

IMPROVING ATM NETWORK PERFORMANCE

# Skyway

magazine



SUMMER 2012

## IN THIS ISSUE:

ATM 2020: A NEW  
WAY FOR AIRCRAFT  
OPERATORS TO FLY

FINDING ROOM  
FOR FIGHTERS  
TO TRAIN

OPENING THE SKY  
TO UNMANNED  
AIR VEHICLES

# FOCUS ON AIRSPACE USERS

BEJ712

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**TRAFFIC JAM AHEAD.**

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NWA258

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BGT145

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UAL478  
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KLM1632  
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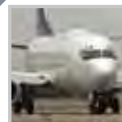
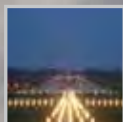
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## EDITORIAL

# FUTURE SUCCESS WILL DEPEND ON BETTER CONNECTIONS – BETWEEN PEOPLE AND COMPUTERS

Air traffic management (ATM) organisations have a tradition of doing some things very well and other things not quite well enough.

It is understandable that – because our core competencies are focused on the very complex task of creating an ATM system which is predominantly safe and increasingly cost-effective, efficient and environmentally responsible – in the past we have not spent enough time really exploring all the ways in which we could use our capabilities to support our customers.

This is changing. In fact, with the onset of the Single European Sky (SES) performance scheme, collaborative decision making, the business and mission trajectories as defined by the SES ATM Research (SESAR) programme and a host of other initiatives which will involve all aviation stakeholders, we are on the edge of a new era of much closer collaboration between the operational departments of air navigation service providers (ANSPs), airports and aircraft operators.

This will go much further than sharing a common set of data. It will mean that we really start to understand each other's businesses and this will take ATM organisations such as EUROCONTROL into relatively uncharted territory – which will require us to spend increasing

amounts of time in close dialogue with aircraft operators of all types so that we can fully understand the priorities they set for their different operations and how these can be accommodated within the future ATM system.

The transparency of decision-making based on accurate and timely data shared between us all could well be the catalyst to a new type of relationship between Europe's infrastructure providers and their aircraft operator customers. This is certainly a key priority for EUROCONTROL and in the pages of this issue of *Skyway* we are highlighting some of the unique data sets the Agency is developing. These will not just measure the performance of the ATM system across a range of areas but will provide airspace users with essential tools they will need to implement, for example, effective environmental mitigation policies.

Here's the real challenge. Automation is a vital element in improving the network but it will only be truly effective if we combine this with a more collaborative approach to finding solutions to common problems at a personal level. A seamless, gate-to-gate ATM system will only work if we agree not just the methods of communication but the fundamental principles behind which common decisions are reached. This will involve talking more to each other, person-to-

person, as well as computer-to-computer.

Some of the most important challenges we face in implementing a new ATM system for the continent involve a complex balance of interests. These can only be properly addressed when airport operators understand how tower controllers see the world, when tower controllers understand the priorities of aircraft operators and how everything connects. For example, when an airline decides to save fuel by employing single-engine taxiing from the runway to the terminal this could mean good news for the airline and the airport – it will be less noisy and less noxious – but it might not be quite such good news for the ATC system, as it could slow down traffic throughput on the apron and taxiways, adding to overall congestion levels, fuel burn and emission levels.

We explored this issue in depth in our article on developing new strategies to achieve our environmental targets.

The future will require some delicate negotiations. Many airlines and ANSPs will be reticent about re-equipping with expensive new technologies when not all the cost-benefit analyses will show a clear and substantial positive outcome in the first three years.

If we are to meet the performance targets that our



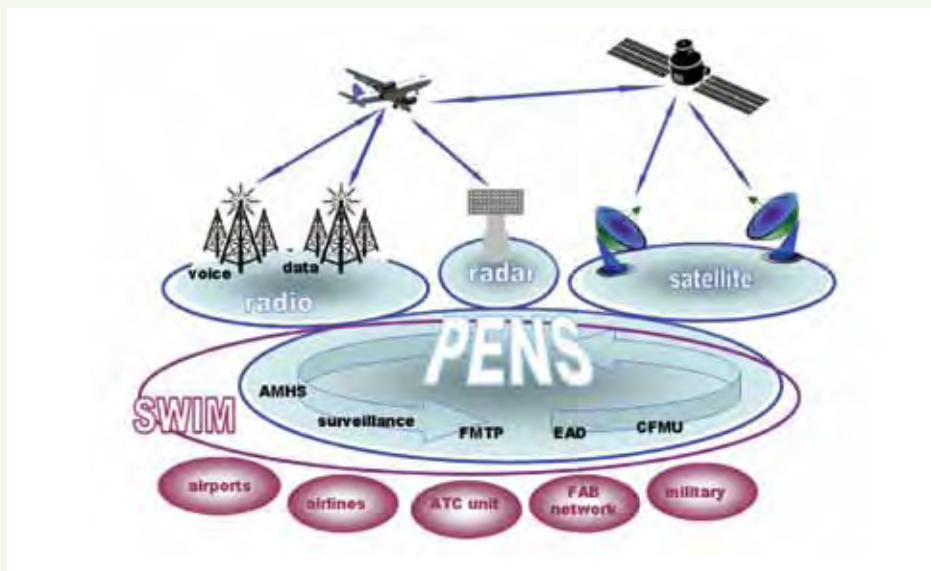
governments have agreed there will have to be an element of consolidation of ATM systems and equipment.

And on a purely tactical level, aircraft operators and ANSPs will sometimes need to take a decision to improve the overall performance of the network which will involve a commercial loss to their own operation. This is a sensitive and complex area, made even more complicated with the addition of military aircraft operators in the system.

The only solution is to understand each other's concerns much better than we do today. Without that we will simply not be able to fully optimise the new technologies and processes we are committed to introducing over the next few years. ■

**Bo Redeborn**  
Principal Director ATM

# Aena encourages the use of PENS in Spain



**P**ENS (Pan-European Network Services) is a joint EUROCONTROL/ANSP-led initiative aimed to provide a common IP-based-network service across the European region covering voice and data communication related to ATC/ATM services.

Its major goal is to provide efficient communication facilities to existing ATM applications as well as be compliant with the new requirements emerging from SESAR definition of future Air Traffic Management concept, mainly SWIM-like services.

PENS feasibility has positively been evaluated taking into account the benefits provided:

- Overall cost reduction in communication.
- Support ANSP in the migration from legacy communication infrastructure to the new IP-based one for applications like AMHS, OLDI/FMTP and surveillance.
- Support ANSPs in complying with some of the Single

European Sky Implementing Rules (i.e.: FMTP)

- Enabler of SWIM-based application environment.
- Enabler of VoIP communication systems.
- Provide a test platform to SESAR for the evaluation and validation of different work packages.

The initial contract to provide PENS backbone services has been jointly signed by a group of European ANSPs and Eurocontrol with SITA in October, 2009, for a seven years period.

Aena, with a vast experience in IP-based communication for ATC/

ATM related services, has pushed the deployment of PENS in Europe by means of its active participation in the PENS governance structure (the governance body: PENS Steering Services Group, PSSG, and the technical consulting one: PENS Users Group, PUG), carrying over tests involving different partners (DFS, DSNA, Eurocontrol, NATS) and different services (AMHS, FMTP and Surveillance) and pioneering the migration of operational services to the Pan-European network.

Aena has also been deeply involved in the SESAR activities mainly related to the Ground/Ground-SWIM backbone project, which has also validated PENS to provide VoIP communication services.

Additionally, EAD and CFMU services, which are supported by PENS to connect their main sites to the remote clients throughout Europe, are respectively already fully operational in Aena since end of 2010, and under migration process.

On top, Aena facilitates the PENS networking solution within Spain to the PENS CFMU customers by means of its highly advanced aeronautical data network, REDAN.





# SACTA-iTEC

## A new concept, a new generation of SACTA



The fourth version of the system for the automation of Aena's air traffic control, SACTA 4, will improve system capacity and operational productivity through the incorporation of a new generation of powerful ATC technologies.

The tactical MTCD, major improvements in trajectory calculations, and a new control position (iFOCUCS) will contribute functional advantages and essential technologies enhancing the harmonization and interoperability of European air traffic control as part of the Single Sky Initiative.



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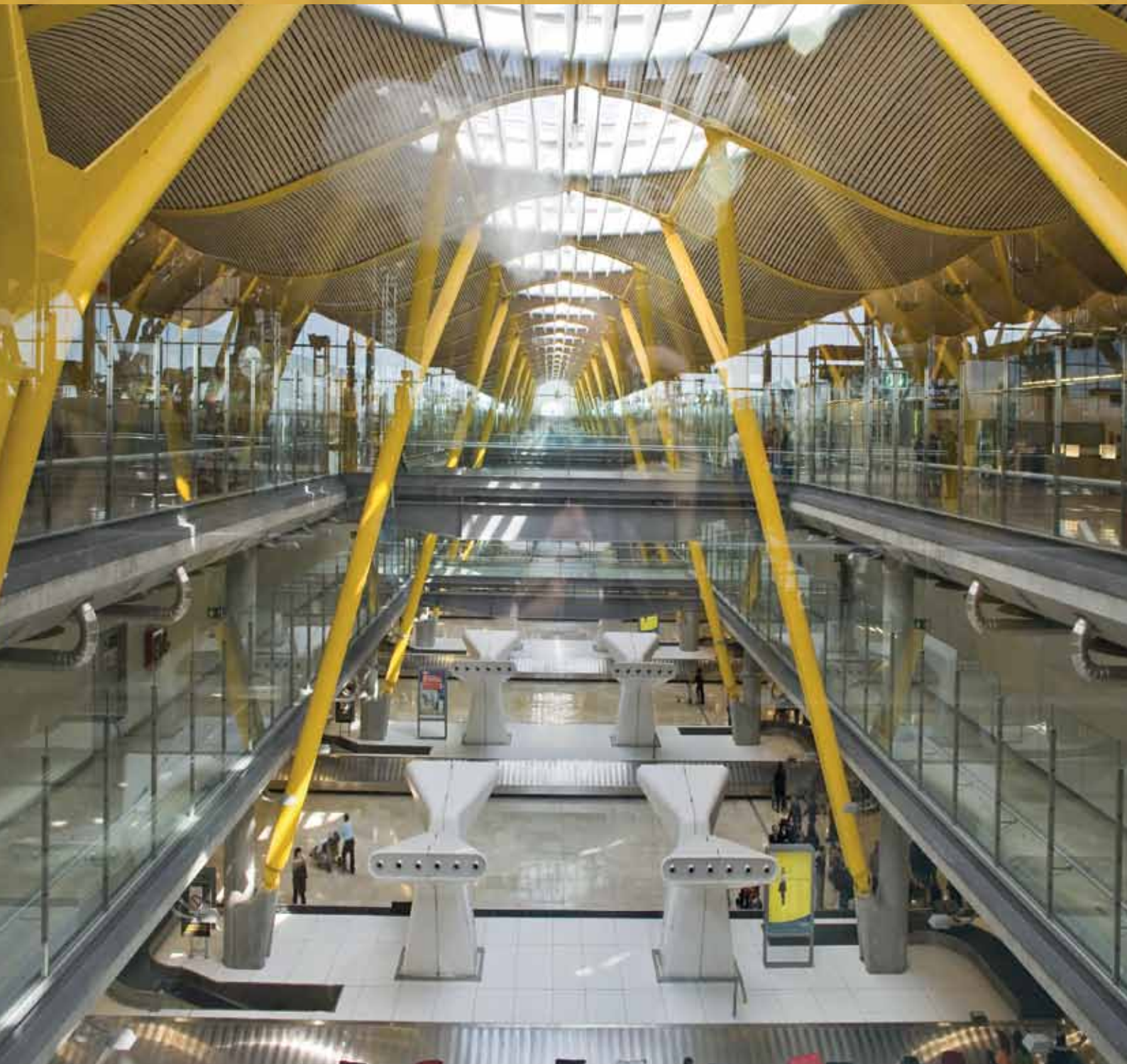
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# WAYPOINTS

## EUROCONTROL FORECASTS A 1.7 PER CENT DECLINE IN FLIGHTS IN 2012

➤ The latest two-year flight forecast (2012–2013) from EUROCONTROL's Statistics and Forecast Service (STATFOR) shows a 1.7 per cent decline in flights for 2012, though downside risks loom increasingly large. Since February, the downside economic risks for Europe have increased significantly in likelihood, with renewed problems in Greece, Spain and elsewhere. These risks have not been translated into flights for this revised flight forecast.

At a European level STATFOR is predicting that 2012 will see 1.7 per cent ( $\pm 0.8$  per cent) fewer flights across Europe than 2011. This is a downward revision of 0.4 percentage points, although some

States have exceeded the previous forecast and been revised upwards. In 2013 there will be signs of a weak recovery (1.6 per cent growth,  $\pm 0.9$  per cent), a slightly higher rate than in the February forecast. However, this growth remains below historical trends, and implies a return only to around 2011 traffic volumes.

The most recent analysis (available at <http://www.eurocontrol.int/sites/default/files/content/documents/official-documents/forecasts/two-year-flight-forecast-2012-2013.pdf>) reports that "Oil prices have fallen back in recent weeks but remain historically very high. Although load factors also remain high

the very uncertain economic outlook and high fuel costs mean that many aircraft operators are exhibiting considerable caution in their immediate future plans, cutting or freezing flight growth while exploring with renewed vigour opportunities for either improving yield or cutting costs."

The report also notes that several airlines have ceased trading – Spanair, Malev, Air Poland, Cimber Sterling and Skyways Express. "For the first part of 2012 European traffic remained at lower levels than 2011, averaging around 2.3 per cent lower than last year's figures," said the forecast.

The forecast will next be updated in September 2012.

## LONDON HEATHROW BECOMES FIFTH CDM AIRPORT

➤ London Heathrow has become the fifth airport in Europe to implement Airport Collaborative Decision Making (A-CDM), after Munich, Brussels, Frankfurt and Paris Charles de Gaulle.

The A-CDM trials between Heathrow Airport and the Network Manager Operations Centre (NMOC) were successfully conducted during April and May 2012. As of 30 May 2012, Heathrow Airport CDM became fully operational and is now fully integrated into the network. Automatic data is exchanged between Network Ops and Heathrow via Departure Planning Information (DPI) and Flight



Update Messages (FUM).

The DPI messages give the NMOC accurate situational information sent automatically from the airport's Collaborative Decision Making (A-CDM) systems and the real-time flight data prior to take-off. This accurate information is displayed to all the

airport partners at the same time, so allowing them to make properly informed decisions in context.

The FUM messages provide CDM airports with an accurate estimated landing time of arriving flights, improving the planning of the subsequent outbound flights.

Heathrow has implemented A-CDM well before the Olympics in London this July as thousands of extra aircraft flights are expected to head to the southeast of England and other parts of the UK at that time.

For more information please visit: (see: <http://www.eurocontrol.int/news/heathrow-becomes-5th-cdm-airport>).



### THE GREEN CONNECTION

➤ The Green Connection project, led by LFV of Sweden with partners Swedavia, SAS, GE and Rockwell Collins, has demonstrated "significant savings in fuel and emissions under the Atlantic interoperability Initiative to Reduce Emission (AIRE) initiative partially financed by SESAR." Flights carried out so far show savings of approximately 220-360 lbs (100-165 kilos) of carbon dioxide emissions per flight. The first flight was carried out on 15 December 2011 and the project concluded at the end of May 2012 with an estimated 100 flights between Gothenburg Landvetter and Stockholm-Arlanda Airports. SAS Scandinavian Airlines carried out the flight trials using their Boeing 737 NG aircraft, TrueCourse FMS and onboard data link connections supplied by Rockwell.

# WAYPOINTS

## NEWS IN BRIEF

➤ EUROCONTROL has identified space weather as a potential problem for Europe's ATM system, as it is capable of disrupting aviation's communications, navigation and surveillance systems. Space weather – solar activity and solar wind in the magnetosphere, ionosphere and thermosphere – can affect the performance and reliability of both space and ground-based technology. Satellites, radio communications and even electrical power grids can be damaged by space weather such as solar eruptions which can affect the earth and are more likely to occur during or just after periods of high solar activity.

➤ From 17:00 UTC on Wednesday 25 April 2012, Mode S implementation in Europe moved to the next stage by extending the number of flights that use downlinked aircraft identification to be identified by air traffic controllers. A significant number of flights landing at, and departing from, major airports and aerodromes in mainland Europe will now be identified by the aircraft's own automatically downlinked aircraft identification and will no longer require a discrete SSR transponder code, but a common Mode S conspicuity transponder code (A1000). SSR transponder codes are a finite source (there are only 4,096 of them) and over the years it has become increasingly difficult to ensure that a sufficient number of codes are available during traffic periods in some areas of Europe. Downlinked aircraft identification is a feature of modern surveillance techniques, namely Mode S Elementary Surveillance, ADS-B and Wide Area Multilateration (WAM).

➤ On 23-24 April 2012, a seminar and workshop on ATM security oversight by National Supervisory Authorities took place in Dubrovnik, organised by the Croatian Civil Aviation Authority with support from EUROCONTROL. "The achievement of an appropriate level of security in ATM is very important for the global and European aviation community in order to protect passengers and goods from exposure to any unlawful interference such as criminal or terrorist attacks," stated Omer Pita, Head of the Croatian Civil Aviation Agency. The event was attended by EUROCONTROL (represented by Mr Luc Tytgat, Director Single Sky), NATO, representatives of the civil aviation authorities from nine states in the region as well as the Croatian Ministry of Maritime Affairs, Transport and Infrastructure and the Croatian Ministry of Defence.

➤ On 15 May 2012 EUROCONTROL's Maastricht Upper Area Control Centre (MUAC) controlled its five-millionth flight – KLM 577 from Amsterdam to Abuja, Nigeria – with its trajectory-based flight data processing system (FDPS), introduced in December 2008. MUAC's FDPS provides a landmark technology base for efficient cross-border air navigation services in one of Europe's busiest and most complex airspaces, requiring system performance of the highest standards.

## CONTINUOUS DESCENT OPERATIONS IN USE AT OVER 80 EUROPEAN AIRPORTS

➤ Over 80 European airports now offer some form of Continuous Descent Operations (CDO) – a flexible continuous descent and approach flight path that delivers major environmental and economic benefits without any adverse impact on safety – for some or all of their daily operation. The initial target of this collaborative effort was to see CDO adopted by at least 100 ECAC airports by December 2013. However, the momentum has been such that this target has been revised upwards to at least 200 airports by end 2014.

The Network Operations Plan 2012-2014 foresees the evolution of CDO in that its use will become more widespread, used for longer (in hours of operation) and from higher levels (the ultimate aim being from Top of Descent). This will be achieved by changes to the airspace architecture and the widespread availability of

harmonised support tools for controllers, which will ensure lateral and/or vertical segregation without impeding the optimum profile.

The EUROCONTROL CDO implementation team is working with stakeholders (ANSPs, aircraft manufacturers and aviation industry associations such as IATA, ERA, ACI and CANSO) to maximise those benefits which are achievable in the current ATM framework. They also support the facilitation of more advanced CDOs that will result from the deployment of future ATM tools and procedures.

At Stockholm-Arlanda Airport, for example, CDOs have been in operation since 2009. A new RNP-AR approach procedure was introduced in 2010 for Arlanda's runway 26, resulting in a much shorter route. As compared with ordinary green flights, the curved green approach shortens the flight path by over 20 kilometres.

