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The Jewel

A Conversation With … Muhammad Ali Albakri, Chief Information Officer, Saudi Arabian Airlines,

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The Consortium

A SESAR Update

The European Commission, along with various other industry leaders, will invest €2.1 billion (US$3 billion) to modernize Europe's air traffic management system.

Europe's air traffic management (ATM) system is operating close to its limits. ATM infrastructure across Europe is dated, expensive to maintain and obsolete in some cases. Airport and airspace congestion and delays are rising, with consequential environmental and economic impacts at a time when air traffic demand is still expected to grow. To manage this demand within these constraints, European airspace has become highly sectorized, fragmented and regulated.

This is a similar story to that of the United States, where the U.S. Federal Aviation Administration has launched the NextGen air transportation system program to address these shortcomings within the national airspace system.

While the challenge and demand to modernize their ATM systems are similar in many aspects, the difference for the European Union is the consequences of managing air traffic across multiple national boundaries where there is often different ATM architecture, systems, technology, standards and procedures.

European airspace is in need of modernization. Previous research and development attempts to design the future and harmonize E.U. ATM operations have been fragmented and slow and are further complicated by the many agencies, governments, organizations, institutions and regulators involved.

The Single European Sky initiative was launched by the European Commission in 2004 to transform European airspace from legacy air traffic control technologies to real-time, leading-edge airspace management with:

- A simple, straightforward institutional and legislative framework across Europe,
- A single design authority that defines and maintains a single functional architecture for European airspace.

"The Single European Sky is much broader than a crisis management mechanism," said Giovanni Bisignani, former director general and chief executive officer of the International Air Transport Association. "It will improve Europe's competitiveness and environmental performance. The inefficiency of the current system is a €5 billion burden on Europe's economy and wastes 16 million tons of CO_2 in delays and indirect routings."

While the process for creating new institutional and legislative organizations is a political endeavor across E.U. member states, creating the technical and functional design for how a Single European Sky could or should operate could move forward. To that end, the Single European Sky ATM Research (SESAR) program was launched.

"SESAR is a truly new approach to ATM modernization, providing guidance and leadership to all ATM-related activities in Europe," said Daniel Calleja, director air transport directorate for the European Commission.

SESAR is one of the most ambitious research and development projects ever launched by the European Union. The European Commission, EUROCONTROL and industry are together investing in research for the complete modernization of the air traffic management system across Europe. SESAR targets, on average per flight by 2020, to save:

- 8 minutes to 14 minutes,
- 300 kilograms to 500 kilograms of fuel,
- 948 kilograms to 1,575 kilograms of CO_2.

"Compared with today's way of managing aircraft, SESAR represents a paradigm shift, achieved in clear steps," said David McMillan, director general of EUROCONTROL. "We will change the way we manage air traffic: no more skyways, just the most efficient trajectory — saving fuel and time."

The program has been structured into three phases:

- The definition phase,
- The development phase,
- The deployment phase.

The Definition Phase

The definition phase of the SESAR program began in 2006. A SESAR consortium consisting of the European Commission, EUROCONTROL and industry experts engaged in an ambitious 24-month project to characterize issues, assess options and recommend a way forward. There were six major deliverables/reports produced during this phase of the project (these now form the foundation upon which the remainder of the program has been built):

