



BULLETIN

AEROSPACE EUROPE



INTERVIEW WITH FLORIAN GUILLERMET

EXECUTIVE DIRECTOR OF SESAR JOINT UNDERTAKING



COUNCIL OF EUROPEAN AEROSPACE SOCIETIES

INTERVIEW OF FLORIAN GUILLERMET, EXECUTIVE DIRECTOR, SESAR JOINT UNDERTAKING

By Jean-Pierre Sanfourche, Editor-in-Chief



Florian GUILLERMET was appointed as Executive Director in April 2014. Florian is responsible for leading the SESAR JU public private partnership, which is modernising Europe's air traffic management system. Florian has worked in the civil aviation field for 20 years. He is an engineer and graduate of the

École polytechnique and Civil Aviation Engineering School in France. He holds a master's degree in aeronautics and airport management.

Jean-Pierre Sanfourche: *SESAR JU is working in view of the future SES (Single European Sky). Precisely, I would like to start our conversation by considering the status of progress of the SES Project. I know that recently IATA urged the European Commission to press ahead with SES: in effect SES has not delivered in important areas like integration of the airspace in Functional Airspace Blocks (FAB) and improvement of cost-efficiency of European ATM network. It also appears that the European Single Sky needs to be sharpened. The 2nd SES package (SES 2+) has been launched some months ago: what is your judgement about SES advancement and perspectives at mid-term time horizon?*

Florian Guillermet – IATA's call to move ahead with the Single European Sky (SES) is one echoed by other stakeholders because they see the potential that this policy can unlock, in terms of delivering a greener, safer and more efficient air transport system in Europe. There is a growing consensus also that technology can act as a potential enabler for the gradual establishment of a more integrated operating airspace. SESAR, as the technological pillar, works closing with the other pillars that make up the SES framework to ensure that the technologies are delivering the required performance for the network in terms of safety, capacity, the environment and cost efficiency. There is always room for improvement in this regard, which is why we regularly review with all the stakeholders the European ATM Master Plan – the roadmap which defines the research and development, and deployment activities for SES/SESAR for the coming years. In doing so, we can adapt to changes in the regulatory and operational landscape, while ensuring alignment with the high level performance goals of SES.

JPS: *From SESAR 1 to SESAR 2020: could you summarize the major achievements of the works accomplished until now and the most important goals which have been assigned by the EC for the three first years of H2020 in the three key areas which are Airport Operations, Network Operations, Air Traffic Services and Technology Enablers?*

FG – The success of SESAR is first and foremost the partnership that we have forged between stakeholders across the entire ATM community. With the support of our founding members, the European Union and EUROCONTROL, we have pooled the resources of over 100 companies, as well as research centres, universities and SMES, bringing together more than 3,000 experts in the field of ATM and aviation. These experts work in small project teams under time pressure of 2-3 years. In this way, SESAR encourages risk taking, and is more agile and responsive to emerging trends both within aviation and in the broader industry landscape.

The level of cooperation that the programme has generated has been unprecedented and it is the motor that has enabled us to fast-track modernisation efforts in a way that seemed impossible ten years ago. We have managed to shorten the innovation lifecycle from 30 years to 5 years (e.g. remote towers, extended arrival management).

We have succeeded in establishing SESAR has created an innovation pipeline through which promising ideas are explored and then moved out of the 'lab' into real operations. This is done in three distinct strands: exploratory research, industrial research and validation, and demonstrations. Thanks to this intensive work, we have been able to deliver more than 90 industrial prototypes as well as over 60 new or improved operational or technical solutions. These solutions provide all the material needed for stakeholders to deploy them, from the operational and technical specifications, to the supporting regulatory, environmental, safety and human performance assessments.

Approximately two thirds of these solutions are part of deployment activities in Europe (local and synchronised). Here are just some examples: *see page 7*.

SESAR also supports Europe's role as a world leader in aviation, as solutions are designed to be globally interoperable, contributing to the global harmonisation efforts. This has been achieved by SESAR through extensive worldwide outreach through cooperative agreements with key regions including Asia, America and the Middle East, and relevant organisations such as the International Civil Aviation Organization (ICAO).