## EUROCONTROL WIN AWARD AT EBACE 2012



David McMillan was honoured for outstanding service to the business aviation industry

During the opening day of the 12th Annual European Business Aviation Convention & Exhibition (EBACE2012), David McMillan, EUROCONTROL's Director General, and Don Spruston, Director General of the International Business Aviation Council (IBAC), were presented with the 2012 European Business Aviation Award by the European Business Aviation Association (EBAA) and National Business Aviation Association (NBAA).

# MONTREAL HOSTS 12TH AIR NAVIGATION CONFERENCE

> The International Civil Aviation Organisation (ICAO) will hold the 12th Air Navigation Conference (AN-Conf/12) in Montreal, from 19-30 November 2012 with participation of its Member States and invited international organisations.

The AN-Conf/12 will address the latest version of the Global Air Navigation Plan. This plan draws heavily on the aviation system block upgrades that were introduced to the international community at the Global Air Navigation Industry Symposium (GANIS). The block upgrades comprise various operational improvements aimed at harmonising and improving the efficiency of the Global Air Navigation System.

To aid in the harmonisation the block upgrades are supported by roadmaps for communications, navigation and surveillance as well as information management and avionics. The purpose of the AN-Conf/12 is to gain consensus, obtain commitments and formulate recommendations



ICAO's air navigation commission meeting in Montreal

ICAO

to achieve a harmonised global air navigation system for international civil aviation and to direct the opportunities in technology and maturing work programmes toward common global objectives.

This Conference will define the planning horizon for the next ten years.

As the future aviation system is expected to be planned from 'airport to airport' the AN-Conf/12 will include through put targets for security and performance targets for the environment as they have an important influence on the air navigation system.

The key European actors in the

international efforts to achieve global aviation operability - EUROCONTROL, the European Aviation Safety Agency, the European Commission and the SESAR Joint Undertaking - will play a key role at the AN-Conf/12 and they will have a joint stand during the three-day exhibition on 19-21 November.



## EUROPEAN ATM MASTER PLAN UPDATED

The SESAR JU handed over the final draft of the European ATM Master Plan Update to the members of its Administrative Board on 10 May 2012. This revision is the result of an intensive six months update campaign involving about 30 representatives

from all air transport sectors gathered in the Master Planning Group. The European ATM Master Plan serves as roadmap for driving the modernisation of the ATM system and connecting SESAR research and development with deployment.





FOCUS

# THERE WILL BE A VERY, VERY DIFFERENT ATM SYSTEM IN 2020

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**Philip Butterworth-Hayes** looks at how aircraft operators will benefit in the short and long term from the work underway to introduce genuine performance-based air traffic management concepts throughout the European continent.

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**I**t is 0730 hours on 21 June, 2020, and the captain of flight DE367 from Cologne to Barcelona is busy in her hotel room, filing a flight plan for the first trip of the day. She plugs her electronic flight planning device (EFPD) into her tablet computer – accessing simultaneously the airline operations and EUROCONTROL Network Manager flight planning systems – weighing up the options before her. She can prioritise speed, cost, environmental performance or an optimised mix of all three; her

airline is running slightly ahead of its emissions trading scheme (ETS) permit schedule, so she clicks the environmental performance priority button and within seconds the EUROCONTROL flight plan computer has given her a preferred routing.

She looks at the routing she has been offered – it takes her some way north of the shortest available track and at a speed slightly slower than the usual cruising speed, but this allows her to exploit some of the strong winds which are blowing across the continent ➔

→ today and will save her 0.253 tonnes of fuel. It will also add five minutes to the journey time and a small increase in navigational charges over the cheapest possible rate – but as there are no connecting flights to factor in and the rate rise is minimal, on balance, this is an acceptable compromise. She clicks 'accept' and goes downstairs to breakfast.

In the cockpit she plugs the EFPD into the aircraft's flight management system (FMS). She has been given a push-back time of 1038 and a touch-down time of 1159. Today the aircraft will be flying with 30 per cent bio-fuel mix, which, with the 'green route' prioritisation will bring the aircraft's emissions performance level to the required standard. But there have been traffic jams on the main approach road to the airport and two of her passengers are late boarding. She calls the flight dispatch officer who locates the passengers, via their Galileo mobile phone transponders, in a long queue for security; they are given a fast track priority but it will still take them another ten minutes to board the aircraft.

The pilot reprograms the FMS with an updated departure time request. The airport operations computer gives her only a slight delay in taxi time but the EUROCONTROL Network Management operations system shows that if she followed the original route she would fly into a military restricted area which is being expanded for three hours for a critical training mission. Within a few seconds the EUROCONTROL computer has identified a new route, again prioritising the environmental performance, but increasing the cruise level 2000ft over the military airspace.

A new take-off and landing-time is calculated, accepted, and the airport, airline and ATM

flight information databases are updated with the new timings. The late passengers board and within a few minutes the aircraft moves silently away from the gate, with just the slight hum from the electric nose-wheel driver motors.

This is what flight operations should look like in 2020, when all the current EUROCONTROL flight planning and operational initiatives are mature. Added to other procedural and technical changes underway at the Agency, the aircraft operator's experience of the ATM system will be completely transformed from that of today.

"The most significant change will be the full deployment of performance-based navigation (PBN)," according to Bo Redeborn, Principal Director ATM at EUROCONTROL. The Agency is currently drafting a rule on advanced required navigation performance (RNP), incorporating many PBN concepts for en-route, terminal and approach environments. "This will allow closer routes, more direct routes and much more widespread application of free route airspace," said Bo Redeborn. "There will almost always be an opportunity for a continuous descent operation (CDO) from top of descent down to the runway threshold and the normal procedure will be to have a continuous climb departure operation. The start-up time and waiting for clearances will be largely reduced. There will be a more precise sequencing system from engine start-up, so you won't have to sit at the end of the runway waiting for take-off. There will be a more time-ordered flow and also gates will be available after you have landed and you have shortened the buffer you need for taxiing.

"EUROCONTROL has been working on free route airspace

for 15 years and we have now introduced it – in a limited format – in Portugal, Denmark, Sweden, Ireland and Maastricht. It's important to note that this is also consistent with the SESAR operational concept."

So by 2020, volcanic eruptions and unpredicted weather events aside, there will be no holding patterns, no en-route delays and no fixed routes. There will be fewer sectors to fly through – thanks to the formation of functional airspace blocks (FABs) – fewer ATC centres and a single set of procedures and regulations to which airspace users will have to comply.



*"The most significant change will be the full deployment of performance-based navigation (PBN)."*

**Bo Redeborn**



By 2020 the regulatory map of the European ATM system will have also radically changed. "In 2020 there will also be fewer regulators and consolidated regulations," said Luc Tytgat, Director of the Single Sky Directorate within EUROCONTROL. "Regulators will find it appropriate to work more and more together, to consolidate their legal obligations and move towards



a consolidated capability of oversight of the service providers. We will see fewer regulators because we will also have fewer service providers. Providers will start to cooperate, coordinate and some will even integrate."

The vision is clear – but as any EUROCONTROL employee or airline operations expert will confirm, the real challenges will be to move from where we are now to this vision of a perfectly coordinated ATM future. There is, however, a growing amount of evidence to suggest that economic pressures, a new political dynamic and market forces are all driving the European

criteria to be imposed by law is half the package of criteria to be implemented in the next phase. So it's capacity and cost today and from 2015-2019 it will be capacity, cost, environment and safety. By law you start to induce a change of attitude in how you use your airspace."

Bo Redeborn believes there are three technical key enablers – new infrastructure in the shape of global navigation satellite systems such as enhanced GPS (Global Positioning System) and Galileo; new procedures, which, for example, will allow for parallel curved operations into and out of airports, accommodating

retrofit programme will be in this timeframe is hard to tell," says Bo Redeborn. "We have today a little over 50 per cent of aircraft that are capable of flying these kinds of procedures. The cost benefit analysis is pretty convincing for advanced RNP and there is unanimous support for developing a mandate." EUROCONTROL would like to see such a mandate in force by 2018 – the ultimate benefits from these procedures will come when everyone can fly them.

If anything, the economic problems which are bearing down so heavily at the moment on aircraft operators and

scheme effect," said Luc Tytgat. "We will have to reduce the cost of ATM in Europe and that will lead naturally to consolidation."

"When States are poorer there are fewer funds for infrastructure improvements," said David Marsh, Head of Forecast and Traffic Analysis at EUROCONTROL. "Until now, transport funding from the European Commission has been largely ground based but now the amount available for aviation is increasing."

But the consequences of the economic pressures in Europe could push governments to even further radical solutions. In the longer term, beyond 2020, "you can start thinking about business trajectories and how ANSPs can interact, with DFS, for example, managing all of Lufthansa's business trajectories across Europe, from gate to gate," said David Marsh.

Recent institutional changes have meant that EUROCONTROL, as the Network Manager, now sits in the driving seat when it comes to helping set up the right institutional framework to introduce these new systems and procedures across the continent. The European Commission sets the rules; EUROCONTROL is working on turning the strict legal text into a real change in ATM culture, where there is a new consensus between all the actors on sharing data. The good news is that collaboration between aircraft operators, ANSPs, airports and the Network Manager has already delivered some quantifiable performance improvements.

"We have seen a very positive effect already from airport collaborative decision making (A-CDM)," said Bo Redeborn. "There's nothing fancy about this – everybody understands the full picture, with the same set of information and takes ➔



ATM system at unusual speed towards the PBN vision.

"Change happens by conviction or by law; here you need both," says Luc Tytgat. "States must implement the legislation but here the Network Manager, via the performance scheme, has introduced a step-by-step approach. So, for example, we are now in the preparatory phase of the scheme where the

multiple CDOs without reducing capacity; and greater capability in the cockpit, with enhanced data quality and more comprehensive FMS databases.

There will be costs associated with equipping, or re-equipping aircraft with compliant technologies, but they are unlikely to be prohibitive.

"There will be retrofit costs for sure but how extensive the

governments are likely to accelerate progress towards a more performance-driven ATM system, both at institutional and operational levels. With ANSPs having to perform to clear targets on safety, delay reduction, cost improvements and environmental impact they will have little choice but to find savings through rationalising their FAB operations.

"We will have the performance



Boeing

➔ necessary decisions to optimise the performance of the whole system. The cost to do this is relatively marginal and the benefits are great and this has encouraged everyone to apply this model far more widely. We've had a form of this CDM within the Network Operations room; if there's a constraint on the route we try to find alternative solutions such as delay your departure, take another route or change your flight level. More and more airlines are choosing to take a delay to choose the most optimum route profile."

With a more holistic approach to flow management being adopted at a human level and the eventual arrival of system wide information management (SWIM) technology planned for the later years of this decade, airports, ANSPs and aircraft operators will be coordinating activities at wider and deeper levels than ever before.

"Fewer and fewer constraints will appear as surprises to aircraft operators; in 2020 the constraints will be known well in advance and there will be plenty of opportunities to choose alternatives," says Bo Redeborn.

And it's not just airlines who will benefit.

"The military wants to be a part of it," says Luc Tytgat. "They need bigger training areas, which will mean negotiating with the civil side. They would also like to benefit from a reduction in fuel burn – they use a lot of fuel flying to and from training areas and if civil controllers can help them with some direct routes they will save money."

In many ways the high-level traffic demands on the ATM system in 2020 will not be as demanding as earlier forecasts predicted. One of the consequences of the recent economic problems has been a reduction in demand for air travel.

"Our forecast is for relatively small growth – by 2020 we will probably be handling 12.3 million flights a year, which is a 26 per cent increase over 2011," said David Marsh. "This means an average growth rate of less than three per cent a year for IFR flights, including military flights. But within this picture there will be a great deal of variation. For example, Istanbul is the sixth busiest city today in terms of aircraft movements but is likely to be the third busiest by 2020. Of the biggest ten airports now all but one have grown relatively little over the last seven years –



*"The strength is in the long haul."*  
**David Marsh**



*"In 2020 there will also be fewer regulators and consolidated regulations."*  
**Luc Tytgat**

all nine have seen three years of decline and four years of growth.

"Average flight distances are increasing as short haul services decline. The strength is in the long haul," added Marsh. However, that still leaves Europe with its perennial problem of a concentration of traffic on a handful of heavily congested hubs, unable to grow airspace capacity to meet future traffic demands. But the future ATM system is being developed now to provide more capacity at airports where new runways are an unrealistic option.

"We are looking now at the way we deal with wake turbulence, working with the FAA and within the framework of SESAR, at dynamic models of separation based on real wake occurrences. In many cases we see a potential of an increase of three or four movements an hour on a busy runway by using new procedures to address wake. In a way this is the low-hanging fruit for us," said Bo Redeborn.

"The better predictability of the system in 2020 will be a full order of magnitude better than the predictability of today. The idea of loading an extra 800kg of fuel into a Boeing 737 because you are flying into a congested airport and you may have to race to meet the slot you have been given will no longer apply," said Bo Redeborn.

"The strength of EUROCONTROL is that we know the network," said Luc Tytgat. "We know all the routes and the push-back times. We know when the operator is playing with time of departure, and, via CDM, we will know the impact on the network of the pilot deciding to wait for the last remaining passengers. The airlines can call directly the Network Manager for all available options. If the airlines are paying their route charges this will be part of the service." ■





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## FOCUS

# EUROPE'S FIRST PERFORMANCE REVIEW PERIOD TARGETS AIRSPACE CAPACITY AND COST

Member States face legally binding targets for capacity and cost efficiency performance improvements, flight efficiency performance being for the first reference period in the hands of the Network Manager.

By **Jennie Beechener.**

**W**hen the European Commission (EC) proposed a Single Sky for Europe, the legislation set out to deliver "more performing and sustainable aviation." All five pillars of the Single European Sky (SES) are expected to converge towards delivering more performance while preserving and improving safety. The initiative took a major step forward in 2012 with the start of the first performance review period (RP1) 2012-2014. For the first time, Member States face legally binding targets for capacity and cost efficiency performance improvements, flight efficiency performance being for the first reference period in the hands of the Network Manager. Under the scrutiny of the Performance Review Body (PRB), States are also monitored in further performance areas of safety, terminal (airports) and the environment.

Head of the EUROCONTROL Performance Review Unit (PRU)

Xavier Fron says: "We are moving from target setting to delivery and the regulations are quite powerful. If States do not deliver on capacity or flight efficiency, the Commission can request application of corrective measures." The PRB estimates airspace users will save well in excess of €2 billion during the first reference period.

The PRB draws on the PRU's many years of experience in reviewing performance for the Performance Review Commission (PRC) on behalf of EUROCONTROL. The PRC was designated the PRB in 2010. The EU-wide performance targets for RP1 were adopted by the European Commission in 2010 based on PRB proposals. Member States prepared national performance plans in the first half of 2011, which were assessed and revised in the second half of 2011, and adopted in the first half of 2012.

Among priority areas, the Commission has set an EU-wide

target to reduce en-route delay to 0.5 minute per flight on average in 2014. The best performance to date was 0.9 minute per flight in 2009. "This is extremely ambitious," explains PRU Senior Manager François Huet. "We wanted to reverse the trend and bring delays much closer to optimum." He adds the traffic downturn may help, and underlines most individual performance plans are in conformance with this goal. EUROCONTROL's appointment as Network Manager will also contribute to improvements.

Meanwhile, RP1 sees a paradigm change in the area of cost-efficiency. Prior to the introduction of the SES II regulations, there was an automatic full cost recovery mechanism which allowed States to recover all costs irrespective of the traffic situation. Revenue losses due to traffic downturn were automatically carried over and recovered from users in →



*"ANSPs now have a genuine incentive to contain costs."*

**François Huet**



→ the following year. Conversely, additional revenue generated by absorbing more traffic, or generating economies of scale through good cost-containment had to be returned to airspace users. Huet says: "This was a rigid system that, beyond good will, offered no incentive for ANSPs to be good managers. The Commission changed this paradigm with a cap on costs, and a risk sharing mechanism. If traffic goes up, the additional revenue is shared between airspace users and ANSP, and if traffic goes down, the ANSP bears a part of the cost or loss of revenue due to traffic downturn. ANSPs now have a genuine interest in containing costs." The target fixed for RP1 imposes a hard target to generate 3.5 per cent unit cost decrease per year, amounting to 15-16 per cent over the three year period, and States are required to perform against their own five-year traffic forecasts.

While RP1 does not include safety targets, it defines performance indicators to be monitored in RP1. These include: "effectiveness of safety management"; application of risk analysis methodology for uniform risk assessment of safety occurrences, runway incursions and airspace infringement; and implementation of 'just culture'. Huet echoes the disappointment expressed by several stakeholders, including the social dialogue partners, against the impossibility to fix safety targets for RP1. He cites the sensitivity of the issue, the recent extension of EASA competence to ATM which needs to produce its effects, and the need to protect the "just culture" environment, making it complex to have access to the data necessary for performance monitoring. He also points out that targets cannot be set until the indicators are deemed mature



*"We wanted to reverse the trend and bring delays much closer to optimum."*

**François Huet**

and tested. The PRB feels confident that it will deliver the right behaviour. "We will build on the three indicators that we monitor now in order to set targets in RP2. As we make progress, we shall have new indicators during RP2 that will probably become the basis for target setting in RP3. So the progress is slow, but it is there."

The area where new target setting will take effect under RP2 is terminal air navigation services. The performance scheme is preparing the ground for target setting through monitoring of performance indicators addressing delays in taxi-out, transit in the terminal area, flow management delays due to airports, as well as the evolution of terminal ANS unit costs.

The latest Performance Review Report (PRR 2011) published in March 2012 recognises airport capacity as one of the main challenges to future growth. Its chapter three positions ANS performance in the wider context of aviation performance. PRR 2011 calls for increased focus on the integration of airports in the ATM network and the optimisation

of operations at and around airports. In particular, it finds flights experience average delays of almost three minutes in the arrival sequencing and metering area (ASMA), the airspace within 40km of an airport. At some airports like Heathrow, Frankfurt and Madrid where runway capacity is limited, average delay is double the average and rising. Delay caused by flow management restrictions (aircraft held on the ground until airspace capacity is available) is responsible for more than one minute average delay and taxi-out time contributes 4.6 minutes per departure.

"RP1 is about targets for en-route, and monitoring in the terminal area," explains Huet. "RP2 will extend the scope of target setting to the terminal areas and ANS at airports. Airports, unlike en-route, come in all sizes and flavours. There is more competition, the legal set up varies from one country to the next, and one size does not fit all. We intend to learn about this during RP1 so we can set robust targets in RP2. From 2015, we shall have a complete gate-to-gate performance scheme with target setting in all areas including safety."

There are other variables facing the performance scheme. Among these, the downturn in traffic levels caused by the recession alters the dynamics and incentives built into the

system. Huet says: "Traffic is expected to be nearly five per cent below earlier forecasts. This remains within the bounds of the 'alert threshold', beyond which performance plans can be revised. We live in a volatile world, and the scheme will need to accommodate such variations in traffic. We had the ash cloud, the Arab Spring, the Libyan war, and the economic crisis. Less traffic might make it easier to reach the capacity target but will cause a loss of revenue for ANSPs. The context has changed between the moment we started work on setting the targets and today's situation. This will be a useful stress test on the performance scheme and charging regime. The performance plans may not be perfect, but we shall demonstrate that they deliver tangible benefits. Now is the time to execute them and meet the capacity and cost efficiency targets set for RP1.

