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Building Europe in the Sky

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Building Europe in the Sky

by Mr Ian Middleton



EUROCONTROL

Traffic, airspace capacity, delay

European policy on the liberalisation of air travel has made a real difference for its citizens. As the air transport

market has been opened up, fares have dropped significantly - with the result that more people travel by air now than ever before¹.

However, increased demand has meant more traffic - and a corresponding airspace capacity squeeze. There is another problem, too: states are responsible for their airspace and the route network was based on national boundaries, not along direct tracks - so aircraft waste both time and money flying much longer routes.

That is not all: states have a variety of air traffic control systems and different ways of dealing with civil and air defence requirements. Consider this: in airspace which is roughly the same size, Europe has 38 en route air navigation service providers and the US has just one.

All these factors combine to put pressure on the overall air traffic management system - and delays are the result. These are annoying for passengers and expensive for the airlines, costing between €1.3 and €1.9 billion a year.

Naturally, delays have many causes - such as adverse weather, problems at airports or with airline operations - but insufficient capacity in the air traffic control system is often a major factor. Not much can be done about the weather but the European Commission decided to tackle the constraints on air traffic management and

airports. They resolved to remove boundaries in the air, as has been done on the ground.

The first Single European Sky package: restructuring European airspace

So, in 2004, the first *Single European Sky* (SES) legislation package was launched. It contains a framework regulation and three technical regulations on the provision of air navigation services, organisation and use of the airspace and the interoperability of the European air traffic management network.

These regulations were designed to enhance safety and to restructure the airspace according to traffic flows instead of along national frontiers.

Creating a single European sky needs not only joint technical and operational measures, but the collective management of airspace. This entails a substantial reorganisation of European air traffic management structures and organisation.

So, all the actors concerned, including national authorities, military, air carriers, air navigation service providers and airports had to play a part in the exercise.

'SES II' - a performance and network-based approach

But progress was slow - and the situation has changed to a certain extent. While capacity was still a cause for concern, greater emphasis began to be placed on aviation's impact on the environment - and the fuel crisis made airlines shift their focus to cost efficiency.

"While capacity was still a cause for concern, greater emphasis began to be placed on aviation's impact on the environment."

So, in 2009, the European Union (EU) updated the SES legislation in a second package. This time, the package had five pillars: performance, a single safety framework, new technologies, managing capacity on the ground and human factors. The first four pillars will be explained in more detail below.

First pillar: regulating performance

Three measures have been agreed under this pillar:

- Driving the performance of the air traffic control system: an independent *Performance Review Body* (PRB) will monitor and assess the performance of the system and propose Community-wide targets for delays, cost reduction and the shortening of routes. These objectives will then be approved by the Commission and passed on to national supervisory authorities, who will set binding national and regional objectives.

- Facilitating the integration of service provision: functional airspace blocks - that is, common airspace arranged around traffic flows not states - had been put forward in the first package but not enough progress was made. The second package made them into real instruments of regional integration for achieving performance targets. These blocks now have to be created by the end of 2012 at the latest.

- Strengthening the network management function: this function completes the performance framework and covers a range of tasks, including European route network design, air traffic management slot coordination/ allocation and management of the deployment of the *Single European Sky ATM Research* (SESAR) programme.

Second pillar: a single safety framework

The growth in air traffic, congestion - in airspace and at airports - and new technologies could all potentially impact air traffic safety. A common approach and harmonised regulation, developed centrally and applied all over Europe, would materially improve safety levels. So, the competence of the *European Aviation Safety Agency* (EASA) has been extended to new areas - aerodromes, air traffic management and air navigation services.

Third pillar: opening the door to new technologies

Right now, Europe's air traffic control system is being pushed to its limits. It works with ageing technologies and suffers from fragmentation. Europe must accelerate the development of its control system - and it can do this by implementing the SESAR programme, which will increase both safety levels and enlarge traffic control capacity.