JPS: *The world of aviation is changing. How is SESAR 2020 addressing these challenges?*

FG – The world of aviation is changing. Starting with the aircraft, which is set to become more autonomous, more connected, more intelligent, and more diverse. Air traffic is projected to grow significantly, moving from several thousands of conventional aircraft in operation every

Remote tower services: Remote tower technology draws on a range of advanced technologies, including high-definition, infrared and pan-tilt-zoom cameras to provide visual surveillance augmented by available radar and flight data to deliver additional information in real time. With this sophisticated technology, an out-of-the-window view from the tower is captured and reproduced at a remote facility with the level of detail and accuracy required for controllers to provide safe and expeditious air traffic control services. The SESAR JU has delivered several remote tower solutions, including for single low-traffic density aerodromes and airports with medium-density traffic, and as a contingency. Following SESAR R&D, the world's first remote tower was opened in Sundsvall, serving Örnsköldsvik airport over 150 km away. Other implementations are underway across Europe and R&D is ongoing into other remote tower applications.

Extended-arrival management (E-AMAN) In November 2015, the solution entered into force in Heathrow Airport by NATS and sees controllers from the four countries working together, including France, to slow down aircraft when there are significant delays at the airport, reducing the amount of time they'd otherwise have to spend in the fuel intensive holding stacks just outside Heathrow. To date, NATS has recorded a reduction of up to one minute in holding times for those aircraft influenced by the solution. This translates into over 4,700 tonnes of fuel savings (or 220,000 saved trees), which delivers approximately EUR 2.9 million savings for airlines per year. The solution, which is part of synchronised deployment plans (PCP), has already been implemented in several other locations in Europe.

Ground-based augmentation system (GBAS): Aircraft have become 75 % less noisy over the last 30 years, but growing air traffic means that EU citizens are still exposed to high noise levels. SESAR members are researching enhanced arrival procedures enabled by a ground-based augmentation system (GBAS) to reduce noise impact of arriving aircraft at airports. Within this framework, in March 2017, Frankfurt became the first airport in the world to fully implement GBAS aiming to counteract noise pollution for the neighbouring populations.

Runway status lights: Paris-CDG is one of the busiest airports in Europe with 4 runways and 1,500 flights per day. In 2016, the airport inaugurated Europe's first runway status lights. This solution is a fully automated safety system, which provides crews and vehicle drivers with immediate and accurate indication of the runway occupancy status. The system is expected to reduce runway incursion by between 50% to 70% while increasing the airport's runway capacity.

day to potentially hundreds of thousands of air vehicles (such as drones and air taxis), operating in all areas, including cities. Services must also evolve as tomorrow's passengers increasingly expect smart and personalised mobility options that allow them to travel seamlessly and efficiently.

To deliver this new era of travel, digitalisation is key. With the technologies on offer, the air traffic management system will be able to handle the growth and diversity of traffic efficiently, safely and with minimum environmental impact. In doing so, we will be able to deliver the best possible passenger experience while also unlocking tremendous economic value for Europe. With SESAR 2020, are progressively integrating into the programme digitally-enabled solutions, in line with the EU Aviation Strategy and with stakeholders' needs both now and in the future. These cover:

- Higher levels of autonomy and connectivity of all (air) vehicles coupled with a smarter, more automated traffic management, enabled by an "intranet of flight."
- Mobile, terrestrial, and satellite-based communications, that can provide real-time vehicle trajectory information, shared between vehicles and with the ground infrastructure.
- Digital and automated tools on board the air vehicle itself or as part of the ground-based infrastructure.
- Virtual technologies to decouple the physical infrastructure such as sensors, communication, or navigation devices from the services that are provided to manage the airspace.
- High-tech video and synthetic and enhanced sensor technologies to operate air traffic services for airports or to enable aircraft to land in low-visibility conditions.
- Big Data analytics and open source data usage to create new services and to allow for more integrated passenger transport.
- System modularity to allow for scalable/easier upgrades and greater interoperability.
- System flexibility to handle an increasing number of air vehicles, such as drones.

SESAR 2020 is building on its predecessor, SESAR 1, to deliver high-performing operational and technological solutions for uptake by the aviation industry. Today, we have over 60 projects underway in all three strands of research: exploratory, industrial and demonstrations, addressing many of the above mentioned technologies. We are also preparing for the next wave of projects which will begin in 2019. It is expected that we will already have a first set of solutions from the programme by then.

