“Aviation in Europe and around the globe has seen some rocky times lately: economic downturn, ash cloud crisis, and a harsh winter. Passengers have suffered from severe disruptions. At the same time, recent projections show a doubling of flights by 2030 in comparison to 2009 levels. A modernised air traffic management system is an absolute need for the aviation industry. SESAR is set out to provide this. And we are presenting first achievements just as planned”, explains Patrick Ky, Executive Director of the SESAR Joint Undertaking (SJU) the reasoning behind the first SESAR Release.

Regrouping not reinventing
During the second half of 2010, the SJU together with its members closely

(Continued on page 2)
embedded in an international context. Beginning of February, the European Commission published its proposal for a Council decision on the Memorandum of Cooperation between the European Union and the US in civil aviation research and development which will also promote interoperability between SESAR and NextGen.

But of course we also have to look at the bigger picture. The SJU closely works with ICAO in a privileged partnership to advance common standards and procedures. Nancy Graham, Director of the ICAO Air Navigation Bureau, details ICAO’s view on the future ATM system in this issue of the SESAR magazine. Because we are pragmatic, we have also welcomed non-European members and associate partners from the US, Canada, Australia and Morocco in the SESAR family. Together, we are bound to deliver. The start of it is happening now.

Patrick Ky,
Executive Director of the SESAR Joint Undertaking

reviewed the status and timetables of the approximately 300 SESAR projects to see where early results can be achieved to quicker serve the aviation world. As a result, 29 validation exercises will take place this year with the aim of gradually introducing pre-industrial SESAR procedures, policies and products. Projects which are included in the 2011 Release will have been verified and validated in an operational environment, in order to enable actors to take industrialisation and deployment decisions. At the same time it is important to underline that work on the first SESAR Release represents only about 25% of the total programme effort planned for 2011. All other SESAR projects will continue to work towards the validation of the SESAR concept of operations, and might contribute to a second or third Release in 2012 or 2013.

Concrete benefits
With the first SESAR Release, the European ATM modernisation programme reveals initial components of the future European ATM system. The validation exercises will cover the areas of efficient and green terminal airspace operations, the initial 4D trajectory, end to end traffic synchronisation, integrated and collaborative network management. The concrete benefits for the different air transport actors will be:

- **Airlines** will start to save time and money through smoother and more direct approach procedures towards airports. 2011 will bring for example improvements to the operational procedures for Precision Area Navigation aiming at increasing capacity and lowering the environmental impact in complex terminal areas.

- **Pilots’ needs** are taken into account as of the first Release. Validation of initial 4D trajectory will pave the way for bringing pilots closer to the ideal flight.

- **Ports** will start to be better integrated into European network operations.

- **Improving the work environment of air traffic controllers** is part of the first SESAR Release. Enhanced human machine interfaces for controller working positions will ensure that all relevant information will be provided to the controller at the right time, in an easy and intuitive way. Advanced procedure for air traffic control (ATC) sector team organisation will enable the controllers to better cope with complex traffic situation.

- **Passengers** will profit from more timeliness and predictability. The first SESAR Release will entail exercises for the optimisation of departure and arrival operations.

- **Through more efficient flight operations, the environment** will benefit from lower fuel burn and consequently fewer emissions.

- **A better cost effectiveness** for ATM operations will result from the provision of air traffic services at one airport from a control facility located on another airport (remote tower operations).

Some examples
"It’s only with the members’ commitment that we will be able to achieve these results”, highlights Florian Guillermet, SJU Chief Programme Officer. By the end of 2011, 29 validation
exercises all over Europe will have been performed by the 15 SESAR members [see map]. Some examples of such exercises including their outcome are:

- SESAR member NORACON – a consortium consisting of eight air navigation service providers – will for example perform ATC services at Ängelholm airport from a remote site on a pre-industrial remote tower prototype. Remote tower technology will allow air traffic at small or medium-sized airports to be managed and controlled remotely from a single, larger air traffic services centre.
- At the Eurocontrol Maastricht control centre, a complexity prediction tool for air traffic controllers will be tested. The new tool set will help air traffic controllers to better anticipate and cope with complex traffic situations.
- Better synchronisation between the airfield and the network manager for improved departure precision is the goal of some of the NATS trials. Shadow mode trials will be exercised on two different prototypes.
- ENAV and DSNA will test prototypes for a new air traffic controller work station prototype with an improved ergonomic design.

