

EUROCONTROL and ACI EUROPE: A vision for European aviation

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Richard Linn
Alan Spence

Published by
Newsdesk Communications Ltd
5th Floor, 130 City Road,
London, EC1V 2NW, UK
Telephone +44 (0) 20 7650 1600
Fax +44 (0) 20 7650 1609
www.newsdeskcomms.com



Newsdesk Communications Ltd publishes a wide range of business and customer publications. For further information please contact Alan Spence, Chief Executive or Richard Linn, Chief Operating Officer.

Newsdesk Communications Ltd is a Newsdesk Media Group company.



On behalf of EUROCONTROL
Rue de la Fusée, 96, B-1130
Brussels, Belgium
Tel: +32 (0) 2 729 9011
Fax: +32 (0) 2 729 9044
www.eurocontrol.int



and ACI EUROPE
6 Square de Meeûs,
1000 Brussels, Belgium
Email: info@aci-europe.org
www.aci-europe.org



Pictures: Getty, Corbis, photolibary.com, Flughafen München GmbH, Athens International Airport, Arne V Petersen-Copenhagen Airports A/S
Repro: ITM Publishing Services
Printed by Buxton Press

ISBN 1-905435-02-9

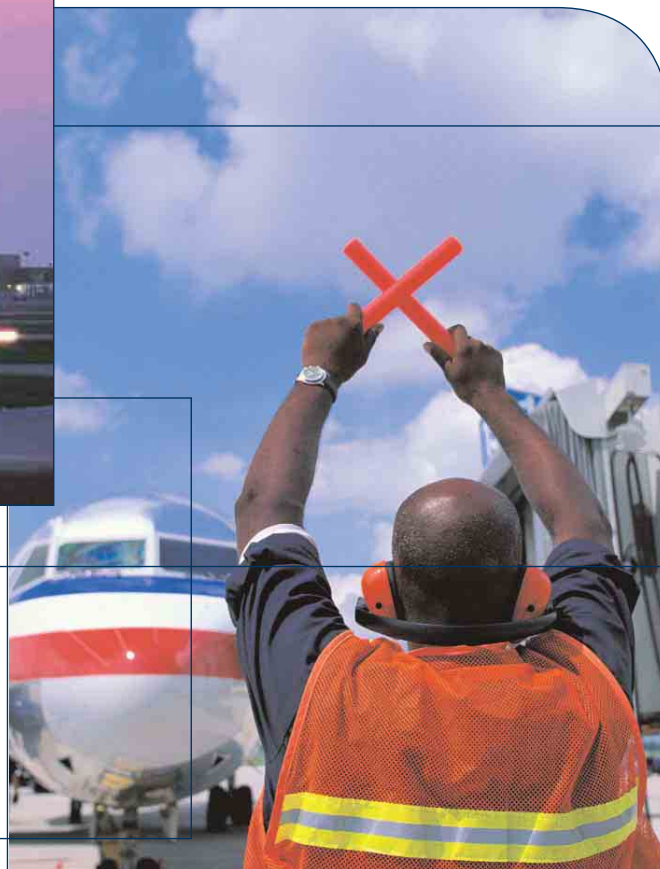
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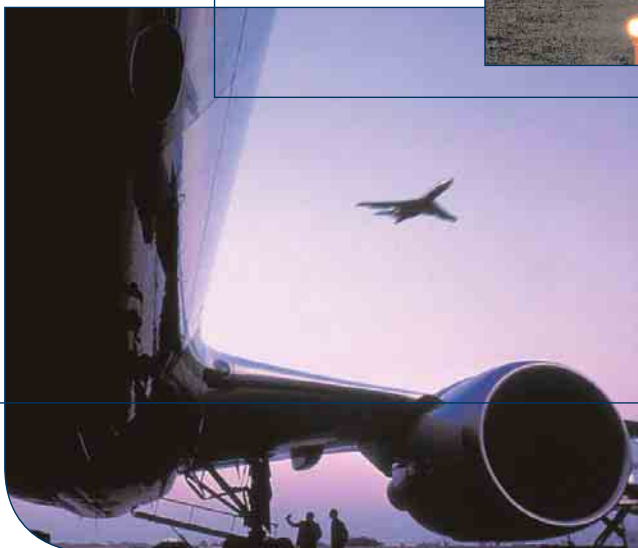


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WORKING TOGETHER

By Víctor M. Aguado, Director General, EUROCONTROL

Aviation is at a turning point. Opportunities and challenges abound – new types of carrier, new types of aircraft, rising energy prices, a constantly growing demand for air travel, ecological concerns: all these factors have to be taken into account in developing an air traffic management (ATM) system for the future that is safe, cost-effective and reliable.

EUROCONTROL's goal is to develop just this kind of flexible and efficient system, in collaboration with all partners in the European air transport industry.

After concentrated effort over the last 15 years, en-route delay is gradually coming under control. Yet the share of overall air traffic delay attributed to airports over the last few years has remained more or less constant. Airports are tipped to become the next area of constraint in the overall >

■ EUROCONTROL's goal is to develop a flexible and efficient European ATM system, in collaboration with all partners in the air transport industry

Airports and air traffic management will have to work more closely together in the future, sharing responsibilities and concerns

system and EUROCONTROL is working closely with ACI EUROPE, amongst others, to help airports make the best possible use of available capacity as well as looking at innovative solutions for the future.

It is a formidable challenge to achieve more environmentally sustainable air traffic and airport operations while meeting safety, security, capacity and economic requirements. The question is, will airports be able to absorb the higher rates of traffic that are expected?

Many airports are running very close to maximum capacity right now. There are fears that by 2020, airports will face an excess demand of around a billion passengers. Furthermore, a lack of capacity has a definite impact on safety. When traffic doubles, risk is quadrupled. This is as true in the air as it is on the ground – so our efforts to increase safety must be maintained, across the board.

Sharp increases in traffic will also affect the airport's environment. Society is growing increasingly critical and sometimes intolerant of the impact that air transport has on the environment in general, and airports are all too frequently the focus of this discontent. So the main issue is to maximise airport throughput in the safest, most environmentally neutral way possible.


Although there is latent capacity that can be used so that airports realise their maximum potential, creative ways have to be found to allow airports to safely accommodate future

growth. The key to doing this is, we believe, to foster the climate of co-operation between all stakeholders in airport operations. In order to continue to provide the capacity that is needed so badly, we have to work together. The only way forward is for us to work as a network. This is a concept that EUROCONTROL is making central to all developments.

The next ATM system, I believe, will be based on these factors, amongst others:

- broad exchange of information
- a sharing of separation responsibility
- collaborative decision making amongst all the stakeholders
- greater automation and support tools for controllers
- regional networks of CNS service provision
- a global navigation satellite system with different constellations

Airports are becoming an increasingly important part of the ATM network. Airports and air traffic management will have to work more closely together in the future, sharing responsibilities and concerns – particularly as far as safety and the environment are concerned.

Of course, one condition is that the systems we develop are globally interoperable. EUROCONTROL is working with partners across the planet to ensure that advances are made in tandem. By collaborating in progressively closer harmony, we can ensure that the travelling public we work for has access to a service that is safer and constantly improved. 



FACING THE CHALLENGES

By Roy Griffins, Director General, ACI EUROPE

A CI EUROPE's mission is to advance the collective interests of Europe's airports and to promote professional excellence in airport management and operations. By mobilising our in-house expertise, EU contacts and a range of communication tools, we aim to promote a wider understanding of the challenges facing civil aviation in Europe.

In achieving this goal, we rely on the expertise and know-how of industry partners such as EUROCONTROL. This publication outlines the successes we have enjoyed and the challenges we face together. The concept of partnership is key. The future success, or failure, of the air transport industry will depend on how well our industry collaborates to keep our >

■ The future success, or failure, of the air transport industry will depend on how well our industry collaborates to keep our customers satisfied

■ Airports, in providing
■ the fundamental
■ infrastructure, have
■ to get aviation its
■ licence to operate,
■ its licence to grow

customers satisfied. Airports, airlines, air navigation service providers, airframe and engine manufacturers – we are all interlinked to a remarkable degree.


As the voice of Europe's airports, ACI EUROPE represents over 400 airports in 45 countries. We leverage this unique position, working with international bodies such as EUROCONTROL, using our expertise to embark on research, testing and eventually implementing proposals for adapted tools and procedures. We have achieved key deliverables such as the Airport Operations Programme. Successes include Airport Collaborative Decision Making, Advanced Surface Movement Guidance and Control Systems, Airport Airside Capacity Enhancement, and runway safety to name a few.

The perpetual demand for air travel ensures that European civil aviation operates on a shifting landscape – new technologies, new procedures, new policies. Today's aviation industry is almost unrecognisable from civil aviation of the 1960s.

Europe's airports face challenges on many levels: safety developments, airport privatisation, the rights of persons with reduced mobility, slots, open skies, airport retail and preparations for the A380.

Underlying these developments is the simple fact that we are facing a capacity crunch, which has environmental, economic and social impacts. Across Europe, airports fall

broadly into two categories: those with insufficient traffic and those with insufficient capacity. During the 1990s delays resulting from airspace congestion grew to unacceptable levels. With traffic set to double by 2020, airports now find themselves under steadily increasing pressure and have already become the main source of delay. Regardless of how far you squeeze the most out of existing airport capacity – new runways and terminals are the only way to accommodate future demand.

But getting the permission to build new runways and terminals is increasingly difficult. Airports are always in the front line as targets for policies directed at reducing the environmental effects of air transport. If we cannot grow our facilities sustainably, then the entire industry will clog, passengers will not fly, communities will be stranded and commerce will stall. And airports, in providing the fundamental infrastructure, have to get aviation its licence to operate, its licence to grow. We are working with industry partners to tackle the environmental challenge. We are leading the call to tackle climate change, to harness technologies that address noise and for more research into local air quality issues. Taking these responsibilities seriously is the only way the industry can meet future demand for air travel. This is the way to an economically and environmentally sustainable future for aviation. 



FINDING SOLUTIONS

By Jacques Barrot, Vice-President of the European Commission, responsible for Transport

Since the European market for air transport was opened up to competition in the 1990s, flying has become more widely accessible than ever.

Low-cost companies have appeared on the market. More destinations and new city pairs are enjoying air service. Thousands of direct jobs have been created in the air and on the ground along with many more indirect jobs, particularly in the tourism and aircraft manufacturing sectors. And as air transport continues to grow faster than all the other modes of transport, airports are increasingly becoming hubs of rail and road traffic and centres of considerable economic activity in their own right. But while this world of rapid development and the emergence of 'airport cities' represent great potential for growth and job creation, the pressures on safety, security, air traffic control, infrastructure and environment continue to ➤

Rapid development represents great potential for growth, but the pressures on safety, security, infrastructure and environment continue to mount

■ A comprehensive,
■ co-ordinated, properly
■ run and well-planned
■ ATM system can make
■ all the difference in
■ safety terms


mount and the Commission is looking to work with Europe's airports to find solutions.

Developing the air traffic management (ATM) system to accommodate growth is essential. With the Single European Sky initiative, the EU has gathered all parties involved in ATM together with the aim of creating a seamless and efficient system and introducing new technology to support air traffic management in the 21st century. The Single European Sky addresses the need to guarantee safety in the skies and to optimise cost-efficiency of air traffic services, whilst also providing the capacity to avoid delays and to sustain the long-term growth of air transport in Europe. The regulatory framework for the Single European Sky was agreed upon in 2004, and we are now in the process of specifying the detailed rules to ensure these objectives.

The Commission is working in parallel on 'Sesar' the technological component of the Single European Sky, which will give rise to a new generation ATM system for Europe. A first 'Definition Phase' involving industry, the Commission and EUROCONTROL started in November 2005 and will progress over the next two years to provide a road map for the development of the system until 2020. The 'Implementation Phase' will use all the regulatory and funding means available to support the introduction of new technology across the whole EU.

Air transport not only faces challenges in the air but also on the ground. It is becoming increasingly clear that, unless decisive action is taken, airports will become the main bottlenecks in our air transport system. Some European hubs are already facing saturation and environmental limitations. As a first step in tackling this issue, the Commission has kicked off a ranging consultation about the best way to deal with these constraints. We must make better use of existing capacity and reinforce safety at our busy airports.