JPS: *How is SESAR addressing the integration of drone into the airspace?*

FG – The expansion of the drone market is accelerating and people are beginning to understand that this not some gadget, but an air vehicle that can bring important economic and societal value. Transforming infrastructure

to support such operations will be critical to harnessing the potential of the sector, unlocking market growth, jobs and services to EU citizens. SESAR's mission is to develop an advanced aviation environment that supports the traffic growth for both manned and unmanned aviation. However, a simple adaptation of our ways of working will not be enough; we also need to introduce a new approach and this is where U-Space will play a central role in the future transformation of our skies. The notion of U-space was first mooted by Violeta Bulc, European Commissioner for Transport, who noted that "the U may be for urban but it is above all also for You"! Supporting the Commissioner's call, the SESAR JU delivered a U-space Blueprint outlining the services and framework needed to handle the increasing number of drones, especially in urban areas.

U-space is a set of new services relying on a high level of digitalisation and automation of functions and specific procedures designed to support safe, efficient and secure access to airspace for a large numbers of drones, with an initial look at very low-level (VLL) operations. As such, U-space is an enabling framework designed to facilitate any kind of routine mission, in all classes of airspace and all types of environment - even the most congested - while addressing an appropriate interface with manned aviation and air traffic control.

The timing for U-space is critical given the speed at which the market is growing. The aim is to have foundation U-space services in place by 2019. As a first step towards this target date, the SESAR JU launched a series of exploratory projects with funding from the EU's Horizon 2020 budget. Through these projects, we are bringing together established aviation stakeholders, academia and new entrants into the sector as well as stakeholders from other industries, such as those from the mobile communications industry. Another series of large scale demonstrations are scheduled for later this year.

Of course, drone integration is not just about handling VLL drone operations. The airspace must accommodate large certified remotely-piloted drones with manned aviation. These RPAS must be able to interact with ATM in the same way as manned aircraft, with special provisions designed to compensate for the fact that the pilot is not on board the aircraft. Mindful of this, the full spectrum of drone operations are captured in "Roadmap for the safe integration of drones into all classes of airspace", which the SESAR JU delivered to its Administrative Board in December 2017. The document outlines the research and development (R&D) needed, as well as a rollout plan for these activities, keeping in mind cyber security and other associated risks. Over the course of 2018, the roadmap will be integrated in the next edition of the European ATM Master Plan as part of the update campaign, supporting the allocation of resources for the development and the deployment of drone operations in all kinds of operational environments.

JPS: *Regarding environmental matters, how is SESAR linked with CLEANSKY, with AIRE (Atlantic Interoperations to Reduce Emissions), and other relevant organisations?*

FG - SESAR aims to contribute to the SES 10% CO₂ reduction target by reducing fuel burn by between 250 and 500 kg per flight by 2035 - this corresponds to between 0.8 to 1.6 tonnes of CO₂ emissions per flight.

SESAR Solutions are green/de-carbonised by design: all projects assess R&D according to key performance areas, including the environment. The innovation lifecycle for SESAR is much shorter than engine manufacture, so our green solutions are already generating benefits:

- E-AMAN: Since its initial introduction on a trial basis in 2014, over 4,700 tonnes of fuel savings (or 220,000 saved trees) have been enabled per annum, which delivers approximately EUR 2.9 million savings for airlines per year.
- DMAN for integrated AMAN/DMAN: Deployed at Paris Charles de Gaulle, the solution has resulted in an 8% reduction of taxi time, 4,000 tonnes of fuel savings annually, reduction of 13,000 tonnes of CO₂ emissions (170,000 trees saved) per year and a 10% increase of Calculated Take-Off Time adherence

In SESAR 2020, we have extended the scope of our environmental work to address noise pollution, looking in particular landing procedures that can mitigate noise for the populations in and around the airport.

JPS: *Towards Automated Flight Planning in Europe: a new digital tool able to provide Air Traffic Control centres across Europe was successfully tested by EUROCONTROL (NMOC) and Maastricht Upper Operations Centre (MUAC) in the last weeks. When do you think this digital flow tool can become operational and enter into service in the different countries of Europe?*

FG - The reader can refer to:

<https://www.sesarju.eu/news/sesar-demonstrates-benefits-digitalisation-better-air-traffic-flow-europe> (PJ24)

JPS: *A conference on future of digitalization in transport ("Digital Transport Days") was held in Tallinn, 16-18 October-2017. What are the major orientations expressed in the "Tallinn Digital Charter" which resulted from this working session?*

FG - European aviation and air transport leaders gathered in Tallinn to show their support for the digital transformation of their industry, and SESAR as the vehicle through which to achieve this ambitious goal. Initial analysis suggests that with a digitalised infrastructure, the industry could directly unlock around EUR 30 billion per annum. The meeting followed a declaration by industry underlining the urgent need to act now in order to enable more connected aviation ecosystem, and, with that, seamless travel and transport for all.

