



FROM INNOVATION TO SOLUTION

SESAR
JOINT UNDERTAKING



magazine

Editorial



Moving Forward

“ *On 1 September, I had the great privilege of taking up the role as Executive Director ad interim of the SESAR Joint Undertaking (SJU). My goal is to ensure the continuity of the SJU activities and a continued smooth connection between the SJU and its Members, until a new Executive Director is appointed in the spring of 2014. I am particularly pleased to have the opportunity to work with the very talented and committed SJU staff, and I am confident that together we can sustain the high level of competence already shown by the SJU until the end of my tenure.*

The importance of the SESAR programme and the SJU's work is widely recognised by and beyond those in the air traffic management (ATM) community. In an interview for this magazine, President of the Employers' Group of the European Economic and Social Committee (EESC) and former Vice-President of the EESC, Jacek Krawczyk, speaks about the EESC Opinion that he prepared on the Single European Sky 2+ (SES2+) initiative, in which he calls for a timely and comprehensive implementation of SESAR.

The aviation world is changing at an immense pace. While SESAR follows a detailed plan of action, the European ATM master plan, it also has the flexibility to take into account developments as they happen such as the integration into



Claude Chêne,
Executive
Director
SESAR Joint
Undertaking

the ATM system of Remotely Piloted Aircraft Systems (RPAS). In an article in this magazine, we hear about a recent call for demonstration project proposals to the tune of over EUR 4 million to deal with the safe integration of RPAS.

A comprehensive view of SESAR's solutions will soon be possible thanks to the development of the Solution Pack online portal. Each solution developed and validated by SESAR comes with extensive technical documentation, as well as regulatory and standardisation recommendations. I am sure that this new resource will help us to share our knowledge more widely and lead to new opportunities in the ATM field.

Of course nothing that SESAR does could be achieved without a strong spirit of cooperation and partnership. Our magazine therefore gets an insight into one of our long-term collaborators, the European Cockpit Association (ECA), which has offered the programme invaluable pilot expertise and perspectives over the years. Enjoy the read. ” ■

Claude Chêne, Executive Director,
SESAR Joint Undertaking



SES2+: There is no room for further delays

Jacek Krawczyk is President of the Employers' Group of the European Economic and Social Committee (EESC), former Vice-President of the EESC (2010-2013), and EESC rapporteur on the SES2+ initiative. In April, he drafted an Opinion in which he called for a timely and comprehensive implementation of SESAR. In this opinion piece, he summarizes what is at stake for Europe's economy to deploy SESAR and how stakeholders need to talk now in order to decide how to share the investment required.

SESAR is now the biggest and most important research and development (R&D) infrastructure programme in the European Union. The figures give a clear indication of its benefits: the generation of additional GDP of EUR 419 billion and the creation of some 328,000 jobs are more than welcome, especially at this time of economic crisis. The programme will have huge benefits for the European economy, but delivering it will require a tremendous amount of funding and a joint effort from all the stakeholders. As the EESC has emphasized in its Opinion, completing the SESAR programme will require major investments from all parts of the aviation value chain, but these will be difficult to justify unless an acceptable return on investments can be established, based on the synchronised deployment of air and ground elements, including Airspace Users, Air Navigation Service Providers (ANSPs) and airports. Moreover, when it comes to managing the deployment of SESAR,



Jacek Krawczyk,
President of the Employers' Group of the European Economic and Social Committee (EESC)

the operational investors (Airspace Users, ANSPs and airports) should be given a prominent role in implementing the priorities, for which a sound business case must be made. All the players involved must feel responsible for the further development of the programme. The role of public-private partnership will be crucial in this cooperation.

Sharing the burden and facing the challenge together!

The burden is currently falling unevenly on the different parts of the aviation chain, with the airlines in particular bearing the brunt of the fluctuations in fuel prices and changing passenger flows caused by the crisis. Figures show that most European airlines are in poor condition. According to a report from the CAPA Centre for Aviation, the 13 biggest European airline companies reported a 17% aggregate fall in operating profit to EUR 1,662 million (71% of this from the four low-cost carriers in the sample), while the operating margin fell by 0.5% to 1.5%. Naturally, full implementation of the SES is not a remedy for all the airlines' problems, but it will make them more competitive on the global market.

