2014

SESAR Release

SESAR JOINT UNDERTAKING

founding members

EUROPEAN UNION

EUROCONTROL

Table of Contents

SESAR JOINT UNDERTAKING

www.sesarju.eu

01 SESAR explained

SESAR is a 2.1 billion euro research and development (R&D) programme until 2016 which aims to modernise the European ATM system. SESAR does so by pooling together the knowledge and resources of the entire ATM community through a public-private partnership - SESAR Joint Undertaking.

As the technological pillar of the Single European Sky, SESAR aims to deliver the capabilities needed for EU skies to handle more traffic with more cost efficiency, while ensuring that the highest safety standards are maintained and the environmental impact per flight is reduced.

Guided by the European ATM Master Plan, the SESAR work programme (2009-2016) is implemented by 3,000 experts working on more than 300 projects to deliver a solid stream of technological and operational solutions.

These solutions have been developed to meet the needs of the ATM industry both for today and the future, which undergo rigorous testing in preparation for deployment.

Thanks to this work, SESAR is proving to be a powerful catalyst in transforming Europe's ATM network into a modern, cohesive and performance-based operational system.

For more information, visit:
www.atmmasterplan.eu

02 SESAR Releases

As a performance-based R&D programme, SESAR systematically validates the work of its technological and operational projects.

The mechanism used to validate these solutions is known as the Release process. This process involves solutions undergoing thorough pre-industrial development and integration testing within a given timeframe in order to establish their readiness for industrialisation and subsequent deployment.

Since 2011, SESAR has been carrying out one release every year and has so far completed **68 exercises**, consisting of a range of flight trials and simulations. **This brochure** gives an **overview of Release 4**, which comprises **20** validation **exercises**, which are planned over the course of 2014.

Thanks to this incremental approach to developing and validating solutions, the aviation community are benefiting early on from improvements made to ATM operations:

- Airlines will see savings through improved routings, as well as the reduction in operating costs through increased predictability.
- Air Navigation Service Providers (ANSP) can provide a better quality of service at a lower unit cost for airspace users, thanks to better integration, improved human/machine interfaces for controller working positions, enhanced tools and advanced working procedures.
- Airports will be more integrated in the overall ATM system, benefiting from technology advances enabling capacity increase, and operations optimisation, even under adverse network and/or weather conditions.
- Passengers will profit from improved punctuality and shorter flight duration.
- Suppliers and manufacturers in Europe will be better prepared to follow tomorrow's technical standards.
- Environment gains will be achieved, thanks to fewer CO_2 emissions as a result of shorter and more efficient routes, and lower noise pollution.

03 Meeting ATM business needs

The SESAR Programme develops

its solutions according to a set of essential operational changes for the ATM industry, as outlined in the European ATM Master Plan (Key Features). These six Key Features have been defined to capture the operational improvements and technical enablers required to deliver SESAR's contribution to Single European Sky. In each Release, solutions are clustered in line with these Key Features, which are as follows:

1. Traffic synchronisation
2. Airport integration and throughput
3. Moving from airspace to 4D trajectory management
4. Network collaborative management and dynamic capacity balancing
5. Conflict management and automation
6. System Wide Information Management

1. Traffic Synchronisation

'Traffic Synchronisation' covers all aspects related to improving arrival/departure management. It aims to achieve an optimum traffic sequence resulting in significantly less need for air traffic control (ATC) tactical intervention, and the optimisation of climbing and descending traffic profiles.

2. Airport Integration and Throughput

'Airport Integration and Throughput' aims at achieving a full integration of airports into the ATM network, ensuring a seamless process through Collaborative Decision Making. Airports will contribute to achieve SESAR performance goals through the increase of runway throughput and improved surface movement management, where air traffic controllers are supported by enhanced tools.

3. Moving from Airspace to 4D Trajectory Management

'Moving from Airspace to 4D Trajectory Management' entails the systematic sharing of aircraft trajectories between various participants in the ATM process to ensure that all partners have a common view of a flight and have access to the most up to date data available to perform their tasks. This creates an environment where air and ground stakeholders share a common view of the aircraft's trajectory, so that the flight can be managed as closely as possible to the airspace user's ideal profile, while optimising the flow of air traffic.