The European Commission, EUROCONTROL and ACI EUROPE need to continue to collaborate both in Europe and at global level to find solutions for the safe and sustainable development of air transport. Dialogue will enhance co-ordination between operations on the ground and in the air, such as co-ordination between airport slots and flow management slots. A comprehensive, co-ordinated, properly run and well-planned ATM system, whilst helping to solve congestion problems, can also make all the difference in safety terms or when coping with air transport crises resulting from security threats.

While we can take pride in our achievements so far, much remains to be done. I believe that we need to continue and enhance our co-operation in order to accommodate growth in a responsible manner and to allow the air transport system to continue to bring Europeans together. 



TOWARDS A GLOBAL STRATEGY

By Dr Assad Kotaite, President of the Council, International Civil Aviation Organisation (ICAO)

Global air transport is fundamentally sound and remarkably safe. The fact that 2003 and 2004 are recognised as the safest years since 1945 is fitting testimony to the on-going efforts of the world aviation community to ensure the safe and orderly development of international civil aviation.

And yet, the fatal air accidents of this past summer, which claimed the lives of hundreds of nationals from European and other countries, were a timely reminder that full implementation and systematic enforcement of ICAO provisions and policies are essential to aviation safety.➤

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Global consensus and co-operation are vital – all parties involved in civil aviation have responsibilities for safety oversight and compliance

Coincidentally, October 2005 marked ten years of safety oversight at ICAO. We began in 1995 with safety assessments, then evolved to a voluntary audit programme, culminating in 1999 with the mandatory Universal Safety Oversight Audit Programme (USOAP) and its expanded version earlier this year.

The message from USOAP audit reports is clear – the obvious and urgent need to correct identified shortfalls in a number of States, in a co-ordinated and assertive manner. The 35th Session of the ICAO Assembly in 2004 recognised this fact with the Resolution on a *Unified strategy to resolve safety-related deficiencies*.

The Unified Strategy involves a shift in focus towards the implementation rather than the development of standards. It enshrines the universal principle of transparency and sharing of safety-related information as a prerequisite to advances in aviation safety. And it calls for the creation or strengthening of partnerships to resolve deficiencies, essentially in the form of regional or sub-regional safety oversight organisations.

As important as the ability to audit, however, is the ability to bring about improvements. Resources allocated to audits and to remedies must be carefully considered; no disproportionate amount of resources should be allocated to auditing at the expense of resources for safety enhancements.

Experience in the industry has shown that safety management


systems (SMS) are the most effective way of responding to increased supervision with a relatively small workforce.

ICAO related initiatives include: standards for establishing SMS; guidance material for States; aligned safety management provisions for aircraft operations, air traffic services, and aerodromes; and model legislation to support the implementation of SMS.

Of course, safety management is not limited to individual States alone; it must be co-ordinated and implemented in a co-operative way, based on the ICAO framework. Global consensus and co-operation are vital because all parties involved in civil aviation have responsibilities for safety oversight and compliance.

At the time of writing this message, the Council of ICAO had just approved the convening of a worldwide safety conference of Directors General of Civil Aviation for March 2006, with the objective of developing a safety framework for the 21st century – a Global Strategy for Aviation Safety.

The time has come to review and bring all of our safety initiatives under the umbrella of a global strategy, while incorporating any new element that could further strengthen aviation safety.

I believe that history will show this conference to be one of the most important for global aviation safety and another crowning achievement for global co-operation among States. 



PLANNING AHEAD

By Simon Michell, Editor-in-Chief, 'A vision for European Aviation'

One are the days when governments issued blank cheques for the aviation industry to develop new airports and Air Traffic Management (ATM) systems. Pressure is building on all sides. Competing factors of safety, security, the environment and cost have made the task of planning for the impressive or alarming – depending on which side of the fence you are on – growth in air passenger numbers a complex and challenging endeavour.

Safety has to be the priority. The relative number of accidents per flights cannot be sustained and has to be reduced in order to maintain confidence in the industry, as air travel is back on track to double in the next 15 years.

Increased security both at the airport and onboard the aircraft has become an absolute necessity as recent acts of terrorism have shown that elements of a nation's transport infrastructure can be the weapon as well as the target.


The effect the aviation industry has on the environment is being examined and resisted to a much greater extent than in the past. Noise and emissions are no longer being tolerated by the general public, who are increasingly ramping up the pressure on governments to show they care.

On top of all this, the passengers themselves have become extremely sophisticated and their expectations for cheap flights, easy access at airports and delay-free journeys are

hitting airline and airport profit margins.

The only way forward is to plan and execute programmes together. Everyone involved in the industry; airlines, airports, Air Navigation Service Providers (ANSPs), manufacturers, regulators and law-makers, have to ensure that everything they do eases the pressure. This yearbook, 'A vision for European aviation' is part of that process. By presenting the efforts of those responsible for airports and ATM together in one volume it is possible to show that the collaboration required is in fact taking place and that a way forward is being addressed.

ACI EUROPE is working tirelessly to improve the passenger experience at airports, especially for Persons of Reduced Mobility (PRMs), and looking at ways of limiting the affect airports have on the local environment. Working with EUROCONTROL and other stakeholders it is also engaged in a continuous effort to improve airport security and safety, particularly on the runway.

EUROCONTROL is playing a key part in the Single European Sky (SES) initiative, which is at the forefront of efforts, not only to open up the skies so that more efficient routes can be used – reducing cost and pollution – but also to make the business of controlling aircraft journeys and regulating ANSPs a more pan-European process. 



AIRPORTS AND EUROPEAN ATM

David Learmount looks at the work being carried out to increase passenger and cargo throughput at Europe's airports and to address safety issues associated with runway incursions



Europe's Air Traffic Management (ATM) system can only handle the traffic its airports can process. Since physical expansion on the ground is difficult because of planning and environmental and social constraints, the managers of airports all over Europe – particularly the big hubs – are looking for ways of getting more out of the resources they already have.

Head of Airport Operations at EUROCONTROL, Paul Wilson, calls this “unlocking latent capacity”. Meanwhile at ACI EUROPE, Policy Manager Philippe Joppart explains where the unlocking process begins: “You can only improve what you can measure,” he says. He follows up this enigmatic statement with a description of a process of measurement and analysis. It is all about determining exactly how long specific operational processes at airports take now, why they take that long, and working out how they could be shortened. This, says Joppart, can be any operational phase

from the average runway occupation time to the precise time it takes to taxi from a given stand to any of the runway holding points.

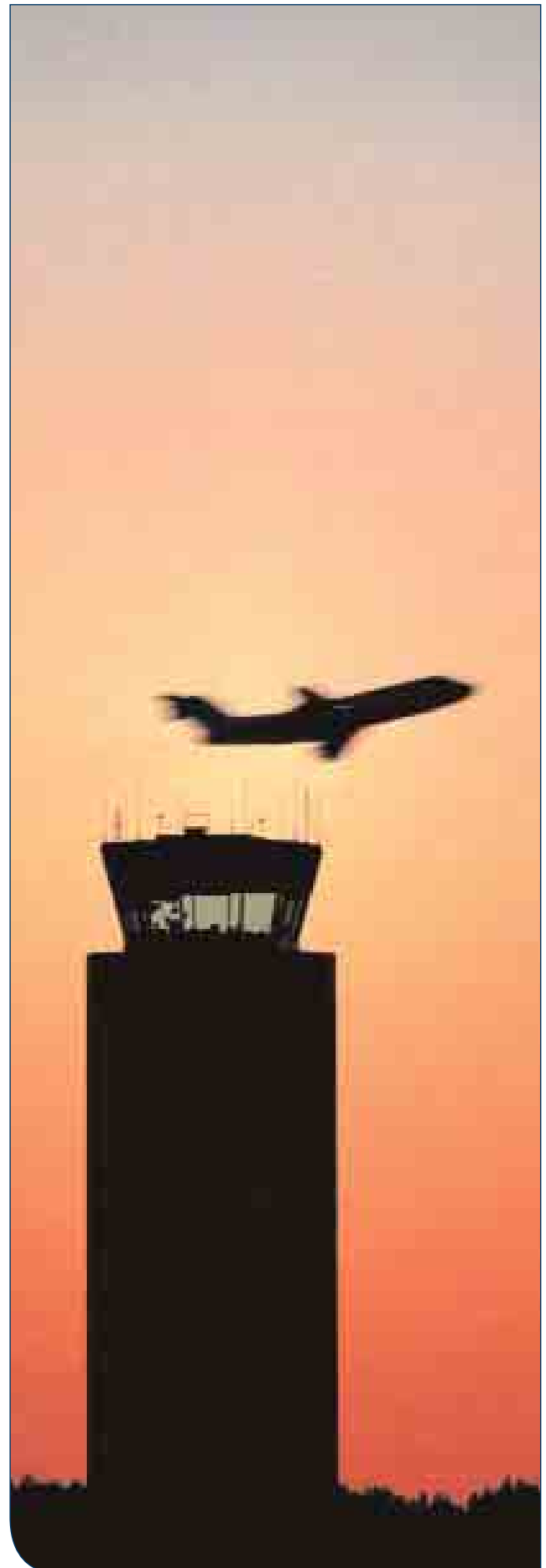
This process is one part of the programme that ACI EUROPE and EUROCONTROL call Airside Capacity Enhancement (ACE). The Commonly Agreed Methodology for Airport Airside Capacity Assessment (CAMACA) provides an accurate means of efficiency comparison that also helps when identifying best practices. The two agencies then defined a tool for analysing alternative ways of using the runway and taxiway assets they have, and predicting the potential benefits of changes to layout and configuration. The Performance Indicators Analysis Tool for Airports (PIATA) can be used to devise an optimum system for each airport that delivers precise movement control, dovetailing all the movements with each other as perfectly as possible to eliminate time wasted, whether between pushback and take-off, or between touchdown, ➤

runway vacation and arrival at the stand. At the same time, the means to reduce turnaround time can be analysed, so each stand can do more work.

All this knowledge about how to improve surface movement efficiency and capacity is reduced in value unless it extends to a seamless interface between the airports and the ATM system. Airports have to be ready to accept aircraft delivered into their system by the Air Navigation Service Provider (ANSP) without the delay that occurs so frequently now at busy hubs before landing or on the way to the stand after touchdown. Conversely, the ANSP has to be prepared and ready with the capacity to accept each aircraft into its system from the moment the flight crew changes frequency from tower to the en-route frequency within a minute or so of take-off, and deliver it to its destination at a predicted time where it will make an arrival that slots seamlessly into the flow of ground movements. This smooth traffic flow can only work if it has at its centre a system for making all the necessary information available to all the players all the time.

Joppart says that every change should consider the total network and system capacity: “Never look at one improvement on its own. Look at the bigger picture.” EUROCONTROL has a description for this total system that pulls together all the disparate pieces of the airports and air traffic management jigsaw puzzle: it is the Dynamic Management of the European Airspace Network (DMEAN). Airport operators, even the smaller ones, are now taking a collective attitude, Joppart says, adding, “there is mutual trust now”. The implication that trust did not exist in the beginning, or that the two components – airports and ATM – did not see what they had to do with each other, suggests progress in itself.

The way most airports work today is a legacy of how they worked when surface space was plentiful and the concept of rationed take-off and landing slots did not yet exist because capacity was not a problem. Also, at that time, environmental awareness and the resulting demands for lower fuel usage and noise levels were not so acute. Since this is where today’s airport operating practices originated, it should not be surprising that ‘latent capacity’ exists at airports – especially at those which still have some spare capacity without yet having to take special measures to improve it. Wilson estimates that there remains considerable latent capacity at many European airports without having to lay more concrete. There are exceptions, he concedes, such as London Heathrow, London Gatwick and Frankfurt Main, where many – though not all – of the proposed techniques for making throughput more efficient are already being applied. ➤



The motivation for airports to adopt practices that make them as efficient as possible is spelled out by ACI EUROPE's Director General, Roy Griffins, who says: "Airports have to take the responsibility of driving this agenda because it is at airports that aviation's negative products are most noticed and measured. And airports, in providing the fundamental infrastructure, have to get aviation its licence to operate and its licence to grow. But airports cannot do this alone. Our fellow stakeholders in the aviation sector need to join us in endorsing this initiative if it is to work."