Outlook

The planning for the Release 2012 will already start in March 2011 and will build upon the Release 1 activities. For the Release 2012 the SJU is expecting more exercises for even more concrete results. “Advancing ready-for-deployment procedures and technologies to incrementally deliver benefits to the aviation community is our goal. I am confident that we will achieve this with the restructuring process we have found through the SESAR Release”, says Patrick Ky.
Air traffic management modernisation on a global scale

The need for ATM modernisation has been recognised around the world. While the main programmes are SESAR in Europe and NextGen in the US, a number of other countries have launched their respective modernisation initiatives. Their interoperability is paramount and the International Civil Aviation Organisation (ICAO) is working hard to achieve consistency. Read in the interview below how the situation is perceived by Nancy Graham, Director of the ICAO Air Navigation Bureau, from an international perspective and what the next steps are to achieve global interoperability.

Mrs Graham, what is ICAO’s global vision on the air traffic management system of the future?

ICAO’s Global ATM vision is to achieve an interoperable global air traffic management system, for all users during all phases of flight that meets agreed levels of safety, supports the expected traffic growth, provides for optimum economic operations, is environmentally sustainable and meets national security requirements.

To satisfy this vision we need to accept the wide range of ATM and CNS needs of States and recognise there will be differences in the timing of system upgrades between States and regions. We therefore need to create a global framework, so that as we transition to the future we:

- Maintain or enhance safety;
- Harmonise individual regional ATM improvement programmes;
- Remove barriers to future efficiency and environmental gains at reasonable cost;
- Provide investment certainty for equipment manufacturers, infrastructure providers and operators; and
- Outline a regulatory approval process to support states in the introduction of such significant change.

With SESAR and NextGen, two major aviation players have launched air traffic management modernisation programmes. What are ICAO’s expectations in them?

ICAO expects these programmes will generate significant performance improvements over the current systems in Europe and the United States and realise gains in both effectiveness and efficiency while coping with the increases in capacity that are forecast. ICAO further expects that some of these improvements will have applicability in other regions and States generating a need for either compatibility or interoperability in systems at the global level. ICAO therefore has an opportunity to identify those operational improvements that are applicable to the global system, harmonise the infrastructure and procedures requirements, develop the business case and make them available to the global community ahead of them being needed and developed independently. This should provide some investment certainty for manufacturers, ANSPs and airline operators.

Both programmes are now in full development and research mode. What are your observations on how the work has been carried out so far? Where do you see main differences?

ICAO has been very pleased to observe that the work so far has been consistent with the ICAO Global ATM Operational Concept and the Global Air Navigation Plan and that they are very forward looking in their consideration of the projected growth of our industry. They are also performance oriented with clear targets to be achieved on the basis of common key performance areas. The challenges and cost equations however, are different, or manifest themselves at different times, in the two continental systems meaning that attention to specific elements of the system are not necessarily consistent in scope or timing. Where the two come together though, (management of traffic into and out of their FIRs, and the transatlantic operations in total), are of interest to ICAO both as international operations in, and of, themselves as well as the influence these two programmes will have on future ATM improvement programmes in the rest of the world. There are large implications for new air traffic procedures and aircraft equipage at these points. We therefore see a role for ICAO in providing a framework for the community to develop a set of globally interoperable aviation system block upgrades that will be placed into the Global Plan for the benefit of all the ICAO regions.
Harmonisation between SESAR and NextGen is a key issue – also for ICAO – with several initiatives already in place. What is ICAO’s role to facilitate this harmonisation?