The Current Situation

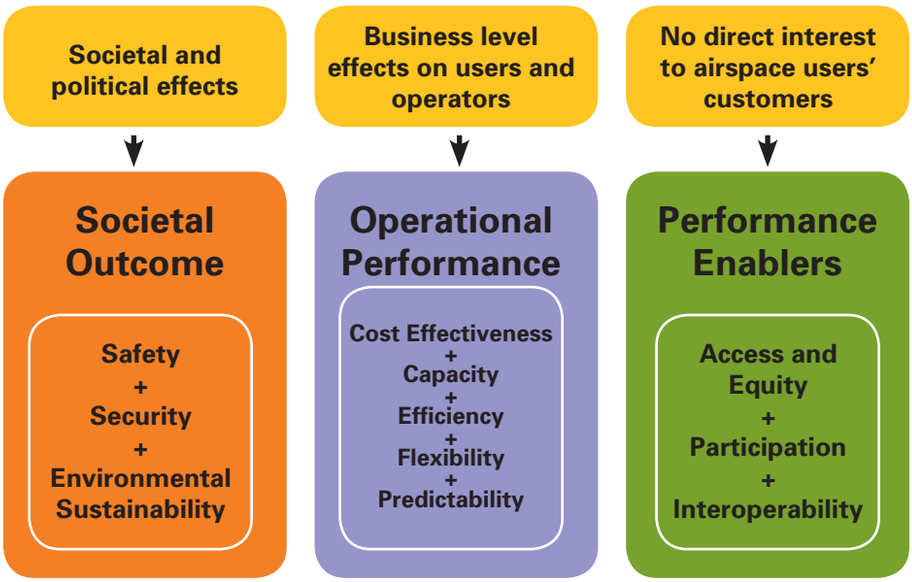
This report characterizes the shortcomings that exist today with the management of European airspace. It assesses efforts thus far to solve the problems, and it makes recommendations for a more structured way forward.

The Performance Target

This report sets out the need for a performance-based ATM system for Europe. It identifies four primary performance goals for the SESAR program as well as endorsing seven additional key performance areas for which the program will contribute. They are aligned with 11 key performance areas developed by ICAO for performance-based ATM operations.

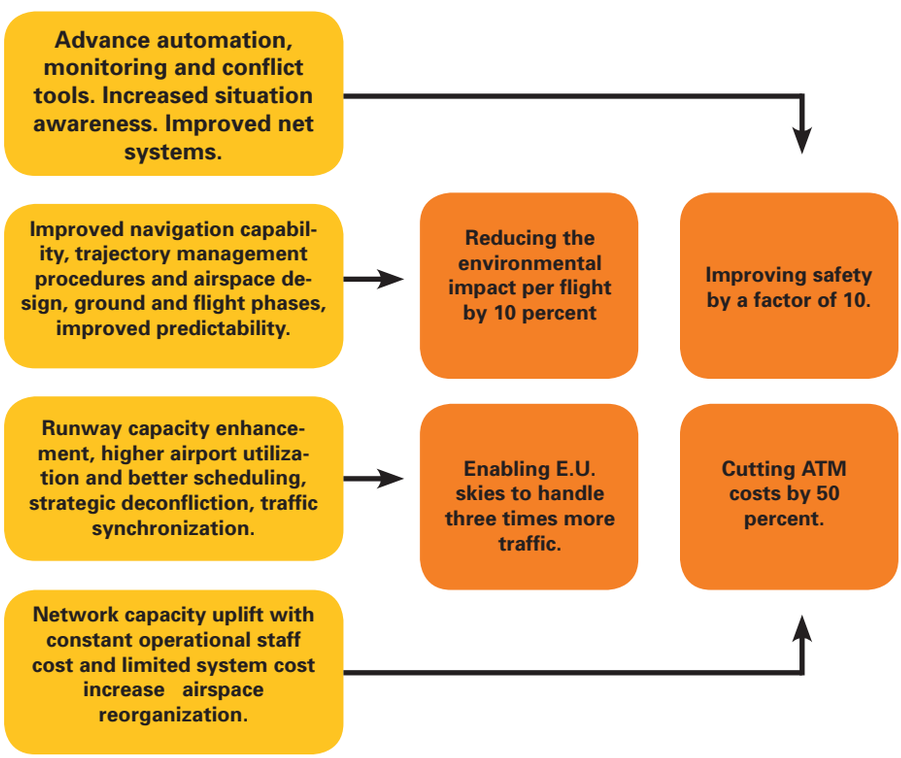
The ATM Target Concept

The key shift in the future ATM system for Europe will be the creation and deployment of a new target concept of operations



Performance Goals As part of a performance-based ATM system for Europe, four primary performance goals as well as seven additional key performance areas have been identified. They are aligned with 11 key performance areas developed by ICAO for performance-based ATM operations.

that focuses on ATM performance and trajectory management. The introduction of trajectory-based operations will be a fundamental change to how air traffic is managed and coordinated in Europe. It outlines the contributions and new operational concepts that will be required of airlines, airports, pilots and aircraft, and the air traffic control agencies to deliver the target level of performance.