ACI EUROPE points out that although infrastructural expansion – for example additional terminal space – is planned at some existing airports, new airports are not on the cards. Griffins spells-out the size of the problem: "With air passenger traffic set to double by 2020, Europe's airports are currently the main bottleneck in the air transport chain. EUROCONTROL has predicted that by 2025 air traffic would grow 2.5 times and that, despite a 60 per cent capacity growth, over 60 European airports will be congested, with the top 20 airports being saturated at least eight to ten hours of the day. This would leave Europe's airports unable to accommodate 17.6 per cent of the total demand for air transport. Recent ACI research indicates that if you take into account airport and airspace capacity issues, passenger demand in 2020 will surpass available airport infrastructure by about 1 billion passengers, resulting in heavy congestion and a general deterioration in the quality of service at airports."

The planned systems that will unlock latent capacity are the same as those that will make the best use of new infrastructural capacity when it becomes available. These consist of a combination of new management techniques and new technology, with the former being the key, and the latter being tools that assist in managing traffic flow. The primary management technique is a highly developed form of "collaborative decision making", Wilson explains. The ultimate aim is for the airport to be able to operate organically, like a body made up of cells and the systems, structures and capabilities that sustain them. The cells could be seen as components like aircraft, vehicles, support systems, passengers and freight consignments, and the airport as the body that contains, manages, and sustains them while at the same time owing its life to them.

Collaborative Decision Making (CDM) is one description of a



“Europe’s airports are currently the main bottleneck in the air transport chain”

process in which the people in every functional unit at the airport know the location, status and readiness of every other unit with which they are involved, or by which their function could be affected. The unit could be an aircraft, or the vehicles and systems that will provide it with turnaround services. That way, decisions about what is needed, and where and when it is needed, can be made seamlessly and without any interruption to the functioning of the whole system, cutting out delay, waste, and ensuring support services are provided as soon as they are required. The seemingly established recent rise in the price of fuel provides another motive for improving system efficiency. Objectives of ➤

CDM, says Joppart, are accuracy and predictability, from which the product will be punctuality. The military refer to such a CDM system as network-centric, and they use it for battlefield tactical management.


Another essential product of such a system is flexibility and responsiveness: as soon as an unplanned event – like an aircraft going unserviceable – is notified within the system, another aircraft can use its movement slot; ensuring time and capacity are not wasted. This is achieved today by having a queue of aircraft awaiting take-off, all burning fuel and sacrificing time with the aim of getting maximum runway utilisation. For arriving aircraft the equivalent is being ‘stacked in the hold’ awaiting a space in the arrival pattern. Under the collaborative system, there would be no need for queues and stacks – aircraft would arrive at the runway as it was vacated by the preceding movement, and each arrival would be fed straight onto final approach from a continuous descent from cruising level toward the destination runway.

Flexibility in the face of unplanned events or those over which you have no direct control – like weather – constitute another challenge. CDM systems enable an airport to recover from disruption faster than before, but minimising any disruption in the first place is the ideal aim. “The impact of weather has to be diminished”, says Joppart. The greatest problem in poor visibility is keeping off-runway surface movements flowing efficiently and safely. Runway operations, given the right aircraft and approach aid equipment, are less affected by poor visibility at present than taxiway and parking ramp movements. One of the technological tools that will address this problem is the Advanced Surface Movement Guidance and Control System (A-SMGCS). Joppart predicts that the system, under trial now at London Heathrow and Paris Charles de Gaulle airports, will be ready for operation within three to five years. It uses Mode S multi-lateration technology that identifies every transponder-equipped aircraft or vehicle, and this is combined with surface radar for the detection of non transponder-equipped vehicles. It is, explains Wilson, a data-fusion system that will also have a conflict or incursion alert function for pilots. In its first stage, A-SMGCS will still be a controller-managed conflict prevention and surface flow management tool, and the pilot’s role would

remain much the same as it does today – but with a reduced need for voice position reporting. The second stage would give the pilots the predictive information to take a more active role in determining the best safe route to runway or stand, and take part in conflict and incursion avoidance.

As well as all the efficiency and capacity enhancements, the issue of runway safety is not being sidelined. It is too important for that. The worst air accident of all time is still, to this day, a collision between two Boeing 747s, one taking off and one crossing the runway (Tenerife, Canary Islands, 27 March 1977). Since then, one of the world’s worst recent collision accidents was caused by a runway incursion by a business jet into the path of an SAS Boeing MD-80 on its take-off run (Milan Linate, Italy, 8 October 2001); and even in 2005 there have been on-runway near-disasters in several countries, including America.

EUROCONTROL has a comprehensive European Action Plan for the Prevention of Runway Incursions (EAPPRI), which takes International Civil Aviation Organisation (ICAO) Annex 14 standards as a basis for its recommendations. However, it goes into greater detail at an operational level, with recommendations for all users of airside manoeuvring areas and runways, whether vehicles or aircraft, as well as the companies responsible for the training of the drivers and the pilots. EUROCONTROL has produced an interactive instructional CD for all airside operators, which is an eye-opener for anyone who thought he/she knew everything they needed to know about driving a vehicle or taxiing an aircraft airside. Apart from the advice to airport operators and air traffic control about standard ICAO signage, taxiway markings and lighting, and the use of correct ATC language, most of the recommendations contained in the EAPPRI are about the initial and recurrent training vehicle drivers and pilots need to acquire and retain the necessary skills to keep airside movements at airports safe.

In due course, A-SMGCS will bring more efficient surface movements combined with a safety-net system that adds another layer of protection against conflict; but it will be several years before all the major airports have such a system, let alone the smaller ones. So runway safety remains a human-centric issue for some time yet. 



THE CAPACITY CRUNCH

New analysis of world economic trends and how they could affect the growth of international travel has led airports to sound a warning about the implications for aviation infrastructure. Between 2005 and 2020 airline passenger numbers are predicted to increase by a compound rate of more than 4 per cent a year (with an even greater growth in global air cargo in the period). **Ian Goold** explains

“Air travellers will soon face widespread delays as severe congestion and poor service standards cause chaos at Europe’s main airports”

The Airports Council International (ACI), representing operators in Europe and throughout the world, points out that within 15 years air travel will have expanded, with some 7.4 billion people flying annually – the equivalent of every man, woman, and child on earth making at least one flight every year. Put another way, it means that the world’s airports will have to be equipped to handle and care for twice as many customers as now.

But although airports are working out how to meet future requirements, operators recognise that their plans will fall short of satisfying demand without a sympathetic atmosphere in which to conduct business. Here in Europe, which is expected to have 2 billion air travellers a year by 2020, the implications are clear. Considering the period to 2025, ACI EUROPE Director General Roy Griffins warns of an airport capacity crunch: “Air travellers will soon face widespread delays as severe congestion and poor service standards cause chaos at Europe’s main airports.”

In 20 years’ time, more than 60 of the region’s major airports (which together handle 90 per cent of Europe’s commercial air travellers) will be seriously congested. By then the first to feel the pressure on capacity will be the 20 busiest airports, which are predicted to have become saturated with



traffic for up to ten hours a day as they try to meet the increased demand.

Apart from general business trends – which indicate a strong recovery from the aggravating effects on the global economic downturn of the 2001 US terrorism attacks, Severe Acute Respiratory Syndrome (SARS) in Asia/Pacific, and the 2003 Iraq war – much of the stimulus to current growth has arisen from the establishment of the single European market in the mid-1990s. Air-transport liberalisation has generated a new airline sector: low-cost carriers, which have started service at hitherto impossibly attractive fares. The low-cost airlines have increased existing competition for established airlines with the result that lower fares all round have put international air travel within reach of millions more people.

So, European business and leisure travellers are able increasingly to fly to new places. But this has brought a very real danger that airports will not be able to expand sufficiently quickly to accommodate the rising demand for their services. Building new, or expanding current facilities has become an increasingly difficult and lengthy undertaking, according to ACI EUROPE.

Airports fear the industry’s best efforts to pour a quart into a pint pot could be stifled by regulatory, political, and ➤



“Without new capacity, there will be less competition, less choice, higher air fares, less economic growth, and – ultimately – fewer jobs”

environmental barriers to expansion and improvement. They want a climate that provides a commercial incentive to speed up new air-traffic control infrastructure and airport construction. But research that takes account of both unlimited demand and expected constraints to future airport and airspace capacity increases has concluded that facilities will be insufficient to meet demand without economic incentives. “Regardless of how far you squeeze the most out

of existing capacity, the reality is that new runways and terminals are the only way to accommodate future demand,” says Griffins. “Without new capacity, there will be less competition, less choice, higher air fares, less economic growth, and – ultimately – fewer jobs.”

This need is recognised by the European Commission (EC), which has called for a re-examination of how airports operate to ensure optimal use of current capacity, while acknowledging that more is required: “This will not be enough and Europe will not be able to cope without new infrastructure.” This will apply particularly to new members of the European Union (and other States aspiring to membership), since many have insufficient capacity to deal with the levels of aviation growth that usually accompany such developments.

According to ACI, European airports generally have too much capacity or too much traffic, with the larger ones likely to feel the pinch first. Indeed, according to EUROCONTROL, which manages international airspace navigation services in the region, the proportion of air-traffic delays that occurs at airports (as opposed to en route) doubled from 23 per cent in ➤



2000 to 46 per cent three years later. In the short-term, EUROCONTROL predicts that 20 or more airports in the region will be short of capacity by 2010, and that by 2025 European air traffic will have grown by more than 150 per cent, compared with 2003 levels.

Obtaining permission and investment funds presents airport operators with both economic and environmental challenges. Not only must airports generate the financial wherewithal, but the collective aerospace and aviation industries have to reduce aircraft noise 'footprints' while lowering gaseous output – the latter through a necessary system of emissions trading between and among states. For airports, the key word is 'sustainability', since they recognise that if growing travel demand cannot be accommodated, then the increased freedom of movement for people and goods provided by aviation will be lost – with tremendous implications for both European commerce and communities.

To provide the facilities needed, airports take a long-term view, looking forward 20 or even 30 years, but they are frustrated because airlines have a notoriously shorter-term vision. Accordingly, their budget forecasts very often do not recognise (much less address) the ongoing investment needed to improve efficiency; investment to which airlines contribute only a small amount of their expenditure. Indeed, their own trade organisations, such as the International Air Transport Association and, nearer home, the Association of

European Airlines, recognise that airport charges paid by carriers have remained stable at only about 4 per cent (on average) of their operating costs for at least a quarter of a century. For their part the airports say that this is too little to sustain long-term development to provide the capacity that airlines will need in future.

To address some of the predicted problems, Europe's airports are planning to invest some \$60 billion on new infrastructure and facilities by 2025, plans that underline the long timescale covering airport developments.

Further good news is that for each million passengers handled, each European airport supports around 3,000 jobs, about half of them in the immediate neighbourhood. More travel means more jobs and greater local prosperity. To pay for improvements, airport charges to airlines have to be heavily subsidised from other non-aviation sources like airport shops and car parks. This has led airports to suggest that true market competition requires their charges to be related more directly to the real costs of providing and paying for services.

Airports are committed to working with aviation industry colleagues to fulfil their environmental responsibilities and want to be proactive contributors to regional economic prosperity through balanced management of growth. Therefore, policy makers and national legislators must recognise the pressures and give proper weight to the social and economic benefits achieved by European airlines, concludes ACI EUROPE. [O](#)

SESAR – PATHWAY TO THE SINGLE EUROPEAN SKY (SES)

When it was adopted by the European Parliament in March 2004, the Single European Sky (SES) regulation became one of the most significant initiatives ever undertaken to improve the European Air Traffic Management (ATM) system. **Julian Moxon** reviews the aims and timeframes of this significant initiative



The main aims of the SES are to create a more efficient, seamless ATM system by reducing fragmentation between States, harmonising the systems in use and creating flexible airspace between civil and military users. As such, its backers face major challenges as they seek to shift the traditional approach to ATM development into a new era that will provide the necessary capacity to handle the predicted doubling of air traffic by 2020.

To achieve its aims the SES will rely on regulations to give it the legislative teeth for the necessary changes, and, on operational and technical initiatives, to enable them to happen. The European Commission (EC) is managing the SES regulatory approach through a series of implementing rules to be developed by EUROCONTROL on the basis of mandates entrusted to it. Now, the EC and EUROCONTROL have launched the Sesar initiative to ensure that the SES succeeds technically and operationally.

According to Bernard Miaillier, Head of EUROCONTROL's European ATM Strategy and Convergence business division, there have been several major attempts in recent years to move European ATM closer to the SES targets, but progress was often inhibited by lack of collaboration amongst the numerous stakeholders which comprise the ATM community. He cites the EUROCONTROL's ATM2000+ Strategy, various EC-sponsored initiatives and the Strategic Research Agenda under the ACARE programme as examples of calls for working more

together. "What was needed was better collaboration between all sectors of aviation industry to get faster decision-making on the transformation of the ATM system through the notion of a master plan for European ATM".