"Having tackled the gate-to-gate ANS performance, the next frontier will be the performance of airport operations," says Huet. "We have highlighted that a lot of delays are not due to ATM, but to airline and airport processes. There are many reasons that prevent an aircraft taking off on time such as security, luggage, ground handling and gate issues. The airport package presented by the Commission and currently under discussion in co-decision (with the Council and European Parliament) acknowledges the importance of the issue and suggests that the PRB of EUROCONTROL may have a role to play. From ANS performance we would then gradually move to aviation performance, in line with the European Commission's White Paper of 28 March 2011 'Roadmap to a Single European Transport Area – Towards a competitive and sustainable and resource efficient transport system'." ☐



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# ROO

FINDING





## FOR FIGHTERS TO TRAIN



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Military aircraft operators need more room to fly more complex aircraft – EUROCONTROL's Civil-Military ATM Coordination Division in the Directorate Single Sky is working to ensure they can be accommodated within a seamless European airspace, writes **Tim Mahon**.

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**F**ifth-generation combat aircraft, such as the Eurofighter Typhoon, Dassault Rafale and Lockheed Martin F-35 Lightning II, present many new challenges for airspace planners. "Fifth generation aircraft need to operate in larger spaces, perhaps as much as 100 miles by 100 miles,

largely due to the capabilities of their beyond visual range (BVR) missiles in air-to-air operations," says Michael Steinfurth, Head of EUROCONTROL's Civil-Military ATM Coordination Division (DSS/CM). Michael Steinfurth, a former military command pilot with extensive experience of

the characteristics of military flight in peacetime training and on operations, adds that the incidence of potential conflict is less than might be expected, however, "since we are talking about higher altitudes – normally above flight level 280 – and the overall number of military ➔



→ flights that require special consideration is probably around two to three per cent of the total."

But with more fifth generation fighters entering service, the training challenge is likely to grow, especially as the full capability of these aircraft relies on their interaction with other platforms on the ground and in the air – such as unmanned air systems – with which they share data on targets and threats.

One important tool now employed by DSS/CM and to be deployed by several Member

States to ease the coordination is the Local and Sub-Regional ASM Support System (LARA). This is an integrated software toolset which supports military airspace planners in making effective use of airspace, de-conflicting potential traffic issues and ensuring user safety. "The Network Manager can see what is planned at an early stage of the planning process and make determinations and build action plans based on accurate shared knowledge," says Steinfurth, adding that LARA is already deployed in Belgium,

the Netherlands and the United Kingdom, "with more States lining up to get involved."

According to Steinfurth's team most operational air traffic flights (the official description for military flights) take place outside controlled airspace but careful coordination is needed when there is a potential conflict in requirements. While the number of overall military platforms is declining as budget cuts bite, the performance characteristics of new military aircraft bring new levels of complexity to ATM operations. As a management tool, LARA has been a critical short term solution to resolving the issue in advance of the results of the Single European Sky ATM Research (SESAR) initiative. Other key elements of the initiative have been the creation of the Military Liaison Officer (MILO) function and the Pan-European Repository of Information Supporting Civil-Military Performance Measurements (PRISMIL) Service.

The MILO function has already been implemented within the Network Management Operations



*"Advanced FUA defines the areas of airspace that may be required for military operations, but only activates those parts of it that are needed at a specific time."*

**Michael Steinfurth**



Room and enables the Network Manager to make proactive determinations in civil-military collaborative decision-making, enhancing routine performance and exploiting the airspace management opportunities provided by LARA.

PRISMIL, which Steinfurth describes as “the only operational system in Europe capable of measuring airspace management performance,” has already been established within the Belgian, French and German air forces, and a number of other States are getting ready to implement the concept within their existing airspace management structures.

Since the 1980s EUROCONTROL has provided its Member States with airspace management services to ease coordination of civil and military air traffic, greatly enhanced with the introduction of EUROCONTROL's Flexible Use of Airspace (FUA) concept, which manages airspace as a single entity, allocated to users at need. The implementation of FUA, together with the developing activities taking place under the umbrella of the Single European Sky (SES) initiative, has made it possible for the Agency to support the integration of military traffic into the increasingly busy airspace over Europe on demand, rapidly and efficiently. There are still challenges to be addressed, though, and new ones rear their heads with surprising frequency.

“Advanced FUA defines the areas of airspace that may be required for military operations, but only activates those parts of it that are needed at a specific time – planning a military flight or series of flights is a relatively simple process, but the management of airspace that may not necessarily be needed for the entire duration of the operation requires the creation of flexible space for the time required,” says Steinfurth.

With the Division now part of the Single European Sky Directorate, Steinfurth's team is working to provide a framework in which civil and military traffic can be coordinated and integrated within a seamless pan-European air traffic management system.

There are still hurdles that need to be overcome, however. As EUROCONTROL has taken on greater responsibility for managing the use of airspace – in a more or less harmonised manner and in parallel with an extension of the European Aviation Safety Agency's

adding “we cannot interfere in this – but we can try to harmonise the multiple issues to create a ‘European military’ view, making civil-military coordination at this level possible and efficient.”

Further development of some of the existing initiatives is needed to realise this ambition, according to Steinfurth. Use of advanced FUA will offer holistic access for users, if harmonised in a process that he defines as “give a little, take a little,” and will capitalise on the better capabilities that the deployment of LARA has brought to the airspace management community.



Dassault Aviation

(EASA) responsibilities – there is a fundamental issue that must be addressed. “There are individual regulations governing the control and behaviour of sovereign national aircraft for state use – including military aircraft – and States have their own airspace arrangements for these aircraft. There is currently no single acceptable system-wide definition,” says Steinfurth,

“The United Kingdom has been the first State to become fully operational with LARA and will shortly be distributing the system to the operational squadrons of the Royal Air Force. From them, and other users, we are already getting essential and very valuable feedback showing us how we can improve the systems and further accelerate the integration process,” he says.

The prospect of increasing use of unmanned aerial systems (UAS) by the armed forces and security agencies also represents a challenge for airspace planners and managers (see also “Opening the sky to unmanned air vehicles”, in this issue), but here again EUROCONTROL has been at the forefront of the discussions, developments and forward planning aimed at providing effective specifications for their deployment. The seminal document Guidelines for Military Unmanned Aerial Vehicles was first published in 2007 and updated in 2011, accompanied by a safety assessment, and provided the foundation for the intra-European work that continues in this sphere.

In Steinfurth's view: “The main issue is that the UAS must be able to behave in the same manner as a manned aircraft and controllers should not necessarily be able to tell the difference between them,” he says. Predictability is the key issue here, and the ability of a UAS to sense and avoid other platforms with which it may find itself sharing airspace – unexpectedly or otherwise – is the single largest remaining fly in the ointment.

Continuing collaboration with other pertinent agencies such as NATO, EASA and the European Defence Agency will result in a robust and sustainable operational framework being established. “We are on track to be able to translate all these considerations into appropriate action,” says Steinfurth. “That action has three dimensions – standardisation, regulation and procedures. We will provide a capable, exploitable safety system, able to accommodate the capacity for more aircraft of all types to operate safely in our airspace. The end game is safety,” he concludes. ■



# The Swedish Way

– Optimal use of airspace means that LFV and Sweden are front runners in terms of the Single European Sky initiative. This delivers returns on the environment, economy and safety, says Lars Håkansson, Managing Director of LFV Aviation Consulting.



**In Europe**, large blocks of airspace comprise military exercise areas which are not accessible to civilian air traffic thus leading to long diversions. LFV's unique concept builds on a close collaboration between civil air traffic control and military stakeholders, whereby military "fighter control" is allowed to "separate" their traffic in relation to commercial traffic. This is coordinated through an active military exercise area which allows commercial air traffic to pass through in a safe and effective manner.

**As a result** of this collaboration LFV has, since 2010, facilitated

the use of Free Route Airspace Sweden (FRAS) which means that any airline can choose the shortest flight path to a destination at cruising altitude.

**This tradition** of cooperation has given LFV a unique position from which we have been able to increase our effectiveness



and capacity. This can be demonstrated through the mutual use of airports, air traffic controllers and airspace.

– Our concept contributes to maximum flexibility and clearer benefits for all stakeholders using the airspace, says Lars Håkansson.

**LFV have improved** airspace access and responded to many different customer needs in a variety of ways. Flexible use of airspace, green flights and collaborative decision making are the keys to building an optimally structured and environmentally effective airspace for all users.



# Optimal Use of Airspace – through civil and military co-operation

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**The solution** was to have a sole organisation responsible for all air traffic management through one single technical system.



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## FOCUS

# OPENING THE SKY TO UNMANNED AIR VEHICLES

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There may be technical, regulatory and perceptual obstacles but proponents of unmanned aerial systems (UAS) are convinced that UAS will one day appear routinely in European skies, writes **Tim Mahon**. The question is when?

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Unmanned air vehicles could be flying in unsegregated European airspace as early as 2016, say some in the industry. How big a challenge does this present for EUROCONTROL and its partner organisations in developing a regulatory framework to cater for unmanned and manned aircraft operating in the same airspace?

Mike Lissone is EUROCONTROL's focal point for the UAS integration issue and he sees the calendar of events unfolding in three distinct phases over the next decade.

"The period from now through 2015 is one of consolidation in which, under the auspices of the European Commission, national regulations will be further harmonised and visual line of sight (VLOS) operations will become a daily occurrence and initial integration will take place in some countries, like Switzerland, for instance. From 2016 onwards we will have relevant standards and recommended practices (SARPs) in place and from 2018 a slow integration process will begin. This will not involve





a tsunami of UAS suddenly appearing in our airspace, but there will undoubtedly be a rapid acceleration, as we expect a dramatic growth in the demand for light UAS once the integration issues are overcome," he said.

According to Mike Lissone, the obstacles that stand in the way of this programme are mostly technical.

The most obvious is the issue of 'sense and avoid' – the ability of the UAS to replicate the human's ability to see and be seen. In an environment that is fully controlled by air traffic control (ATC) the technology already exists to ensure safe execution of a flight. However 'sense and avoid' covers more than just traffic and collision avoidance. It addresses issues like obstacle clearance, meteorological conditions, visual signs, distance from clouds and other possible hazards, such as what happens when an unmanned aircraft encounters an unexpected problem in the shape of another aircraft nearby. Should the UAS react in such a manner as to preserve overall airspace safety and

continue its mission – or land safely to be re-launched at a later point?

"I believe there is not a single solution that will meet all eventualities – it's going to be more a case of developing a 'system of systems' approach to the 'sense and avoid' question," said Mike Lissone.

Less obvious, perhaps, though certainly no less critical, is the issue of communications. To cater for the safe routine operation of UAS in airspace, where they need to be integrated with other traffic, secure and robust communications in the form of data links need to be provided. Here the challenge is that we are in a chicken and egg situation as we need sufficient spectrum, but regulation is not yet in place – because we do not have UAS flying – to create a stronger business case for the next World Radio Conference in 2015.

"The challenge in making appropriate frequencies available is a significant one," Mike Lissone said. Not least is the fact that national governments have, in many cases, sold off chunks

of the spectrum for other uses in an increasingly crowded electromagnetic environment.

In addition to the technical challenges, however, probably the greatest challenge is the critically important one of public opinion. Fears over the safety of unmanned aircraft operating over urban areas, and the associated issues of invasion of privacy, fuel debate and discussion around the dangers of wholesale integration of UAS into the air traffic management (ATM) world.

"It is, perhaps, entirely logical that the public have this fear, because the only UAS they hear about regularly are the armed reconnaissance drones operating in Afghanistan and elsewhere. What they do not get to hear about are the statistics that show millions of flight hours of safe operation in an environment much more hostile than civil airspace," said Lissone. He points out that Japan has had 2,000 to 3,000 remote controlled helicopters →

**The prospect that European skies will soon host unmanned aerial vehicles such as the EADS Advanced UAV, shown here, has inspired the rigorous examination of how to ensure that an unmanned aircraft is capable of flying as safely and securely as a manned aircraft.**



Launched from hydraulic or pneumatic catapults, as for the Ranger UAV shown, or taking off on a runway in more traditional style, UAS will occupy airspace at low, medium and high altitudes, according to role and mission requirements.



UAS such as the BAE Systems Mantis will have to operate in close proximity to and in collaboration with manned military aircraft.



➔ in operation in agricultural applications for a decade, with a near perfect record of safety in routine use.

By comparison, Germany has 28,000 wind turbines in operation, whose blades can delaminate and cause massive havoc if struck by lightning. Yet there seems to be little public fear and

almost no urgent investigation of the concomitant risk factors, or any means of mitigating them. "The answer would seem to be a better public relations and outreach programme (to provide more detailed information and emphasise the real nature of UAS operations) and certainly in the European Commission

series of workshops we have participated in there has been a plan developed for just such a programme," said Lissone.

The privacy issue may be more difficult to overcome. There are major concerns by many of the continent's citizens about the potential infringement of privacy that UAS operated by law enforcement and security agencies may cause. However, this is an aspect of social development rather than technology insertion, in Lissone's view. "There are concerns, true, but the UAS component is only part of the problem – the UAS has not caused the privacy debate," he said. The United Kingdom (UK), for example, has the reputation of being the European State with the highest incidence of civil surveillance, in the form of CCTV cameras on motorways, in car parks and on urban high streets. The use of UAS in such applications arguably makes surveillance more effective and provides social protection,

which has to be weighed against their potential intrusion into the daily life of the populace.

Obstacles and perceptions aside, what is EUROCONTROL's current level of activity in the UAS space?

"We started the process early in 2002, having recognised this was an issue that would have significant impact.

"We were instrumental in setting up EUROCAE WG-73 with the goal to develop industry standards. In this we provided WG-73 with a foundation of simulations, studies and scenarios ranging from the capability to conduct routine VLOS operations through to the use of Instrument Flight Rules (IFR) in Class A, B and C airspace," Mike Lissone said.

The Directorate Single Sky works closely with partner organisations and other agencies involved in the regulatory process, including EUROCAE, EASA, ESA, EDA and the European Commission itself. At this moment we are awaiting the conclusions





UAS such as the Alenia Aeronautica Sky-Y will potentially operate over urban areas and in congested airspace, making the issue of adequate air safety and air navigation procedures of paramount importance.

of the EC UAS Panel workshops that will ensure a consolidated European approach towards UAS integration.

"The pressure for making civil operations (of UAS) has become very high – such that some States are developing their response in isolation. Although some of these responses are quite robust – the UK's CAP722, for example, is an excellent guidance document, on which such operations can be conducted – (this fragmentation) is clearly something we are trying to avoid," Lissone said. Until agreement is reached at a pan-European level, however, States will continue to struggle to find interim solutions in response to mounting pressure from the aviation community.

Not all UAS, of course, are the same, nor do they necessarily present the same level of challenge for air traffic management (ATM) professionals. Some can almost fit in the palm of the hand, while others – like the

Eurohawk, for example – weigh more than ten tonnes and can be similar in size to a business jet. Nevertheless, the ATM integration issues are relatively simple, in Lissone's view.

#### As safe as or safer

The overall approach towards integration is that UAS will have to fit into the ATM system and not that the ATM system needs to adapt to enable UAS to integrate safely. Just like manned aviation UAS will have to prove to be as safe as or safer than present manned operations. UAS operations will also have to be as close as manned aviation certainly for ATC as it will not be possible for them to effectively handle many different types of UAS with different operational characteristics. "The visual line of sight (VLOS) requirements could be relatively low, if the vehicles operated in this regime are relatively low in weight. It is envisaged that UAS under 25kg

would not need a licensed pilot in order to fly under such rules.

Flying UAS in civil airspace under IFR or VFR will require the UAS to be equipped as required per airspace class and the operator will have to be licensed and the UAS will have to be certified.

For example Skyguide in Switzerland will be accommodating flights by the Ranger UAS with ground-based 'sense and avoid' in Class C and D airspace by the end of May. "The Ranger has been operated in Swiss airspace and has suffered lost links only once, the occasion being human error," Mike Lissone commented.

#### Growth in demand

But regulators need to ensure that UAS represent no greater a risk than current manned aircraft – and need to be seen to do so. There are some side issues that are almost as important, however. "Some 90-95 per cent of current UAS operations are military in nature, but that will not last. Predictions are for the growth in demand to be little short of phenomenal once the green light is given," Lissone said. The United States, by way of illustration, is working towards the objective of an open sky policy for UAS by 2015, and has major companies such as FedEx lining up in the wings to take advantage of the benefits unmanned operations would afford them.

It would seem the steepest hill to climb in the foreseeable future, however, will be resolution of the 'sense and avoid' issue.

"Some have suggested that ground-based 'sense and avoid' is the 'silver bullet' solution – but it isn't. It is much more likely to be resolved by a federated or 'system of systems' solution, which will accelerate the process considerably and will also bring safety benefits to manned aviation," said Lissone. ■



*"Some 90-95 per cent of current UAS operations are military in nature, but that will not last."*

**Mike Lissone**





## FOCUS

# ROUTE CHARGES: HOW THEY CAME ABOUT AND WHAT'S NEW

**Lynn Koch**, from EUROCONTROL's Corporate Communications, reports on the origins of EUROCONTROL's route charging system and how it has changed.

**I**t was the Paris Convention of 1919 which first addressed the issue of recovering the costs for providing services to 'aerial navigation'. In those days, there were no air navigation services (ANS) as such, just services provided at airports, but the principles laid down then have stayed the same ever since.

These principles were elaborated on in the Chicago Convention of 1944 and included: equal access to airports and ANS; non-discrimination: national

and foreign users to have the same treatment and charges; transparency and cost-relatedness, which meant the charges had to correspond to actual costs incurred.

The first ICAO conference on "Route Facilities Charges in International Air Transportation", held in 1958, added to these principles, stipulating that: charges should not be imposed for facilities not used or required; charges should not discourage the use of services, and the system

should be as simple as possible.

At the time, most States provided ANS free of charge, but the 1958 conference recognised that the financial burden was a heavy one and that user charges would be inevitable. The 72 participating States did not reach final agreement on the method of charging but they did think about different ways of calculating charges – these could be based on the weight factor only, on the kind of flight/facilities needed, or the route flown. They also considered adding levies on fuel and oil.

In 1965, the Federal Republic of Germany asked EUROCONTROL to carry out an 'enquiry into charges for the use of air traffic control charges'. An intergovernmental working group was set up and it was this group that came up with the system that is still used →



→ today to calculate charges. The formula is based on the distance flown and the maximum take-off weight of the aircraft.

ICAO held another conference on "Charges for Airport and Route Air Navigation Facilities" in 1967 and the working group's conclusions were presented there. The Conference decided that their approach was right and recommended that charging systems should indeed be based on flight distance and aircraft weight and three years later EUROCONTROL's multilateral route charges system was set up. The seven Member States at the time signed bilateral agreements with EUROCONTROL and the system began operations in 1971.

When amending EUROCONTROL's Convention in 1981, these arrangements were formalised with the signature of a Multilateral Agreement relating to Route Charges and this entered into force on 1 January 1986 for ten Member States. Europe had led the way, becoming the first region in the world to have set up a simple, cost-effective system with only one charge per flight in one currency, made by one institution, with user consultation. And it was a model that was to endure. The route charges system proved to be robust and only two major changes were

made to it before the advent of the Single European Sky: The first change came in 1983. Up until then, historical costs had been recovered two years later, for example, costs identified in 1980 and incurred in 1979 were recovered in 1981. But from 1983 onwards, costs for forecasted traffic were charged for, with a possibility of carrying over under- or over-recoveries.

In 1998, there was a switch from the 'most frequently used route' – the route that was most often used between any given pair of cities – to the 'route per state overflown' which was much more accurate and fairer for the user.

But there is a distinct drawback to the full cost recovery approach. When traffic declines, the costs of providing the service are shared by fewer users – and so the charges per user are higher. Any additional revenue generated by, for instance, the service provider's good management or cost containment has to be returned to the users. So, there is absolutely no incentive for service providers to reduce costs or heighten productivity. This drawback has become more of an issue over time.