Airports are not doing well either. The 2012 ACI Europe Economics Report notes that, in 2011, the entire airport

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industry made an overall net profit of EUR 3.3 billion. However, it also stresses that only the larger and medium-sized airports are generally able to generate reasonable profits, whilst smaller airports (particularly those with under 5 million passengers per year) are getting very small returns for their efforts. As a result, in 2011, 42.5% of European airports were loss-making. The report goes on to conclude that, excluding non-operating income (where public support is accounted for), 50.9% of European airports would be loss making. At the same time, national ANSPs are in very good condition and are often treated by governments as a valuable and stable source of budget income, which explains the resistance to implementing the changes in European airspace.

Economics versus politics – the leading role of the European Commission

In the EESC's view, the European Commission should maintain strong leadership and responsibility throughout the entire implementation process. More powers should be given at EU and Functional Airspace Block level to help overcome the current problem whereby Member States focus on protecting their own national ANSPs rather than on creating value added for Airspace Users and customers/passengers.

The EESC stresses the need to safeguard the independence of the EU Performance Review Body (PRB), whose activities should be detached from those of EUROCONTROL and transferred to a full EU body under the Commission's responsibility. The EU should also give the PRB a stronger role in the process of establishing EU-wide performance targets and national performance plans. All stakeholders should be adequately represented.

Timely implementation of the SES initiative must be enforced through penalties for non-compliance. However, fines are only a part of the solution. We also need a "carrot and stick" approach. For example, rather than introducing price modulation for congested routes, it should be focused on motivating

aircraft operators to purchase the equipment needed to improve the overall performance of the ATM system. This could be achieved by using public funds to reduce user charges for those aircraft operators which invest early in SESAR technologies. This approach could then be accompanied by further measures such as the Best Equipped, Best Served Concept, which is fully supported by the EESC.

“ There can be no SES without SESAR and no SESAR without SES. ”

The changes are for the better so let's talk!

I believe that effective on-going social dialogue is essential to facilitate the transition process. If staff members are not fully engaged in this transition, the risk of failure will increase significantly. In particular, new technologies and operational concepts developed by SESAR will change the traditional role of air traffic controllers, who will henceforth be acting as air traffic managers.

Last, but not least we must not forget the project's public image. We need to promote the Single European Sky and SESAR, not as complicated and theoretical but as a passenger issue. Shorter flights, fewer delays, less fuel burned and lower CO₂ emissions – these advantages are well known to those already involved in the project but most Europeans are not yet aware of them. There can be no SES without SESAR and no SESAR without SES. Implementation remains a challenge and, after attending the last Informal Meeting of Ministers for Transport in Vilnius (16 September 2013), my conclusion is that the European Parliament, the European Commission and the EESC need to exert far more political pressure if the initiatives are to be delivered. 800 million passengers cannot be held hostage by one narrow group defending its own interests. ■

Focus on



Steering the safe integration of RPAS

The development of Remotely Piloted Aircraft Systems (RPAS) has opened a promising new chapter in the history of aviation. Being remotely piloted, RPAS can perform tasks that manned systems cannot perform, either for safety or monetary reasons. These remote systems are based on innovative developments in aviation technologies, offering developments which may open new and improved civil/commercial applications, as well as improvements to the safety and efficiency of civil aviation. RPAS can also bring significant economic and societal benefits through the creation of highly qualified jobs in manufacturing, operations and through the exploitation of the information acquired through RPAS.



In light of these significant benefits, the European Remotely Piloted Air Systems Steering Group (ERSG), established by the European Commission in 2012, has recognised a need to identify, plan, coordinate, and subsequently monitor the activities necessary to achieve the safe integration of RPAS into a non-segregated ATM environment. Given that the full integration of RPAS into the European ATM System is vital and that the mission of SESAR is to create the new generation of ATM systems and operations, RPAS will need to be incorporated into future SESAR solutions.