For the first time, the Sesar programme brings all stakeholders together to create the operational and technical backing to the SES regulatory scheme. The definition phase was launched by the EC and EUROCONTROL in June 2005, EC Vice-President Jacques Barrot proclaiming the programme as being "of strategic importance for Europe and the Single European Sky". EUROCONTROL Director General Víctor M. Aguado added that the programme "will produce the ATM Master Plan for Europe that will formulate operational concepts and propose new systems as well as define the road map for their implementation".

The two-year, €60 million definition phase is funded equally by EUROCONTROL and the EC's transport directorate, (through the Trans-European Network programme), under a contract awarded in 2005. In another first, the work will be carried out by a major new consortium comprising stakeholders from all corners of the ATM community (listed at the end of this article). The consortium will initially prepare a detailed statement of work in preparation for the actual work due to begin in January 2006. "Sesar will become the ultimate SES implementation tool", says Miaillier. "It is the operational and technical vehicle for the SES. In essence it represents the next ➤

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■ Sesar programme
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■ SES regulatory scheme



Sesar will encourage a synchronised and integrated approach to ATM development

15 years of improvements to the European ATM system, while recognising that changes will also be required later”.

Sesar does not mean, says Miaillier, stopping all existing ATM improvement programmes. “The ambition is more to extend them, and allow for the preparation of the further operational and technical steps which, in turn, may require additional regulatory measures under the SES regulations”. The first benefits will, however, not be seen much before 2009/10, he adds. “We expect a smooth and efficient transition from current EUROCONTROL programmes such as Link 2000+ and DMEAN (Dynamic Management of the European Airspace Network), which are platforms from which the actions to come out of Sesar will be taken”. Miaillier adds, however, “there may be significant changes compared to current plans because of the much bigger stakeholder involvement. We may find in the definition phase that there are potential improvements we haven’t contemplated yet. We expect that this programme will be a catalyst to accelerate ATM changes, which may allow things to move forwards a lot faster, because the proposals resulting from this phase will be more widely supported by the aviation community. This wasn’t always the case in the past”.

In addition, Sesar will encourage a synchronised and integrated approach to ATM development, from research through to operational phases, ensuring that more cost-effective use is made of scarce resources. The idea is to create an holistic approach to the future European ATM landscape – hence the involvement of as many stakeholders as possible, to ensure that all of the difficult issues – for example, the creation of fewer, larger, functional airspace blocks that do not necessarily follow national boundary lines – are addressed together.

The definition phase will lead to a common, unique, European ATM Master Plan geared from the outset towards implementing the SES. “For the first time in European ATM

history, all European aviation players will come together in defining, committing to and carrying out a plan”, says Miaillier.

The Master Plan will be based on the future aviation requirements, the industrial capability to develop new technologies and on current developments. It will be used to generate the work programme for the first years of the implementation phase, running from 2007-2012, during which it will be necessary to perform a parallel range of tasks supporting the short-, medium- and longer-term developments.

The Master Plan will also be expected to take account of the global dimension and ensure that there is total interoperability between non-European and European ATM systems.

The hope is that, in conjunction with the regulatory approach now being taken, Sesar will provide the long-awaited pathway to a future, seamless, European ATM system. By bringing together so many involved parties, the EC and EUROCONTROL have ensured that the massive changes needed to cater for the expected growth in traffic are certain to happen.

Sesar consortium partners

Airspace users: Air France, Iberia, Deutsche Lufthansa AG, KLM, Association of European Airlines, International Council of Aircraft Owner and Pilot Associations, European Regions Airline Association, International Air Transport Association.

Airports: AENA (Spain), Amsterdam Schiphol, British Airports Authority (BAA), Frankfurt Airport, LfV (Sweden), Munich Airport, Aéroports de Paris.

Air Navigation Services Providers: AENA, AustroControl, DFS (Germany), DSNA (France), ENAV (Italy), LfV (Sweden), LVNL (Netherlands), NATS (UK), NAV (Portugal).

Industry: Airbus, Selex Sistemi Integrati, BAE Systems, EADS, INDRA, Thales ATM, Thales Avionics and Air Traffic Alliance.

In addition, the definition phase will include Project Associates, a growing list of entities including representatives of the military, civil aviation authorities, representatives from European research and development institutions, and non-European industry. □

For a review on how EUROCONTROL intends to oversee and apply safety management best practices in the Sesar definition phase, see ‘Safety management and safety risk regulation aspects of the Sesar definition phase’.

SAFETY MANAGEMENT AND SAFETY REGULATION ASPECTS OF THE SESAR DEFINITION PHASE

Simon Michell reports on the challenges EUROCONTROL faces as it oversees and applies safety management best practices in the Sesar definition phase



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Sesar, the implementation programme for the Single European Sky (SES) complements the regulatory framework and aims to make the operational and technical changes necessary for SES implementation. It is a collaborative programme in two phases, involving all of the stakeholders. The first phase, the 'definition' phase, has already begun and will finish in mid-2007. The second, the 'implementation' phase, will run from 2007 to 2020.

According to Dr Erik Merckx, the head of EUROCONTROL's Safety Enhancement Business Division, there are two elements to safety management within the Sesar definition phase. The first one is assessing the safety of all technical improvements that are being developed in terms of operations, capacity and delay. This requires the development of safety cases to prove that new technology introduced into the system is in fact safe.

EUROCONTROL has learnt a great deal from its success in introducing the Reduced Vertical Separation Minima (RVSM) programme, where a very thorough safety case was undertaken prior to giving the green light. Erik Merckx explained: "This worked very well. We want to do the same thing with everything that comes out of the Sesar definition phase. We want to make safety explicit in Sesar ensuring that all safety aspects are being looked at". To this end, legislation and regulation together with ATM safety regulation form part of the work packages in the Institutional Framework Definition phase of the Sesar work breakdown structure. These work packages will look at legislative and regulatory benchmarking with third countries, identification of potential modifications to existing legislation and regulation, the study of the impact

"We want to make safety explicit in Sesar ensuring that all safety aspects are being looked at"



of new concepts and procedures on safety regulation and compliance and synchronisation with ICAO safety standards.

The second element concerns safety in its own right. In short, how can EUROCONTROL carry out the business of safety management to a higher standard in the future? Obviously, in ten years time, things will be very different. For example, pilots will be more involved – much of the decision-making in ATC will be delegated from the ground to the cockpit. There will also be many more differences in the overall ATM environment. Therefore it is necessary to have a fresh look at what safety management means. Current safety practices are based on the ATC world as it exists today. But according to Erik Merckx, it is necessary to imagine what changes will have taken place, for example, in:

- the level of traffic increases
- the increased passenger throughput at airports
- new aircraft design
- changes in working practices
- increased prevalence of Unmanned Aerial Vehicles (UAVs)
- satellite navigation
- changes in regulation
- changes in institutions

"An increasing number of aircraft will have consequences on how the ATC deal with those aircraft. This means we will have to assist in the implementation of new technologies ensuring that the appropriate safety cases have been thoroughly examined."

New aircraft being developed, such as the Airbus A380 and the Boeing Dreamliner, are bringing with them a new set of ➤



technologies that need to be properly assessed to ensure that they are safe. EUROCONTROL has already carried out a lot of work with Airbus to ensure that the changes that are associated with operating the A380 aircraft are indeed safe.

The addition of systems such as Controller-Pilot Data Link Communications, on top of existing voice communications, not only introduce improvements in the communication systems themselves, but also introduce a change to the way things have been done for 50 years. “This is a change to the world of ATC which has been going on since World War II. How do people cope with this change?” asks Erik Merckx.

The increased use of satellite navigations as part of the Galileo programme will also introduce an extra element into the ATC environment. Again, how will the ATC personnel and pilots cope with this?

Another important element that needs to be assessed is the increasing likelihood that UAVs will be given permission to fly within controlled airspace. This adds a whole new set of challenges as to how to deal with a system where the pilot is in the loop but on the ground.

Regulation throughout the whole of Europe is becoming stronger as a result of the Single European Sky (SES) initiative at the same time as many of the institutions

responsible for ATM safety, such as the Air Navigation Service Providers (ANSPs), are evolving into different types of organisations. Many are becoming either privatised or corporatised. Likewise the creation of the European Aviation Safety Agency (EASA) will certainly have a significant effect on safety management as its tentacles become more widespread. Erik Merckx explains: “EUROCONTROL is already talking to EASA on how they will work together after EASA has extended its remit to cover ATM and airports. However it is likely that the definition phase will have been completed by 2007 and the implementation phase will have begun by the time EASA has extended their competencies to cover these two crucial areas.

Erik Merckx points out that the role of EUROCONTROL is also changing. “In the old days as far as safety was considered, EUROCONTROL played a pioneering role, but now, increasingly, the European Commission is taking over in the regulation area and a number of service providers themselves have good safety management systems. We still have a lot of expertise in-house. We should play a major role as far as safety is concerned in the SES definition phase, but there are many players involved in Sesar. EUROCONTROL can provide the safety glue which binds all of the stakeholders together.”



ANSP'S VIEWS ON SAFETY AND RISK MANAGEMENT

Anne Paylor examines how Air Navigation Service Providers (ANSPs) are addressing safety and risk management in light of changes to regulations as part of the Single European Sky initiative

The Single European Sky (SES) is bringing significant changes to the way air navigation service providers are regulated, and one of its key pillars is the clear separation of safety regulation from service provision. The concept is both a cornerstone of and a pre-requisite for greater commercialisation in the provision of air navigation services. It is also one of the building blocks that will facilitate cross-border service provision, ensuring that safety standards can be assured by each Member State regardless of who is providing the services.

Safety is fundamental to air traffic management: it is its *raison d'être*. But with traffic once again increasing at pre-9/11 rates, and forecast to double by 2020, it follows that if the current accident rate remains the same, the number of aviation accidents will also double by 2020. With aircraft operating in more complex operational conditions in more congested airspace, some experts predict that this could mean a fatal air accident occurring every seven to ten days. Although air traffic would still be proportionately safer than any other form of transport, such concentrated negative press would inevitably damage public perceptions of air safety.

Despite the rapid and constant growth in air traffic, overall aviation accident rates have been reduced by more than 50 per cent during the past 20 years, and the long-term goal in Europe is to reduce accident rates by 80 per cent by 2020 through technology, operational and regulatory initiatives, and measures to decrease human error.

In a bid to address the European disparities, the European Commission drafted a regulation in 2004 laying down common requirements for the provision of air navigation services, aimed at ensuring that a common level of safety management is implemented throughout the European Community.

The draft regulation defines safety management as “that function of air traffic services provision which ensures that all safety risks have been identified, assessed and satisfactorily mitigated, and that a formal and systematic approach to safety management will maximise safety benefits in a visible and traceable way.”

It requires every ANSP, as an integral part of the management of its services, to have a safety management system (SMS) that:

- ensures a formalised, explicit and pro-active approach to systematic safety management in meeting its safety

responsibilities within the provision of its services;

- operates in respect of all its services and the supporting arrangements under its managerial control; and includes, as its foundation, a statement of safety policy defining the organisation’s fundamental approach to managing safety (safety management);
- ensures that everyone involved in the safety aspects of the provision of air traffic services has an individual safety responsibility for their own actions, that managers are responsible for the safety performance of their respective departments or divisions and that the top management of the provider carries an overall safety responsibility (safety responsibility);
- ensures that the achievement of satisfactory safety in air traffic services shall be afforded the highest priority (safety priority); and
- ensures that while providing air traffic services, the principal safety objective is to minimise its contribution to the risk of an aircraft accident as far as reasonably practicable (safety objective).

Acceptance of the Common Requirements (CRs) by the ANSP community has been generally positive, because they are at least a first step towards creating a level playing field. But there are concerns among the more mature and commercialised providers that the CRs have the potential to act as a constraint. The Commercial Air Navigation Services ➤



IRISH AVIATION AUTHORITY

The Irish Aviation Authority is, in the words of its Operations Director, Pat Ryan, “A small service provider which continues to punch above its weight.” Ireland’s location has given the IAA a niche role in the interface of traffic operating between Europe and North America – a position that it intends to maintain and strengthen.

