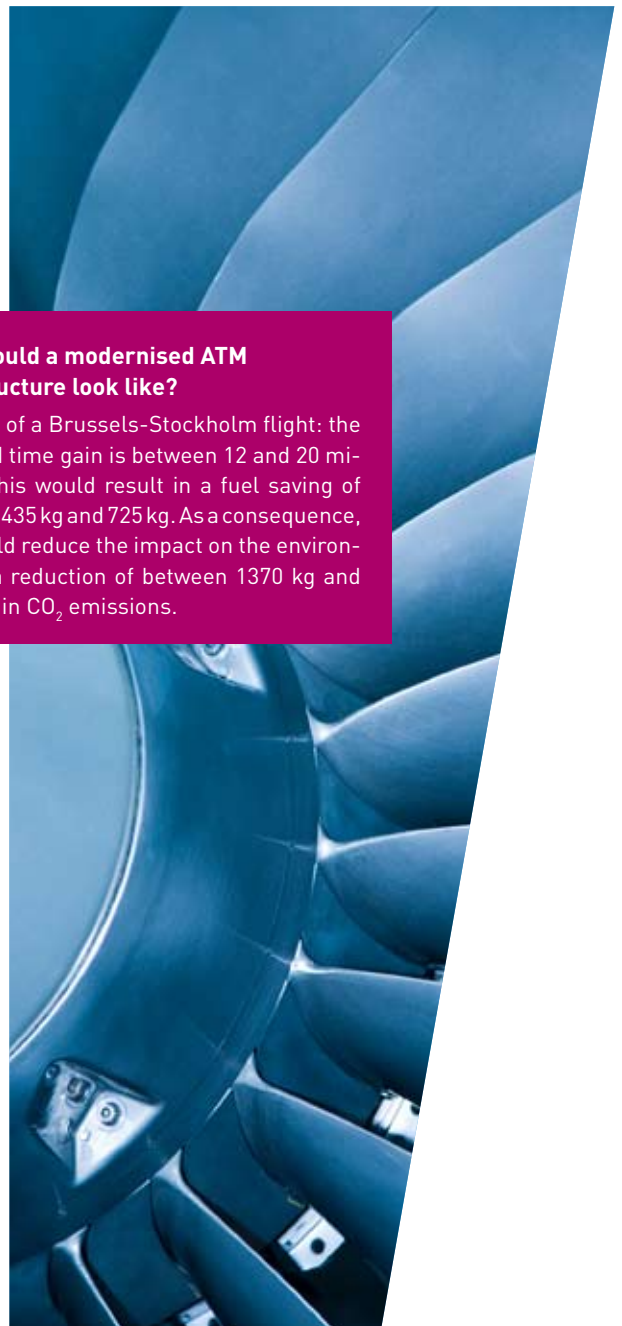
Taking full advantage of existing and newly developed technologies, SESAR's target concept relies on a number of key features applicable to all aircrafts:

- The notion of "trajectory-based operations" which will improve dramatically the predictability and precision of operations
- A rolling network operation plan taking into account real time situations including weather, and traffic evolution.
- The introduction of an Air Traffic Management intranet, including aircraft, which will enable all actors to have full access to the right information at the right time.
- The full integration of ground activities into the Air Traffic Management processes.
- Increased automation support to air traffic controllers and pilots, enabling them to concentrate on high added value activities.
- Increased environmentally-friendly operations at airports, enabling greener trajectories whilst maximising the use of existing runways.

\* The Economic Catalytic Effects of Air Transport in Europe – EUROCONTROL - 2005

### What would a modernised ATM infrastructure look like?

Example of a Brussels-Stockholm flight: the expected time gain is between 12 and 20 minutes. This would result in a fuel saving of between 435 kg and 725 kg. As a consequence, this would reduce the impact on the environment - a reduction of between 1370 kg and 2 283 kg in CO<sub>2</sub> emissions.





# Greener sky

One of the top priorities of the SESAR Programme is to reduce by 10% the environmental impact per flight. The air traffic growth can only be sustainable. This is a major expectation of the air transport community and the world at large.

The Atlantic Interoperability Initiative to Reduce Emissions (AIRE) is a programme designed to improve energy efficiency and lower engine emissions and aircraft noise in cooperation with the FAA. The SESAR JU is responsible for its management from a European perspective, under the authority of the European Commission.

Under this initiative ATM stakeholders will work collaboratively to perform integrated flight trials and demonstrations validating solutions for the reduction of CO<sub>2</sub> emissions for ground movements and terminal and oceanic operations.