I mentioned the consistency of both programmes with the Operational concept and the Global Air Navigation Plan but, as always, the devil is in the detail. We are very pleased to note these details are being analysed and assessed for compatibility in the research and development phase and mitigated through consultation. The Memorandum of Co-operation is a very effective medium for addressing these concerns and both programmes are taking these harmonisation responsibilities very seriously. ICAO is both impressed and relieved at the problems and issues that are resolved through this mechanism. We are also analysing the two programmes, in an effort to identify areas where International Standards and Recommended Practices will be necessary to enable harmonisation and interoperability.

What role will the 12th ICAO Air Navigation Conference next year play in this respect?

The 12th Air Navigation Conference is an exciting opportunity for the global aviation community to cement the near and mid-term future of aviation infrastructure and airborne equipage and to put strategies in place to focus the research and development for the longer term requirements. To achieve this, we see a need to revise the Global Air Navigation Plan to give it a bit more focus and to be more succinct about the operational capabilities that we will need to manage the various ATM system requirements around the world. SESAR and NextGen are being very supportive to ICAO in identifying those elements of the two programmes that have global applicability and therefore interoperability requirements. The 12th Air Navigation Conference will be the venue for all 192 States to continue (beyond the conference) to secure the future of our international system and ensure its interoperability at reasonable cost. We are working hard to make this a reality and looking forward to this important milestone.

Do you see other important air traffic management modernisation initiatives in other regions in the world?

Yes we do. Japan has already presented us with the contents of their Collaborative Actions for Renovation of Air Traffic Systems (CARATS), the Russian Federation, the Republic of Korea and China have alerted us to their ATM improvement programmes and a number of other countries noted that they had smaller improvement programmes under way during our recent Assembly meeting in October 2010. We have developed a mechanism to analyse these programmes for future global interoperability and provide certainty to those States that their initiatives are consistent with the rest of the world. Indeed there was an agreement at the recent 37th Session of the ICAO Assembly which requests all States undertaking ATM reform through improvement programmes, to present them to ICAO for harmonisation analysis. We are confident of receiving this information in the near future.

**SESAR in depth**

**Optimising tracking of aircraft**

Following the tragic loss of Air France Flight 447 over the Atlantic in June 2009, the European Commission asked the SESAR Joint Undertaking (SJU) to find solutions for the better tracking of aircraft in oceanic and remote low density airspace. The consortium responsible for the Oceanic Position Tracking Improvement & Monitoring (OPTIMI) project now delivered their report to the SJU with recommendations regarding technical, operational, economic and regulatory changes.

OPTIMI was launched with the aim to enable closer monitoring of aircraft movements in oceanic and remote areas, as well as to speed up rescue reaction times and accident analysis and diagnosis. After an initial analysis of the current situation from technical, operational, social, economic and regulatory perspectives, sets of in-flight demonstrations involving commercial flights in the North Atlantic, European and African regions of the Atlantic Ocean were carried out. Their objective was to assess the added value of using existing Automatic Dependent Surveillance-Contract (ADS-C) based flight tracking services and existing ‘Controller pilot data link communication’ (CPDLC) technology in combination with new procedures and protocols to achieve the necessary improvement of aircraft tracking.

**Recommendations**

The consortium carrying out the project on behalf of the SJU recommended on a technological level to encourage the equipage and use of Future Air Navigation System products (FANS 1/A) for Oceanic Area Control Centers and aircraft flying oceanic areas; this will cover in particular ADS-C and CPDLC. At the same time, improvements of procedures should be envisaged with the automatic transmission of the aircraft position in oceanic and remote areas in an interval of 15 minutes. An automatic transmission of the position should be triggered whenever a deviation from the planned route is detected. “Through OPTIMI, we will also increase aviation safety – says José Calvo Fresno – this is the best side-effect of a project ever.”
elements to improve aircraft tracking are already available. It is now important to make full use of this technology by proposing the necessary regulatory changes”, says José Calvo Fresno, Chief Regulatory Affairs of the SESAR Joint Undertaking.