In line with the overall growth in the Irish economy over the past decade, the IAA is also developing and enhancing its capabilities to assist with the continuing growth in traffic at state airports in Dublin, Cork and Shannon as well as in the rapidly developing regional airport sector.

The company is constantly seeking to influence developments internationally through the ICAO process including the North Atlantic Systems Planning Group as well as through the various EUROCONTROL fora in which it is participating and in CANSO. In particular the company is preparing for the Single European Sky (SES) initiative and is at the forefront of the development of Functional Airspace Blocks (FAB).

As a result of a study undertaken by the Solar Alliance in July 2005, the IAA is collaborating with the UK’s service provider, NATS with a view to creating a joint Ireland/UK FAB.

A significant building block for a possible UK/Irish FAB was set in place in 2005 with the completion of phase 1 of radar service provision from Shannon ACC for the Northern Oceanic Transition Area (NOTA) with full implementation scheduled for October 2006. The Authority has commenced preparatory work, in line with SES requirements, which will see the separation of the regulatory and

service provision services. Legislation is due to be introduced in the Irish Parliament in 2006 with a view for separation to take place in 2007.

With the advent of satellite-based data link communications, the IAA has started discussions with the Icelandic Civil Aviation Authority (ICAA) to look at strategies to prepare a carefully managed transition from HF to datalink communications services in the North Atlantic over a number of years. As one of seven HF providers in the North Atlantic the IAA recognises the need to manage this transition very carefully as it involves significant costs in terms of staff reduction, redeployment and retraining. The IAA envisages a co-operative arrangement with Iceland’s ICAA to help with this process, which would see the two service providers work together to share frequencies, airspace and co-operate in the efficient management of resources at each of their facilities.

The IAA is also part of a collaborative venture with Sweden’s LVF, Denmark’s Naviair and Thales ATM in the COOPANS proposal. The rationale behind this is to spread the cost and effort of enhancing the Thales EUROCAT 2000 product over a defined period during which regular upgrades will be implemented. Not only will the costs be more manageable and the upgrades better planned, but also the three service providers will enjoy a high degree of system harmonisation.

These far-sighted strategies and collaborations should ensure that the IAA remains according to Pat Ryan “a leading safe and cost-effective service provider, which is customer focused and value-for-money driven.” ◻



Organisation (CANSO) told the European Commission that, despite some revisions, it believes the proposed legislation is still “over prescriptive, too detailed and fails to recognise the need for proportionality”. CANSO argues that some proportionality is needed and that the CRs should be tailored to reduce the burden on ANSPs depending on the scale and type of their operations and subject to tests of reasonableness, proportionality and relevance to the SES objectives.

The UK’s National Air Traffic Services (NATS), which was the first European ANSP to be privatised, and operates in an environment where service provision and safety (and economic) regulation are entirely independent, would like to see a level playing field achieved, but not if it means sacrificing standards.

“There is a risk that those aspects of the Common Requirements relating to safety will end up being too detailed and too prescriptive,” said Fergus Cusden, Director of Safety with NATS. “They are very useful for less mature ANSPs, but there is a danger that they could force more mature service providers into areas where we don’t need to go. They could limit how we can use our resources to manage risk. So, we must make sure the playing field is levelled up. There is always a temptation to settle for the lowest common denominator because there is a cost associated with achieving a higher level, but we are looking for the bar to be continually raised in a way that is not prescriptive.”

NATS was the first ANSP to implement a formal structured safety management system in 1990. This formal approach is founded on documented safety policies, safety principles and safety procedures, and the system forms the basis for risk

assessment, safety assurance, safety control and safety monitoring. Much of this pioneering effort has been assimilated into the Common Requirements.

A key element in managing safety is creating a structure that makes it possible to clearly identify who is accountable for what. “It is very clear who is responsible for safety in our organisation,” Cusden said.

NATS also has a mature incident reporting system, which Cusden describes as “the foundation” of any safety management system. “It is the fuel for the system and allows us to measure how well we are doing,” he said.

“You have to have the right culture in place in the organisation for effective incident reporting. People need to feel confident that reporting incidents will not be detrimental to their career. We prefer to call this a ‘just’ culture rather than a ‘no blame’ culture because if an incident is clearly the result of someone being grossly negligent, then they must be held accountable and we would reserve the right to take appropriate action,” Cusden said. “Incidents may be caused by equipment problems or incorrect procedures, not just human error. We must know when things have gone wrong in order to change and constantly improve our system”. A view echoed by Jenny Beechener in her article ‘Just Culture’.

“The legislative environment should also not be punishment based,” he said. “If reporting can lead to legal action, why would anyone report anything? From a safety management perspective, you are better served by learning the lessons of an incident rather than punishing the individual responsible. Our regulator, the UK Civil Aviation Authority, has also agreed not to prosecute at a legislative level.” ➤

■ “Safety has to be our first priority as a business: it is not just a moral issue, but an economic driver as well”

Incident reporting is a key weakness in Europe and although the situation is beginning to improve, “the process is not comprehensive and the quality of the safety data obtained varies significantly from State to State,” says George Paulson, the EUROCONTROL Director of ATM Programmes. In his view, “despite the clear benefits of sharing aircraft accident/incident information, some States and service providers remain concerned that their safety-related performance might be unfavourably compared with others.”

EUROCONTROL highlights incident reporting as the “least mature” area within the SSAP Implementation Programme, “mainly because of legal impediments to reporting, the lack of a ‘Just Culture’ within States, and a shortage of qualified and trained manpower.”

However, it points out that most States and ANSPs have now established a focal point for safety data collection. In addition, a voluntary safety data policy has been agreed with ANSPs through the Chief Executives Standing Conference (CESC), a magazine – *Hindsight* – has been launched and issued to controllers to disseminate lessons learned, and a ‘Level-Bust Action Plan and Toolkit’ has been provided.

The NATS incident reporting system, which is not confidential, is complemented by the UK Confidential Human Factors Incident Reporting Programme (CHIRP), which has been in operation since 1982 and is available to flight crew members, air traffic controllers, licensed aircraft maintenance engineers, cabin crew and the GA community.

Personal details of anyone who makes a report to CHIRP are kept confidential and are returned to the reporter on closure of their report. With their approval, the information is made available in a disidentified form to whoever can take action to remedy the problem. Important information is also disseminated as widely as possible within the industry to help improve safety standards.

CHIRP, which operates as a registered charity, complements the UK CAA’s Mandatory Occurrence Reporting system and

other formal reporting systems operated by UK organisations by providing a confidential, though not anonymous, means for individuals to raise issues of concern.

NATS recognises there is a place for CHIRP but believes that by adopting a ‘just’ culture, an open approach to incident reporting will be maintained within the organisation.

“We strive to encourage openness,” said Cusden. “We find we are generally able to get more detailed information about an incident if we can talk to the reporter”.

An area of particular focus at a European level is runway incursions and Cusden said that, as soon as NATS focused on this, the number of incident reports received on runway incursions increased significantly. However, he pointed out that, despite the overall increase in the level of reporting, the number of serious events remained largely constant while the number of minor, low-risk events increased.

NATS has runway safety teams working at all 14 of the UK airports where it provides services. These teams work closely with airlines, airports and other stakeholders to find solutions and the result is a very quick turnover of improvement actions. “At one airport, we managed to implement taxiway marking improvements identified by the team as an action to improve safety within 48 hours of the recommendation being made,” Cusden said. “Working together is crucial.”

NATS has a register of all the risks it manages, such as runway incursions, level busts, etc., and works with EUROCONTROL and CANSO to learn from others what problems they have identified and what solutions they have implemented. But Cusden stressed: “We are not just reacting to EUROCONTROL. Rather, we are actively contributing to the effort.”

On level busts, for example, NATS is about to send CDs to 22,000 pilots to raise awareness of the issue, and it is working with 42 airlines on activities to reduce the number of level busts.

“We don’t wait for directives: we just get on with it. We have a good safety record and there is a huge ongoing effort aimed at improving that record,” said Cusden. “It is part of our culture to always strive to improve. No matter how good you are, you can never rest on your laurels. There are always improvements to be made and as long as we strive for those, we will sustain a high level of safety.”

Cusden stressed that NATS does what it does in terms of safety management “for the right business reasons, not because the regulator says so. Regulation is just a safety net. As an air navigation services provider, safety has to be our first priority as a business: it is not just a moral issue, but an economic driver as well.” ○



THE CHALLENGES AHEAD

Jenny Beechener looks at the key challenges facing Europe's airports; how ATM and airports must work together, encourage open honest communication on incident reporting and add capacity through better co-operation

Airports are predicted to become the main capacity bottleneck from 2006, exceeding en-route delays for the first time. A EUROCONTROL study forecasts that Europe's 20 largest airports will have a capacity shortage within five years, and despite major infrastructure development, the network will be unable to handle some 18 per cent of the predicted doubling of traffic by 2020.

But the figures do not fully account for untapped capacity that exists in and around the airport, and in particular, the potential benefits of improved co-operation between airports and air traffic control. As more advanced computer planning tools become available, the opportunity for collaboration between controllers, pilots and airports promises benefits in terms of capacity, safety and environmental impact.

"Our first goal is to unlock latent capacity," says Philippe Joppart of ACI EUROPE, co-Chairman of the Airport Programme Advisory Group. "It is not really creating new capacity, although it could be, but it is about improving the way aircraft can be flown to minimise environmental impact and to establish good flow management."

EUROCONTROL's Airport Programme tackles the issues of safety and capacity through a series of projects that focus on runway occupancy and incursions, collaborative decision making, time-sequenced arrivals and surface movement guidance. Joppart says there has been a quantum leap in the level of understanding about airport operations over the last five years, and that airports themselves have become much more involved.

Prague was an early test-bed for the Advanced Surface Movement Guidance and Control System (A-SMGCS) project. The airport has become a benchmark for good practices, and has been able to accommodate a surge in traffic. A-SMGCS is an example of a tool that is available today, but is not yet used to its full potential. It is both a capacity tool and, at the same time, a safety net, with many procedures still in development stages. "It is an advanced warning tool," says Joppart. "It could ultimately put the ground controller and the pilot in a position to use the airport in bad weather in almost the same way they would in normal weather conditions." Airports that suffer prolonged periods of bad weather cannot realise their full capacity. A-SMGCS, along with other tools, could improve this situation for many European airports.

Joppart also believes the airport mindset has changed. "We

There has been a quantum leap in the level of understanding about airport operations over the last five years

have to be pragmatic about how airports are today, compared to how they were. Some of them are totally privatised, some are on the way, others are State-owned but nevertheless very business minded." Aircraft delays have a knock-on effect on the ground. Airports have to take care of the passengers and this can become a health and safety issue.

Several airports are participating in the collaborative decision making (CDM) project, which aims to share information between air traffic control, pilots and airports to take account of individual preferences. These include slot compliance, night curfews, stand allocation and aircraft sequencing. The EUROCONTROL team is supporting Stockholm, Barcelona, Brussels and Heathrow in order to demonstrate the benefits of CDM and others are following closely, among them Paris CDG, Amsterdam, Munich, Frankfurt and Zurich.

An implementation manual is also available that enables any airport to embark on its own CDM programme. Moreover, the technology is straightforward and includes a server at airport level and a database. The cost is estimated at less than €100,000 for a small airport and double this for large airports.

Meanwhile, a high degree of co-operation has resulted from the runway safety programme. More than 90 per cent of Member States have established local runway safety teams that include representatives from the airport operators, airlines and navigation service providers. The initiative is driven by the ICAO safety committee requirement, and received a boost in 2004 when the EUROCONTROL Strategic Safety Action Plan highlighted the need for more stringent runway incursion reporting.

Yvonne Page, EUROCONTROL Runway Safety Project Manager, says in 1999 there were only 50 official runway reports. By 2004, these had risen to 530. "This improvement in reporting culture does not reflect a negative change in ➤



the levels of operational safety on the manoeuvring area. It does reflect an improvement in ATM incident reporting culture. Even with the improved levels of reporting there is not enough data yet to confirm a reduction in runway incursions per se, but what we can say from the data we have available is that the seriousness of the incursions is reduced. Incursions are classified A-E and we have a reduction in the As and Bs compared to previous years with a significant drop between 2004 and 2003.” In November 2004 ICAO Member States agreed upon one definition of a runway incursion, enabling runway incursion data to be compared, and common causal factors identified and researched.