4. Network Collaborative Management and Dynamic/Capacity Balancing

'Collaborative Management of the ATM Network' relies on successive phases of operation planning from long to medium and short term. In this context, all involved ATM stakeholders progressively share more and more precise data to build a common traffic and operational environment picture called the Network Operations Plan (NOP). This NOP is updated in real time to reflect any changes in ATM operations. The NOP also covers military activity, taking full account of the needs of mission trajectories and military airspace demands.

Throughout the lifecycle of the flights, the traffic demand/available capacity is monitored by the different ATM actors. When an imbalance occurs, capacity shortfall scenarios are collaboratively agreed and implemented. When required, the Aircraft Operators submit the revised user-preferred trajectories, integrating the ATM constraints.

5. Conflict Management and Automation

'Conflict Management and Automation' aims at substantially reducing controller task load per flight through a significant enhancement of integrated automation support, whilst simultaneously meeting the safety and environmental goals of SESAR. Human operators will remain at the core of the system (overall system managers) using automated systems with the required degree of integrity and redundancy. In addition, this Key Feature covers the evolution of Ground and Airborne Safety Nets (and their mutual compatibility) through the use of new surveillance means and system wide information sharing. They will be fully adapted to SESAR future trajectory management systems and new separation modes, thus ensuring their continuing effectiveness as a last safety layer against the risk of collision (and other hazards).

6. System Wide Information Management

The concept of 'System Wide Information Management' - SWIM - covers a complete change in paradigm of how information is managed along its full lifecycle, involving stakeholders from across the whole European ATM network. SWIM is an advanced concept designed to facilitate greater sharing of ATM system information, such as aeronautical, flight trajectory, aerodrome operational and meteorological (MET) information. It consists of standards, infrastructure and governance enabling the management of ATM information and its exchange between qualified parties via interoperable services.

04 Release 4 overview

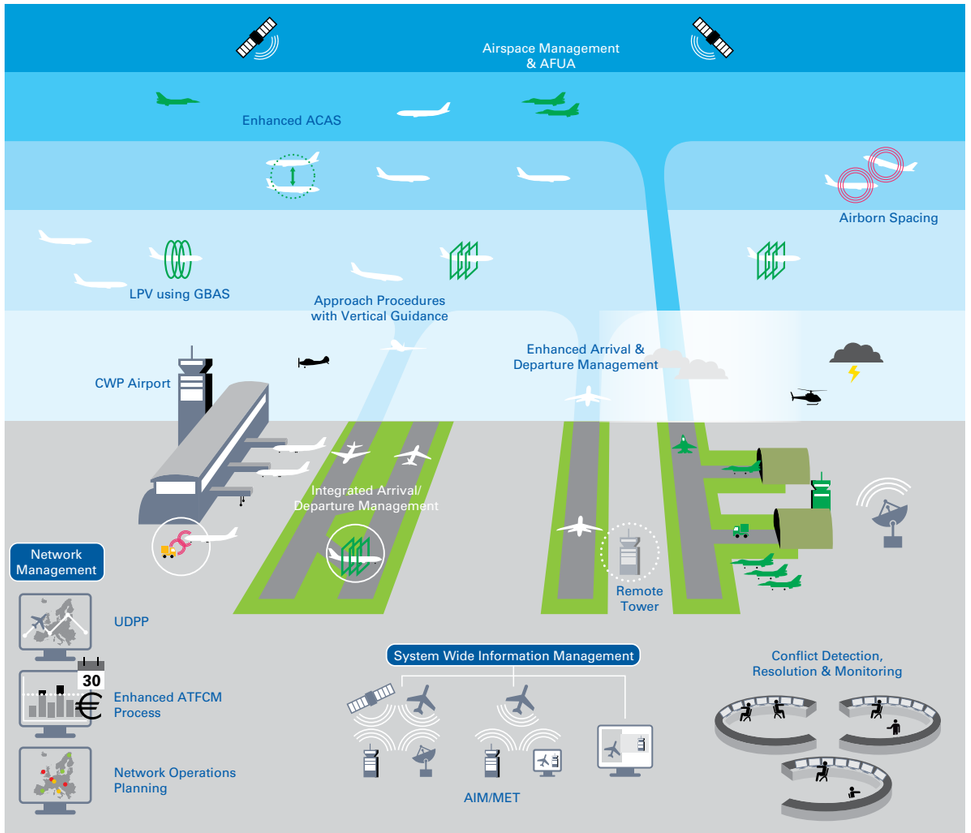
Release 1 included 25 operational validation exercises throughout Europe. The exercises centred on the development of efficient and green terminal airspace operations, the initial 4D trajectory, end-to-end traffic synchronisation and integrated and collaborative network management.