Major Improvements By 2025, the SESAR program calls for several significant improvements to the E.U. airspace including handling three times more traffic and improving safety by a factor of 10.

Business trajectories will be expressed in all four dimensions (position and time) and flown with much higher precision than today. Sharing access to accurately predicted, unique 4D-trajectory information will reduce uncertainty and give all stakeholders a common reference, permitting collaboration across all organizational boundaries.

Fundamental to the entire ATM target concept is a net-centric operation based on:

- A powerful information-handling network for sharing data;
- New air-to-air, ground-to-ground and air-to-ground data communications systems;
- An increased reliance of airborne and ground-based automated support tools.

In addition, the ATM concept of operations represents a paradigm shift from an airspace-based environment to a trajectory-based environment and contains specific elements, including the ATM deployment sequence, the SESAR master plan and the work program for 2006-2013.

The ATM Deployment Sequence

The ATM Deployment Sequence is a detailed, realistic roadmap on how to execute and sequence the development and deployment of the new target concept and the performance targets and benefits that could be progressively realized along the way.

SESAR Master Plan

The SESAR master plan breaks down and structures the remaining phases of the SESAR program including governance, procedures and financing, and it structures the required research and development activities into work packages. It also outlines a plan for the research and development as well as deployment phases of the project.

Work Program For 2008-2013

The 2008-2013 work program defines the collection of all required project items in the 2008-2013 timeframe necessary to support the implementation of the ATM target concept by the execution of the SESAR master plan (deployment of existing systems, development of systems that are almost mature, applied research to refine the concept and develop technical solutions and longer-term research for the more advanced concept elements and technologies).

In detail it covers specific aspects, including:

- Definition of the management structure for the development phase,
- Structured lifecycle and methods supporting the development phase,

- Detailed work-program activities for 2008 through 2013.

The Development Phase

Given the complexity of the program, the SESAR Joint Undertaking (a new legal entity) was founded by the European Commission and EUROCONTROL to coordinate and concentrate all relevant research and development efforts across the European Union relating to the future of Europe's ATM system.

The SJU owns and manages the target ATM concept of operations. It executes the ATM master plan and manages the approved work plan by engaging and partnering with the industry in research and development activity to develop, test, prove and verify the target concept of operations. By executing the master plan, demonstrating and delivering the ambitious performance targets and goals set for the program, the SJU can verify the goals are attainable before operational deployment.

Since 2008, the SJU has progressively initiated the work packages identified in the master plan, engaging with various institutions, organizations, government agencies and industry players to select the most effective teams to address each element of the plan.

Work Package 11

Work Package 11 is the final work package contract to be tendered by the SJU. Commencing in late 2009, the SJU engaged the software and solutions industry supporting flight operations in Europe to gauge interest in supporting research and development regarding how airlines' operations, procedures and technology solutions would need to change to make the Single European Sky a reality.

Work Package 11 is broken down into two sub-work packages, and the SJU split the program into two packets for the tender process to permit them to engage with segments of the operations industry specializing in each field:

- WP-11.1 — Flight and wing operations centers,
- WP-11.2 — Meteorological services.