Given what's at stake stakeholders agreed there's no place for a silo approach in European aviation. We need

to work together to fully integrate the three components of the system: airspace, airport and aircraft enabled by technologies. They noted that we need to change our mindset and look at how we can create more value for our customers from digital technologies. They also agreed for the need to open up to those industries that are currently working outside our industry to achieve the digital transformation of aviation.

The SESAR JU and its members are now undertaking an in-depth stakeholder-wide consultation on the modernisation of Europe's aviation infrastructure and air traffic management (ATM) system. The results of this consultation will be published in the fourth edition of the European ATM Master Plan, due for publication at the end of 2018.

Detailed highlights:

- Digitalisation is not the goal but the means to ensure safe air connectivity with the lowest carbon footprint. A key issue is to have an open, progressive, risk-taking aviation ecosystem that nurtures innovation and ambition. Ultimately we need to change the mindset in Europe about embracing digital tech.
- Airspace is a finite resource that must be used more efficiently. However, one way of enhancing efficiency is via digitalisation and this is where we envisage opportunities for us. We believe there's a need for a more digitalised approach to coordinate all those entities that want to use airspace.
- There's no place for a silo approach in European aviation. We need to work together to fully integrate the three components of the system: airspace, airport and aircraft enabled by technologies. The European ATM Master Plan guides cooperation in aviation and is critical for the modernisation of the system.
- Regulators need to be proactive and as innovative as the technology on offer. The model for digital transformation should be based on great ideas but also tangible demonstrator projects.
- Passengers are the only focal point around which to discuss the future of aviation enabled by tech.
- We need to change our mindset and look at how we can create more value for our customers from digital tech.
- We need to open up to those industries that are currently working outside our industry to achieve the digital transformation of aviation. But whatever technological changes we make we have to be sure that the aviation system remains safe and secure.

JPS: *Inmarsat has signed an important contract with ESA to develop satellite services enabling 4D trajectory, which would constitute quite a major step forward in the ATM modernisation process. What are your hopes in this research programme?*

FG – Stakeholders are looking at the next set of ATM-oriented space-based services that will be made possible thanks to Europe's global satellite navigation system, Galileo, the updated satellite-based augmenta-

tion system (SBAS), EGNOS Version 3, and Iris' SATCOM or other infrastructures such as Aireon's Space based ADS-B technologies. The move towards space-based services as the primary means for CNS offer many benefits to ATM, which is why the SESAR JU cooperates with the European Space Agency and The European GNSS Agency. Our ANSP members are showing that the number of terrestrial navigation aids can be reduced due to the flexibility of airspace design provided by PBN (including free routes), and the locations of this terrestrial support can be optimised. These technologies and resulting services will mean improved air-ground data exchange as well as increased flight predictability.

- The move towards space-based services as the primary means for CNS offer many benefits to ATM.
- Galileo - improved accuracy, integrity and resilience to the satellite navigation capabilities of today.
- ANSPs are showing that the number of terrestrial navigation aids can be reduced due to the flexibility of airspace design provided by PBN (including free routes), and the locations of this terrestrial support can be optimised. For example, in France there has been a reduction in the number of Cat I ILS infrastructure by up to 50%. Similar efficiencies can be expected within terrestrial based surveillance.
- In the communications domain, the Iris SATCOM system is set to complement the existing provisions for delivery of aeronautical telecommunications network (ATN) data link in continental Europe. This will increase the resilience and availability of continental controller-pilot data link communications (CPDLC), communications while also underpinning the i4D SESAR concept by increasing the bandwidth available for this essential data transfer. These technologies and resulting services will mean improved air-ground data exchange as well as increased flight predictability.

JPS: *Further testing activities are programmed at the end of 2018. They concern two SESAR projects which are progressing well: (i) Optimised Airspace User Operations; (ii) Advanced demand-capacity balancing. Could you in a few words give us some information concerning the main advances that will result from each of these research actions?*

FG – With our solutions, we aim to inject greater flexibility into the system to enable airlines and other airspace users to fly the most optimum trajectories, and making better use of the performance capabilities of the aircraft. Examples of solutions include:

- **UDPP** - The user-driven prioritisation process allows airlines to change the priority order of unregulated flights among themselves and in collaboration with the airport authorities. Airlines are given this flexibility in the pre-departure sequence (PDS) for last-minute disruptions, which usually lead to departure delays or cancelled flights.
- **Enhanced ATFM slot-swapping** - The SESAR solution

enhances slot swapping functionalities by making it possible to swap pre-allocated slots with allocated slots or carry out multiple swaps for a single flight. These functionalities allow airlines to swap between long-haul and short-haul flights, or split the delay assigned to one flight between a maximum of three flights.