Release 2 built on the experience gained during Release 1, widening the scope of the work and comprised 30 exercises, which took place across 18 European locations targeting the Key Features. The main results of these exercises focused on: refining the time-based separation minima between arrival aircraft, optimising the Air Traffic Control (ATC) sectorisation to better cope with traffic demand, providing new direct routing for airlines and increasing ATC efficiency.

Release 3 expanded the scope with 13 exercises covering all 6 Key Features. The exercises focused on traffic synchronisation in complex environments, arrival management solutions, time-based operations, enhanced flight data exchange. Results deriving from Release 3 will be published in the second quarter of 2014.

Release 4 includes 20 exercises, covering five Key Features and addressing a set of operational improvements.

Figure 1:
Operational improvements planned for Release 4.



The Release 4 exercises are expected to demonstrate that the solutions have achieved a sufficient level of complexity and maturity so that a decision can be made for their industrialisation and subsequent deployment.

A summary of the operational improvements expected from the Release 4 validation exercises, grouped by Key Feature, are as follows:

Traffic Synchronisation

- Integration of airborne spacing manoeuvres (ASAS) within an environment using initial four dimensional (i4D) trajectory management, Controlled Time of Arrival (CTA) and Extended AMAN Horizon with a view to enhancing Arrival Manager (AMAN) procedures
- Combined use of AMAN, Departure Manager (DMAN) and Advanced Surface Movement Guidance and Control System (A-SMGCS) to reduce delays and increase predictability
- Assessment of the operational and environment requirements, as well as the technical feasibility of implementing i4D+CTA operational procedures for air traffic controllers (ATCO) and flight crews in a Terminal Manoeuvring Area (TMA) environment
- Validation of two Airborne Spacing manoeuvres to increase synchronisation of traffic in TMA
- Assessment of aircraft behaviours, situational awareness and efficiency of crew and air traffic controllers when performing advanced approach procedures with vertical guidance.

Airport Integration & Throughput

- Use of Ground Based Augmentation System (GBAS) stations enabling Category II/III approaches with a view to improving operations in low visibility conditions and increasing runway capacity
- Usability of an integrated Human Machine Interface (HMI) for Tower Controller Working Position, considering new features for surface management operations procedures
- Assessment of the basic functionalities needed to provide air traffic control remotely to an airport with low-to-medium density traffic, as well as the feasibility of providing air traffic services to multiple remote aerodromes.

Network Collaborative Management and Dynamic Capacity Balancing

- Real-time airspace data exchange, in particular for airspace reservation/restrictions, between civil and military ATM systems to assess the technical feasibility and safety of a Collaborative Decision Making (CDM) process between these systems
- Assessment of Short Term Air Traffic Flow Management (STAM) procedures and a tool to allow for better predictability and ATC efficiency in complex traffic scenarios
- Evaluation of the feasibility, cost effectiveness and flexibility of a slot-swapping procedure between airlines.

System Wide Information Management (SWIM)

- Provision of Digital NOTAM (Notice to Airmen) and digital MET data to enhance pre-flight briefing services (ePIB), with a view to improving information transfer.

Conflict Management and Automation

- Assessment of the performance delivered by a set of Medium Term Conflict Detection and Resolution (CD/R) tools for the Planner and Tactical Controllers in the en-route phase of a flight
- Evaluation of the display and use of downlinked Airborne Collision Avoidance System (ACAS) Resolution Advisories on the Controller Working Position (CWP).