Another project that is delivering results is the capacity assessment work that centres on the Commonly Agreed Methodology for Airside Capacity Assessment (CAMACA). This computer tool is a simulation programme that enables airports to examine various options to enhance capacity management. First used by Brussels in the late 1990s, the airport gained an

extra two movements an hour as a result of more efficient operations. In Lisbon, the additional rapid exits and concrete modifications led to a 10 per cent gain in aircraft movements. EUROCONTROL has brought the tool to an advanced stage of development under its capacity enhancement initiative.

“The most immediate challenge is to unlock capacity over the next five years,” says Paul Wilson, Head of EUROCONTROL’s Airport Throughput Business Division. “Some airports, we have to admit, are totally capacity constrained. But at the majority of airports there exists a degree of latent capacity. We are working with airports to develop processes and procedures, and disseminating these across the European region. Historically, network planning has focused on en-route airspace. Now airports are becoming the issue and we need to fully integrate airports into that process. The way we do that is by obtaining capacity data and feeding this into the network planning process. That shows us where the hotspots are and where we really have to try and focus the work.” ○



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TOOLS AND SYSTEMS

Anne Paylor looks at the Airport Operations Programme and the work being undertaken to enhance capacity and safety at airports

As air traffic in the post-9/11 environment resumes its inexorable pace of growth, predictions that today's traffic levels will double as early as 2020 once again seem realistic. And as airspace capacity issues are addressed, there is growing recognition that airports are now the major infrastructure constraint to continued growth.

According to EUROCONTROL, airports accounted for just 23 per cent of delays in 2000, with 77 per cent of delays attributable to the en-route phases of flight. By 2003, airspace improvements meant that the share of delays attributable to airports had grown to 46 per cent, and airports are expected to be the main bottleneck beyond 2005 from 2006.

A study entitled *Challenges to Growth*, published by EUROCONTROL and the European Civil Aviation Conference (ECAC) in 2004, found that by 2010, more than 20 of Europe's top 133 airports are expected to have a capacity shortage if demand continues to grow as anticipated. By 2025, annual demand is forecast to have increased to as many as 21 million flights per year, a growth factor of 2.5 compared to 2003 levels. The number of congested airports is expected to increase accordingly, to more than 60, with the top 20 airports saturated for at least eight to ten hours a day.

The study found that the overall airport network has a long-term potential for 60 per cent capacity growth, but ➤



pointed out that only a small part of this extra capacity could be provided at the major airports. One third would in fact not be needed in 2025 due to insufficient demand at the airports where it was available. The study also points out that, even if the 60 per cent capacity increase could be achieved, it would only be able to accommodate twice the volume of 2003 traffic, meaning that 17.6 per cent of demand (3.7 million flights per year) could not be accommodated.

Accordingly, EUROCONTROL is working closely with ACI EUROPE and the International Air Transport Association (IATA) on the Airport Operations Programme in a bid to improve the efficiency of airport airside operations and to maximise capacity. There are currently four projects under way covering a broad spectrum of airside operations. Together they offer a cohesive approach to the improvement of efficiency and the harmonisation across the European region.

The four projects, which are also examined in the article 'Airports and European ATM', cover:

- **Airport Collaborative Decision Making (CDM)**

Airport CDM uses already available information to complement and enhance existing procedures, but replaces the current central planning paradigm with a collaborative process. At a CDM airport, all partners have access to the same up-to-date information, establishing a common situational awareness platform. As a result, decision making is based on accurate shared information and predictability in the case of unforeseen events or disruption is increased. Because it does not introduce radically new systems or procedures, Airport CDM is not an expensive process, and the level of potential benefits is significant for all parties.

- **Advanced Surface Movement Guidance and Control System (A-SMGCS)**

A-SMGCS uses Mode S multilateration technology to provide

■ By 2025, annual demand
■ is forecast to have
■ increased to as many as
■ 21 million flights per year,
■ a growth factor of 2.5
■ compared to 2003 levels

accurate surveillance and identification of all aircraft and transponder equipped vehicles on the airport surface, while Surface Movement Radar detects non-transponder equipped aircraft or vehicles.

For controllers, a dedicated display screen shows each aircraft and vehicle securely tagged with its identification and position. In conditions of restricted or reduced visibility, the system will greatly increase the situational awareness of controllers, allowing them to be completely sure of the position of aircraft and vehicles, and alerting them to potential conflicts on the runway.

- **Airside Capacity Enhancement (ACE)**

ACE helps airports release latent airside capacity by implementing guidelines – based on best practices developed at European airports – for runway, taxiway and apron operations. Software tools available to help airports determine and identify airside capacity gaps include the Commonly Agreed Methodology for Airport airside Capacity Assessment (CAMACA), Performance Indicator Analysis Tools for Airports (PIATA), the Data Measurement System and the Pilot Reaction Times and Runway Occupancy Times Measurement Systems.

CAMACA allows airports to measure and correlate the potential of runways, taxiways, aprons and stands in terms of capacity and demand. Using CAMACA, airport planners can detect possible bottlenecks and safety hazards and estimate the best scenario for improving capacity and safety. The system is based on a mixture of stochastic and analytical models, calculating outputs from a set of input parameters,

such as traffic mix and a physical description of the airport.

Pilot Reaction Times and Runway Measurement Methods focus on the efforts of flight crews to optimise runway utilisation. Fundamental to this is the ability to measure and analyse pilot reaction times to ATC clearances.

PIATA is a software tool, based on Microsoft Excel and Palisade Corporation's '@RISK,' to evaluate the impact on airside capacity of a wide range of performance indicators, such as ROT (runway occupancy times), arrival/departure demand, push back delay, departure/arrival sequence efficiency and departure/arrival separation efficiency. Having analysed the data, PIATA then explores alternative scenarios, helping airports to identify and then 'unlock' or release existing capacity.

- **Runway Safety**

The latest available data indicates that more than one runway incursion a day takes place within the ECAC region. They are responsible for at least two actual collisions with significant loss of life, and a number of serious incidents.

To standardise interpretation, ICAO has now formally defined a runway incursion as "any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take off of aircraft."

In April 2004, a European Action Plan for the Prevention of Runway Incursions (EAPPRI) was drawn up by EUROCONTROL, the Joint Aviation Authorities, the Group of Aerodrome Safety Regulators, and a number of professional organisations encompassing airport operators, air navigation service providers, aircraft operators, safety regulators, air traffic controllers and pilots.

The plan includes 56 recommendations for immediate action and each member of the aerodrome community involved in runway operations has a specific set of recommendations to implement.

Key actions for individual airports include development of a Runway Safety Programme that includes creating a local runway safety team to review implementation of ICAO provisions, improve runway safety occurrence reporting and analysis, establish a risk-based approach to change management, ensure existing safety management systems explicitly incorporate runway operations and join the SAForum secure site as a means of sharing information about common problems and exchanging common solutions. ○



SECURING EUROPE'S SKIES

Bernard Fitzsimons looks at how maintaining and enhancing ATM security remains an essential focus for EUROCONTROL

Two of the four initiatives developed by EUROCONTROL together with NATO, conceived in response to the September 2001 hijackings, are reaching the stage of pre-operational trials.

The first of these is an effort to provide a high-capacity air-ground downlink that would support the transmission of encrypted voice, flight data and on-board video from the cockpit of an aircraft that was the subject of a security alert. The purpose is to give those responding to the alert on the ground a clearer idea of what is happening on board.

Developed with support from the European Commission using Trans-European Transport Networks (TEN-T) funding, the European Aviation Security based on the 3G technology (EAS3G) project centres on a C-band air-ground link operating at a frequency of around 5GHz. The International Telecommunications Union is considering the use of aeronautical spectrum for this purpose. Third generation (3G) mobile phone technology has been adapted avoiding the need to develop new technology at high cost.

The technology has already proved robust in earlier flight

The purpose is to give those responding to the alert on the ground a clearer idea of what is happening on board

trials, and encryption software may be used to protect the confidentiality as well as the security of the information transmitted. Avionics are being kept as simple as possible to minimise equipment costs.

A main objective of the 2006 trials will be to demonstrate the value of particular types of information. Having provided a secure pipe carrying encrypted information between ground and aircraft they will explore what information would be most useful. One concern of the work is to provide a simple picture, avoiding information overload. It is planned that the distribution of the downlinked information will be handled by the second project, the European Regional Renegade Information Dissemination System (ERRIDS), which is being developed to meet the identified need for an air traffic management information focal point to support the response to incidents.

ERRIDS is a joint project between EUROCONTROL and NATO. The motive for the creation of such a system was to avoid the potential for misinterpretation in disseminating information on an incident among multiple European States and to shorten the delays inherent in such cross-border co-ordination. That potential would be unacceptably high if communications were based purely on telephone calls, for example. The concept behind ERRIDS is to provide real-time information on a situation and ensure that everybody involved in the handling of an incident would have the same situation awareness.

Using internet technology with PC nodes running NATO accredited security software enables the level of confidentiality to be controlled. Information is encrypted and access can be restricted to selected recipients on a need-to-know basis.

Initial testing of a demonstration model was carried out during the autumn of 2004 followed by the first series of validation trials in June-September 2005, culminating in a trial with a live aircraft. The scenario of the trials was a security

incident involving the loss of communications, deviation of track and loss of transponder over the area of Benelux and Germany with the key organisations from those States participating. Re-engineering of the prototype terminals was started in 2005 using the results from the development of the Concept of Operations, the User Requirements Document, the Information Exchange Model and the output from the trials. The aim is to build an updated application better suited to operational needs.

There have been proposals that ERRIDS could be used in its pre-operational form during 2006, a year which sees Germany hosting the FIFA World Cup. The country is also due to host a G8 summit meeting the following year. Sweden and Italy have also expressed an interest in the project and Austria and Switzerland are interested because of the European football championships they are jointly staging in 2008.

One of the first areas of application for the system is in incidents where voice communication between the controller and the aircraft is lost. This is believed to happen almost every other day in Europe, often triggering the launch of costly intercept missions by military fighter aircraft. Equipment failure aside, a common cause for the loss of communications is crews tuning one of their two radios to the wrong ATC frequency channel. The other radio is often tuned to the company channel in order to maintain communications with the airline operations centre.

ATC will normally respond to aircraft's failure to acknowledge attempted radio contact by trying the 121.5 MHz emergency frequency, and by alerting the airline operations centre to try their company communications such as the ACARS data link. If there is no response, ATC will advise the relevant national military, which in due course will launch an intercept.

For the benefit of those national authorities who are ➤

concerned with an aircraft involved in an incident when it lands or crashes (such as police and various government agencies), another objective of the information distribution network is to be able to present the position of that aircraft against a geographical map overlaid with the maximum range of the aircraft, based on what is known about its fuel state. States would be able to overlay their own information on locations of sensitive installations. Although that information would be restricted to the ERRID actor in question, all actors will be able to see the situation and while it would be up to the one nearest to the incident to take action, the network should provide a low-cost means of enhancing situation awareness and decision support.

Recipients of ERRIDS information could include government departments responsible for aviation security, intelligence services, air traffic control centre supervisors, the military, police, airports and the airlines, according to national requirements. The police are also involved in the project and EUROCONTROL are working with Europol, the European Union law enforcement organisation responsible for handling criminal intelligence, which could distribute information to national police forces.

Air defence forces within each State that may also be part of NATO have a major role in responding to security incidents, which explains why the other two of the four initiatives involve civil-military co-operation. One is the development of processes to optimise the sharing of civil and military ATC and air defence radar track information of aircraft involved in an incident. This will enable the authorities to continue tracking aircraft whose secondary surveillance radar transponders have been turned off – a low-cost alternative to the proposal to modify the transponders themselves.

The other initiative was to review and harmonise civil and military ATC procedures and training for dealing with hijacks and other emergency situations. The NATO EUROCONTROL Security ATM Coordination Group (NEASCOG) was set up at an early stage, and in 2005 the political decision was taken to make the group a central focal point for co-ordination in ATM security. The membership base will be expanded accordingly to include airports, the police, intelligence services and national governments. There is a collaborative activity through NEASCOG to improve some of the procedures for handling security incidents.

In another part of its programme of work, EUROCONTROL has developed a security case methodology. This will be evaluated in the latter part of 2005 and in 2006, both to evaluate whether the methodology is correct and to encourage stakeholder buy-in.

As part of the Single European Sky initiative, EUROCONTROL is developing guidance material to help Member States to meet the new European Commission regulations for certification of air navigation service providers, one part of which relates to security. The agency will also be providing input on security to the definition phase of the Sesar project to develop an ATM master plan.