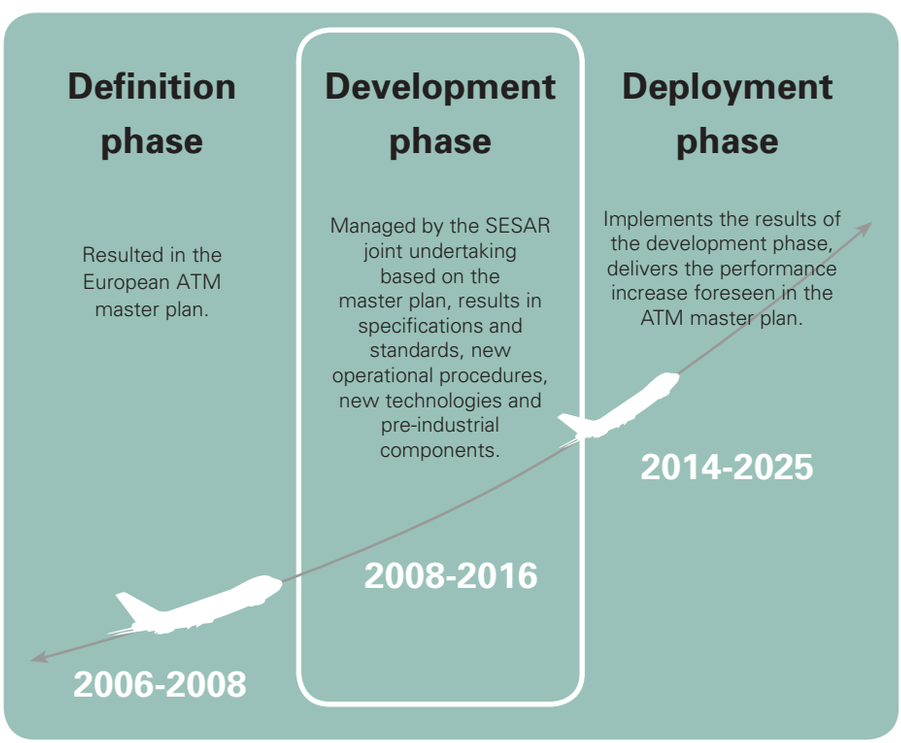
In June, the SJU and Eurocontrol awarded the contract for Work Package 11.1 to the Fly4D consortium led by Airbus with Cassidian, Honeywell, Lufthansa Systems and *Sabre Airline Solutions*®. The project will run for the next five years and is structured to deliver validated and tested operational concepts progressively throughout this period.

The target concepts being developed for the Single European Sky will require changes to airline operations within European airspace:

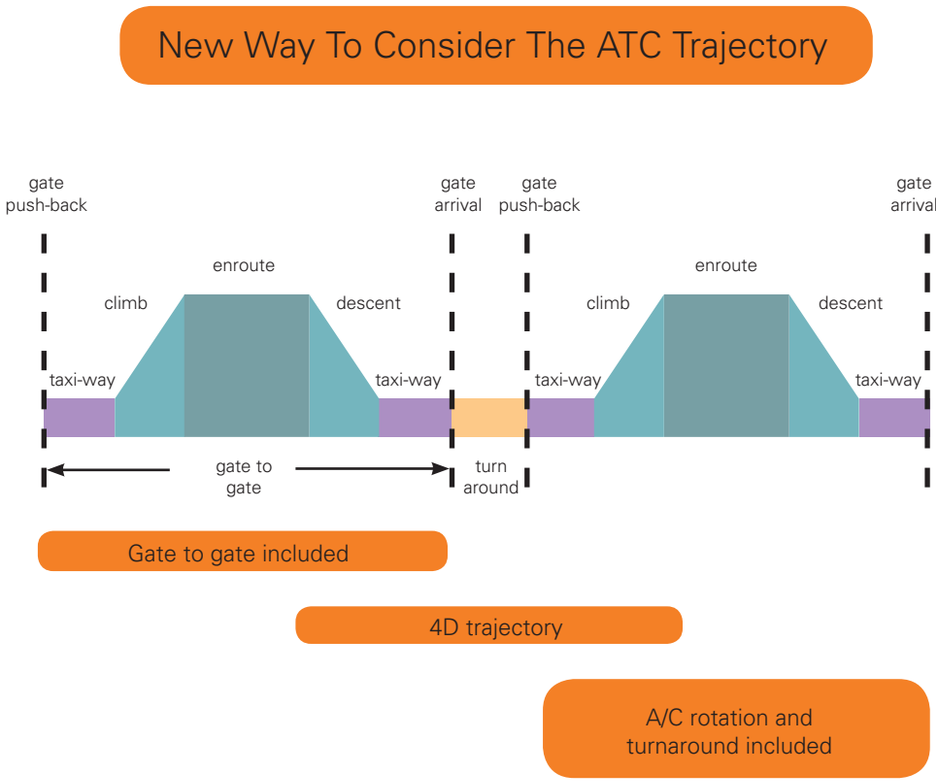
- Trajectory management will introduce a new approach to airspace design and management to avoid, whenever possible, airspace becoming a constraint on the trajectories. Airspace user-preferred routing, without pre-defined routes, will be applicable everywhere with the exception of some terminal areas and below a designated level in some areas.
- Collaborative planning continuously reflected in the E.U.-wide network operations plan will require airspace users to share and communicate data and information regarding their intended trajectories from the scheduling phase right up to the day of operations, permitting the ATM system to forecast and manage capacity more effectively … right down to the airport level.
- Airport operations will be integrated into trajectory management, contributing to capacity gains and performance-based improvements to the overall ATM system.
- New separation modes will allow for increased capacity including new onboard technology and procedures for flight crew.
- System-wide information management will integrate all ATM business-related data into a real-time network of information that all ATM contributors may consume to support their operational procedures.