Figure 2:
Map of Release 4 validation sites

05 Release 4: A detailed look

Release 4 is expected to make contributions to essential operational changes as detailed below:

TRAFFIC SYNCHRONISATION

Airborne spacing manoeuvres (ASAS) and Enhanced Arrival and Departure Manager (AMAN/DMAN)

Real-time simulations in Toulouse and Rome will validate the feasibility of integrating airborne spacing manoeuvres within an i4D & CTA, Extended AMAN Horizon environment with a view to enhancing procedures.

The main focus of the exercise will be to see if there is operational compatibility between i4D+CTA and Airborne Spacing operations in an Extended TMA (E-TMA).

The exercise will also assess whether the AMAN can provide a sufficiently stable time that can become a CTA to further enhance network operations.

Expected outcomes:

- Increased controller efficiency through smoother arrival flows
- Improved traffic predictability in terms of difference between actual flight duration and estimated flight duration (time variability).

Integrated arrival and departure management

This exercise, taking place in London Gatwick, will aim to validate the benefits of combining AMAN, DMAN and Advanced Surface Movement Guidance Control System (A-SMGCS) and Time Based Separation (TBS). In real-time simulations, air traffic controllers will assess the performance of a TBS tool in selecting the arrivals and departures pattern with the fewest delays. Controllers will follow the same procedures as today, i.e. follow Target Start-up Approval Time (TSAT) for establishing pre-departures sequences and follow a target time for metering fix for metering traffic into the TMA. Additionally the TBS tool will be validated for its use in mixed mode operations.

Expected outcomes:

- Lower fuel burn and improved ATCO efficiency due to the calculation of an integrated arrival and departure sequence
- Increased predictability and stability of actual times and target times for taxi-out.

Enhanced AMAN and DMAN

Three exercises, including flight trials and real-time simulations, will assess the technical feasibility and the operational and environmental requirements for implementing i4D&CTA operational procedures for ATCOs and flight crews in a TMA environment. The live trials in Reims and London Heathrow will specifically evaluate the use of an Extended AMAN Horizon for cross-border arrival management.

These exercises will review new or refined technical and functional features, in particular:

- A cockpit simulator with an upgraded i4D+CTA related functionality
- Ground systems with an upgraded i4D+CTA and AMAN functionality to accommodate findings from previous flight trials, simulations and requirements
- Increased automation in the 4D trajectory negotiations between air and ground, as well as ground and ground agencies
- The ATC multi-sector planner.

Expected outcomes:

- Proven technical feasibility and operability of the i4D+CTA concept, with validated safety and human performance requirements
- Improved data exchange between air and ground systems, due to a shared trajectory
- Better flow/queue management.

Airborne Separation Assistance System (ASAS) – Spacing Applications

The flight trials, which are planned to take place in the Toulouse and Rome approach environments, will validate two additional ASAS S&M manoeuvres to increase synchronisation of traffic in a TMA, namely "vector then merge" and "follow route then merge". The exercise will also assess the correlated benefits for controllers and pilots. Air traffic controllers will use TBS to calculate the actual and predicted headwind and the target runway throughput, as well as to initiate the appropriate manoeuvres.

Expected outcomes:

- An increase in controllers' efficiency per flight thanks to greater automation
- Increased safety and better situational awareness of flight crew during the arrival sequence
- Improved runway throughput thanks to TBS, which ensures an optimised traffic sequence in strong headwind conditions.

Approach procedures with vertical guidance

Two flight tests performed in Turin will assess the performance of regional aircraft fitted with upgraded avionics when performing advanced approach procedures with vertical guidance. The tests will also evaluate the efficiency and situational awareness of the flight crew and ATCOs when these procedures are used.

Specifically the tests will determine whether the aircraft is capable of adhering to a given flight path throughout the entire approach. They will also evaluate the aircraft's ability to remain stabilised following the transition from the Required Navigation Performance (RNP) mode to the Localizer performance with vertical guidance (LVP) mode. Furthermore, safety aspects, mainly related to flight path monitoring by ATCOs, will be qualitatively investigated.

Expected outcomes:

- Increased flight efficiency and fuel efficiency, with a better adherence to the nominal flight track
- Increased predictability, with better punctuality of arrival traffic
- Increased ATCO efficiency due to better compliance by aircraft to their flight path.