There are two other European Commission projects in which EUROCONTROL is a part. The first is the Protection of Air Transportation and Infrastructure (PATIN) project, which is part of the Security Research Programme due to start work in early 2006. The other is the Safety of Aircraft in the Future European Environment (SAFE), which started in 2004 in the 6th Framework Programme. EUROCONTROL has an advisory role assisting with defining the operational concepts and with the evaluation. Further work with the European Commission is planned as part of the 7th Framework Programme to evaluate some of these new security concepts together, which will hopefully make civil aviation even more secure in future. 





THE SECURE AIRPORT

Chris Yates reviews the state of airport security in Europe

A hand grenade in the hold, a handgun in the cabin, the shoe bomber, knives and imitation pistols successfully smuggled on board as hand luggage... sharp reminders that security remains the aviation industry's primary concern and its principal challenge. Guaranteeing total security is widely acknowledged to be impossible, but the effort to achieve the highest possible standard has to be unremitting. This takes time, resources, dedication, intelligence, technology – and money.

The suicide hijackings of 11 September 2001, as well as attacks on other transportation modes during the past four years, have shown us there is now even greater pressure on industry specialists not just to detect and deter but to actually stop a possible terrorist outrage in its tracks. Europe's long history of dealing with potential and real

terrorist threats to its transportation infrastructure has resulted in the development and continual enhancement of techniques and solutions widely regarded as best practice throughout the world.

European airports have led the field in areas as diverse as developing multi-level techniques for hold baggage screening, enhanced checkpoint screening techniques for hand baggage, passenger profiling, staff screening, surveillance and facilities security, but there is still much to be done to make travelling through European airports even safer.

The European Union (EU), in consort with the European Civil Aviation Conference (ECAC), continues to drive enhancements to security at European airports. The ECAC long ago adopted the UK-developed multi-level hold baggage screening technique and continues to promote the solution as best >

practice among new EU members of the European Union (EU) as well as further afield. Meanwhile, the European Commission (EC) itself legislates to require airports to adopt standard practices such as staff screening, and physically separating inbound and outbound passengers from one another.

Several airports across Europe remain at the forefront of the drive to adopt advanced techniques to deal with terrorism.

Manchester Airport (MAN), the third biggest in the United Kingdom, has recently embarked on multi-level checkpoint screening trials. The concept Manchester has adopted is long overdue. Rather than utilising just metal detection, x-ray and trace detection for passenger hand baggage, this airport has opted to randomly direct individual passengers to checkpoint lines employing differing technologies. The trials mark a departure from standard checkpoint practice. The thinking behind the concept is to make it harder for terrorists to plan an attack since they will not know with any degree of certainty what detection systems they are faced with.

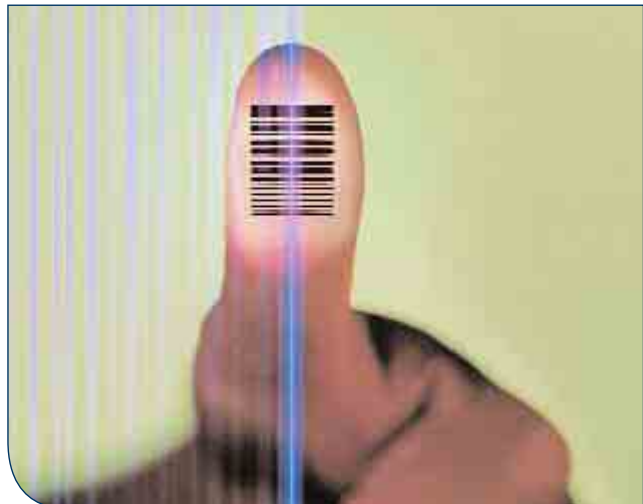
Elsewhere across Europe both access control and border control is being enhanced with the adoption, in some countries, of biometric technologies. These technologies are ideally suited to access control, providing positive identification of airport employees and effective tracking of employee movements. They can be set up in such a way that employees are given differing levels of access to the secure areas of airports dependent upon their job description. Only those with a biometrics matching that in the airport database can gain access, for example, between landside and airside in a terminal building. The use of biometrics for access control purposes also solves an age-old problem of unauthorised access using lost or stolen identification cards.

Amsterdam Schiphol (AMS) has become the first airport in the world to use iris recognition technology for its Privium border control system. Iris scanning is considered to be more reliable and faster than other forms of biometric identification, such as fingerprint or hand palm recognition. This is because the iris never changes and irises are rarely damaged or injured. Just a tiny injury to the finger or to the palm of the hand can hamper biometric recognition. Privium is an 'opt in' members' scheme and is proving to be considerably faster compared with manual passport control.

Paris Charles de Gaulle (CDG) meanwhile has opted to stick with fingerprint for its Pegase border control solution, which finally went live in the summer 2005. Pegase is again an 'opt in' solution and requires passengers to register a fingerprint from both left and right hands at special booths situated in the terminals. False acceptance or rejection data for Pegase is not presently available, but given that Aéroports de Paris (ADP) has been successfully using biometrics for access control at both Charles de Gaulle and Orly airports for some time, it seems likely the figures will be somewhat similar. The access control system has some 100,000 registered users and 40,000 biometric checks are conducted daily with a low false rejection rate of just 0.6 per cent.

Such technology-based solutions help to ensure that air passengers avoid unacceptably long lines, wait times and missed flights. There is a concern among European airport operators not to make security so onerous and such a hassle that customer service is lost in the shuffle. That is when the airports' customers, the passengers, will pack their bags and resort to other forms of transportation – an outcome the aviation industry, the world economy and indeed the

■ Only by willingly
■ shouldering their duty
■ to air passengers will
■ governments ensure
■ the highest level of
■ security for all citizens





passengers themselves can ill afford.

But this luxury comes at a price. Application of these crucial new procedures entails the purchase of the aforementioned sophisticated technology, implementing major infrastructural changes, employing additional resources and significant staff training. European airports have demanded that these costs not be passed directly onto airports or air passengers. Rather, they have called for the financing of new security measures to be shouldered by governments, whose moral duty it is to ensure a coherent policy against terrorism, so as to defend the fabric of society including the substantial social and economic benefits of aviation.

Critics point out that the post 9/11 EU security legislation only has modest impact without concrete agreement from European governments on how to pay the millions of euros required for these new measures. Airlines, airports and security experts have expressed disappointment at the lack of commitment from European governments regarding the

security funding issue. Most European airport operators have been refused government assistance, even though the European Commission and European Parliament have both indicated their belief that European governments should reassess their stance on funding for aviation security.

Present geopolitical developments are causing major concerns within the air transport industry. It is imperative that, in the face of these new threats, decision-making is well planned and co-ordinated. All policies impacting the aviation industry must be both decisive and well funded. Air transport symbolises freedom of movement and trade, cornerstones of our society. It must stay that way. The European aviation industry argues that the security of air travellers must be guaranteed, so that we may all continue to have confidence in European aviation. Only by willingly shouldering their duty to air passengers will governments ensure the highest level of security for all citizens at airports and on-board aircraft. [O](#)



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THE SOCIAL AND ECONOMIC BENEFIT OF EUROPE'S AIRPORTS

Anne Paylor looks at why European airports are good for Europe



In the debate about the environmental impact of air transport, and calls for a curb on air traffic growth, the powerful economic and social impact of this massive global industry at a local, national and regional level is sometimes overlooked. Airports are the palpable manifestation of what is perceived to be negative about aviation, but the real impact of these virtual cities is almost inevitably underestimated.

Aviation infrastructure has traditionally been high on the list of priorities for international aid funding in developing countries, because air transport is recognised to be a significant engine for kick-starting economic growth. But even in the developed world, cost effectively plays an influential role in determining where economic hubs and business centres are located.

The 2004 study into *The social and economic impact of airports in Europe* (available at www.aci-europe.org) points out that the economic and social impacts of Europe's airports "go far beyond the direct effect of an airport's operation on its neighbours to the wider benefits that air service accessibility brings to regional business interests and to consumers." It says that airports "provide essential

infrastructure to support regional social and economic growth as well as being commercial entities in their own right, capable of generating returns on investment to the benefit of their shareholders, other stakeholders and to society as a whole."

This study highlights the often overlooked role played by European airports in boosting regional accessibility and social expansion, driving tourism development, and serving as national and regional economic motors. Key findings from the study include:

- Total on-site employment at European airports was around 1.2 million in 2001 creating some 1,000 on-site jobs per million passengers per annum. Once direct, indirect and induced employment is factored in: for every million passengers, each European airport supports around 3,000 jobs nationally of which some 50 per cent are generated in the immediate vicinity of the airport.
- Access to markets and external and international transport links are regarded as "absolutely essential" to enterprises making location decisions. Large airports are seen as fundamental national economic motors, for example the role of Amsterdam Schiphol, London >

Heathrow, Paris CDG, Munich, Helsinki and Vienna.

- Regional airports are equally important to their local and national economies. In addition, in remote regions, airports and air transport fulfil an essential social function, often connecting communities to key services, such as hospitals and further education.
- Restricting airport capacity or pricing-off air travel demand would have severe economic and social consequences. Recent research shows that failure to provide increases in airport capacity could cost between 2.5 per cent and 3 per cent of national or regional GDP respectively.
- For the EU as a whole, tourism accounts for 5 per cent of total employment and GDP – airports and air services are vital in making this possible as evidenced in the Spanish and Greek Islands. The advent of low-cost carrier services is also accelerating the development of tourism in many places. Take, for example, small Spanish airports, such as Girona-Costa Brava and Murcia-San Javier airports, which in 2003 witnessed growth of 160 and 77.6 per cent, respectively.
- The social and economic importance of air transport in Europe will grow with enlargement of the EU.

Looking at some of these key issues in detail, the study highlights the role that airports play as key economic motors – providing ‘accessibility’ across Europe. Indeed, international accessibility is one of the top three factors in company location decisions, and there are clear examples of airports developing as growth poles at a national and regional level, attracting global companies. Air freight is increasingly important for global trade, carrying some 40 per cent (by value) of global merchandise.

Despite the obvious links with air freight, however, the study found that it is often the financial and business services sectors that make the greatest use of air transport and for whom accessibility to air services will have the strongest influence on location decisions. It defines the most ‘air intensive’ sectors of business as insurance, banking and finance, other business services, transport, communication, printing and publishing, other means of transport, extraction, coke, petroleum and nuclear fuel, basic metals, research and development, computer activities and precision and optical instruments.


Although it is difficult to quantify the catalytic impact of airports, ACI EUROPE says there is strong anecdotal evidence to illustrate the importance of airports on economic development in their vicinity and on inward investment

specifically. So important is this issue believed to be that EUROCONTROL has published the results of a new study on *The Economic Catalytic Effects of Air Transport in Europe*.

The study concludes that the catalytic impact of air transport in Europe is substantial and is set to increase over coming years. Across Europe, the overall demand-side economic catalytic impact of air transport in 2003 increased net demand by 0.2 per cent of GDP. By 2025, demand side economic catalytic impact is expected to rise by over 1.3 per cent of GDP.

On the social side, the ACI EUROPE study analysed the social impacts of airports and the effects of restricting capacity or otherwise limiting the growth in demand for air travel.

It found that the social benefits from the accessibility that air transport brings are all too often taken for granted as an integral part of modern life. The availability of leisure opportunities by air can be an important quality of life indicator affecting the ability to retain skilled labour in areas with a good air transport infrastructure. In remote regions, however, air transport provides a more essential social function, often providing the only link to essential services, such as hospitals and further education.

In conclusion, the study warns that restricting the growth of the air transport industry, through capacity restrictions at airports or otherwise, would have damaging implications for the economy of Europe. These implications would go beyond the direct impact on employment and income generated by the industry but would affect wider economic performance. 



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EFFICIENT ATM AND AIRPORT OPERATIONS

Efforts to reduce the problem of en-route delays have succeeded remarkably well. Airports are now unlocking their latent capacity to reduce ground delays. But a future system will need to integrate airports and the en-route environment in a seamless system. **Bernard Fitzsimons** examines the issues

During the 1990s delays resulting from airspace congestion grew to unacceptable levels. Measures to enhance capacity, such as reduced vertical separation minimum (RVSM), helped reverse the trend toward increasing delays: now, even with traffic at record levels, delays are at an all-time low.