The 1990s saw the intense traffic growth, which had begun in the previous decade, compounded. Delays mounted – as did public frustration. The European Civil

Aviation Conference (ECAC) tried to address the issue with its harmonisation programme, European Air Traffic Control Harmonisation and Integration Programme (EATCHIP) for en-route delays and Airport / Air Traffic Systems Interface (APATSI) for airports.

In their Institutional Strategy for Air Traffic Management in Europe, the ECAC Ministers also laid the foundations for independent performance monitoring. Following the signature of the revised Convention of 1997 and the early implementation of some of its provisions, the Performance Review Commission and Unit were established in 1998.

For the first time in Europe, key performance areas were examined and benchmarks provided in full transparency. But there was an inherent weakness: recommendations were not binding and their implementation depended wholly on States' goodwill. So although some States did their best to meet the new standards, others did nothing at all and progress was frustratingly slow. All the same, it was very clear that performance monitoring was valuable and papers presented to ICAO on this topic were well received.

The European Commission, in the meantime, became increasingly aware of how the consensus approach was failing. In a communication presented in 1999, they called the airspace situation "disastrous" and cast doubt on the efficacy of ECAC's initiatives. "Structural reforms are needed," they declared, "to permit the creation of a single European sky by way of integrated management of airspace and the development of new concepts and procedures for air traffic management."

The Single European Sky dawned. It was obvious from

*"For the first time in Europe, key performance areas were examined and benchmarks provided in full transparency."*



the first that the best way to construct the Single European Sky (SES) was to create a performance benchmarking system and to give the European Community competency on air navigation charges. The legal basis for a common charging scheme was laid down in the first SES package in Chapter III, 'Charging Schemes', of the service provision regulation No 550/2004 of March 2004. Basically, the regulations defined principles of transparency, set out principles for establishing cost bases that

possibility of establishing a fully transparent, cost-related and cost-efficient charging scheme to cover both en-route and terminal phases of flight for a genuine gate-to-gate approach.

Of course, the final version of the regulation was based on a number of compromises – and did not satisfy all parties. As a result, a number of stakeholders called it just a "prudent enhancement". All the same, the regulation did present some fundamental changes. Firstly, it went a long way to ensuring the separation of

could be clearly plotted.

Secondly, it had real gate-to-gate scope because it covered en-route and terminal costs whereas before then, there had been no rule on terminal costs and tariffs. Some States recovered these costs through en-route charges – in contradiction to the ICAO principles of "user pays" and that "civil aviation should not be asked to meet costs which are not properly allocable to it." There was a variety of schemes and formulae for calculating terminal charges; no centralisation of information and

presented for both service providers and airspace users but these were optional – a drawback to the first SES legislative package.

The regulation also made other improvements, by making provision for more consultation and more timely consultation with users; clarification on exemptions from charges and compliance review and enforcement – the Commission was given the authority to investigate cases of suspected non-compliance – a tool that did much to discourage misuse.



complied with – but went beyond – ICAO's recommendations, and described measures for reviewing compliance of charges with the SES's rules and principles. The Charging Regulation of December 2006 (EC No 1794/2006) laid down a common scheme for charging. It was developed under mandate by the Central Route Charges Office. The main change that the charging regulation brought to EUROCONTROL's system, with its full cost recovery mechanism and charging formula, was that it broadened its scope: it set out the

service provision and regulation in States by insisting on the submission of reporting tables that had to be completed independently by the air navigation service provider, the meteorological service provider and the regulator/national civil aviation authority. These consolidated tables would also reflect airport charges for airports with more than 50,000 commercial movements. This would deliver an unprecedented level of transparency – which would mean the evolution of costs over time,

no way to benchmark or compare. The regulation made for a level playing field by obliging all service providers to calculate costs in the same template and so gradually converge towards applying the same terminal charging formula in 2015. Thirdly it introduced the concept of charging zones with a single cost base and harmonised rules on, for instance, incentive schemes. The idea was to match these zones with Functional Airspace Blocks (FABs). The fourth innovation was incentive schemes. Economic incentives were

The first SES package was on the right track but it had not gone far enough. As time went on, it became clearer that safety needed continuous improvement and that aviation had to keep strong and competitive so as to support economic growth. Besides, environmental concerns were growing and these needed to be addressed. So, the second SES package focused on performance and sustainability. Three regulations made a quantum leap in charging. ➔

➔ Together, they made it possible to end automatic full cost recovery – and made the charging scheme into a tool for incentivising performance. The three regulations are: the performance scheme, adopted as regulation EU No 691/2010 of July 2010; the amended service provision regulation, EU No 1070/2009 of October 2009 and the amended charging regulation EU No 1190/2010 of December 2010.

The new scheme works by allowing 'determined costs' rather than 'full costs' to be recovered. These costs are fixed in advance for each year of the performance reference period (the current transitional reference period is for three years; it ends in 2015. Subsequent ones will be for five years). Any variations to these pre-determined rates will be subject to a risk-sharing mechanism: an incentive for cost-efficiency as from now on, there will be a sharing for financial risk between States, service providers and airspace users.

There are two parameters to the setting of unit costs: traffic and costs. Previously, in the case of traffic risk-sharing, if the costs remained the same, losses or over-recoveries were carried over until the next year. This is no longer the case. Now costs are divided into those that are not affected by variations in traffic and those which are.

The first set is costs which are incurred by the regulator and meteorological service providers. As for the second set of costs, a variation bracket of +/- two per cent is now applicable. The ANSP is obliged to cope with all variations within this margin. If there is more traffic than expected, then the extra revenue can be used to provide extra capacity. If the traffic goes down, then the loss must be absorbed through cost containment. For traffic variations



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of between +/- two per cent and +/- ten per cent, both risks and opportunities are shared between the service providers and the airspace users.

The sharing is done like this: service providers bear 30 per cent of the losses or retain 70 per cent of the extra revenue. It is expected that this 70/30 risk allocation will make for a reasonable but meaningful incentive for service providers, encouraging them to adapt well to changing contexts.

Should there be more than a ten per cent variation in traffic full cost recovery can be made. This never happened in the old system in which traffic forecasts were updated every year, but is conceivable in the new one in which traffic forecasts will be calculated up to five years in advance. This feature will protect the service providers' financial stability, allowing them to ensure safety and continuity of service if traffic were to fall dramatically.

The determined costs principle applies to all those bodies that may recover their costs from airspace users, that is, regulators, ANSPs and meteorological service providers. If costs are higher than planned, then the loss is borne by the body concerned. If they are lower than expected, thanks to good cost control, then the

additional revenue may be kept. This should be an incentive for good management; it should also make for economies of scale and gains in productivity.

If the targets are set at the right level – that is, targets that are reachable but also sufficiently ambitious – then service providers should be able to adapt flexibly enough to changes. They should be able to take structural measures to improve productivity without affecting safety – such as collaboration, common procurement, and the merger of some services in FABs. They will be encouraged to make optimal technological choices, as outlined in the SESAR programme.

The refined charging regulation also introduces a number of changes including: incentives – these have been widened to include environmental benefits and investment in SESAR-validated technologies; common projects – a link has been forged between charges and SESAR deployment. The common projects concept makes it possible for large, cross-border projects validated by the European Commission to benefit from tailor-made governance and financing. It will be easier to apply incentives, if necessary, and to inject public money to decrease the amount to be recovered

through user charges; FABs – these now become a performance tool in defragmenting service provision. However, the Commission has agreed that it would be unrealistic to have completely uniform rules in one charging zone and only expects that "consistency and uniformity are ensured in the application of the regulation ... to the maximum possible extent." And consultation – this must be exhaustive and detailed before the beginning of each reference period.

This year will be a pivotal year as it is the first year in which the new charging regulation will be applied – a regulation which encapsulates the financial aspects of the Single European Sky's performance scheme, providing economic incentives and allowing both users and air navigation service providers to share risks. It should also help promote the deployment of leading edge technology as it enables the financing of cross-border projects which will help improve the performance of the network as a whole.

The Single European Sky will improve Europe's competitiveness and environmental performance. It is in everyone's interest to make sure that it is properly constructed, so that people and goods can fly freely, safely and securely – with minimal damage to the planet. ☪

*This article is based on François Huet's Chapter 16, "The Regulation of Air Navigation Charges", in the book Achieving the Single Sky, published by Kluwer Law International, the Netherlands, in 2011. You can find an electronic version on the EUROCONTROL Route Charges website: <http://www.eurocontrol.int/articles/full-integration-single-european-sky>*



# PLANNING! UNDER PRESSURE ■

- Shortage of ATCOs
- Difficulty in incorporating fatigue rules
- Fatigue factors disregarded in your planning system
- Difficulty in creating rosters that incorporate existing rules, regulations and constraints
- Inability to measure and improve the effectiveness of your rosters
- Difficulty in foreseeing the impacts of allowing swaps or granting leave
- Disruptions are muddled through rather than managed

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ANSPs constantly face a difficult struggle: to operate in a challenging environment of rapid and constant change due to new technology while having to maintain secure procedures and the highest levels of safety. Adding to these challenges is the relentless pressure on keeping costs down. In many ANSPs, the biggest

expense is the workforce. Making the best use of this resource pool is one way – perhaps even the best way – that an ANSP can keep their costs down and improve their service delivery performance.

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FOCUS

# REDUCING FLOW MANAGEMENT RESTRICTIONS ON TRAFFIC

The Network Manager is pursuing multiple initiatives in its efforts to maximise capacity and reduce delays, managers tell **Bernard Fitzsimons**.

**T**he key to reducing delays in the future European air traffic management network will be a new capability of accurate predictability.

The basis for future work by the Network Manager is the Network Strategic Plan. Currently under review in draft form by the Network Management Board, the plan defines the main operational drivers for two reference periods – up to 2014 and from then to 2019. Christopher Bouman, who heads the network development unit, says it focuses on the first period, “because we know what can be done and what the performance targets are.” Once performance targets for the second reference

period are agreed next year, the plan will be reviewed to determine whether the actions it describes are still appropriate.

The strategic plan includes a Network Manager Performance Plan which describes in some detail what the Network Manager can do to support the network in addition to improvements made by Air navigation services providers (ANSPs), airports and other stakeholders.

The plan identifies predictability as an important operational driver. Lack of predictability means ANSPs may receive more traffic than planned for, so they typically declare a slightly lower capacity than they can

actually handle. The declared capacity values determine the regulations and measures required to deal with lack of capacity for a given demand. So a lower declared capacity has an immediate negative impact on the performance of the network.

## Improving predictability

“We are looking at whether we can reduce that margin between what they can handle and what they declare by improving predictability,” explains Mr Bouman. So a flight plan and air traffic flow and capacity management (ATFCM) adherence campaign started in 2009 encourages operators to file an

accurate flight plan and stick to it.

“The flight plan is the means for ATFCM to prepare the network, so if it does not reflect the real operational intention then we already have built in unpredictability,” he says. “The adherence campaign tries to increase all the players’ awareness of the impact of deviating from the flight plan. We had a flight level adherence trial in 2010 and we may hold more local trials in the flight level domain, but we are looking for adherence in all three dimensions – flight level, route and time.”

In line with the adherence campaign is a potential move to make operations more time-based.

Currently, Mr Bouman points out, one ATFCM measure to manage congestion is a calculated take-off time (CTOT) or ATFCM slot clearing an aircraft to depart in a 15 minute window. The problem, he says, is that the CTOT applies only at the airport of departure: once the aircraft has taken off the pilots may try to catch up or ATC give a direct routing, negating the original intent of the ATFCM slot.

The Network Manager, in coordination with its SESAR colleagues, is looking at an alternative approach that would operationally use the calculated time for the aircraft to arrive at the congested airport or en-route sector. Making both pilots and ATC aware of the target time so that they both try to achieve it should greatly help predictability.

An improved predictability campaign might be better received, Mr Bouman suggests, since adherence carries suggestions of an inflexible constraint. "We need flexibility in the system, we're just trying to remove that flexibility which is not required. You always need the operational flexibility to deal with new circumstances, with operational issues, with weather, with optimising traffic from an ATC perspective. But at the moment the amount of flexibility and the amount of deviation is so high that I think there is a lot of improvement possible which will have direct impact on network performance."

The introduction of target times would have to provide a clear benefit to the operator and

work is on-going to quantify the performance benefit of improved predictability. Mr Bouman says: "Everybody knows that the ANSPs have these margins to be able to cope with additional traffic when it comes, but after the adherence trial, which saw a 30 to 40 per cent improvement in flight level predictability, we have asked a number of ANSPs about the impact on their declared capacity if that improvement was permanent.

"If an improved predictability of ten per cent or 20 per cent can result in an improvement of declared capacity by two per cent that would already be major. Everybody understands that lack of predictability is a penalty to performance, but we need clear figures." The results of the study should be available in the summer.

The Network Manager Performance Plan also includes short-term actions. One is delay sharing: This aims to distribute the traffic away from a sector suffering significant delays in order to reduce overall network delay – even at the expense of slightly increased delays in the sectors receiving the diverted traffic. Another on-going activity focuses on reducing the number of flights with delays of more than 15 minutes or 30 minutes by looking at individual flights rather than simply the average delay per flight.

Mr Bouman stresses that re-routings of flights suffering such delays must be acceptable to the aircraft operator: "Operators have different business models. For a hub and spoke system they need punctuality so they might accept

more of a fuel penalty. Others might be less interested in arrival time and more aware of flight efficiency."

### Anticipating weather

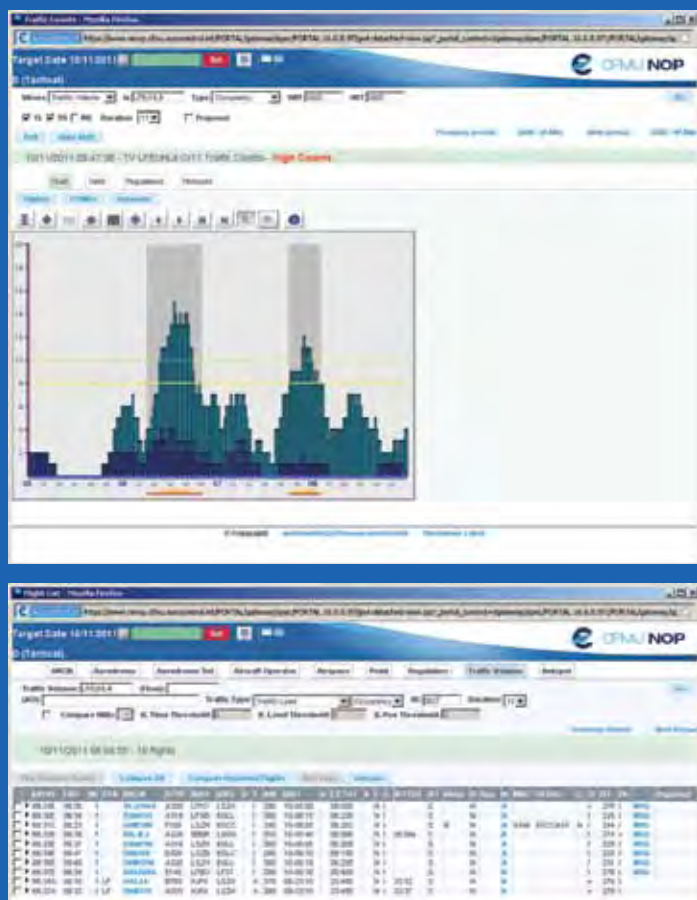
The Network Manager operations room is also taking a more proactive approach to weather disruption. "We can't do anything about the weather itself but we can manage its impact better," says Mr Bouman. At the moment the ANSPs decide when to ask the Network Manager to reduce the amount of flights into their airspace because of severe weather. Under a new procedure the ops room looks at the weather from a network perspective and notifies ANSPs in advance of anticipated weather events such as severe thunderstorms, so that they can make their own preparations rather than reacting after they arrive. "These are important developments to improve the performance as a whole," he comments. "People see traffic not growing as fast as expected and some say that with this lack of traffic growth the single European sky delay targets set by the European Commission, will be met easily. I'm not convinced of that. We said that in earlier years when the traffic went down and we thought the delays would go down."

The ANSPs' moves to improve cost-effectiveness in reaction to reduced income could also impact on delays. So apart from the fact that everybody expects growth to resume, "I think we ➔



*"Everybody understands that lack of predictability is a penalty to performance, but we need clear figures."*

**Christopher Bouman**



➔ have to continue working at preparing for improvements that are very much still required," he added.

Focused or short term ATFM measures (STAMs) are being developed to supplement existing measures such as reroutes or ATFCM slots. EUROCONTROL ATFCM expert Marcel Richard says many ANSPs and flow managers rely on hourly counts to monitor traffic and define the capacity of en-route sectors and airports. "In the definition of the capacity it's always a compromise that the air traffic control centres (ACCs) have to make to translate the workload and the traffic that the controller in the sector can process into an hourly flow," he explains.

Now accurate data updates from ACC radars and airport collaborative decision making (CDM) systems are significantly improving the predictability of

the flight profiles. "Thanks to this improvement we are now able to switch from hourly counts to sector occupancy," says Mr Richard. "Sector occupancy is giving minute by minute the number of flights that will occupy the sector as much as four or five hours in advance, and with the reliability of the predictions some flow management positions are starting to gain confidence in the predictability and trying to avoid regulations in the congested area by acting on some flights."

As well as monitoring the traffic, the process applies sustainable and peak monitoring values – respectively the level of traffic that a sector can handle continuously and the level that has never been exceeded. When a traffic peak occurs and is between the 'sustainable' and 'peak' levels, the complexity of the traffic is then analysed to determine whether the peak is sustainable or action is required. In most cases acting on a few flights is enough to resolve a significant complexity problem.

### Flight level capping

A typical measure is flight level capping, applied when a flight is about to climb into a busy sector so that it climbs later into another sector. Flight level capping can also be applied in the descent to keep a flight in upper airspace longer or descend it earlier to avoid specific traffic. "We can also use small re-routings, which is the case on departure from Frankfurt going to Maastricht," says Mr Richard. "They can redistribute the traffic from one sector to another by using different departure procedures. We can also use pre-defined scenarios, but for the time being they are used more as pre-tactical measures than as a dynamic measure."

Another measure can be used for transversal flights. A flight from Southampton in the UK to Paris CDG, for example, will be flying

across the main flows in and out of London. "They synchronise the departure of that flight to avoid the conflict with the main flows in the sector," Mr Richard explains. "They can keep the flight on the ground for ten minutes so that it departs when there is a gap in the traffic."

This process smooths traffic into the sectors, identifies and resolves major complexity issues and increases safety and traffic throughput. ANSPs operating under this concept can manage traffic levels far beyond their conventional hourly capacity.

In SESAR terminology such measures are called dynamic Demand Capacity Balancing (dDCB), Mr Richard says: "We have made an investigation of this working practice. We have defined common operational concepts and procedures and we have now defined the tools that are needed to facilitate this process."

"The main one is a coordination tool that needs to interface all the flow management positions, ATC tower, airline operators and the Network Manager in order to coordinate these measures and maintain the stability of the network. A successful trial using prototype tools was conducted in November 2011, and we are now defining new refined requirements for the next trial that will take place at the end of September 2013."