AIRPORT INTEGRATION AND THROUGHPUT

Low visibility procedures using of Ground Based Augmentation System (GBAS)

A real-time simulation in Brétigny will evaluate the use of Ground Based Augmentation System (GBAS) stations and their impact on runway capacity. GBAS offers an alternative to Instrument Landing System (ILS), the tool currently used to provide lateral and vertical guidance but which has limitations, such as its sensitivity to bad weather and uneven terrain.

The exercise will assess how GBAS can facilitate Cat II/III approaches (e.g. 1000 feet or less of runway visual range) at several runway ends (which are not ILS equipped). It will also see whether GBAS will allow for reduced arrival spacing during low visibility, which is currently necessary because of the sensitivity of ILS in intemperate weather.

Meanwhile, a flight trial in Blagnac will aim to validate a flight's autoland performance using GBAS CAT II/III airborne equipment and ground station. Autoland, an automated landing system, is considered a prerequisite for increasing runway throughput during low visibility operations. The exercise will aim to show that unlike ILS, GBAS is capable of managing complex simultaneous approaches across multiple runways.

Expected outcomes:

- Increased runway capacity due to the ability to reduce arrival spacing between aircraft, and simultaneous use of multiple runways
- Reduced installation and maintenance costs compared to ILS
- Limited impact on ATC workload.
- Improved interoperability between air and ground during approach and landing.

CWP Airport

Through real-time simulations, this exercise will validate the usability of an integrated HMI for an advanced Tower CWP considering new features for surface management operations related to routing and guidance, Airport Ground Light procedures and data link-taxi (D-Taxi).

The simulations will aim to validate the logic and functionality of the HMI prototype when the Advanced CWP is exercising surface-in and surface-out procedures. Specifically they will assess its usability to support the ATCO in coping with various conflict and hazardous scenarios.

The simulations will help to identify the operational, human factor and safety requirements, as well as assess the suitability of the prototype for use at small-to-medium sized airports.

Expected outcomes:

- Reduction in the number of screens and interactive technologies used by controllers
- Optimised HMI interface, providing controllers with a clear picture of the current traffic situation and with all the necessary traffic information to assist them in their control tasks.

Remote Tower

A shadow mode trial planned at Saarbrücken airport will assess the basic functionalities needed to provide air traffic control remotely to an airport with low-to-medium density traffic (e.g. 20,000 movements a year or less). The trial will assess whether the Remote Tower concept, which was validated in Release 3 at several Scandinavian airports, can be applied to the remote control of traffic in a medium traffic density airport environment in Germany.

A second shadow mode trial at Röst airport and Vaeröy Heliport will validate the feasibility of providing simultaneous air traffic services to multiple remote aerodromes by a single operator. The trial will assess, in a variety of conditions, how the use of a remote tower for multiple locations can affect service provision, safety and aerodrome and ATCO efficiency.

Expected outcomes:

- Identification of a core set of functionalities needed to provide air traffic control to airports with small-to-medium sized traffic density
- Improved traffic handling capacity, in the case of bad weather conditions, and a more efficient use of human resources.

NETWORK COLLABORATIVE MANAGEMENT AND DYNAMIC CAPACITY BALANCING

Airspace management and Advanced Flexible Use of Airspace (AFUA)

Two exercises, real-time and fast-time simulations in Brétigny and Langen, will evaluate real-time airspace data exchange between civil and military ATM systems in order to assess the technical feasibility and safety of a CDM process between these systems.

In the real-time simulation, the CDM will be made possible by connecting three systems, the Network Manager, Langen CWP and Airspace Management tool and the Maastricht Airspace Management tool. The aim is to validate the technical feasibility and safety of automatically updating airspace reservation/restrictions (ARES) on the CWP.

In a fast-time simulation within a free route environment, new procedures will be assessed that deal with planning ARES according to the Variable Profile Area (VPA) principle. The principle seeks to offer a flexible use

of portions of airspace to fulfil mainly military needs, restricting airspace use for other airspace users by only a necessary minimum. Ultimately the exercise will evaluate the feasibility of the VPA supported by business-to-business applications.