By 2020, SESAR intends to have:

- improved safety performance by a factor of 10;
- enabled a three-fold increase in capacity;
- reduced delays both on the ground and in the air;

- lowered the cost of air navigation service provision by more than half;
- provided a 10% reduction in the environmental impact per flight.

Fourth pillar: managing capacity on the ground

The Commission is determined to invest in airports so that their capacity stays aligned with air transport management capacity. If this is not done, they fear that airports will become a bottleneck in the system.

"EUROCONTROL's recently-published Long Term Forecast predicts that in 2030, 5%-19% of the demand might not be accommodated."

EUROCONTROL's recently-published Long Term Forecast² predicts that in 2030, 5%-19% of the demand might not be accommodated. There will also be 13-34 airports as big as the top seven are now. Congested airports create pressure on the flow of operations in the network and so will exacerbate delays.

So, the European Commission have established an Airport Observatory. Representatives of member states and stakeholders exchange and monitor information on airport capacity as a whole. They also provide advice on the development and implementation of the EU's transport legislation.

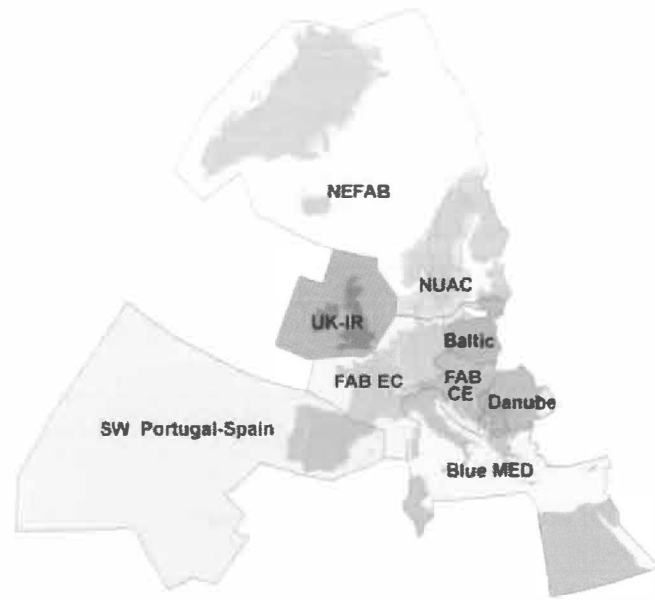
EUROCONTROL's contribution to the Single European Sky

The European Commission is giving the political lead in implementing a Single European Sky and establishing the legal framework, which is binding on EU Member States. EUROCONTROL - widely acknowledged as Europe's principal repository of ATM experience and expertise - is providing the technical support.

A joint founding member, together with the European Commission, of the SESAR Joint Undertaking, EUROCONTROL is making an important contribution to the construction of the single sky.

EUROCONTROL is involved in the development of those implementing rules which fall within its remit, on the basis of mandates from the European Commission. Community Specifications are drawn up as well: these explain the means of compliance with the regulation concerned and its implementing rule.

It also provides technical support to EASA, the European Aviation Safety Agency, in the area >



of ATM safety regulations and oversight activities.

EUROCONTROL has recently restructured, so as to align itself with the Single European Sky's goals; draw clear lines between its various functions; be more pro-active on the stakeholder front and become more transparent.

There are now three new directorates in the Agency: Single Sky (which gives regulatory support and oversight); Network Management and SESAR Research.

On 29 July 2010, EUROCONTROL was designated by the EU as the *Performance Review Body* (PRB) and will help the European Commission set up and manage the performance scheme for air navigation services.

By acting as the PRB through its own Performance Review Commission, EUROCONTROL will help set up the appropriate mechanisms.

It is expected that the European Union will invite EUROCONTROL to take on the role of Network Manager. In essence, the Network Manager has four main areas of activity:

- route network design and development
- flow management
- coordination of radio frequencies and radar transponder codes
- network crisis management.

The European Commission feels that a central manager will be able to expedite decision-making, draw up detailed plans for achieving

performance objectives – a key feature of the second SES package. The Network Manager will also be responsible for monitoring progress and addressing difficulties, from an operational perspective.