As a consequence, the procedures and practices within particular functions of an airline/airspace user may have to change:

- Schedule management — Early sharing of schedule and possible route data in advance of day of operations.
- Movement control — As the schedule is managed, registrations are assigned and the flight schedule is executed, continuous sharing of intended trajectories/operations will be required.
- Flight planning — The introduction of 4D flight planning with the element of time (these concepts will progress from time-based operations to trajectory-based operations and finally to performance-based operations as Single European Sky operations mature).
- Airport turnaround management — The surface management of airport capacity will require insight into the predictability and performance of group handling operations for the airport transit of aircraft.
- Flight tracking and situational awareness — A common picture of traffic awareness, capacity, demand and performance will be available to support improved decision making and new processes such as collaborative decision making and user-driven prioritization.
- Data link communications — An increased dependency on improved ground-to-air and air-to-ground communication and data exchange in flight.



Phased Approach The SESAR initiative has been divided into three phases that span from 2006 through 2025.



ATC Trajectory A new approach to airspace design and management will help avoid, whenever possible, airspace becoming a constraint on trajectories.

The Fly4D Consortium

The Fly4D Consortium comprises leading technology and solution partners that have been pulled together under the coordination of Airbus, each contributing unique skills and expertise to the program.

Airbus

Airbus will provide structured program management and consortium governance and will be a primary liaison with the SJU and EUROCONTROL throughout the project. Airbus is a founding member of the SJU organization, leading Work Package 9 (aircraft technology and systems) and many other projects within the SESAR program.

Cassidian

Cassidian (formally EADS Defense and Security Systems) will represent the interests of military airspace users (wing operations centers), ensuring the translation of the concept of operations and requirements/needs of governments' and states' humanitarian and military operations are integrated into the overall design for future ATM operations in Europe. It will build and test prototypes to test and validate these concepts.

Honeywell

Honeywell, a leading provider of onboard avionic equipment, flight management systems and data link communications technology, contributes to a variety of projects across the program. Regarding WP-11.1, it will focus on data link communications between aircraft and operation control centers as well as support the needs of business/corporate aviation, airlines and agencies that are also airspace users in the frame of the Single European Sky.

Lufthansa Systems

Lufthansa Systems will bring expertise in the area of flight planning, supporting prototype development to prove and validate new 4D flight planning concepts. It will support performance analysis to validate the proof of concept.

Sabre Airline Solutions

Sabre Airline Solutions will define and generate definition of new specification and standards across the fields of schedule design and management, flight operations control, flight planning, airport hub/turnaround management, flight tracking situational awareness, and operational performance analysis and intelligence. It will develop operational prototypes across this entire functional space that will fully simulate an end-to-end airline operation and the future target concept of operations within European skies.

It will also build and host an integrated test platform whereby consortium partners will interface their solutions and prototypes and use this infrastructure to simulate the operations of airspace users and how they will interact with the rest of the SESAR world in both local validation of WP-11.1 concepts as well as the validation of global SESAR concepts in partnership with the other work packages.

"We are the first in the world to start to integrate ATM future concepts with airline operations," said Patrick Ky, executive director of the SESAR Joint Undertaking. "This is truly a breakthrough in our sector of activity."

The Deployment Phase

As concepts mature, are validated and tested progressively during the development phase, the SJU will advise the industry and invoke the legislative, procedural or technology changes required to deploy new ATM capabilities.

SESAR news

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