Against this background, in February 2013, the SESAR Joint Undertaking launched a call for proposals in order to select and co-finance a series of projects offering SESAR integrated RPAS demonstration activities. The

purpose of this call was to select a number of projects or activities, including integrated pre-operational flight trials activities, which aim to:

- Demonstrate how to integrate RPAS into non-segregated airspace in a multi-aircraft flight environment, with the purpose of exploring the feasibility of integration within the wider aviation community by 2016;
- Focus on concrete results filling the operational and technical gaps identified for RPAS integration into non-segregated airspace; and
- Capitalise on the SESAR delivery approach by providing synergies, risk and opportunities, with the overall SESAR programme.

RPAS explained

Whether an RPAS is an aeroplane, rotorcraft, airship, ornitopter or glider, or whether it is operated by battery or solar power, an RPAS is, above all, an aircraft. What differentiates an RPAS from another aircraft is that the cockpit is no longer on board the aircraft. An RPAS cockpit can be as simple as a handheld device or as sophisticated as a cockpit simulator.

Due to its high capability, performance, flexibility and low cost, RPAS can be used as civil/commercial aircraft, as well as state aircraft (Police or military aircraft), with special attention to:

- **Civil/Commercial use:** Commercial uses/services where RPAS can provide an added value if compared with the existing conventional assets;
- **Custom/Police aircraft use:** Typical operations with the aim to survey,

manage and control the National assets, goods, and citizens welfare/security;

- **Military use:** Typical operations for defence purposes, in conflict and non-conflict situations.

RPAS already has applications in both defence and security situations. Deployment of these aircraft by militaries worldwide has significantly risen in recent years and prospective civilian uses are leading aviation regulators to develop and adapt policies that will govern and facilitate the expansion of their uses.

The safe integration of RPAS into non-segregated airspace is being actively studied by the SESAR programme, as well as International Civil Aviation Organization (ICAO), the European Commission and the aviation industry at large.

“RPAS can perform tasks that manned systems cannot perform, either for safety or monetary reasons.”

As a result of the call, **9 out of 23 RPAS Demonstration Projects were selected, with a co-financing of EUR 4 million.** The selected Demonstration Projects represent **38 different partners from 8 different countries:** Czech Republic, France, Germany, Italy, Malta, The Netherlands, Spain and United Kingdom.

Each project includes an ANSP and Air Operators and will be carried out within the European Union and/or within EUROCONTROL's member states.

The Demonstration Projects will incorporate existing SESAR R&D and will also cover some of SESAR's focus areas, such as Airborne Spacing and Separation, Integrated Controller Working Position, Surface Planning and Routing, and Business and Mission Trajectory. Both optionally piloted and completely remotely piloted systems will be participating in the demo activities. Various types and sizes of RPAS, such as rotary wing, motor gliders, and light observation aircraft both civil and military, will be involved in the Demonstration Projects, which are expected to take place between the third quarter of 2013 and first quarter of 2015.

The full transparent integration of RPAS into non-segregated airspace will not happen overnight. The SESAR programme, along with its partners, hopes that this new wave of demonstration activities will be a first step towards achieving this pioneering goal. ■

The following projects were selected:

1. AIRICA - ATM Innovative RPAS Integration for Coastguard Applications	
Coordinated by: Nationaal Lucht-en Ruimtevaartlaboratorium (NLR)	Consortium Members: Netherlands Coastguards Glasmann Systems GmbH Royal Netherlands Air Force Command (RNLAf)
2. ARIADNA - Activities on RPAS Integration Assistance and Demonstration for operations in Non-segregated Airspace	
Coordinated by: Indra Sistemas S.A.	Consortium Members: Aeropuertos Españoles y Navegación Aérea (AENA) Centro de Referencia de Investigación, Desarrollo e Innovación ATM (CRIDA) FADA
3. CLAIRE - Civil Airspace Integration of RPAS in Europe	
Coordinated by: Thales UK Limited	Consortium Members: NLR NATS (En Route) Plc
4. DEMORPAS – Demonstration Activities for Integration of RPAS in SESAR	
Coordinated by: Ingeniería de Sistemas para la Defensa de España (ISDEFE)	Consortium Members: AENA Instituto Nacional de Técnica Aeroespacial (INTA) CRIDA Fundación Andaluza para el Desarrollo Aeroespacial (FADA-CATEC)
5. INSURE - RPAS Integration into non-segregated ATM	
Coordinated by: IDS Ingegneria Dei Sistemi S.p.A.	Consortium Members: Sistemi Dinamici S.p.A. Air Navigation Services of the Czech Republic
6. MedALE - Mediterranean ATM Live Exercise	
Coordinated by: Alenia Aermacchi S.p.A	Consortium Members: Selex ES ENAV NIMBUS Thales Alenia Space Italia
7. ODREA – Operational Demonstration of RPAS in European Airspace	
Coordinated by: Rockwell Collins France (RCF)	Consortium Members: Direction des Services de la Navigation Aérienne (DSNA) ENAC SAGEM Défense Sécurité
8. RAID – RPAS ATM Integration Demonstration	
Coordinated by: Centro Italiano Ricerche Aerospaziali ScpA (C.I.R.A. ScpA)	Consortium Members: Deep Blue SRL Nextant S.p.A. Nimbus SRL University of Malta (UoM) Malta Air Traffic Services Ltd (MATS)
9. TEMPAERIS - Testing Emergency Procedures in Approach and En Route Integration Simulation	
Coordinated by: DSNA	Consortium Members: Airbus ProSky Cassidian SAS STERIA Ecole Nationale de l'Aviation Civile (ENAC)

Figure 1: Spread of RPAS Demonstration Projects by location



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Unpacking SESAR Solutions

As a bridge from research and development to deployment, SESAR is continually looking for ways to share its innovative solutions as widely as possible. This reflects the SJU's commitment, as a publicly funded programme, to openness and transparency. That is why SESAR is launching SESAR Solution Packs, an online portal whereby ATM stakeholders can explore and make use of the concrete solutions that SESAR is delivering. The aim is to also demonstrate to audiences such as policy decision-makers and regulators, at national and European level, the operational, societal, environmental and safety benefits that SESAR's solutions will bring to the world of ATM.

“ Solutions are systematically validated in real operational environments in order to have conclusive and sufficient proof to support a decision for their industrialisation. ”

What are SESAR Solutions?

Solutions are operational and technological improvements developed by SESAR members and partners which aim to contribute to the modernisation of the European and global ATM system. Through the Release process, solutions are systematically validated in real operational environments in order to have conclusive and sufficient proof to support a decision for their industrialisation. Specifically, these solutions must demonstrate clear business benefits for the ATM sector when translated into their effective implementation. Since 2011, SESAR has been performing these validation exercises and has so far (end of 2013) generated 14 solutions. Further solutions

will be developed and validated between now and 2016, in alignment with the European ATM Master Plan.

Solutions in three steps

For every validated solution, there is a significant amount of documentation on the deliverables required for their industrialisation. Each solution comes with recommendations on the regulatory and standardisation frameworks needed. Up until now, this information has been shared with experts within the SESAR programme. With the SESAR Solution Packs, the aim is to provide a public space where audiences, both technical and non-technical, can get the information they need.

The Packs are displayed in three steps:






- 1. At a glance:** gives a brief description of the solution and the benefits it will bring to air traffic management
- 2. In context:** provides a summary of the validation process, performance achievements, benefits to ATM operations, and activities to be conducted before or part of deployment
- 3. Getting technical:** provides a pack of documentation, including validation reports, technical and interoperability specifications, and regulatory recommendations. Additional material may include safety and security assessments, and human and environmental performance reports.

Open access

The effectiveness of SESAR's solutions is extremely dependent on the ability of the aviation industry to move forward in a timely and synchronised way in their implementation. The launch of SESAR Solution Packs will enable the entire ATM community to actively explore how they can best benefit from SESAR's solutions, according to their own needs, to ensure that these innovative solutions become a reality.

Packed and ready to go!