The STAMs are also being coordinated in the context of SESAR work on trajectory management. "It is a cooperative effort with the SESAR people involved," adds Christopher Bouman. "The SESAR planning determines the overall direction and, of course, what we do is implementation-oriented and should be on the same track. And the findings of this work will provide important inputs into the SESAR programme, so we need that cooperation. ■"



*"They can redistribute the traffic from one sector to another by using different departure procedures."*  
**Marcel Richard**



# Attention!

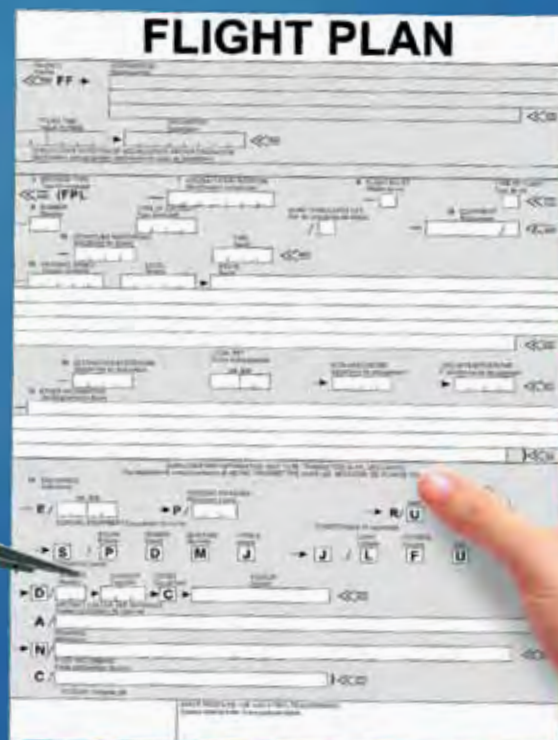
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FOCUS

# COLLABORATIVE ENVIRONMENTAL MANAGEMENT GOES **VIRAL**

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Talking together about converting operational improvements into environmental benefits is one way in which Europe's aircraft operators, airports and air navigation service providers are tackling the growing environmental challenge – and EUROCONTROL has a unique role to play, writes **Philip Butterworth-Hayes**.

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In Geneva this year leaders of the aviation industry – airlines, airports, air navigation service providers (ANSPs) and aircraft and engine manufacturers – signed an industry-wide agreement of cooperative action to reduce fuel use and emissions. “In 2008, we were the first global sector to commit to global cross-industry action on climate change,” said Paul Steele, Executive Director of the Air Transport Action Group (ATAG) which organised the March summit on aviation and the environment where the agreement was signed. “That declaration set the agenda for cooperative action across the aviation industry to reduce fuel use and emissions. The existing cooperation between industry partners and the projects underway are impressive. They have led to a reduction of millions of tonnes of carbon emissions.”

Cooperation at the highest leadership level is vital if the industry is to reduce its emissions and noise performance levels – but how far is cooperation really working at an operational level? How closely are aircraft operators, airports and ANSPs collaborating to assess what they can do together and ensure that a fuel-saving benefit in one part of the operation does not lead to an unwelcome environmental impact in another?

The airside area of the airport is one place where the issues of noise and emissions are particularly focused and where all the main operational stakeholders – plus all the other airport partners active on the ramp, such as ground-handling organisations, fuel companies and de-icing vehicle operators – have different but connected roles to play.

The Directorate Single Sky (DSS) of EUROCONTROL has developed a protocol called Collaborative Environmental Management

(CEM) where all the operational stakeholders can meet to discuss, prioritise and agree a common vision on how to collaboratively address environmental challenges at their airports.

“CEM is a way of thinking, to join the dots up between the operational benefits and the environmental challenges. You get operational benefits but they are not always qualified as environmental benefits and that’s the missing link,” said Sharon Mahony, Environmental Analyst at EUROCONTROL. When an airport is developing its environmental strategy CEM can play a vital role in ensuring that all internal stakeholders are focused and can agree a way forward. “Due to a lack of communication you don’t necessarily always have the right people in the room, the environmental and the operational people from the airports, ANSPs and aircraft operators.

### Severe regulations

This also concerns the stakeholders in the airport, such as ground handlers, collaborating and communicating their environmental priorities and making sure they have the buy-in from the respective CEOs. It’s not always about quick wins.”

Environmental regulations around airports are already severe and this pressure can be expected to continue. CEM – when implemented by operational stakeholders at airports – has the potential to send a strong signal to regulators and policy makers that environmental issues are being addressed in a collaborative and transparent process as part of a long term vision and strategy for each “airport business”. It is crucial, however, to build internal commitment and vision among the CEM partners before engaging with stakeholders such

as planning authorities and local community representatives.

As part of the CEM process increasing numbers of ANSPs, airports and aircraft operators are now sitting down around the table, agreeing the environmental challenges and discussing some of the system-wide impacts of mitigation measures. Although EUROCONTROL is not involved in all these discussions, it can play an important role in providing the key data sets which all partners need to measure their environmental impact and by facilitating initial meetings.

By early 2013 EUROCONTROL plans to have developed a web-portal (SOPHOS) that will consist of two functions. The first is an emissions estimator for ground operations, which will provide European airport operators, aircraft operators and ANSPs with customised, secure and confidential access to fuel burn and associated carbon dioxide (CO<sub>2</sub>) and nitrogen oxide (NO) emissions estimates. It will also provide a means to assess the fuel, environmental and cost impact of, for example, altering taxi times with the operational stakeholders at an airport thus sharing a common harmonised information source, which should facilitate enhanced cooperation.

The second function provided by the SOPHOS portal will give subscribers access to a repository of environmental legislation, regulation and scientific papers which directly relates to their industry. Static pages on best practise will also form an important part of SOPHOS’ content. Participants can share experiences and ask questions through secure blogs and forums.

There are other good reasons for CEM partners to use EUROCONTROL data. “A common data source gives you credibility and robustness so that when you



*“There should be 200 airports in Europe by 2014 which offer CDOs at some point during the day.”*

**Andrew Watt**

are addressing the concerns of the local community you can be sure that the data you are using comes from an objective, robust European source," said Sharon Mahony.

"Historically many of the environmental improvements which have been made in our industry have delivered environmental benefits but they were not quantified but this is increasingly changing," said Andrew Watt. "And providing robust, accurate, timely and independent data on environmental performance is a role which EUROCONTROL will develop even further in the future.

"The emissions trading

methodologies, so there is no danger of comparing apples to pears."

With overall traffic numbers static or falling currently and airlines and ANSPs having to consider major cost-cutting exercises in the face of a turbulent economic climate, it would not have been surprising if environmental issues were to slip down the agenda of priorities for many aircraft operators and ANSPs. But for a number of reasons the opposite is true. "Airlines are making tremendous efforts to reduce fuel burn primarily to reduce costs; but they also recognise this helps them to reduce their emissions and this is

saving 100kg fuel burn (over 300 kg of CO<sub>2</sub>) per flight. "CDOs are being developed in cooperation with the ANSPs, the airport operators and airlines, who agree to introduce CDOs at some part of the day and then try to increase their frequency as well as raise the altitudes at which CDOs can start. The initial target of having them offered at 100 airports by 2013 has been doubled so there should be 200 airports in Europe by 2014 which offer CDOs at some point during the day," said Andrew Watt.

The aim is to get rid of stepped descents altogether; by 2020 CDOs should be available virtually everywhere in Europe, though this will only be possible with

providers reaching definitive environmental improvement targets when the environment comes under increased focus during the second period (2015-2019) of the Single European Sky's performance scheme. At the same time, the first deliverables will be entering operations from the SESAR "business trajectory" research, where the aircraft operator will propose its optimum trajectory for each flight and the environmental cost of that flight will be included in the mix. EUROCONTROL's Directorate of SESAR and Research is leading the work to assess the environmental impact of the various SESAR initiatives; this will help to gauge



scheme (ETS) for aviation, to take an example, is something for which EUROCONTROL already provides a support facility to the States – a central source web service which allows us to provide Competent Authorities with tailored information about aircraft operators within the ETS such as how many flights should be included and excluded from the scheme, and our estimate of the CO<sub>2</sub> emissions generated," said Andrew Watt. "Information is processed in the same way with the same level of quality. This is a central source, with harmonised

a particularly important issue at the moment given the political discussion about the EU-ETS," according to Andrew Watt.

The Agency has therefore not been surprised to the extent with which aircraft operators, ANSPs and airports have embraced environmentally beneficial programmes which have reducing fuel burn at their heart. For example, there are now more than 80 airports which offer continuous descent operations (CDOs) at some point in the day, limiting the occurrence of segments of level flight whenever possible, typically

the introduction of some SESAR initiatives, particularly software tools that provide support to air traffic controllers in the organisation of inbound traffic.

But by 2020 the performance of the aviation environmental system will be different from that of today. EUROCONTROL's environmental initiatives cover research, operations and regulatory support. The Network Management Directorate, which is focused on ensuring aircraft operators are given the safest and most fuel efficient route possible, will start supporting service

the extent to which the SESAR Programme reaches its stated objective of reducing emissions by ten per cent per flight.

"Deploying the SESAR business trajectory and system wide information management (SWIM) is absolutely fundamental to reducing environmental impact and gives everyone the ability to monitor," said Andrew Watt. "With the designation of the Network Manager that changes the mind-set – people see there is an organisation that is under the performance scheme as well; it has to deliver network ➔

→ performance and that will have to be cascaded into the ANSPs and airport operators and airspace users.”

EUROCONTROL's specialist environmental department within the Single Sky Directorate focuses on providing States, the European Commission, EASA and ICAO with expert support, including assessment modelling and environmental databases. This is where the Agency's ETS-related work is managed. But it also provides staff to support the other directorates' environmentally-related work. For example, the DSS Environment Unit works closely with EUROCONTROL's Training Division to offer specialised training, comments Sharon Mahony who develops and manages two courses a year in the Luxembourg training centre on "Environment in ATM" for regulatory and operational personnel. We also maintain links on the operational side through ACI Europe's Environmental Strategy Committee and with the Civil Air Navigation Services Organisation's (CANSO) Environment Work Group.

### Increased pressure

The environmental pressures on all aviation stakeholders are likely to increase in the coming years not reduce. "Take a look at what has been happening in Germany – with night curfews at Frankfurt airport now and at the new Berlin/ Brandenburg International when it opens next year," said Andrew Watt. "Many cargo movements from Frankfurt have now moved up to Cologne and this may now lead to increasing pressure around Cologne for further noise controls. There are still many airports which operate 24 hours per day and I don't see the pressure on them decreasing from a noise perspective. That will be a big challenge.



*"All stakeholders must acknowledge that they cannot achieve this acting individually, and that collaboration is key."*

**Sharon Mahony**



The other main challenge is climate change and CO<sub>2</sub> emissions. We don't know what will happen in the ICAO process on how to apply Market-Based Measures to control aviation's emissions, but it is fairly well accepted that the polluter- pays principle is being introduced into aviation for climate change reasons. So that means the political pressure around airports on noise issues and the political and economic pressure on the industry on climate change issues will be even higher in 2020 than now."

Environmental and fuel-burn priorities will increasingly drive industry's performance, with the new aircraft rolling off the production lines in the next ten years – such as the Airbus A350 and A320neo and the Boeing 737Max – all being designed around competitively improved fuel efficiency and environmental performance.

But by 2020 the environmental focus of the Agency will change.

"In the end there's only so much we can do," said Andrew Watt. "Obviously we can't shorten the great circle distances between airports so once we have a system in which the offer is at its optimum it will be extremely difficult to make any further improvements.

Beyond 2020, air traffic management (ATM) will be there to ensure that what it does is done to the best of its ability. The real difference then in environmental performance will come from technology improvements in airframes and engines and the fuel they will be burning. Aviation

should be moving from oil-based fuels to sustainable bio-fuels.

"The challenge for the ATM system then will be to maintain that optimum performance as traffic grows – and grows in complexity with more and bigger hub airports, coupled with secondary airports becoming more important. But, ATM will also be expected to ensure that future aircraft designs can be successfully integrated into network operations. Although we're not really sure what they will look like, exactly how they will perform or when they will roll off the production lines, I am sure that ATM will rise to the challenge. Once again, industry-wide collaboration that includes regulators will be the key to our success."

The Director General has announced that EUROCONTROL will develop a Specification in support of CEM. This will provide local regulators and airport operational stakeholders with a generic framework by which they can voluntarily shape their local strategic response to the multiple environmental challenges that they face. The drafting of the Specification will involve a wide range of industry stakeholders and should be completed in the Spring of 2013.

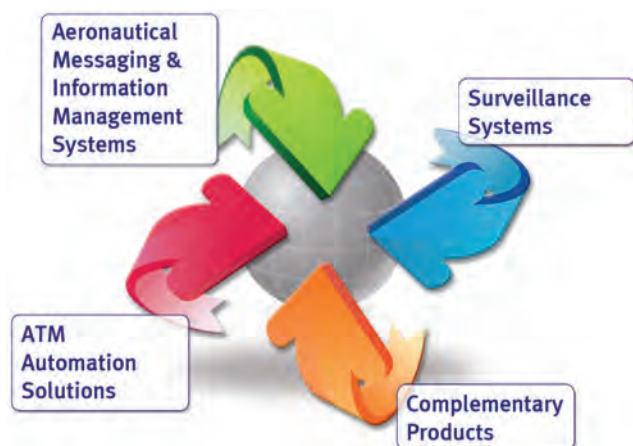
In conclusion, observed Sharon Mahony, to maintain optimal operational and environmental performance in ATM, all stakeholders must acknowledge that they cannot achieve this acting individually, and that collaboration is the key. ■





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**COMSOFT**  
IS MAKING THE LINK

## FOCUS

# ARTAS BRINGS CLARITY TO SURVEILLANCE

**Costas Christodoulou** from EUROCONTROL and **Robert Clauß** from COMSOFT report on how an Agency product and its related services have transformed surveillance capabilities throughout Europe.



Controllers need a clear and accurate picture of the traffic flows in their sector in order to keep the separation standards. With the number of surveillance sensors and technologies multiplying it is a challenge to provide them with the right surveillance picture.

The European ATM Surveillance Tracker and Server, ARTAS, is one of the core elements of current

European ATM systems and an example of EUROCONTROL's successful contributions to the harmonisation of ATM in the Single European Sky. It is a system which forms the core of the surveillance chain, fusing information from various surveillance data sources into one seamless and highly accurate air situation picture.

Last year marked a significant milestone in the systems history:

20 years since the launch of the ARTAS concept and 10 years since the establishment of the Centralised ARTAS Maintenance and Operational Support (CAMOS). CAMOS has played an important role in the success of the product since its beginning, providing national administrations with software maintenance and support. Coupled with its outstanding cost-benefit ratio, CAMOS has contributed to ARTAS' popularity among users.

When CAMOS was initiated in 2001 three operational sites and a further nine test sites were pinned on the implementation map. Today over 100 ARTAS units are running in approximately 30 civil and military ATC centres in Europe, including almost every EUROCONTROL Member State. Besides the increasing number of installations, software versions and hardware platforms, there is continual growth in functionality to meet the needs of users.



*"ARTAS is an excellent example of how a united approach can bring real benefits, reducing fragmentation and improving integration."*  
**David McMillan**

As with many things in life, the system has to grow with the size of the task; today's CAMOS service team consists of an experienced and well-coordinated group of professionals at EUROCONTROL and at COMSOFT, CAMOS' industrial partner. The ARTAS User Group (AUG) and Change Control Board (CCB) oversee all activities and manage corresponding actions and developments.

According to David McMillan, Director General of EUROCONTROL, "ARTAS is an excellent example of how a united approach can bring real benefits, reducing fragmentation and improving integration."

The first ARTAS system was shaped on behalf of the EUROCONTROL Member States in the 1990s. After 20 years of continuous development the system has evolved into a precious tool for the work of controllers and an important enabler for the integration of new surveillance techniques into existing ATC infrastructures, such as Mode S enhanced surveillance, WAM (wide area multilateration), ADS-B and ADS-C (automatic dependent surveillance – broadcast and contract, respectively). With ARTAS, the downstream systems – for example, controller working positions, flight plan data processing systems, safety nets or metering applications, systems in remote towers or military sites – can immediately benefit from the new surveillance technology, while the track service interface to ARTAS remains largely the same. Consequently, the impact of the change in the ATC environment due to new surveillance techniques is limited to a minimum. This kind of interoperability is further supported by using explicit messages in ASTERIX standards.

ARTAS also supports classical multi-radar tracking, which forms the surveillance backbone of most European air navigation service providers (ANSPs), whose maturity means that such high accuracy is the benchmark to be met by modern tracking systems.

The demand for safety assurance and certification of systems in the ATM domain is ever increasing. EUROCONTROL Safety Regulatory Requirements (ESARR) are an important part in the evolving ATM safety regulatory framework and have been transformed into European Community law. The EUROCONTROL Safety Assessment Methodology (SAM) offers guidance material for the required safety assurance, the definition of SWALs (software assurance levels) and their application in the system development and maintenance processes. SWAL relies upon planned and systematic actions necessary to provide confidence and assurance that software satisfies given requirements. For a legacy system such as ARTAS

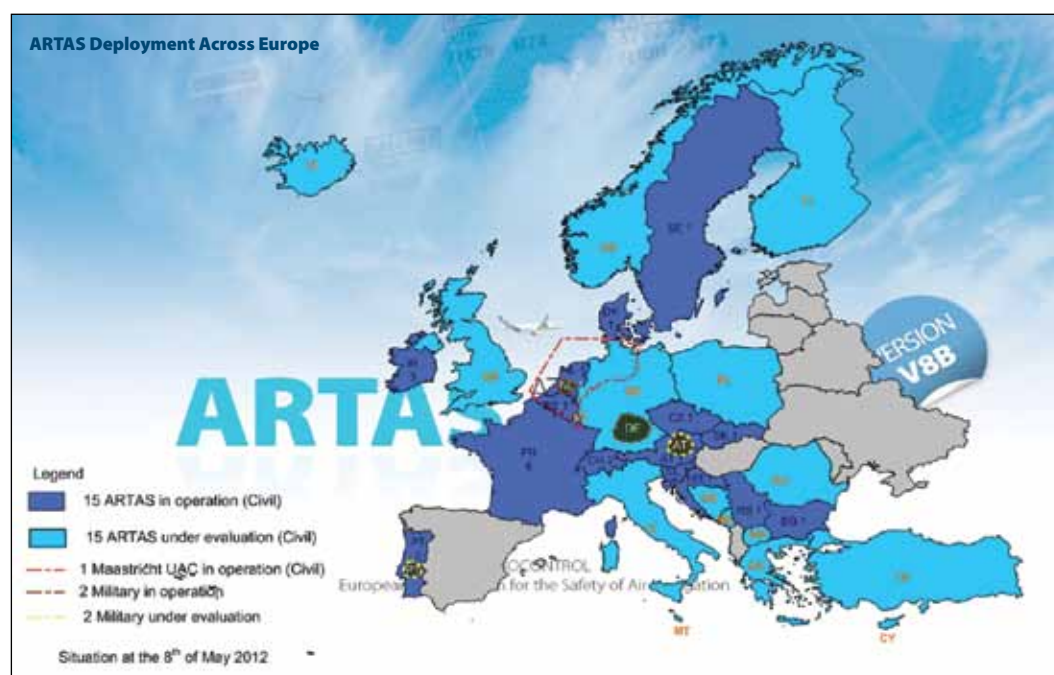
EUROCONTROL undertook an extensive and expensive programme to provide all the missing evidences identified during a safety assessment exercise, to ensure compliance with SWAL3. The programme and the related roadmap are well under way. This includes the maintenance activities and recently all CAMOS related activities follow processes according to SWAL3.

The ARTAS teams are also involved in SESAR, the implementation programme for the Single European Sky (SES). This implies the modernisation of the CNS technology including the broad introduction of ADS-B and multilateration as preferred surveillance methods, as these deliver improved performance in terms of accuracy, update rate, coverage and ultimately costs compared to conventional radar. In the context of working package 15 "Non-avionic CNS system" the SESAR programme addresses the development of CNS technology and identifies

and defines systems to serve as future communication and surveillance services, the ground system wide information management (SWIM) backbone.