In 2009, the SESAR JU will support more than one hundred trials in real conditions scheduled to take place with seventeen partners: Air France, DSNA, Aéroports de Paris, ADACEL, AVTECH, Egis Avia, Nav Portugal, TAP Portugal, Isavia, Icelandair, AENA, INECO, Iberia, LfV, Novair, Airbus and Thales.

To take an example of a Stockholm – New York flight operated with an Airbus A330, current consumption is about 46,000 kg of fuel, equivalent to 144,000 kg of CO<sub>2</sub>. As a result of greener air traffic management, savings are estimated to be in the range of 10%, meaning in this case 4,600 kg of fuel, or 14,400 kg of CO<sub>2</sub>.



“Compared with today’s way of managing aircraft, SESAR represents a paradigm shift, achieved in clear steps. We will change the way we manage air traffic: no more skyways, just the most efficient trajectory – saving fuel and time.”

**David McMillan**, Director General of EUROCONTROL

# A results-focussed work programme

## A results-focussed work programme

Using the ATM Master Plan developed during the Definition Phase of the SESAR Programme, the Work Programme defines all projects and activities to be undertaken in the 2008-2014 timeframe under the supervision of the SESAR JU.

The Work Programme, executed in cooperation with the 16 members, including EUROCONTROL, comprises 16 work packages oriented to providing tangible results from the ATM Network R&D Programme.

These packages will develop and deliver the necessary operational and technical materials (specifications, procedures, prototypes, validation reports, etc) for the progressive industrialisation, deployment and operation of the new ATM system.

## WP B / "Target Concept and Architecture Maintenance"

The scope of the Target Concept and Architecture Maintenance Work Package covers the maintenance and refinement of the high-level ATM Performance Target and Architecture including the Concept of Operations (CONOPS). It defines and ensures the consistency of the ATM Service architecture for all SESAR WPs. WPB will also conduct a performance analysis of the ATM Target Concept throughout SESAR development phase.

## WP C / "Master Plan Maintenance"

The scope of the Master Plan Maintenance Work Package is to administrate the up-to-date maintenance of the ATM Master Plan to monitor the progress of development and of implementation. It also maintains the standard and regulatory roadmaps as well as the SESAR business cases.

### The Programme is split in 4 different threads:

- Operational activities are addressed under WPs 4, 5, 6 and 7,
- System development activities are addressed under WPs 9, 10, 11, 12, 13 and 15,
- System Wide Information Management is addressed under WPs 8 and 14,
- "Transverse activities", such as validation infrastructure, development of safety, security, environment and human performance cases, ATM Master Plan maintenance, Target concept and architecture maintenance, are dealt with additional WPs (i.e. B, C, 3, 16).





### WP 3 / “Validation Infrastructure Adaptation and Integration”

The scope of the Validation Infrastructure Adaptation and Integration Work Package is to build a comprehensive and integrated validation infrastructure to fulfil the overall validation needs for the SESAR ATM system. It coordinates the development and deployment of the validation infrastructure needed for all SESAR validation activities including the system of systems aspects.

### WP 4 / “En-Route Operations”

The scope of the En-Route Operations Work Package is to provide the operational concept description for the En-Route Operations and perform its validation. The term En-Route includes both ‘continental’ and ‘oceanic’ applications (as

appropriate). This covers all phases of planning and execution of flights/trajectories and the identification of supporting functions necessary for En-route operations.

### WP 5 / Terminal Operations

The scope of the TMA Operations Work Package is to manage and perform all activities required to define and validate the TMA ATM Target Concept (i.e. Concept of Operations, and System Architecture). This covers all phases of planning and execution of flights/trajectories and the identification of supporting functions necessary for TMA Operations, which include the management of traffic from the top of descent until landing and from take off until the top of climb.

### WP 6 / “Airport Operations”

The scope of the Airport Operations Work Package is the refinement and validation of the concept definition, as well as the preparation and coordination of its operational validation process. The Airport Operations Work Package will address developments associated with the ‘airside’ elements of airport operations only. However, to ensure effective planning and management, landside elements (such as passenger and baggage handling) will be taken into consideration.

### WP 7 / “Network Operations”

The scope of the Network Operations Work Package covers the evolution of services taking place in the business development and planning phases to prepare and support trajectory-based operations including airspace management, collaborative flight planning and Network Operations Plan (NOP).