The Solution Packs portal will be ready by the end of 2013 and will be officially launched during the World ATM Congress in Madrid from the 6th-8th March 2014. ■

Business needs	SESAR solutions - Release 1	SESAR solutions Release 2
 Moving from Airspace to 4D Trajectory Management	<ul style="list-style-type: none"> Validation of LPV, ATC Procedures and ATC Training 	
 Airport Integration and Throughput	<ul style="list-style-type: none"> CWP Airport - Low Cost and Simple Departure Data Entry Panel 	<ul style="list-style-type: none"> Time-Based Separation
 Conflict Management & Automation	<ul style="list-style-type: none"> Sector Team Organisation & task sharing Enhanced Short Term Conflict Alert (STCA) for TMA Operations 	<ul style="list-style-type: none"> Automated Support for Dynamic Sectorisation Sector Team Operations – multi-sector planner AOC Data Increasing Trajectory Prediction Accuracy
 Traffic Synchronisation	<ul style="list-style-type: none"> P-RNAV in a complex TMA Enhanced Airborne Collision Avoidance System (ACAS) DMAN Baseline for integrated AMAN DMAN 	<ul style="list-style-type: none"> Point Merge in a complex TMA AMAN and Point Merge in extended TMA
 Network Collaborative Management & Dynamic/ Capacity Balancing		<ul style="list-style-type: none"> User Preferred Routing

Release Results: paving the way for solutions!



The aim of SESAR's Release approach is to feed the aviation community with an incremental flow of new or improved ATM technological solutions at a pre-industrialisation stage. Results delivered through the Release process will gradually allow the European ATM network to evolve in accordance with the new SESAR paradigm, and thereby help the aviation community to overcome the constraints which currently limit the optimal performance of the ATM environment. The results of SESAR's Release 2 have been published, featuring 30 validation exercises, which took place throughout Europe in 2012. Release 2 focused on: refining the time-based separation minima between arrival aircraft; optimising the Air Traffic Control (ATC) sectorisation to better cope with the traffic demand; providing new direct routing for airlines; and increasing ATC efficiency. The Release identified a further seven solutions that are mature enough for industrialisation.

Member's profile



SESAR: A view from the cockpit



ECA Piloting Safety
European Cockpit Association

Every day more than 26,000 scheduled flights take off and land in Europe. Behind the scenes of these numerous take-offs and landings, air traffic controllers coordinate, communicate and interact with the pilots that ensure safe operations with (hopefully) minimal delays. This ATM system and its specificities for communication and exchange of information – while having been efficient in the past – is now lagging behind the technological developments and innovations in aviation.

Within a few years' time, a European pilot on a scheduled flight will program into the flight management system (FMS) a destination and arrival time. Dispatchers will have identified the optimum flight path, using continuous climb and descent approaches, the most economic altitude and speed. Data will be exchanged directly between the airborne and ground systems, giving better information and guidance for dealing with uncertain situations. This future scenario reflects the current SESAR objectives. The Programme, no doubt, will transform Europe's airspace and the way it operates, ultimately changing the roles and responsibilities of all front-end users.

This transformation, and the related transition, cannot happen without the active involvement of pilots, air traffic controllers and engineers in the development of new systems, providing their 'niche' operational expertise vis-à-vis new technologies and equipment. European pilots, as an essential stakeholder, have enthusiastically embarked on this ambitious project to improve and develop new ATM concepts and procedures in order to shape a more efficient and safer European sky.

Since the early start of the SESAR Definition Phase (2006-2008), the European Cockpit Association (ECA), representing the pilots' community at the EU level, has been closely involved in the SESAR Programme. Created in 1991, ECA is the representative body of European pilots and the European regional body of International Federation of Airline Pilots' Associations (IFALPA). ECA represents over 38,000 European pilots

from National Pilot Associations in 37 European states. ECA has long established itself as the active voice of pilots speaking with the European Institutions regulating European air transport, such as the European Aviation Safety Agency (EASA), the European Commission, the European Parliament and the Council of Ministers, as well as EUROCONTROL and the European Civil Aviation Conference (ECAC). Becoming a key stakeholder in the SESAR Joint Undertaking, in cooperation with other industry representatives, government and aviation stakeholders, has been a further way to express the pilots' determination for improving safety.