EUROCONTROL's Director General, David McMillan, highlights the meaning of ARTAS for SESAR: "ARTAS, when launched 20 years ago, was seen as a stepping stone towards the goal of a consistent, coherent ATC system. Now we talk about it being an enabler for the SESAR operational concept".

ARTAS, as the surveillance data processing system at the core of the ground infrastructure, is thus an important building block of SESAR, enabling interoperability and seamless operation by ensuring a common high accuracy of the air situation based on all surveillance technologies. It greatly propagates defragmentation of system topologies (European de-facto standard), airspace (ARTAS capacity is ready for the larger airspace volumes of functional airspace blocks) and organisations (an example for a united →

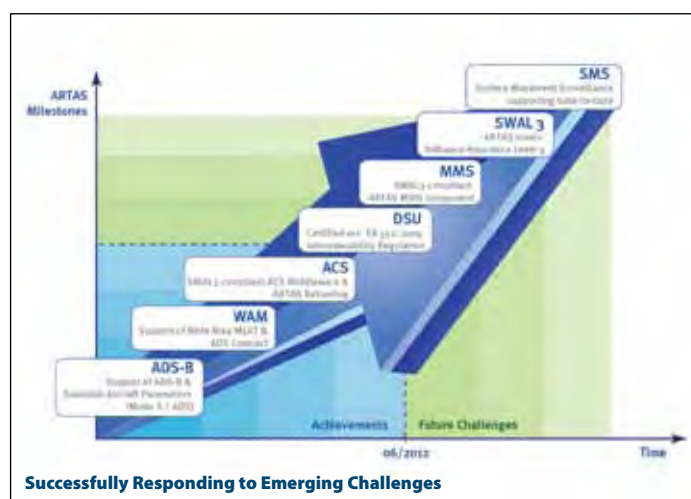
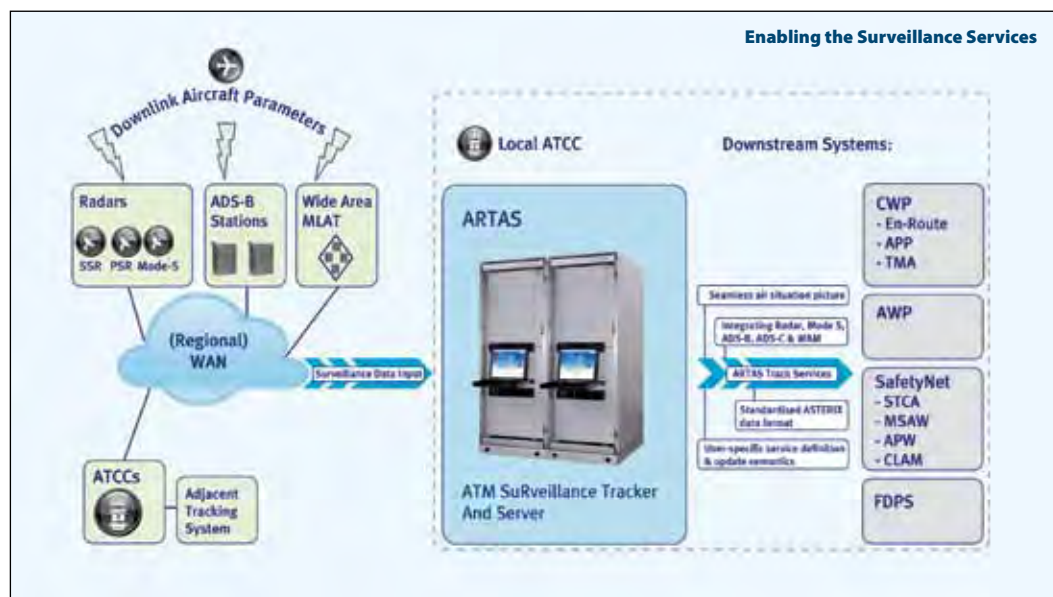






*"As for every product it is not only the functionality that convinces, but most important are the people, the framework and the services around the product that decide on success, stagnation or failure."*

**Costas Christodoulou**



→ European approach to system development and maintenance).

EUROCONTROL's ARTAS team can look back on a successful past, but the future holds a multitude of new challenges.

During 2012, EUROCONTROL will issue an ARTAS Declaration of Suitability for Use according to the EU interoperability regulation (Regulation 552/2004 - Interoperability of the European ATM Network - as amended by Regulation (EC) No 1070/2009).

But despite being an important element of the European surveillance chain, ARTAS lacks a capability that is gaining more significance to support

an integrated gate-to-gate ATM operational concept: airport surface movement.

With the growth of air traffic and the resulting congestions and delays, the integrated gate-to-gate operations are seen as an important component in future ATM systems. At present both the operational responsibility as well as the system chains for ground surveillance and air surveillance typically differ, whereby the air traffic controller has to hand over a flight to a colleague as soon as the aircraft leaves their area of responsibility – procedures consuming valuable time. A tracking system that integrates

both air and ground surveillance is an important first step to overcoming this situation and to enable gate-to-gate services. Both EUROCONTROL and the ARTAS user community have identified the development of surface movement surveillance (SMS) for ARTAS as crucial and EUROCONTROL has already started to set up the first prototype.

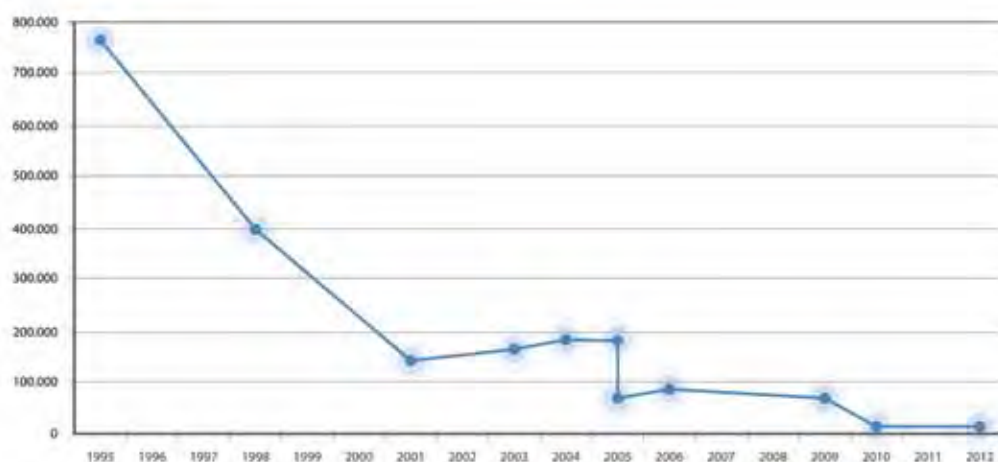
There is also the challenge of maintenance service for an ever growing ARTAS community of users. To address these challenges, COMSOFT, the current CAMOS industrial partner, decided to apply the ITIL (information technology infrastructure library) philosophy to its ARTAS support services. The result is a service management that is certified to comply with ISO/IEC 20000-1. ITIL provides guidelines for IT service management and covers the complete range of processes required for service delivery and support. The processes include quality and safety assurance procedures to enhance the overall environment. The reliable, traceable, structured and well documented IT service procedures and the achieved quality of services are effective measures to

counteract the steadily increasing costs and number of tasks. They improve overall efficiency and productivity of the CAMOS service, thus contributing to maintain an optimum cost-performance ratio.

ARTAS and all related services around this mature and high quality product will continue to be at the forefront of ATC technology and destined to play a key role for enabling a Single European Sky. Moreover, as current developments will be concluded, ARTAS will be a major contributor to the SESAR programme and for air traffic management in Europe. The central service concept for Europe plays a significant part and is envisaged to stay at the same level and to be delivered with the same dedication. In this way, ARTAS is providing and will continue to provide to airspace users high quality, cost-effective surveillance services. 

#### Delivering Cost effectiveness

## Platform cost



## Deployment of new airborne surveillance capabilities

A major advance in safety, capacity enhancement, reduced fuel consumption and carbon dioxide (CO<sub>2</sub>) emissions was achieved in February 2012 with the operational deployment of surveillance capability in the cockpit using an Automatic Dependent Surveillance Broadcast (ADS-B) system. An Airbus A330-300 of Swiss International Airlines equipped with a certified Airborne Traffic Situational Awareness (ATSAW) system from Airbus – including a Honeywell traffic computer – took off from Zurich Airport in Switzerland for Montreal, Canada. ATSAW provides pilots with a real-time picture of the surrounding traffic. It gives pilots the ability to move more frequently to a more efficient altitude when operating outside ground surveillance coverage. ATSAW also supports visual separation on approach and can provide traffic situational awareness on the airport surface.

The aircraft is part of the ATSAW Pioneer Project initiative of the EUROCONTROL's CASCADE programme, which coordinates the deployment of initial ADS-B applications and Wide Area Multilateration (WAM) in Europe. The project involves 25 Airbus and Boeing aircraft of British Airways, Delta Airlines, Swiss International Airlines, US Airways and Virgin Atlantic and aims at supporting deployment of new



airborne surveillance systems for operational use. It also involves the UK and Icelandic air navigation service providers, NATS and ISAVIA. "This is a major achievement, resulting from the close partnership between stakeholders and EUROCONTROL. It reinforces our ability to deliver performance for the European ATM Network in short, medium and long-term" said Joe Sultana, Chief Operating Officer of EUROCONTROL's Network Management Directorate.

FOCUS

# DATA LINK

IS KEY TO MORE PREDICTABLE  
**FLIGHT TRAJECTORIES**





Data link is more than just the replacement of air-to-ground voice communications with electronic messages – it's a vital enabler for a new generation of safer and more predictable flight operations, writes **Jenny Beechener.**

Today, EUROCONTROL's Maastricht Upper Area Centre (MUAC) and Deutsche Flugsicherung GmbH (DFS) at Karlsruhe are the only facilities equipped to communicate with pilots using data link messages supplementing conventional voice. MUAC has been using data link since 2003 and sees capacity and safety benefits, for example allowing routine messages to be sent by a second controller while the radar controller can focus on tactical issues. The benefits multiply as more centres equip, leading to an estimated 11 per cent capacity increase once 75 per cent of flights operate controller pilot data link communications

(CDPLC). Data link communications are so important the European Commission published an implementing rule in 2009 that requires all European navigation service providers (ANSPs) and airspace users flying above FL 285 to be equipped by 2015.

Data link provides a foundation for many longer term SESAR plans to automate air traffic services and introduce more efficient ways to manage the airspace. Studies reveal up to one in four voice messages are misunderstood, and routine messages account for half the total voice exchanges between controllers and pilots. In contrast, data link reduces unexpected events and will in future ➔



*"The long term challenge is moving from a position-based system to time-based control."*

**Martin Adnams**



*"The ability to downlink the FMS data gives controllers far better knowledge of what the aircraft is going to do, and when it will do it."*

**Chris Adams**

➔ support more accurate trajectory management. The LINK 2000+ programme introduced the first services at Maastricht in 2003 with more than 400 pioneer aircraft, while an additional 500 aircraft will equip in 2012 with the aid of EU grants. All European ANSPs are upgrading their flight data processing capability to support the new technology and comply with the Single Sky implementing rule.

Meanwhile, MUAC has embarked on the next phase of development, adding further messages that enable the aircraft to follow an optimum flight trajectory. In addition to height and direction, time over waypoints is included as part of the more advanced Initial 4D (I-4D) operations. The first validation flight took place on 10 February 2012 when an Airbus 320 test aircraft flew from Toulouse to Copenhagen then to Stockholm and back. The flight was able to establish in an early phase a coordinated time to overfly merging points into busy terminal airspace. It flew its optimum profile up to those points without any vectoring or speed instructions from the controllers and met its

agreed time of arrival.

The operation relied on data exchange between the aircraft flight management system (FMS) and the ground automation systems. Indra (Indra Sistemas S.A) supplied the flight data processor (FDP) for MUAC with the information displayed on an in-house developed controller display, while controllers in combined Danish/Swedish airspace used a Thales Group display to interact with the test flight. The aircraft received route clearances and time constraints via CPDLC over the aeronautical telecommunications network (ATN) to agree six separate merge points during the flight, each of which were met to within ten seconds.

The EUROCONTROL Programme Manager for data link Martin Adnams says the flight served as a first validation of standards that have been under development for the past three to four years. These standards have been developed by EUROCAE working group WG78 in Europe and RTCA Special Committee SC214 in the US and their verification is part of SESAR validation exercises under its Release 1 programme. Adnams

adds: "The road from your first test flight to full implementation is a long one. There is also a lot of business analysis on benefits which has to be done in parallel with technical validation." The next step is pre-operational validation that will put the system in front of real operational controllers, on the flight deck with real pilots, and execute the system in daily revenue flights.

The long term challenge is moving from a position-based system to time-based control," explains Adnams. "There is a lot to learn for controllers and pilots, and there is a lot more work needed to complete the validation process." Simulation activity at Toulouse and MUAC, which started in 2011, will continue in 2012. There will be another trial, taking feedback from the first flight trial and simulation work, at the end of 2013.

EUROCONTROL has joined with the SESAR Joint Undertaking (JU), Airbus and MUAC to draw up an implementation strategy plan for I-4D. The draft plan outlines a pre-operational phase involving controllers and pilots using the technology in real environments between 2015 and 2017. I-4D will re-use Link 2000+ infrastructure



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and technology but it will require a connection to the FMS on board the aircraft, upgraded controller HMI, electronic flight strips and more advanced ground to-ground coordination. The minimum requirement for this phase includes at least two adjacent air navigation service providers (ANSPs) with connected airspace and an airport. At least one operator conducting regular revenue generating flights in the relevant airspace will also be needed. The airborne systems will need to be certified and the ground systems approved before this can begin – it is a prelude to Initial Operational Capability (IOC) that would be the final demonstration of the benefits of I-4D prior to full implementation.

The implementation plan also includes airport services, as the I-4D package is not just limited to en-route airspace, but extends to the terminal area. As more predictability is introduced into the system, the planning process needs to include airport operations like start-up, pushback, taxi time, meteorological reports and special airport operations. I-4D eventually aims to connect the automation on the aircraft with automation on the ground. CDPLC systems that are integrated with the flight management system (FMS) will allow direct input of more complex clearances.

"The biggest challenge in implementation is synchronising the investment in the air and on the ground," says Adnams. "The basic problem we have is that the return on investment cycle for airlines is shorter than for ANSPs. To synchronise, you probably need incentives backed up by regulation." The simulations planned during 2012, using the Airbus cockpit simulator at Toulouse and test controller working positions at MUAC, will help to assess the benefits that

DFS Deutsche Flugsicherung GmbH



NATS



accrue in relation to different equipage levels by airspace users and ANSPs.

Honeywell and Thales both developed prototype FMS for the validation flight in February 2012. Tested on four descents and two en-route waypoints made during the flight, the equipment performed well within the +/- ten-second tolerance specified. The suppliers are using the test results to refine the technology and develop an avionics package for the I-4D programme. The earliest this would be available for certification would be 2018.

#### Network benefits

I-4D operations can be broken down into two steps: the first is the synchronisation between air and ground of the flight path or reference business trajectory. The second step is imposing a time constraint and allowing

the aircraft to fly its profile in the most optimal way to meet that constraint. The ATM system relies on all actors having the same view; it is therefore essential that the trajectory in the FMS is synchronised with that held on the ground in the flight data processing systems and the network management systems. MUAC operations expert Chris Adams says the ability to downlink the FMS data gives controllers far better knowledge of what the aircraft is going to do, and when it will do it, so they can plan ahead earlier and more effectively. "We can put information we did not have before about the flight profile into our conflict detection tools. We can do conformance checking so we know there is no discrepancy between the FMS and the ground. If you can give a 3D profile down to an initial approach fix, and use the time

element from arrival management systems to avoid aircraft going into holding patterns, the result is less noise, less emissions and less environmental impact. We are trying to look more and more to network management improvements."

Technology upgrade is also required in ground-to-ground communications, to facilitate data exchange between ATC centres, network management and controllers. "To really achieve I-4D, the ground-to-ground infrastructure has to evolve," explains Martin Adnams. "We need better ground-to-ground coordination, otherwise the data you exchange between the ground and the air is not going to be put to good use." The OnLine Data Interchange (OLDI) protocols that have been in use since the 1990s, will be enhanced by modern IP-based infrastructure able to communicate with multiple users. While many ANSPs have the capability embedded in their automation systems, so far only three – in Denmark, Finland and Sweden – use advanced system-supported coordination to exchange electronic messages between centres.

European data link work coincides with similar activities in the US, where the FAA's Data Communications Integrated Services (DCIS) programme aims to establish a data link network between the cockpit and the ground in the airport domain within the next six years, and en-route environment from 2018 to 2023. Adnams says: "EUROCAE WG78 and RTCA 214 are working on converged standards in order to bring us to the point where oceanic and domestic standards are the same globally. A convergent solution will be presented at the ICAO Air Navigation Conference in September 2012 (ANC 2012)." ■





*"When we have a project that links across borders or involves avionics, then we need to be careful."*

**Tony Licu**



## FOCUS

# NEW WAYS OF CAPTURING REAL SAFETY DATA

Traditional safety performance indicators do not always give a full picture of how the air traffic management (ATM) system is performing, writes **Jenny Beechener**, so some innovative thinking is needed.

The number of accidents caused directly or indirectly by ATM continues to fall year on year in Europe. But this is no reason to take safety for granted, and Europe has a number of monitoring programmes in place to check safety trends and measure progress. The 2011 Annual Safety Report published by the European Safety Regulatory Committee (SRC) identified several areas of concern and highlighted growing pressure on operating budgets for air navigation service providers (ANSPs) and regulators.

The SRC stated: "The lack of resources and qualified staff at national level dedicated to safety data collection and analysis is a factor of concern. States and National Supervisory Authorities (NSAs) have difficulties in complying with the timelines given for their full range of activities."

EUROCONTROL's Head of Safety within the Network Management Directorate Tony Licu says that safety has to be managed in combination with capacity and efficiency. One of his key messages is to relate safety improvements to the benefits these bring for improved business practices and that a culture change, rather than just a focus on the technical issues, is what is needed to improve safety. He says many ANSPs have adopted a safety culture over the past decade, but to really work it needs to involve the whole organisation. In the context of Single European Sky, it also needs to extend across national borders. "When we have a project that links across borders or involves avionics, then we need to be careful. These interfaces have to be top priority for us."

Licu warns that because we have not had a collision since Uberlingen in 2002, the classic approach to safety to look just at negatives – incidents, accidents, airproxes – needs to be updated by also focusing on the positives, at best practice.

EUROCONTROL is working to finalise a priority list of five operational issues that need to be addressed. These include runway incursions, which increased by 26 per cent in 2010 (the most recent reporting year), separation minima infringements, level busts, loss of separation and sector over-deliveries. Airspace infringement has increased in severity and is now the focus of an Action Plan approved by the Provisional Council aimed at incident risk reduction. The plan was developed with the support and contribution of airspace users, service providers,

regulatory and military authorities, the European Commission and EUROCONTROL. It follows similar initiatives in other priority areas such as runway incursions.

"We are working on a process where we collate data and end up with 30 plus operational issues and then we work together as a network to look at the top five and link this with the process of reporting," says Tony Licu. "We see with runway incursions that whenever you target this the reporting doubles. This is not because we have double the runway incursions, but because we have put a focus on it. You have to marry the data with expert judgment."