Expected outcomes:
- Safe and better CDM between civil and military ATM systems as a result of real-time airspace data exchange
- Increased airspace available to airspace users, enabling optimum trajectories and improved flow management due to better Demand and Capacity Balancing
- Better fuel efficiency due to more optimum trajectories.

Enhanced Air Traffic Flow and Capacity Management (ATFCM) processes

Taking place in Toulouse, Brétigny and Brussels, these exercises will focus on validating a prototype aimed at reducing sector complexity and ATCO efficiency.

The exercises will assess the use of STAM procedures for arrival flows, and their impact on traffic counts.

They will also determine the roles and responsibility-sharing between various STAM actors, and evaluate a prototype that supports STAM coordination workflow.

Expected outcomes:
- Feasibility of introducing STAM in environments currently not practising these procedures
- Validation of pre-industrial prototype tool supporting the STAM co-ordination workflow
- Improvement to air traffic flow through harmonised operational procedures and processes
- Better predictability and ATCO efficiency in complex traffic scenarios.

User Driven Prioritisation Process

The exercise will evaluate the cost effectiveness and flexibility of swapping pre-allocated slots between airlines. Known collectively as User Driven Prioritisation Process (UDPP), the procedure aims to expand the slot swapping process, which was previously only feasible within one and the same airline.

Expected outcomes:
- Greater equity by increasing the swapping opportunity to all airlines
- Optimised Air Traffic Flow and Capacity Management (ATFCM) network performance.

SYSTEM WIDE INFORMATION MANAGEMENT (SWIM)

Aeronautical Information Management/ Meteorological Information (AIM/MET)

Using real-time simulation, this exercise in Vienna will validate whether the provision of Digital NOTAM (Notice to Airmen) and digital MET data can enhance electronic pre-flight information bulletin services (ePIB) with a view to improving information transfer.

It will also assess whether ePIB that contain Digital NOTAM and Digital MET data can:
- Assist pilots in creating a mental map of the status and condition of the airports, airspace and the Communications, Navigation, Surveillance (CNS) environment, as relevant for their flight
- Reduce risks of misunderstood or missed information in the pre-flight briefing phase;
- Increase the pilots' confidence that all the information required for pre-flight briefing was seen and understood
- Facilitate an enhanced filtering mechanism that can be customised based on pilot needs (such as trajectory-based filtering, time-based filtering) and to prevent information overflow.

Expected outcomes:
- Improved efficiency of information transfer to pilots
- Improvements in the quality of information transferred by reducing irrelevant notifications
- Reduction in the risk of misinterpretation of messages by pilots thanks to machine interpretable NOTAM
- Increased satisfaction experienced by pilots, dispatchers and other users when retrieving and browsing ePIB information.

CONFLICT MANAGEMENT AND AUTOMATION

Conflict detection, resolution and monitoring

This real-time simulation in Southampton will assess the performance delivered by a set of Enhanced Medium Term Conflict Detection and Resolution (CD/R) tools for the Planner and Tactical Controllers operating in en-route sectors and taking into account i4D flights, mixed flights environment (i4D and non-i4D flights) and what-if capability.

Specifically the exercise will assess how these CD/R tools improve efficiency and quality of service; en-route capacity; flight efficiency and predictability. It will also evaluate the safety and cost effectiveness of introducing such tools.

Expected outcomes:
- Better precision and earlier identification of conflicts by controllers, leading to fewer conflicts and false alarms taking place, and ultimately increased safety
- Increased cost-effectiveness and capacity, and better fuel efficiency due to tools that allow for more accurate trajectory prediction and the use of "what-if" functionalities to look at what happens when routes deviate.

Integrating of Airborne Collision Avoidance System (ACAS) alerts into CWP

Taking place in Langen, this real time simulation will evaluate a set of requirements for the display and use of ACAS Resolution Advisories (alerts) downlinked on the CWP.

During the replay of real encounters, Resolution Advisories will be displayed on the CWP, while Short Term Conflict Alert (STCA) will also be integrated, so ground-based and airborne-based alerts can be evaluated simultaneously to assess their ability to work together.