- **Extended flight plan** - In Europe's future trajectory-based flight environment, where aircraft can fly their preferred flight paths without being constrained by airspace configurations, flight plan data will include additional information, which will allow both the Network Manager and the air traffic control units to have a more precise plan of how the aircraft will fly.

JPS: *What is the state of advancement of the cooperative agreement with the Global Navigation Satellite Systems Agency (GSA)?*

FG - The cooperation is being formalised. Technical cooperation is already underway.

JPS: *Are some evolutions foreseen in matter of SESAR general organisational structures (the different boards)?*

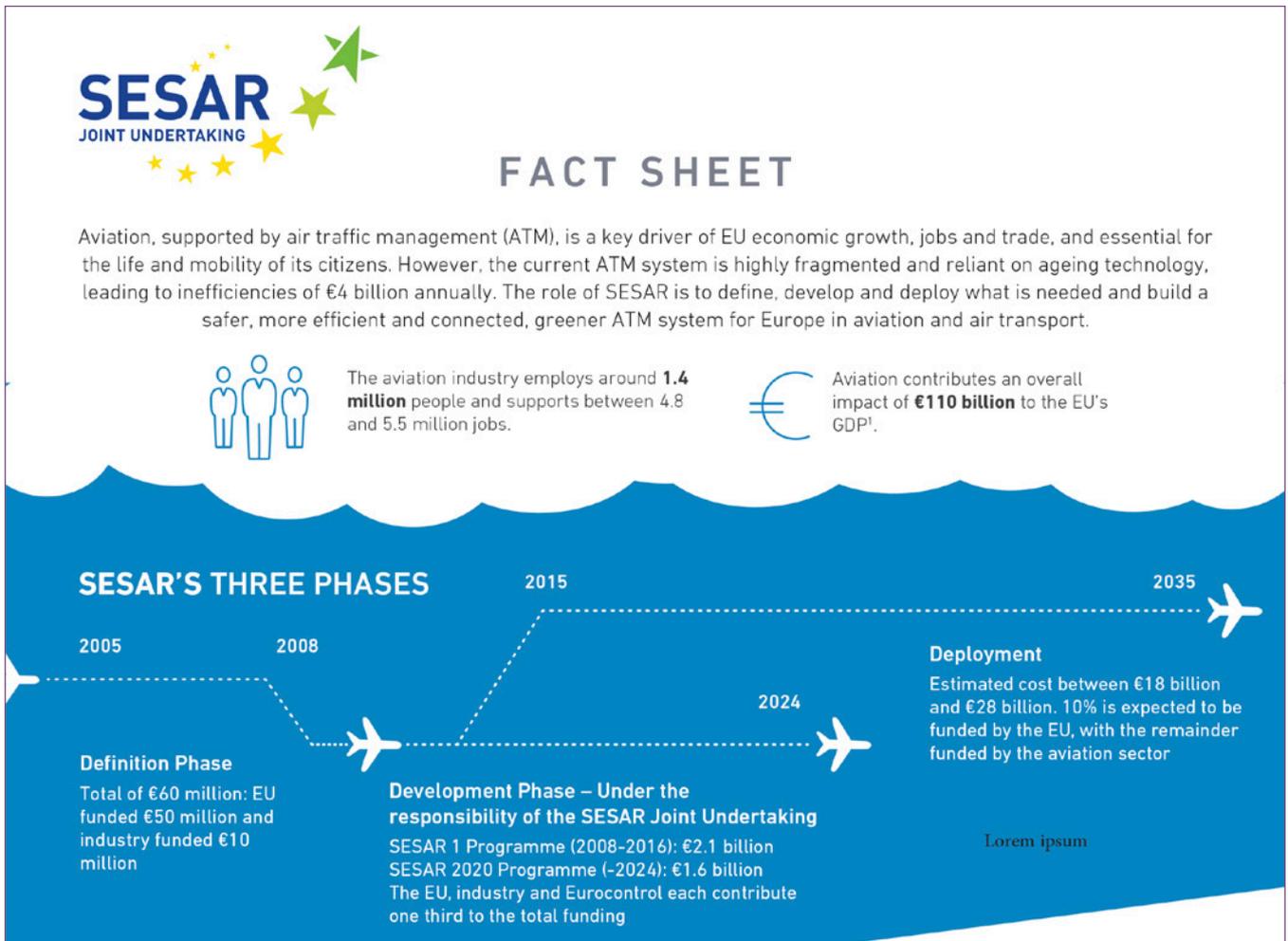
FG -The SESAR JU governance structure brings together