EUROCONTROL's principal safety data analysis tool is the Safety Analysis Function EUROCONTROL and associated Repository (SAFER). This receives data from two ➔

➔ main data flows: mandated reports from Member States and voluntary reports. Mandated reports, known as Annual Summary Template (AST) submissions, were introduced by ESARR 2 in 1999 and include key safety indicators such as runway incursions, separation minima infringements, (near) controlled flight into terrain, airspace infringements and level busts. The EUROCONTROL Voluntary ATM Incident Reporting (EVAIR) encourages all European stakeholders to report occurrences from a range of sources including pilot data, accounts from air traffic controllers and from airspace users. Charlie Govaarts is senior safety expert for the Safety Oversight Division. "The two data flows complement each other. Certain elements can be reported in far more detail in the voluntary data flow, revealing key causal elements for occurrences. You get more granularity," said Govaarts.

More than 100 airlines contribute to EVAIR under confidential bilateral agreements with EUROCONTROL. Airline associations including IATA and the European Regions Airline Association (ERA) also participate, but the direct airline reports are the most effective. "You can approach the airline directly and it is possible to set up a quick solution with the relevant ANSP," explains Govaarts. "It is a faster process."

SAFER is also connected to data repositories held by the EC and ICAO and shares a common taxonomy in respect of ATM occurrences. The integrated analysis forms the basis for safety improvement measures and safety management.

The SAFER safety analysis system supplies data to a number of reporting outlets. These include the SRC annual safety report and the Performance Review Board



(PRB), through cooperation with the Performance Review Unit (PRU). The data is also provided to the European Aviation Safety Agency (EASA) for its annual safety review, as a so-called ATM chapter, published for the first time in 2011. "All this output has a meaning and contributes to possible safety improvements," explains Govaarts. "Because you can find trends, you can identify risk areas and give input to certain initiatives to improve safety in ATM. We have valuable examples of input from voluntary and mandatory reporting systems which have worked together and the input has led to safety improvements in level bust and runway incursions."

The PRB uses the data to monitor safety performance and to establish safety performance indicators which are incorporated in the first reference period (RP1) of the European performance review scheme. While the indicators are used to measure safety performance, there are no binding safety targets included in RP1. "You need more experience in monitoring key performance indicators (KPIs) before setting targets," says Govaarts. "Safety is not as straight forward as cost or efficiency." It is still uncertain whether safety targets will feature in RP2. "There is a lot of discussion going on between Member States, EUROCONTROL, PRB, EASA and the EC in order to refine the safety KPIs."

Furthermore, a number of EUROCONTROL Member States are still not submitting ASTs, and among those that are submitting reports, the severity assessment at occurrence level is deteriorating. The main reason for this, as already mentioned, is limited resources. But in order to achieve common assessment targets, the States need to adhere to Europe-wide consistent assessment criteria. There is also under-reporting of incidents, estimated at 50,000 in 2010 across ECAC States. The absence of a 'just culture' in favour of incident reporting is a contributory factor among some ANSPs and regulatory authorities.

Tony Licu would like to see stronger leadership. "The ultimate resource for us is the senior management leadership. Having CEOs committed to safety is key and essential for driving safety improvements and better performance."

Achieving regional harmony becomes more important as the Single European Sky takes shape. Safety has to be maintained across different ATM systems irrespective of hardware and software infrastructure. "The way the performance framework develops is key," says Licu. "To help understand the issues, we are looking to learn from mergers of large multinationals. It is a big safety issue and we are working on the solutions, but the first thing is to raise awareness." 🇪🇺



*"You can approach the airline directly and it is possible to set up a quick solution with the relevant ANSP."*

**Charlie Govaarts**



## FOCUS

# AIRSPACE USERS AT THE HEART OF DEFINING THE FUTURE ATM SYSTEM

By 2020 a new concept in airspace management systems used by the flight operations centres (FOCs), should be available in Europe to replace flight data processing system (FDPS) equipment. FOCs will redefine the way aircraft of all types can fly their most efficient routes – and redefine the relationship between their operators, air traffic management agencies and airports, writes **Philip Butterworth-Hayes**.

**T**he key to Europe's future air traffic management system (ATM) lies in the perfect synchronisation of aircraft, ground-based data processing systems and communication links between air navigation service providers (ANSPs).

The future system is being planned around the concept of the four-dimensional (4D) trajectory, called a 'business trajectory' (or 'mission trajectory' for military flights) where the aircraft operator defines a detailed, optimum route and the ATM and airport systems work to ensure the route can be flown as close as possible to the operator's original plan. The pilot enters into an agreement with ATC to ensure that a point in space and a required time of arrival at that point shall be met within a predefined time slot.

The technology which underpins this concept provides a stiff challenge for researchers planning a new generation of ATM systems. Right from the early

planning stages through to the flight itself and the post-flight analysis all the participants have to share enormous amounts of detailed dynamic information, as the flight cannot be managed in isolation but as part of a constantly changing traffic scenario. Terminal push-back and arrival times need to be coordinated, take-off and landing slots, ascent and descent paths will need to be planned, and de-conflicted from other traffic. Weather conditions, actual and forecast, will need to be input, and the aircraft's own flight management system will need to be linked to the data processing systems on the ground so the flight can be optimised for speed, fuel efficiency, cost, or all three.

As well as crunching all this dynamic data the synchronised systems will have to make available to all participants the exact amount of data they will need in order to optimise the safety and efficiency of the flight – while bearing in mind they might

need to make a few compromises along the way to ensure the safety and efficiency of the entire network.

At the heart of this complex operation lies the FOC systems. Currently aircraft operators in Europe plan each flight in detail and then file a simplified flight plan to the relevant ANSPs and EUROCONTROL's Network Manager Operations Centre – previously the Central Flow Management Unit (CFMU). These simplified plans are passed to sector controllers who coordinate the flight plan data with radar pictures, tactically ensuring the safe separation of traffic and, if there is time, the most direct flight possible.

But in the future, the current role of the flight data processing system (FDPS) will be elevated from basic flight-plan display system to that of the FOC, managing the business trajectories (from the airspace user perspective) of all aircraft in a particular sector, a workload

which includes automatic conflict detection, military traffic management and automatic coordination with ATC adjoining centres and Network Manager.

It is a hugely complex task and involves, as never before, the integration of airborne and ground-based systems. In Europe much of the work to define, model and develop this new generation of systems is taking place among partners of the Single European Sky ATM Research (SESAR) Work Package (WP)11.1, within the Flight and Wing Operations Centre (F/WOC) team. In June 2011 EUROCONTROL, on behalf of the SESAR Joint Undertaking, awarded the Fly4D consortium – led by Airbus with members Cassidian, Honeywell, Lufthansa Systems and Sabre Airline Solutions – the job of carrying out the project. "We have defined four major areas of work within this programme," said Daniel Chiesa of Airbus, leader of both the Fly4D Consortium and WP11.1 Work ➔



*"Systems manufacturers will have to adapt to the new technologies available in the market."*

**Daniel Chiesa**

➔ Package. "These are management of the business mission trajectories, flight planning the trajectories, operations control management (both ground and air) and support to the post-flight analysis reporting."

But WP11.1 is slightly different from many of the other SESAR Work Packages. First, the involvement of airspace users has played a crucial role in the work to define and develop the technical requirements for FOC systems and their influence within the programme is particularly high; the view of what a business trajectory really means has been defined by the community of all involved airspace users, not just the airlines.

Second, the Work Package contains itself both operational and systems development projects, contrary to the rest of SESAR WP, thus improving the

flow-down of requirements and reducing external dependencies.

"SESAR Work Packages are mainly systems development or operational," said Daniel Chiesa. "We will produce the system based on operational requirements which we will consolidate. Our first two projects are operational by nature and projects three to five are broadly concerned with systems development."

Thus projects four and five will demonstrate one or more solutions which meet the SESAR requirements.

It was clear from the start of the programme that WP11.1 was also of strategic importance, beyond the generation of new technology systems and procedures, closing the loop for SESAR future developments between the Network Manager and airspace users.

"WP11.1 is considered to be

of strategic importance by the airspace user community within the SESAR Joint Undertaking and it is strategic for us, too," said Giuseppe Murgese, SESAR WP 11.1 Contribution Manager at EUROCONTROL's Experimental Centre. "We're talking about a major improvement in the operational coordination between users, industry and ATM organisations. That's why we have developed a modus operandi with the SESAR Joint Undertaking which goes beyond just administration, there's a strong cooperation in the technical issues as well. As Network Manager it is very important that we have this type of link with the airspace users. We need this for the future."

As well as funding the work, EUROCONTROL is providing technical support (through the involvement of identified experts), and acts on behalf of SJU as the customer (buyer). There is





## SESAR work package 11.1

### the constituent parts

Among the Fly4D consortium members Airbus has overall responsibility for progress on the work, with Lufthansa Systems dealing with the operational and systems requirements and the prototype of the new flight planning system. Sabre is also undertaking software development work in these areas plus prototyping the new flight plan system and new operational control management software. Cassidian is managing the state users perspective (including military) for all projects.

Honeywell is defining the operational system requirements for the Business and General Aviation communities and for those operators with no FOC.

The Work Package 11.1, to define and develop a next-generation FDPS, is broken down into five research areas:

- First, define the operational concepts of the requirements of the business and mission trajectories (this is being led by Airbus).
- Second, input these requirements to define the functional requirements for the FOC/WOC (Airbus)
- Third, define architecture and systems specifications (Lufthansa Systems)
- Fourth, development of the system prototype (Sabre)
- Fifth, pre-operational validation (Airbus)



*"WP11.1 is considered to be of strategic importance by the airspace user community within the SESAR Joint Undertaking and it is strategic for us, too."*  
**Giuseppe Murgese**

also a crucial role played by the Civil-Military ATM Coordination Division (DSS/CM) of EUROCONTROL for the definition of operational and system development requirements, a complex but vital task as Member States have different definitions of requirements for a mission trajectory. EUROCONTROL also plays a role in ensuring security issues are also being addressed throughout the programme.

There has been relatively rapid progress on the programme in recent months with the first three research projects now up and running while the fourth has just completed the initiation phase.

"Project one has already developed a view of the trajectory

management concept from the airspace user perspective," said Giuseppe Murgese, to complement the views of the ATM management world.

"Although the validation project has not started yet, Fly4D partners have also agreed to support other Work Packages' validation activities. This can be seen as a "quick-win" within the whole SESAR Programme. This year and next year the consortium is involved in supporting other Work Packages such as WP7, Network Operations, by sharing the additional information needed via files exchange. It's an important achievement because we are talking about improvements to

the flight planning process and system today."

The research work is complex and throws up a number of technical challenges.

"Systems manufacturers will have to adapt to the new technologies available in the market – they will have to consider cloud computing, for example, to support the multiple calculations required. It is a challenge," said Daniel Chiesa.

"The main technical component is data sharing," said Giuseppe Murgese. "We have collaborative decision making (CDM) links today but they are local. And in terms of technology aircraft operators are isolated, though they do have links with the EUROCONTROL Network Operations Centre. That is why the system wide information management (SWIM) element will become so vital – and we cannot forget airspace users who are not airlines and do not run Aircraft Operations Centres. They are starting to have technology available today such as iPads and tablets – used mainly by business and general aviation users – which are not yet common in the ATM world."

The in-coming technologies are likely to change not just the way aircraft are operated but the way the systems owners cooperate.

"With data sharing the same information and CDM processes integrated with other ATM systems, the future will be very different," said Giuseppe Murgese. "Today the major interaction is between the pilot and the controller, with the Network Manager playing a major role into the definition of the operations.

In the future this will change. The airspace users themselves will play a major role; the link between aircraft and ATC will be reinforced but there will also be a strong link between the aircraft operator, the airport and the ATM system." ■





FOCUS

# IMPROVING NETWORK CONNECTIONS

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Aircraft operators and EUROCONTROL's Network Management operations room will have to forge even closer links in the future if the European air transport system is to operate at its most efficient level, write **Bernard Fitzsimons** and **Philip Butterworth-Hayes**.

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**T**he Network Management operations room is a symbol of change in the air traffic management industry. It is not merely the technology which is different, but the culture and philosophy have evolved too – Europe's strategic air traffic flow management operations centre has become a blueprint for a new way for aircraft operators and infrastructure providers to work together. The result has been a dramatic improvement in the way demand and capacity has been re-balanced.

"In summer 2000 we recorded an overall daily delay up to 250,000 minutes" according to Giovanni Lenti, one of the five Current Operations Managers in the Network Management operations room. "A single flight could be subject to up to ten regulations and there was no possibility of individual delay improvement at all. Now regulation is the last resort. Once we have identified a potential capacity overload, we work with the air navigation service provider (ANSP) to find another existing sector configuration

which will avoid a regulation. If not possible, we then coordinate and apply offloading measures (aiming at reducing delays) as level capping or geographical reroutes, all in full agreement and coordination with ANSPs and air operators (AOs). We don't apply re-routing of more than 20 or 25 miles – a few years ago these could have been between 80 and 100 miles. Cost is a major issue for aircraft operators and we understand how important it is."

A visitor to the former Central Flow Management Unit (CFMU) in 2000 would immediately see that today's ops room is very different from its predecessor. It is much larger – with 43 tactical operators now working in shifts on reducing delays and managing peaks and optimising radar sectors' and airports' available capacity. It also works to clear performance targets – the average delay-per-flight target is 0.7 minutes and as Network Manager, EUROCONTROL is aiming for a further reduction of ten per cent by the end of the 2012.

"Since we took over the role of Network Manager we have been able to ensure that "best practice" procedures can now be applied by all personnel in all ops room domains. So all the Flow and Tactical Network Managers have been trained to apply measures to the benefit of the overall network," said Giovanni Lenti.

Another of the key changes is the way in which aircraft operators are integrated within the operation.

"There are two permanent airline representatives at EUROCONTROL, called AOLC (Aircraft Operators Liaison Cell), from IATA (the International Air Transport Association) and IACA (the International Air Carrier Association). They are totally involved in the coordination of all

operations, from the strategic to the tactical management of any event (sport, military, national) that might lead to a traffic bottleneck and consequently delays, such as the European football championships this year in Poland and the Ukraine."

In the operations room the number of AOLOs (Aircraft Operator Liaison Officers) has also recently risen. Up to seven AOLOs are the main operational pre-tactical/tactical points of contact with individual aircraft operators.

### Dynamic data

It is not just airlines who are involved. The military has a key role to play. The ops centre automatically receives dynamic data from each State's airspace management cell on the availability of routes to civil traffic in dedicated military airspace areas. It automatically correlates this with the flight plan processing database so airlines can quickly be made aware of potential short cuts.

"But it is not perfect – one of the reasons that these routes are not always taken up is because some airlines don't have enough flight dispatchers available to check when these routes become free. That's why we are trying to improve our coordination with aircraft operators – we send colleagues to talk to aircraft operators, to gain a knowledge of their respective operating systems," said Giovanni Lenti.

Heading towards a level of "perfect" coordination is a constant process and depends on improving communications at both systems and personnel level. A key element in the delivery of automated data is the NOP portal (see <https://www.public.cfm.eurocontrol.int/PUBPORTAL/gateway/spec/index.html>), which gives aircraft operators and all

other aviation stakeholders an up-to-the minute view of the state of the European air traffic network. The portal offers headline news on possible areas of congestion, accurate weather forecasts and access to the EVITA (the European crisis visualisation interactive tool for ATFCM) system which supports decision making in times of crisis, such as industrial actions or the appearance of volcanic ash clouds.

The NOP also includes a huge amount of relevant information and data (AIMs, the valid Route Availability Document, lists of air traffic flow and capacity management (ATFCM) scenarios, etc.) helping aircraft operators (AOs) to perform more and more efficient flight operations.

But what's the view of the users of the system? The introduction of increased automation in communications between the ops room and airspace users is an evolving process.

Ian Pauls is Air Traffic Operations Manager at British Airways. "Since they (the ops room) created the e-help desk our relationship is not any worse, but because its been automated, we don't have the same interaction.

"We do actually think it's a good idea, but we're very keen still to maintain that daily contact with the human beings there, because you can't do some of the things on the help desk that you could do through human interaction. So I know why they automated it, but I still want to see more daily interaction.

"If it warrants it, my guys will still call the ops room and say, "How about this?" And 99 times out of a hundred they'll get what they wanted," said Ian Pauls. "I think the other thing they're very keen to do is recovery from network disruption. ➔



*"Since we took over the role of Network Manager we have been able to ensure that 'best practice' procedures can now be applied by all personnel in all ops room domains."*

**Giovanni Lenti**



*"It's nice when you have personal contact for a specific airline and they can solve your problem."*

**Martin Dijkzeul**

➔ So when there is potential disruption, strike action or any natural disaster like a volcano, they are quite quick to set up conference calls and give updated information on the network so people can plan. Then they're very good at managing disruptions through the event, seeing where the capacity is and what they can give in terms of capacity round different parts of the network," said Ian Pauls.

But even with increased coordination there are still limits to what the ops room can currently achieve.

Martin Dijkzeul is ATC (Air Traffic Control) Coordinator/Flowcontrol at KLM Royal Dutch Airlines. "What happens now is that the ANSPs have the final say despite the advice that the Network Managers

problems are exactly the same. British Airways has more to do with NATS, for example, while we have more to do with DFS, and there are some differences. So it is nice when you have personal contact for a specific airline and they can solve your problem."

#### Finding their way

But he sees encouraging signs of progress: "The Network Manager is relatively new. We see some progress and they have to find their way too and see how much pressure or power they can give to it. I hope the Network Manager will be very proactive in solving problems or trying to prevent problems - and if they prevent problems then we, as an operator, won't see it - and that's a good thing."

Ian Pauls believes there are

function is in a state of constant evolution and in the future that will mean increasing the spread of information between stakeholders throughout the network. "Further improvements are linked to exchange of information," said Giovanni Lenti. "That means more automation. We will expand the NOP Portal and eventually we will have the benefit of the SESAR (Single European Sky ATM Research programme) system-wide information management (SWIM) concept which will allow all parties to have increased common situational awareness, by allowing more decision makers to access the same information available on a single screen. Even now we're working hard to collate all this information in place."

*"If it warrants it, my guys will still call the ops room and say, 'How about this?' And 99 times out of a hundred they'll get what they wanted."*

**Ian Pauls**



will give them. For example, if the ANSP wants a particular scenario the Network Manager has to put it in place. I think that is something that should change in the near future."

Mr Dijkzeul also believes personal contact is important: "The main carriers in Europe – British Airways, Lufthansa, KLM – have dedicated desks working on ATC problems, and it's nice if you have a small group of people who have contact with a small group of network managers, especially on a personal basis. Not all our

improvements to be made: "I think they need to be a bit more dynamic on sector reconfiguration, but then that obviously relies on the ANSPs giving them information."

"The ATC world sees flight efficiency as the shortest way from A to B, and often they don't take wind or over-flight cost into account," said Martin Dijkzeul. "We might prefer a longer route because of positive winds or lower over-flight costs. The equation is different for every operator."

So the Network Management

"They need to exploit all available capacity through different ANSPs and provide that to the carriers," said Ian Pauls. "So strategically they'll look at where the demand is in advance and then offer solutions to carriers to mitigate any delays on the day, I would say. The other side of it is looking at flight efficiency, emissions and noise, but I guess that comes under the SESAR package and working with carriers about what they really want – parabolic descents, perfect flight plan and so on." ■



## VIEWPOINT

# GREATER CLARITY REQUIRED ON COSTS AND BENEFITS



For some of Europe's smaller airlines the costs and benefits of the continent's new air traffic management programmes remain obscure, writes **Simon McNamara**, Deputy Director General of the European Regions Airline Association (ERA).