Expected outcomes:
- Increased safety due to enhanced controller situational awareness, as a result of the use of a downlink of Resolution Advisories.

Figure 3: How the SESAR Release process contributes to the Master Plan Key Features

Key Feature	Release 1	Release 2	Release 3	Release 4
Moving from Airspace to 4D Trajectory Management	• Approach procedures with vertical guidance (APV) • Integrated controller working position	• Free Routing • Business and Mission Trajectory Flight Planning	• ATS coordination procedures for ATS Units including coordination & transfer of flights	
Traffic Synchronisation	• P-RNAV in a complex TMA (full implementation) • Point Merge in a complex TMA • Enhanced Airborne Collision Avoidance System (ACAS) • AMAN & Extended Horizon • AMAN-DMAN Integration • Controller working position enhancements • Initial 4D (i4D) & Controlled Time of Arrival – initial operations	• Airborne Spacing, Sequencing and Merging • Initial 4D Trajectory (i4D) & Controlled Time of Arrival – Time management • Arrival Manager (AMAN) and Extended AMAN Horizon with precision Navigation in complex TMA • AMAN and Point Merge in extended TMA • Point Merge in a complex TMA using P-RNAV for Continuous Descent Approaches (CDA)	• Airborne spacing (ASPA) Sequencing and Merging (S&M) for TMA • Traffic sequencing assistance for Initial 4D Trajectory Management and Controlled Time of Arrival	• Integration of Airborne Spacing manoeuvres into an AMAN extended horizon environment • Integrated arrival and departure management • Extended AMAN horizon for cross border arrival management • Airborne Separation Assistance System (ASAS) Spacing Applications • Approach procedures with vertical guidance
Network Collaborative Management & Dynamic/Capacity Balancing	• Short-term Air Traffic Flow and Capacity Management (ATFCM) measures improvements	• Airspace Management and Advanced Flexible use of Airspace – sharing of real time airspace usage	• Enhanced flight planning considering 4D profiles or 4D data • Network Operation Plan update with Airport Target Time of Arrival data	• Airspace management and Advanced Flexible Use of Airspace (AFUA) • Enhanced Air Traffic Flow and Capacity Management (ATFCM) processes • User Driven Prioritisation Process
System Wide Information Management			• Air and Ground Data Sharing in support of ATS coordination procedures for coordination & transfer of flight	• Aeronautical Information Management/ Metrological information (AIM/MET)
Airport Integration & Throughput	• Controller working position - Data entry to CFMU • Remote Tower	• Situation awareness improvements at controller working position • Airport Safety Net tool supporting clearances for the runway controller • Use of Time-Based Separation Minima • Surface Planning and Routing • Remote Tower, single airport ATS	• Low Visibility Procedure using GBAS • Airport Safety Nets for incursion detection • Remote Tower, single airport, ATS & FIS • Runway Occupancy Time Management through Brake to Vacate performance • Integrated Airport Operations Management by use of Airport Operations Plan (AOP) link to Network Operations Plan (NOP)	• Low visibility procedures using Ground Based Augmentation System (GBAS) • CWP Airport • Remote Tower
Conflict Management & Automation	• Sector Team Organisation & task sharing • Enhanced Short Term Conflict Alert (STCA) • Complexity Assessment & Resolution • Controller working position enhancements	• Enhanced Conflict Detection & Resolution tools for high density operations • Tooling for complexity and density assessment related to capacity • Sector Team Operations – multi-sector planner	• Enhanced Ground Based Safety Nets using aircraft derived data in Short Term Conflict Alert (STCA)	• Conflict detection, resolution and monitoring • Enhanced Medium Term Conflict Detection and Resolution • Downlink of ACAS Resolution Advisories on CWP

(1) Please note that the objectives mentioned under each Release may include more than one exercise

06 Conclusions and outlook

Release 4 builds on the knowledge and experience gained in previous releases to produce a comprehensive validation plan. This incremental approach to validating solutions allows SESAR to stay in tune with and responsive to the needs of the aviation industry, as they evolve. The 20 exercises are expected to demonstrate that the solutions included in Release 4 are sufficiently mature, allowing for a decision to be taken for their industrialisation and subsequent deployment.