### WP 8 / Information Management

The scope of the Information Management workpackage is to gather the information needs identified from the operations workpackages into an implementation-independent data model suitable for establishing the ‘Aviation Intranet’ concept in Workpackage 14. This workpackage supports the Service Oriented Architecture development approach being delivered in Workpackage B and bridges between the operations and the systems aspects using information models and service descriptions.

### WP 9 / “Aircraft Systems”

The scope of the Aircraft System Work Package covers the required evolutions of the aircraft platform, in particular to progressively introduce 4D Trajectory management functions in mainline, regional and business aircraft to provide very precise 4D trajectory management capabilities (3 spatial dimensions + time). The work will address as well the progressive development of Aircraft Separation Assurance and the aircraft components required for the improvement of surface movement operations.



#### WP 10 / “En-Route & Approach ATC Systems”

The scope of En-Route & Approach ATC Systems includes all Research & Development activities for the En-route & TMA ATC Systems evolutions. It will introduce and enhance Trajectory Management functions, new Separation Modes, Controller Tools and Safety Nets, Airspace Management supporting functions, Management Complexity tools, Queue Management and Route optimisation features.

#### WP 11 / Flight Operations Centre System

The scope of the Flight Operations Centre Work Package covers the development of the Airspace Users operations systems required to support the implementation of the various SESAR components (e.g. adaptation to the 4D trajectory).

#### WP 12 / “Airport Systems”

The scope of the Airport Systems Work Package encompasses all Research & Development activities for the Airport Systems evolutions needed to support the SESAR ATM target concept. It also addresses system/technical aspects such as functional and technical architecture, technical performance & safety requirements, technical interoperability requirements,

associated specifications, models/simulation platforms and prototypes, technical validation and the development of inputs/proposals to technical standards groups.

#### WP 13 / Network Information Management System

The scope of this workpackage is to cover all systems Research and Development activities in support of three key aspects:

- ATM Network design
- Airspace Management
- Aeronautical Information

This workpackage will address the architectural (interoperability) and system/technical tasks required to deliver technology solutions to airspace capacity modelling, airspace design and organisation, scenario management, network demand and capacity balancing, flight planning management, demand data management, network performance management and Aeronautical information distribution. Deliverables will include specifications, models, and prototypes in support of technical validation, in addition to safety, environment and standardisation work, leading to operational validation/trials.



/ Staff SESAR Joint Undertaking

The Single European Sky initiative is the only way to provide a uniform and high level of safety and efficiency over Europe’s skies.

**WP 14 / SWIM technical architecture**

The SWIM (System Wide Information Management) is the workpackage responsible for delivering the 'Aviation Intranet' concept; thus enabling the improved sharing of ATM information and eliminating the 'information silo with limited interoperability' approach used today. Benefits include access to information directly from the aircraft and being better able to respond to change (business agility) as well as supporting unexpected contingent operations and planned flexible methods of operation.

The scope of the SWIM workpackage is to cover all systems Research and Development activities that facilitate delivery of an 'information centric' ATM system where the right information is in the right place, with the right people and at the right time, to ensure that optimum decisions are taken and distributed across the network.

**WP 15 / "Non-Avionic CNS System"**

The Non Avionic CNS System Work Package addresses Communication, Navigation, Surveillance (CNS) technologies development and validation also considering their compatibility

with the Military and General Aviation user needs. It identifies and defines the future mobile datalink systems to serve communication and surveillance services, the ground SWIM backbone system. It addresses the best combination of GNSS and non-GNSS Navigation technologies to support Performance Based Navigation and precision approach requirements. It proceeds to the enhancements of the ground Surveillance systems, the introduction of new Surveillance systems as well as the use of future Surveillance applications including ADS-B applications beyond Initial operational capabilities.

**WP 16 / "R&D Transversal Areas"**

The scope of the R&D Transversal Areas Work Package covers the improvements needed to adapt the Transversal Area (TA) (safety, security, environment, contingency (service continuity) and human performance) management system practices to SESAR as well as towards an integrated management system. WP16 also provides support and coordination for the consistent and coherent application of the already existing as well as newly developed TA-related practices to SESAR operational and system Work Packages.



# Final word

"We cannot succeed without the collaboration of all. No solutions for the long term can be found by only one actor: the various air navigation service providers, airspace users, airports, the military, the States, etc. must all agree on the technological solutions and the way to implement them. SESAR is all about partnership."

**Patrick Ky**, Director of the SESAR Joint Undertaking



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