The European air traffic management (ATM) sector is in a period of major transition – and it's a difficult transition for both the ATM industry and the airline industry. Airlines have high expectations on the cost reduction and efficiency improvement that must be delivered and the ATM industry has some tough choices to make in order to deliver. However, there is currently a great deal of uncertainty about whether the project is going to be able to deliver the improvements needed while making the system more cost-effective.

The ideal ATM infrastructure – for an airline – should be a totally seamless service. It should allow an airline to plan and execute its operation with the least interference at the lowest possible cost. However, air traffic delays and congestion remain a serious

concern to our members. Linked to delays is also an environment impact. Under the EU Emissions Trading Scheme, for example, airlines will need to buy extra carbon credits in order to offset the inefficiency of the current ATM system. Equally airlines face very penalising legislation for compensation and assistance to passengers in the event of delays even when the ATM industry, not the airline, causes the delay. Add to this the fact that most of ERA's members operate multi-sector days with typically five, six, or seven sectors a day so they are particularly exposed to ATM knock-on delays.

As ERA sees it, there are two critical elements to the reform of European ATM. Firstly, the technology side, or SESAR (Single European Sky ATM Research programme), which is being developed with the support ➔

*"We have the prospect of something very exciting when it comes to ATM reform, a chance to make Europe more efficient and competitive."*

**Simon McNamara**



→ of the industry, including ERA. The Definition Phase of SESAR was a success in that it delivered a Master Plan. Some momentum was lost due to the delay in setting up the Joint Undertaking which is managing the current, Development Phase. However, that is now running with a large number of projects launched. One of the major challenges for the Development Phase is communicating to non-ATM professionals what all these projects are destined to deliver and how they might benefit different airlines in the short, medium and long term. Many of

ERA's members, especially some of the smaller airlines, know that new technologies and procedures should deliver more capacity at a lower cost – but they do not know how they will be deployed, what the costs will be and what the exact benefits will be to them. It's a question constantly asked by operational planners and those needing to plan investment budgets.

#### **Consolidation required**

The second aspect is the Single Sky project as a whole and that brings with it highly political issues surrounding sovereignty

and the challenges of streamlining a very fragmented and nationalistic airspace. What Europe needs, as far ATM infrastructure is concerned, is a great deal of consolidation. The case has been clearly demonstrated by independent review bodies such as the EUROCONTROL Performance Review Commission. The inefficiency comes through fragmentation, with a multitude of different national ANSPs providing airspace control over their State's sovereign airspace. Despite years of debate there still seems no clear path to reduce this fragmentation.

Functional Airspace Blocks (FABs) were put forward as a way of trying to drive greater integration, but to date they have yet to really deliver what is needed by the airspace user industry.

The implementation of the Single Sky II (SESII) regulatory package was a big step forward in incentivising change – it imposed a form of economic regulation on the air navigation service industry in Europe. The European Commission (EC) deserves credit for aiming high on this package and trying to deliver real change in Europe. However, what we saw after the base legislation was put in place was a progressive watering down by States of the recommended targets put forward by the EC's own independent Performance Review Body in the first reference period of the scheme. If we are still to meet the overall goals of SESII there is a lot of catching up to be done.

An additional risk for the overhaul of the European ATM system is cost. In particular, the risk that the investment in the new airborne and ground technology needed to deliver efficiency improvements will be expected to be picked up solely by airlines and other airspace users without a clear benefit being shown. A European deployment plan and governance model is currently being developed and it will be important to ensure this plan generates the maximum return on investment and also addresses funding of the required investment. The governance structure will have to ensure users have a right to determine and influence what is needed, when it is needed and at what cost.

For example, for ERA's members operating in the remoter regions of Europe, it's very likely that the technologies will be very different from those needed for airlines



operating either in the core of the continent or on long haul, possibly trans-oceanic, services. It is therefore important that the different types of airspace users have control over deployment and that is something we are working hard to achieve at the moment.

On the cost side we also need to understand what the likely costs will be, so operators can plan deployment and see what

the benefits will be to them individually. As an Association we can play an important role in feeding information to our members but ultimately individual operators need to be able to challenge, accept or reject any deployment plans depending on the associated business case.

As an Association, we are also campaigning for both public and private finance to be used to fund the upfront investment required,

which could then be recovered as and when the benefits come on line for individual operators.

Despite these concerns we remain optimistic that benefits will flow from the Single European Sky and SESAR projects. For example, the ability to provide tools which give far more control to operators to allow them to see in real time what is going on within the network and to take decisions to optimise their own networks. The new Network Manager should be another benefit to the network as a whole allowing a top-down control and optimisation of how airspace is managed.

We have the prospect of something very exciting when it comes to ATM reform, a chance to make Europe more efficient and competitive. But to do this we need to move beyond the status quo, all parties need to have high ambitions and ideally we need to take politics out of the equation. Above all, in Europe, we need to accept that change in ATM is a good thing for all concerned. ■





## VIEWPOINT

# SINGLE EUROPEAN SKY – CAN THE AIRLINES HOPE FOR THE BEST?

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**Athar Husain Khan**, acting Secretary General of the Association of European Airlines (AEA), believes that, for the moment at least, there is more hope than expectation that the Single European Sky (SES) will deliver on its performance targets.

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European airline professionals are, for the most part, an optimistic species. They need to be, because the industry as a whole has delivered just one decent annual profit in the last ten years. Consequently, there is a widespread belief that 'things will get better', even when all the evidence is to the contrary.

This year is proving to be a particularly tough one for optimists. The combination of a feeble European economy and sky-high fuel prices is a particularly toxic one, and also highly unusual. The negative effects of previous recessions have been at least partly offset with depressed oil prices, but not this time around.

If that weren't bad enough, we have the prospect of European airlines becoming caught up in numerous trade wars arising from the EU's Emissions Trading Scheme (ETS). Some of the threatened sanctions include restrictions on access to airspace – a politicisation of ATM which, I imagine, will

strike a discordant note with the readership of this publication.

Still, we have to keep believing that things will get better, and the SES initiative has been a source for optimism since it first received political endorsement in the late 1990s. Justifiably so: the more the price of fuel rises, the greater the benefit of the estimated 12 per cent fuel burn reduction that SES can deliver; the more damage inflicted on airline revenues by the global economy, the more welcome the cost-efficiency savings promised by SES. And with a 12 per cent reduction in carbon footprint at stake, airspace users look forward to providing their environmental antagonists with solid evidence that their green credentials are sound.

But is all as it should be on the Single Sky front? We should, right now, be seeing the fine-tuning of the Functional Airspace Blocks (FABs), in readiness for their roll-out on 4 December this year. We should also be seeing the

SES capacity and cost-efficiency targets being translated into firm commitments for the coming years. In both cases, our optimism is sorely tested.

As far as the FABs are concerned, they are of course 'functional' only up to a point. A glance at their geography will reveal the obvious – that they are collections of existing national airspaces whose boundaries continue to follow national frontiers. Consequently, many intra-European flights will be transiting the same number of airspaces as they do now.

As long as the FABs are essentially collectives of national airspaces, governance issues are bound to be influenced by national politics. It was just such stresses which led to the breakdown of the prototype FAB project Central European Air Traffic Services (CEATS) in 2008, which could not even agree on where to locate its headquarters. If we consider the giant

FAB-Europe Central, comprising France and Germany as well as Benelux and Switzerland, and tackling the congested core of Europe's airway network, there are clear divisions already emerging over such fundamental matters as which operating system the computers will use. Even a less-complex entity such as the Baltic FAB (FAB-Baltic) is using national procurement policies as a stumbling block to realising efficiencies through equipment rationalisation.

Meanwhile, the issue of performance targets is showing up the gulf between the commitments made in the system-wide target-setting exercise of late 2010 and the reality of what individual FABs and national service providers are willing or able to deliver. At present a number of Member States are falling short of either their cost-efficiency or capacity targets. Moreover, some States are actively lobbying the European Commission for a revision of their

cost targets in response to weaker than anticipated traffic – in other words, to perpetuate the vicious circle of cost-recovery pricing that the cost-efficiency provisions of SES were designed to eliminate.

The point is rapidly approaching where the Commission will have to take the initiative with respect to enforcement proceedings against States which are failing to meet their targets. It goes without saying that the largest countries – those which would be the most politically daunting to tackle – are also those which account for the bulk of the airlines' user fees. Nonetheless, the airlines remain optimistic, for the time being, that the Commission's resolve will hold, and that the Single Sky legislation is sufficiently robust to begin delivering the cost benefits which have been promised for so long.

The stakes could scarcely be higher. Europe depends on its network airlines for its connectivity, both internally and to the rest of the globe.

But Europe's network airlines are held back by a number of factors, including the persistent sluggishness of the European economy and the burdens imposed by vast layers of regulation.

The same applies to infrastructure. The newest and next generations of global competitors to European airlines are coming from areas of the world where national administrations are fully aware of aviation's contribution to social and economic development, and naturally receptive to its infrastructure needs. The Single European Sky offers an opportunity to echo the steps being taken in aviation infrastructure provision elsewhere in the world, and go a very long way to restoring the European industry's competitiveness. It's good for passengers and it's good for the environment. Will it deliver? We in the airline sector continue to hope for the best. ■

*"As long as the FABs are essentially collectives of national airspaces, governance issues are bound to be influenced by national politics."*



## VIEWPOINT

# “WE ARE CONCERNED WITH THE **SLOW PROGRESS** ON FABs”

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**Pedro Vicente Azua**, Chief Operating Officer of the European Business Aviation Association (EBAA), talks here with *Skyway* about how Europe’s business aviation operators view progress towards implementing the Single European Sky performance targets of 2020.

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**Skyway:** What would you say is your major concern when it comes to implementing a less fragmented, better-performing air traffic management (ATM) system for Europe?

We are increasingly concerned about the slow progress being made in implementing functional airspace blocs (FABs). We have been waiting ten years for these. They first appeared in the initial Single European Sky (SES) package of Commissioner Jacques Barrot in 2003/2004, but we have been really disappointed by the results so far. We believe that FABs are the best way for States and national air navigation service providers (ANSPs) to improve their ATM performance through clearly defined key performance indicators (KPIs), but in the last few years we have seen very slow progress in political and technical programmes. We recognise that Sweden and Denmark are moving faster than most of the FABs and we know the United Kingdom (UK)

and Ireland are doing better. But when we look at the heart of the continent, at FABEC (FAB Europe Central), which is responsible for around 50 per cent of our traffic, we are really disappointed.

We should remember the key objectives of the first Single European Sky package in 2004: a reduction of costs of 50 per cent, a three-fold improvement in safety, a ten per cent reduction in carbon dioxide emissions and substantial increases in capacity. These targets I know are being reviewed by the Commission and will probably be pushed to the right because we are a long way away from them. But these are the targets we all signed up to and FABs were a large portion of the political targets. We know SESAR (Single European Sky ATM Research) technology alone will not give us the cost-savings we need, especially when we compare the European system to that of the USA. FABs are fundamental to reducing fragmentation, clarifying

airways and providing a big chunk of cost reductions. We need to consolidate some of the centres – we still have ANSPs you cross in five minutes.

We are all promoting globalisation and a modern economy and we need to get ANSPs into the second decade of this century. We’ve seen consolidation impact most of our industries and now ANSPs will have to go through the same process.

FABs are essential for safety, cost-effectiveness and environmental improvement. If we increase flight efficiency as a consequence of fragmentation that will reduce emissions. At the moment the whole world is looking at Europe’s emissions trading scheme (ETS) with very critical eyes but on the other hand we have delays because we don’t have FABs in place and that has a significant impact on emissions. It is something very difficult to explain.



**Skyway:** How do you see business aviation traffic evolving over the coming years?

We continue to represent seven per cent of all IFR (instrument flight rules) traffic in Europe, which is a significant amount. While the economic crisis is still not over and we are still suffering from that, and growth in fleet and traffic numbers is still not what it was four or five years ago, our forecasts still say that in the next two years we will be out of the current era of flat performance and start to grow again in a healthy way, though perhaps not as fast as before the crisis.

The fleet will continue to grow probably with the same mix of aircraft types. I don't think we have already answered all the questions about the potential very light jet (VLJ) demand and the issues of the business model for operating these aircraft. There will be growth in VLJ operations but I don't think

it will be the fast growth forecast in the early years of the last decade.

There are now around 4,000 business aircraft in Europe and by 2020 this could well rise to 5,250 aircraft. So that's healthy growth. The work-horse of the fleet is the smaller type of jet, flying typically sectors of just one-and-a-half hours. These are not very comfortable for the passengers but they are small, agile and can access many different types of airports.

Business aviation, which forms the basis of our business, will continue to offer the same amount of flexibility, agility and reactivity it does today. These small jets tend to fly with more than one or two passengers on board – normally they have a team of business colleagues as with these numbers they make economic sense as an alternative to scheduled airline business and first-class travel.

We will continue to invest in infrastructure as we have in the past, operating mainly from secondary airports which are sometimes dedicated business aviation airports. We need to continue to do this which is why we are involved in SESAR and the Single European Sky; we believe it is essential that in the future we will need more flexibility and continued regional access. We are also deeply involved in the current European Union (EU) discussions on slot allocation, as we are a significant partner in the European airspace user community.

**Skyway:** But you are not impacted too badly by issues of congestion at the continent's largest hub airports?

One day some of the regional airports will also be congested and slot coordinated. But this is not a problem for today. ➔

*"We've seen consolidation impact most of our industries and now ANSPs will have to go through the same process."*



➔ However, business aviation should have the right to protect access to these airports as we have built businesses there for many decades. So we are involved in discussions to protect our operations there into the future.

**Skyway:** How will business aviation benefit from new air traffic management (ATM) technologies and procedures such as those being developed by SESAR?

The EBAA has been involved in SESAR from the very start. We were partners in the definition phase and we are now involved in the development phase. We have a contract with the Joint Undertaking and have formed a consortium with Dassault Aviation and NetJets to bring expertise from across the industry so we can have a positive impact inside SESAR. And we are cooperating in actual research projects alongside other airspace users and airports.

In particular we are involved in work packages where there is a link to business aviation, helping to develop new technologies which will have a direct impact on safety. For example, with the certification of EGNOS (the European Geostationary Navigation Overlay Service) at many airports throughout Europe we are helping to create approach procedures using EGNOS-LPV (Localiser Performance with Vertical guidance) approach procedures which will introduce a lot of flexibility at many European airports which currently don't have any precision approach procedures. EUROCONTROL and the European Commission consider SBAS (satellite based augmentation systems) approaches to be precision approaches. We are coupling this technology with enhanced vision systems (EVS) inside the cockpit, head up and head down. The

result will be a system which has been certified and which gives you a synthetic vision system and a database image on the same screen. That, coupled with the SBAS approach, can easily provide you with a category two approach, which means a decision height of around 100ft.

So that's where we are really making big steps. It gives you huge flexibility and enhanced safety. And it means ANSPs will be able to create LNAV/VNAV (lateral navigation/vertical navigation) precision approaches which we can start using tomorrow as most of our fleet is equipped with flight management systems (FMS). Airlines go to hundreds of airports in Europe but we go to thousands, which is why this is such an important technology for us.

London Oxford Airport



**Skyway:** It still sounds expensive. And as we are in the middle of an economic crisis I wonder whether you are convinced that the cost-benefit analysis of some of the SESAR outputs is in favour of your members?

It doesn't look too good. For some new technologies and procedures they will be easily accepted. A lot depends on where you are based. In the more northern regions, such as Scandinavia, such technologies

will be introduced easily. But in more southern regions where weather is not a problem, it will be harder to introduce.

So our view is that it's great to have options but let's not make them compulsory.

Some technologies will fly but there are a lot of elements in SESAR which are for the benefit of the overall network, rather than a single airspace user group. In many cases we have been disappointed in the way new technologies have been introduced. Take the mandates for data link, for example, or surveillance performance which have been designed for other airspace users. These were imposed on us even though our aircraft are just too small and we don't have the physical room for

the equipment.

The Commission had to accept that we had to be exempted from the mandate, along with the regional aircraft community which had the same problems as us. Of course these new technology programmes offer many potential benefits but there are also many things we need to be careful about. We need to ensure that they have been designed for us and that the overall network will actually benefit if we retrofit.

But whatever happens these technologies will be very expensive. Some will be easy to pay for but others will be hard, especially when we compare our community to that of the airlines.

**Skyway:** So what will be the best way to ensure business aviation is equipped with compatible systems and that it can afford to pay for them? Should these new systems be mandated or introduced by a "best equipped, best served" principle?

I think we need a mixture of both. Some of these systems will need to be mandated otherwise there is no way the system is going to work; you need a critical mass of airspace users to carry the new equipment for it to be effective.

But if you look at new communications technology, for example, we need to have improved communications. We want data link, CPDLC (controller pilot data link communications) and ACARS (aircraft communications addressing and reporting systems). After all, we go to a lot of remote areas of Europe but we also have to operate in the core regions too, flying through complex TMAs (terminal manoeuvring areas). We recognise there's a price to pay for improving the network.

So some of the new systems and procedures will also have to be introduced on a "best equipped best served" principle and other types – such as EVS – will need to be introduced in a more flexible way.

But we are concerned with the prices we see. We have a negative cost-benefit-analysis to overcome and we have told the Commission that if it is trying to build a completely new ATM system it will have to fund at least part of it, as it would for the road and rail networks. ■



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# Forthcoming events Calendar

**Date:** 11 - 12 September 2012

## **LSSIP 2012 Kick-Off Event**

An event to launch the 2012 Local Single Sky Implementation mechanism (LSSIP) cycle, to present the changes in the ESSIP objectives, lessons learned from the previous cycle and ways of working for the production of the LSSIP document.

### **Location:**

EUROCONTROL's Headquarters,  
Brussels, Belgium

**Date:** 12 - 14 September 2012

## **HCI-Aero 2012**

International Conference on Human Computer-Interaction in Aerospace  
"Transition of science into reality"

A scientific and industrial event and a unique opportunity for a dialogue between researchers and practitioners.

### **Location:**

EUROCONTROL's Headquarters,  
Brussels, Belgium

**Date:** 24 - 25 September 2012

## **FMP Exchange Workshop**

A Workshop to foster EUROCONTROL's partnership with one of the Network Manager's most important stakeholder group: the flow management position community.

### **Location:**

EUROCONTROL's Headquarters,  
Brussels, Belgium



**Date:** 19-30 November 2012

## **EUROCONTROL at the ICAO Twelfth Air Navigation Conference (AN-Conf/12)**

The key European actors in the international efforts to achieve global aviation operability – EUROCONTROL, the European Civil Aviation Conference, the European Aviation Safety Agency, the European Commission and the SESAR Joint Undertaking – will play a key role at the AN-Conf/12. Continuing EUROCONTROL's contribution to achieving greater ATM interoperability, an Agency delegation of experts, who have been actively involved in the ICAO Technical team and Challenge team, led by Bo Redeborn, Principal Director ATM, will be present at the event. The goal of this global event is to bring the entire aviation community together with a view to defining the next steps towards a seamless global navigation system. The Single European Sky is just the beginning. The eventual aim remains a single global sky.

### **Location:**

Montreal, Canada

**Date:** 12-14 February 2013

## **EUROCONTROL at the World ATM Congress**

In 2013 EUROCONTROL will be attending the World ATM Congress for the first time. This is a new and key event for the international air traffic management (ATM) industry. EUROCONTROL will have a stand at the Exhibition and take part in the Conference, Workshop and Seminar programme. The World ATM Congress combines a large-scale exhibition, an industry conference and social events, providing networking opportunities and the chance to find out the latest trends and developments in air traffic control.

### **Location:**

Madrid, Spain

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