Although the increase in the cost of ATC communications due to OPTIMI would be very limited, it was found possible to further optimise this cost along the service provision chain in the oceanic areas. The consortium also calls on rescue and area control centres to jointly develop protocols for notifications and interventions in emergency situations. Further research is also needed regarding technologies and procedures for the downloading of aircraft safety critical data to the ground on an event-triggered basis, together with the possibility of creating a central repository to manage this information. The SAT-OPTIMI project – a side project studying on how to make best use of today’s and future satellite communication for OPTIMI – will be dealing with these topics during the next three months.

International perspective
Taking the recommendations from this study, the SJU will also work closely with international partners to address the issue of improved search and rescue procedures as well as to verify the benefits of OPTIMI. Canada already participated in OPTIMI; and it is expected that Brazil and México will join soon through respective agreements at a technical level.

The way forward
The SJU, based on the final report of the OPTIMI consortium, will propose regulatory initiatives to the European Commission in the first half of 2011. There are several possibilities, from a purely prescriptive approach, in line with datalink regulation, to the use of incentive mechanisms exploring the performance scheme. There would be differences in the way each approach could affect airlines registered in Europe or abroad, for what the options will be carefully weighted. At the same time, the SJU is working with ICAO to promote these recommendations on a global basis.

The side effect
“While we originally intended to ‘only’ improve aircraft positioning and tracking, allowing for example a better reaction time in case of an accident, the study also showed that through the proposed actions, we will considerably lower the risk of mid-air collisions. OPTIMI will therefore increase safety. Air traffic controllers will be regularly updated on the exact aircraft position; should there be any potential problem, they will be able to act”, emphasises José Calvo Fresno this positive side effect of OPTIMI.

What is the need for OPTIMI?
- Locating planes over oceanic and remote areas – Currently, when a flight leaves areas that are well-covered by air traffic control (ATC) radar systems, the plane communicates its location to ATC services only occasionally. In the case of an accident this can increase the time taken for search and rescue services (SAR) to respond.
- Rapid reaction to accidents – Efficient SAR services are dependent on the location information in order to reach passengers rapidly.
- Accessing flight data and cockpit voice (‘Black Box’) recorders – In case of an accident, investigators depend on the data from the ‘Black Box’ to analyse causes. In oceanic and remote areas, their physical recovery is often difficult and time consuming.
- Avoiding future recurrences – Rapid diagnosis of the cause of an accident can reveal repetitive problems that may cause further occurrences. A quick diagnosis can prevent this.
It is generally recognised that airports represent the most critical element in air transport system and a major source of bottlenecks which risk hindering the future expansion of air traffic. This criticality derives from the simple observation that space becomes scarcer as the aircraft approaches the airport: while a three dimensional space is available to air traffic in the en-route phase of the flight, this is essentially reduced to two dimensions in the approach phase and to one dimension on the airport runway. It is therefore not surprising that airports have become a key focus of R&D as technologies and procedures are put in place to optimise the utilisation of airport resources.

SELEX Sistemi Integrati is a recognised leader in solutions for airports. It is also in recognition of this background that SELEX Sistemi Integrati is responsible for co-leading SESAR Work Package (WP) 12, which is tasked with implementing the Airport Systems.

A set of brief questions have been put to Marina Matrone, SELEX Consortium Airport Domain Manager, Carla Nese, WP12 Co-leader and Elisa Rosini, P12.1.7 Project Manager.

Marina, how large is the SELEX Consortium involvement in the airport domain and how have you set about organising the team?