Substantial cost-savings can be made once air traffic management (ATM) service provision has been de-fragmented and ATM operational performance optimised. A single process of decision-making built on sound consultation processes will make future plans and their implementation consistent, uniform and focused on the performance of the network.

A lot of time and effort can be saved as well: this new cooperative decision-making process will take the interests of many parties into account and therefore make for a less complex and more efficient system overall. Scarce resources – like radio frequencies and transponder codes – have to be shared and fair, transparent access to these resources be made available to all. The Network Manager will centralise the allocation of these resources.

In Conclusion

As Giovanni Bisignani, the International Air Transport Association's Director General and CEO, has pointed out: "The Single European Sky will improve Europe's competitiveness and environmental performance. The inefficiency of the current system is a €5 billion burden on Europe's economy and wastes 16 million tonnes of CO₂ in delays and indirect routings."

EUROCONTROL, EASA and the European Commission are engaged in removing barriers in the sky as quickly as possible.

However, our coordination activities do not begin and end in Europe. As aviation is global, we have to ensure that our technical and operational developments dovetail properly with those in the rest of the world, too, and we are working closely with the United States to make sure that NextGen and SESAR are compatible.

All players will work together to make proper provision for the future so that people and goods can move freely, safely and securely through the skies - with minimal damage to the planet as a whole. ■

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Mr Rob Appleton
Air Traffic Controller in the
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Safety in Air Traffic Control

This article is a short discussion about advances in technology in Air Traffic Control (ATC). From a personal ATC perspective there are two particular improvements that have made a significant impact on overall safety.

The first of these is **Mode S**: A transponder is located in the cockpit of all aircraft. The primary function of the transponder is to transmit a unique 4 number code as well as the current height of the aircraft to ground based radars. These are known as Mode A and Mode C respectively. Aircraft now carry Mode S equipped transponders which download a number of other parameters from aircraft both in flight and on the ground to ATC radars capable of receiving them. These parameters, amongst others, include:

- Ground Speed
- Indicated Air Speed
- Heading
- Pressure setting in use
- Selected Flight Level (SFL)

All of the above are useful to ATC, Selected Flight Level (the level selected in the cockpit by the pilot to which the aircraft is climbing or descending) being by far the most useful. It allows air traffic controllers to compare the instruction they have given to what the pilot has input to the aircraft's Flight Management System. The ability to see and compare this information gives ATC the ability to prevent Level Busts - where pilots climb or descend to the wrong level - and exercise a significant impact on reducing the number of safety related incidents. Unfortunately, for the time being, the number of Air Traffic Service Providers with this equipment is very limited.

The second technology advance that I would like to discuss is **Traffic Collision Avoidance System** (TCAS). A TCAS display is provided in the cockpits of all airliners and gives pilots an audible warning of other aircraft in dangerous proximity combined with instructions of how to miss this traffic. TCAS software obtains its information from the transponder (discussed above) and communicates in real time with other transponders on other aircraft. If the software judges that two aircraft will get too close a warning is generated to both crews and advice is given by the TCAS display on how to miss each other. If ATC have made a mistake (and believe me, we are all human) this is a very effective last line of defence to prevent a mid-air collision.

Those of you familiar with pilot-ATC radio communication will know that it is normally carried out in a short, professional standard format. The only time that I have had anybody swear on my frequency was during a normal communication when suddenly the pilot received a TCAS Resolution Advisory and was so shocked that he stopped mid sentence.

In conclusion, having worked in ATC for more than 30 years, I have seen and witnessed a number of changes in technology. In a radar control environment, the primary tools remain the radar, the radio, the telephone and of course the human being. In all branches of aviation the first priority must always be safety and any technological advance that improves safety is most welcome.

¹ Since the liberalisation of aviation in Europe in 1993, traffic has grown by 54%.

² EUROCONTROL Long-Term Forecast: IFR Flight Movements 2010-2030, published 17 December 2010.