At the same time, the Release work is guided by the European ATM Master Plan, which provides a well-defined roadmap on how to make change happen in the ATM system in the long term. Release 4 will undoubtedly add to the solutions that have already been developed, of which 15 are mature enough to be considered for deployment (end of 2013), thus delivering further concrete benefits to the entire ATM community, both today and in the future.

Release 4 involves a significant amount of coordination and planning between SESAR Members and validation sites across Europe. It is therefore also proof of the strong partnership that underpins the SESAR Programme. SESAR Members show that, by working together, real changes in the ATM domain are achievable.

07 Glossary of terms and abbreviations

ACAS	Airborne Collision Avoidance System
AFUA	Advanced Flexible Use of Airspace
AIM	Aeronautical Information Management
AMAN	Arrival Manager
ANSP	Air Navigation Service Provider
APV	Approach Procedure with Vertical guidance
ARES	Airspace Reservation
ASAS	Airborne Separation Assistance System
A-SMGCS	Advanced Surface Movement Guidance and Control System
ASPA	Airborne Spacing
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ATFCM	Air Traffic Flow and Capacity Management
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
AU	Airspace User
CAT	Category (ILS)
CDM	Collaborative Decision Making
CNS	Communications, Navigation, Surveillance
CTA	Controlled Time of Arrival
CWP	Controller Working Position
DCB	Demand and Capacity Balancing
DMAN	Departure Manager
E-TMA	Extended Terminal Manoeuvring Area
EUROCAE	European Organisation for Civil Aviation Equipment
GBAS	Ground Based Augmentation System
GNSS	Global Navigation Satellite System
GUI	Graphical User Interface
HF	High Frequency
HMI	Human-Machine Interface
i4D	Initial 4 Dimension
ILS	Instrument Landing System
LVP	Low Visibility Procedure
MET	Meteorological Services
MTCD	Medium-Term Conflict Detection
NOP	Network Operations Plan
NOTAM	Notice to Airmen
R&D	Research and Development
RA	Resolution Advisories
RNP	Required Navigation Performance
S&M	Sequencing & Merging
SMGCS	Surface Movement Guidance and Control System
STAM	Short-Term ATFM Measures
STCA	Short Term Conflict Alert
SWIM	System-Wide Information Management
TBS	Time-Based Separation
TMA	Terminal Manoeuvring Area
TSAT	Target Start-Up Approval Time
UDPP	User Driven Prioritisation Process
VPA	Variable Profile Area

SESAR JOINT UNDERTAKING

www.sesarju.eu

Members

Aena · AIRBUS · Alenia Aermacchi A Finmeccanica Company · DFS Deutsche Flugsicherung · dgac DSNA · ENAV · FREQUENTIS · Honeywell · indra · NATMIG · NATS · noracon · SEAC · Selex ES A Finmeccanica Company · THALES

Associate Partners

AVTECH · Belgocontrol · BOEING · Luchtverkeersleiding Nederland Air Traffic Control the Netherlands · NLR · NAV NAV Portugal, E.P.E. · NATS services · LOCKHEED MARTIN We never forget who we're working for™ · POLSKA AGENCJA ŻEGLUGI POWIETRZNEJ POLISH AIR NAVIGATION SERVICES AGENCY · SEA AEROPORTI DI MILANO · skyguide · ThalesRaytheonSystems · THALES AUSTRALIA

Associate Partners to the SESAR Joint Undertaking

ACSEP ACademia at SESAR · ATM-FUSION · AT-One · innovate · MOSIA · Optpromise · MAGNITUDE CONSORTIUM

MG-AC-14-001-EN-C

IMPRINT ISBN 978-92-9216-013-5 - DOI 10.2829/21058 - ISSN 1977-4109 © SESAR Joint Undertaking, 2014

Publisher
SESAR Joint Undertaking
Avenue de Cortenbergh 100
B-1000 Brussels

Phone: +32 2 507 80 00
Fax: +32 2 507 80 01

Executive Director
Claude Chêne

Editors
Triona Keaveney
Christine Stewart

For more information about this publication, reactions or subscriptions, please write to communications@sesarju.eu.