The SELEX Consortium involvement in the airport domain extends to the participation in 27 projects, 21 from WP12 and 6 from WP6. Seven of these projects are directly led by the SELEX Consortium while the development of fifteen prototypes, five of which for step 1, adds to the complexity of the task. With 22 projects receiving the green light we have now mainly entered the execution phase and all effort is focused on working towards the objectives set for the airport domain.

In order to meet the challenges expected from these tasks a strong team has been created formed by around twenty people spread around Italy, Germany and the UK. Internal communication and sharing of information is an extremely important and challenging task on which we put a huge emphasis. I feel passionate about the need to create a motivated and winning team and information sharing is a prerequisite to achieve this objective.

Carla, which has been in your opinion the main achievements so far of WP12?

Our efforts have so far mainly focused on laying the ground and smoothing the way for the actual development work which lie ahead. Interaction with the operational projects in WP6 is a fundamental pillar for the success of the airport developments and I am very happy that an excellent working relationship has been built up in these months setting out the basis to define clear boundaries and interconnections between projects. Having completed most of the initiation activities and received a green light status, most of the WP12 projects are now well and truly on track to take on the challenges which lie ahead.

P12.1.7, which is a federating project, has been pivotal in the definition of the requirement framework which will guide the rest of the execution phase. The first SESAR Release, which includes three exercises involving four projects from the airport domain, represents the first real test as well as a great opportunity to keep our minds focused on the achievements of concrete results.

Elisa, project 12.1.7 ‘Airport Systems Specifications Drafting and Maintenance’ has been elevated to a federating project: How has this changed the nature of the project and your task of Project Manager?

It is a great privilege to lead a federating project although with this comes also the responsibility to deliver the objectives and expectations set out by SESAR. Our mission is to bring together knowledge and experience gained from current implementation activities into an innovative and challenging Airport System. In this context, the main objective of the 12.1.7 project is the consolidation of the new system requirements to produce and deliver the whole airport system specifications.

As leader of a federating project I have the unique opportunity of working with projects of the entire programme as well as the SJU. This position provides me with a broader view of the SESAR initiative and how the various bits fit together. I find it inspiring to gain a higher visibility into how our daily activities fit into a coherent overall vision.
AIRE: 5,000 trials in 2011

AIRE projects are steadily progressing. Following the selection of 18 new AIRE projects in July 2010, all the projects have, by end of February, delivered their detailed trial plans. More than 40 airline, airport, ANSP and industry partners will be involved in the estimated 5,000 flights demonstrating environmentally friendly procedures in operational conditions.

Among the projects is DORIS, ‘Dynamic Optimisation of the Route In flight’. Carried out by NAV Portugal, Air Europa, Iberia, INECO, AESA, and SENASA, the project tests and validates techniques for efficiency improvements in oceanic airspace flight trajectories currently on the routes Madrid-Cancun, Madrid-Havana and Madrid-Santo Domingo. Results are still preliminary, however the potential for both flight time and fuel savings has been observed. More than 300 flights are expected.

Transatlantic green gate-to-gate flights have also commenced with the Airbus A380 under the leadership of Airbus together with Air France, NATS, NAV CANADA supported by FAA. The trials are scheduled to last into the first quarter of 2011 accumulating about 20 trial flights. The expected CO2 gains are estimated in the order of three tons per flight, half of which on ground and the other half en-route.

VINGA, ‘Validation and Improvement of Next Generation Airspace’, is another interesting project run by LFV, in partnership with the Gothenburg Landvetter airport, Quovadis, Airbus and Novair. The project will conduct at least 100 validation flights using five newly designed approach procedures, compromising of four Required Navigation Performance with Authorisation Required (RNP AR) procedures, and for the first time in Europe, a RNP transition to Instrument Landing System (ILS) approach.

The results of all projects will be published in 2011 with the aim to further encourage the aviation community to put these green procedures – which can be applied with today’s technology – into daily practice.

Check out the improved website www.sesarju.eu. If you want regular news about SESAR, register to our newsletters!