the European Union and Eurocontrol as founding members and 19 industrial partners. This core partnership, through consortia with third-parties, brings together over 100 companies and start-ups from across the aviation value chain. In addition, through open calls for exploratory research and demonstrations we are able to bring in academic research centres and universities, as well as new entrants. So our governance structure is paying off in terms of establishing a good cross-section of industrial and academic expertise and skills. Going forward, our aim will be to nurture the talent and skills of the next generation of aviation leaders, through a variety of educational and training activities.

JPS: *In conclusion of this interview, what are your top priorities for the coming months?*

FG - **The first priority** for SESAR will be to continue to deliver concrete results encouraging up-take by industry. These results will take the shape of operational and technological solutions, which will be published in the next edition of the SESAR Solution Catalogue, due for the end of 2018.

The second priority will be to prepare the ground for the future, which we will be addressed in the next edition of the European ATM Master Plan.



MILESTONES

In 2016, completion of SESAR 1 research activities and delivery of SESAR Solutions Catalogue.

In 2015, the world's first flight trial of a large civil drone integrated into commercial traffic.

The opening in 2014 of the world's first remote tower facility in Sweden. These towers can serve Europe's remote locations and boost regional economies. Sweden plans to launch another 12 remote towers in coming years. Germany and Ireland have expressed interest too.

In 2013, the SESAR JU delivered a first set of solutions selected by the European Commission for Europe-wide deployment², coordinated by the SESAR Deployment Manager. The 24 solutions to be deployed between 2015 and 2024 across Europe are expected to deliver approximately 12.1€ billion worth of performance gains for some 3.8€ billion of investments³.

The world's first flight in four dimensions (4D spatial dimensions + time) in 2012 and 2014 to enhance flight predictability and therefore punctuality and efficiency.



Conducted 300 industrial research projects



Digitisation

Remote tower & virtual tech rollout, better information exchange and cross-border collaboration, all air vehicles (including drones) integrated into Europe's airspace

OUR ACHIEVEMENTS

Since its establishment, the SESAR JU and members have taken ATM research 'out of the lab' into real systems and real-life air traffic operations across Europe and internationally. They have:



350 validation exercises



30,000 flight trials



More than 90 industrial prototypes



60 new or improved operational procedures and technologies (SESAR Solutions)



Dozens of exploratory projects to push the boundaries of ATM knowledge and aviation



Investment

1.4€b in R&D ((2024-2016)
3.8€b in 24 deployment solutions, EU-wide (2024-2015) generating 12.1€b in performance gains

BENEFITS

SESAR offers benefits in several key areas:



Decarbonisation

Greener flight routes, 500-250kg fuel savings per flight & 10kg per passenger



People

Shorter travel times, better mobility & connectivity, less noise & congestion around airports, consumer savings, 4-3 times better safety SESAR Solutions Catalogue.

SESAR 2020

SESAR 2020 provides the tools and funds to meet the goals set out in the EU Aviation Strategy for a Single European Sky. It builds on the results of its predecessor, capitalising on lessons learned, and helping to forge stronger relationships and focus energy on achieving critical scale to deliver market-ready innovations in a timely, cost-effective way.

Research and innovation activities will continue under SESAR 2020, with focus on four areas:



High performing airports (estimated 25% of 2020 industrial research budget)



Advanced air traffic services (24%)



Optimised ATM network services (14%)



Enabling aviation infrastructure (37%)

The programme will create an innovation pipeline, moving ideas into industrial research and large scale demonstrations.

- €20 million will ensure the safe integration of **drones** into airspace. By 2050, drones will represent a quarter of air traffic.
- €12-15 million will address **cyber security** to ensure information can be shared securely among all stakeholders.
- €85 million will be used to fund **exploratory research** projects.

² Commission Implementing Regulation (EU) No 716/2014 of 27 June 2014 on the establishment of the Pilot Common Project supporting the implementation of the European Air Traffic Management Master Plan

³ Official proposal on the content of the PCP (edition 1.0), 6 May 2013, SESAR Joint Undertaking. All figures are undiscounted.