Pilots have actively contributed to the development of the new European ATM system since 2008 and will continue to do so when the Deployment phase of SESAR gradually starts taking effect. A team of 12 experts on behalf of all European pilots have contributed to projects dealing with airborne and ground safety nets, which alert controllers and pilots to an increased risk to flight safety; remote and virtual tower; airport safety support tools; airborne collision avoidance systems or weather forecast (MET), to name a few.

ECA's experts have also participated in a number of validation exercises, organised on a yearly basis by the SESAR Joint Undertaking, to measure the maturity of some key concepts and the robustness of the related breakthrough technologies. There is no better way to assess the feasibility, usability and acceptability

of advanced concepts and flight deck technologies than bringing in the perspective of line pilots. Sharing experience of daily operations, about what works and what does not work in reality is one of the biggest added-values that front-line operators can bring into such an ambitious R&D programme.

“ There is no better way to assess the feasibility, usability and acceptability of advanced concepts and flight deck technologies than bringing in the perspective of line pilots. ”

Yet, the complexity of the new ATM system and the related change in the role of pilots should not be underestimated, especially as ATM safety levels need to be improved at the same time. SESAR will bring a sweeping change to the way we fly in Europe. It will inherently affect the human performance requirements and it will both add new and redefine existing responsibilities of pilots.

Whereas today, pilots accept the flight plan submitted by their operator to the Network Manager (former CFMU amongst other functions), and rely on the possibility of making further adjustments during flight, tomorrow will bring a need to have better trajectory predictability. Although there will still be opportunities to adjust the trajectory during a flight due to unpredicted conditions, the core idea is that every crew complies with what was agreed upon between the operator and the Network Manager. SESAR also foresees for de-confliction tools to solve problems that may arise in real time, but the important thing is that the controllers will no longer be in a tactical mode influencing the individual trajectories. Controllers will rather have a more strategic role to manage the flows of traffic and oversee that everything runs smoothly. This means a major change for pilots who will be in a more active mode during the whole flight, making



sure that they comply with the agreed trajectory and analyse different options or scenarios in case of unpredicted events.

A further example of the new role and duties for pilots is the delegation of the separation in specific circumstances aided by tools such as those developed by the Airborne Separation Assistance System projects, in which ECA pilots are involved. This concept will be relying on an extensive use of supporting tools, predictive software and exchange of information, allowing for more precise trajectories to be calculated and flown. This however will pose a higher attention demand on the crews. The 4D trajectory, a cornerstone of the SESAR programme, will ensure computing of the most efficient trajectories for flights. The aircraft will fly the most efficient route available to a predefined point depending on information about weather and traffic conditions, with the ATM and aircraft computers exchanging relevant information via data-link. Yet, a strict 4D trajectory enforcement does not provide for unforeseen events, such as turbulence, evolution of thunderstorms or use of anti-icing devices, etc. Those situations require flexibility, which is a predominantly human strength. ECA's involvement in SESAR is a way to ensure this flexibility becomes inherent in the new operations and ATM technologies.



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Another example of how SESAR will change the role and responsibilities of pilots is related to the so-called ‘intranet’ of the future ATM system – System Wide Information Management (SWIM). Often described as a ‘one-stop shop’ for all the information needed in the air community, SWIM allows air crews to obtain near real-time information about air operations from the ANSPs. This flow of information will enable a swift, cost-efficient decision-making, especially in times of unforeseen circumstances (such as bad weather conditions, delay, etc). At the same time, the existence of this infrastructure will shift the focus towards collaborative decision-making. Although ‘collaborative’ might sound equal to ‘collective’, this cannot be the case. The decision-making process will

still require clear lines of accountability and the crews will have to remain the ones taking the decision when dealing with operational decisions that affect their own flight.

The European pilots’ community will continue its tradition of striving for a safer aviation industry in Europe, in line with ECA’s motto to ‘piloting safety’. Throughout every step of SESAR, European pilots will offer a view from the cockpit, share their expertise and invest time and efforts in a modern and ultimately safe ATM system that will be able to keep pace with the future needs of aviation.

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founding members



EUROPEAN UNION



EUROCONTROL