Airports, though, find themselves under steadily increasing pressure and threaten to become the main source of delay. The *Challenges to Growth* study published in December 2004 found that even if they use every runway to its maximum capacity, airports will be unable to cope with the demand if traffic continues to increase in line with the higher estimates of future growth.

EUROCONTROL's Airport Operations Unit was formed in 1999 and since then, says Paul Wilson, Head of Airport Throughput Business Division, it has developed an extremely close relationship with air traffic control (ATC), airport operators, the military and the airlines: "We have a really good relationship with the airport community, and we have now integrated them into the network planning system."

The unit's focus in the short- and medium-term is unlocking what the *Challenges to Growth* study found was unused capacity amounting to an average 30 per cent at typical peak hour traffic levels. "New runways are extremely rare because of environmental and political difficulties," Wilson says. "So our short-term job is to help airports unlock this latent capacity, to be able to use their runways to the maximum extent."

“Our short-term job is to help airports unlock latent capacity, to be able to use their runways to the maximum extent”

Reducing congestion will also help environmentally by reducing noise and emissions from aircraft queuing to take-off. Another aspect of the unit's work is helping airports operate more efficiently through techniques such as collaborative decision making (CDM).

Unlocking the latent capacity demands a partnership approach, Wilson says: "No single entity can do it on their own. Any success has to be a joint venture by the airport operator, airlines, ground handlers and ATC."

CDM is one of the main tools to achieve this: "The essence of CDM is to share high-quality, highly accurate information among them all, so the right person gets the right information at the right time. Accurate information improves the quality of decisions incredibly, and it really allows you to use the resources you have to the maximum."

The investment required in CDM is relatively modest – less than €100,000 at smaller airports and around €200,000 at bigger ones. Yet trials at several airports, among them Barcelona, Brussels, London Heathrow and Stockholm Arlanda, have demonstrated a return of 1:60 in the first year and 1:80 in the second and subsequent years.

Implementation at individual airports is only the first step. A new Framework programme currently under development in EUROCONTROL, the dynamic management of European airspace (DMEAN), envisages what will effectively be a network of CDM-enabled airports. "Essentially it's a very flexible use of European airspace," Wilson says. "Re-routing



SMATSA PREPARES FOR THE FUTURE

The Serbia and Montenegro Air Traffic Services Agency (SMATSA) is modernising with the assistance of the European Commission and EUROCONTROL as part of the Community Assistance for Reconstruction, Development and Stabilisation (CARDS) programme.

After having changed its status on 29 December 2003, SMATSA now operates as a limited liability company. It is taking part in the ASATC Phase II programme as the ANS provider of one of the five CARDS participating countries. According to its Director General, Nikola Stankov, this programme has provided numerous benefits to the Agency. The national assessment that EUROCONTROL carried out provided CARDS countries with official documents describing the level of their ATM services. This means that Civil Aviation Authorities (CAAs) and ANSPs in the region have the opportunity to modernise in an efficient and co-ordinated manner focusing on the weaker areas identified by EUROCONTROL. The strengthening of the region's CAAs will result in improved safety regulation and supervision. ANSPs in the area have experienced traffic growth that has been increasing at a rate of 20 per cent per annum for the past two years and now have to prepare in a safe and efficient way for growth, which is expected to exceed current traffic forecasts. SMATSA is already actively participating in several ASATC Working Packages (WPs) covering Safety Regulation and Safety Management Systems, Human Resources Development and Development of Strategic Business Plans. Safety is the imperative in aviation. It has the highest priority over commercial, operational, environmental or social pressures. For that reason safety is the major concern to the aviation community, to governments and to the public. In SMATSA the

systematic approach starts at the very top of the organisation and continues down to every level of the organisational structure. Everyone has been given individual responsibility for his/her own actions. This has enabled the total reorganisation of SMATSA from a vertical to a horizontal structure and the establishment of four new departments: Safety and Security, Quality, Statistical and Analytical and IT. The agency has already applied some of the new procedures, and this programme and these WPs are giving the company the opportunity to reassess its documentation methods enabling a proactive prevention philosophy.

EUROCONTROL and CARDS experts supported the development of the new departments providing tools and guidelines. SMATSA now expects to customise the programme to its own individual requirements as they differ from those of its neighbours. For example, the Human Resources Department needs practical help and training for the selection process of new employees – especially air traffic controllers.

SMATSA has used EUROCONTROL techniques and guidelines to incorporate all of its modernisation plans (MASTER plan, LCIP, financial and investment plans) into a single strategic business plan document which clearly states the company's vision, mission and strategic objectives. SMATSA has started a wide-ranging modernisation project, which along with implementation of new systems and facilities, includes the construction of a new ACC building. The whole project is co-funded by SMATSA, the European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB). Procurement of goods and services will be through international tender to ensure that the best expertise will be represented. ◻



aircraft, operating alternatives, based on the information at airports – what is their capacity at the moment? How many aircraft are going to take off? When will they take off there? It will really allow very efficient use of European airspace as part of the single sky.”

As well as sharing information to enhance the quality of decision making, progressively more advanced levels of CDM should enable air traffic controllers to take the preferences of airlines, airport operators and ground handlers into account when they are planning departure and arrival sequences. They will also cover operations in adverse conditions.

Meanwhile, the Airside Capacity Enhancement (ACE) programme, which involves the application of best practices to runway, taxiway and apron operations, is helping airports unlock their latent capacity. ACE uses tools such as the Commonly Agreed Methodology for Airport Airside Capacity Enhancement (CAMACA) to correlate airport potential in terms of capacity and demand so that planners can detect bottlenecks and safety hazards and identify scenarios to improve the capacity.

Guidelines for measuring and analysing pilot reaction times and runway occupancy help in the assessment of flight crews' ability to optimise the use of runways. And the Performance

Indicators Analysis Tool for Airports (PIATA) enables airport managers to explore alternative scenarios by analysing the impact of specific efficiency indicators.

“Airports are incredibly exciting and the challenge is vast, but we really think we can make a big difference,” Wilson adds. “In the short-term the focus is on latent capacity, efficiency and safety, and we think we can really address those issues. For the long-term there are concepts around which solutions need to be developed: some without doubt will bear fruit, and others will fall by the wayside.”

Looking beyond the current situation and the tools and procedures developed to unlock latent capacity in the short-term, Philippe Joppart, ACI EUROPE Policy Manager points to the strategic research agenda developed by the Advisory Council for Aeronautical Research in Europe (ACARE) as a principal signpost to the future air transport system.

“What we have now is a system based on advanced planning, with a number of discrepancies,” Joppart says. “Flights are planned long in advance, slots are allocated at airports on a six-month basis: those are strategic goals, they are not designed to solve punctuality problems or tactical problems and they barely address operational problems.” Indeed, slots at crowded airports are not so much ➤

operational tools as commercial assets.

Another component of the planning is aircraft flight plans, which are filed but not always adhered to or even flown at all. But they have to be input to the system and consequently add to congestion even if the aircraft never takes off. Another frequent occurrence is that the aircraft which arrives at the destination airport is a different type from that specified in the flight plan: much ground support equipment is type-specific, so the result is further delay.

Those discrepancies can be compounded by the Central Flow Management Unit (CFMU) issuing tactical air traffic flow management (ATFM) slots to regulate traffic because of an en-route problem. "It all piles up and at the end of the day you have a system which is full of discrepancies and inaccuracies," Joppart says.

His alternative vision of European air transport ten years from now is a totally integrated system where planning plays a role but which also permits tactical adjustment: "What we are looking at is a seamless 4D system in which the airport and en-route elements operate under a full collaborative decision making system."

That will put air traffic controllers and operations directors in a position to tactically react to problems. "There will always be problems, but if the information was available and the system could be used to make modifications on the spot – to runway assignments and so on – that would be a quantum leap." His vision is not one of total automation, Joppart stresses, "but a future system should be as smart, as open, as collaborative as possible and as integrated as possible."

One requirement is network-wide capacity planning: "Today you have a Europe-wide capacity planning through EUROCONTROL for en route, but airports aren't included. It's absolutely staggering that in the 21st century you have airports planning for capacity development and those parameters aren't taken into account when en-route capacity is planned."

Joppart does not underestimate the scale of the task. It has taken ten years and a huge effort to get the various participants working together rather than doing their best in isolation, he says, and to meet the challenges posed by future traffic growth another cultural shift will be needed: "The way that air traffic is managed and the way the network is managed in the future will be quite different to what we have


“What we are looking at is a seamless 4D system in which the airport and en-route elements operate under a full collaborative decision making system”

now, but that's what we've got to achieve. Flights have to be managed as processes, with airports totally integrated into the entire air traffic flow management system, and not as single occurrences as they are today."

A lot of research and development will be needed, which means a lot of money. That indicates a role for the European Commission working through the Single European Sky (SES) initiative, for example. Adequate legislation is another requirement. And environmental aspects will have to be addressed.

"There are a number of environmental constraints that won't go away," Joppart concedes, "but there are a number of areas where technology can help, such as accurate routing on take-off or arrival, and accurate taxiing to reduce fuel burn and noise emissions."

One of the concepts on which the ACARE Strategic Research Agenda focuses is a highly time-efficient air transport system. This involves such requirements for airport airside operations as a runway management system able to adjust for weather, with wind shear and wake vortex monitors, and one that is able to adjust and minimise separation distances in line with prevailing conditions.

"We have to look at advanced solutions," Joppart concludes. Some of the visionary ideas thrown up by the ACARE work are unlikely to be realised quickly, he accepts, but in combination they will add up to an ATM network quite different from today's: one with system-wide tactical control, the ability to modify plans in real time, and no discrepancies between flight plan, airport slot and ATFM slot. 



EUROPEAN AIRPORTS: MEETING PASSENGER EXPECTATIONS

Anne Paylor looks at how airports are improving the passenger experience

With the European Union focusing increasing attention on the rights of air travellers and with airports adopting market-oriented business strategies that require a much higher standard of customer service, the passenger is fast becoming the key focus of attention at the airport.

As air travellers become more experienced, sophisticated and demanding, airport quality management systems need to include continuous monitoring of passenger satisfaction levels in order to maintain standards, identify areas for improvement, and benchmark service performance.

Airports Service Quality (ASQ) Programme

To that end, ACI has launched the Airport Service Quality (ASQ) programme, which kicks off from January 2006. Positive feedback from airports that participated in a two-year joint ACI/IATA project to gather data from airline customers has led ACI to build on the process with a new more adaptable system. It aims to enhance customer satisfaction at all participating airports by identifying best practice throughout the industry, allowing airports to benchmark performance against it.

The ASQ programme will be managed by ACI and will guarantee customers of the joint IATA/ACI benchmark a seamless transition into the new initiative. To ensure this, the ASQ programme will provide full continuity with the former programme's questionnaire, methodology, existing survey and reporting deliverables and fieldwork. New features will also be added during 2006 and in order to enhance the value of the programme ACI will establish a high-level Global Airport Strategy Forum to discuss research and implementation strategies. ACI also hopes to optimise ASQ output by customising the reports to any format that meets the airport's needs and airports that require their data quickly will be offered a Hot Alert Service.

Airport Voluntary Commitment to passengers

In 2001, following extensive consultation with consumers, European governments, the European Commission and the air transport industry, Europe's airports developed an Airport Voluntary Commitment on Air Passenger Service which contains commitments to deliver a defined quality of service to air travellers. Although the commitments are not legally

Airport quality management systems need to include continuous monitoring of passenger satisfaction levels

binding, signatories continually strive to achieve the standards of quality set out in the Commitment on a consistent basis.

The Commitment takes into account the fact that when a passenger buys an air ticket their contract is with the airline: no contractual relationship exists between passengers and airports. "However, airport operators recognise that they have a duty of care towards the passengers," ACI EUROPE concedes.

The Commitment also highlights the fact that many 'airport services' are not performed by the airport operator at all and, although airports strive to work closely with all business partners and government agencies, they often have little or no choice over the selection of these suppliers. This can include critical services such as ground handling, which is organised by airlines and encompasses check-in and baggage delivery, as well as security checks, border controls, airport access, etc. ACI EUROPE highlights how its members across 45 European countries cannot be held responsible should these services fall below a desired level. Often poor service standards adversely affect the image of an airport although the operator is not at fault. It is a constant struggle for Europe's airports to address this challenge.

The 11 commitments cover key areas that directly affect the passenger journey: assistance during periods of significant delays or disruption, trolley management, way-finding and information, cleanliness and customer comment/complaint management, airport access and public transport, and provision of infrastructure for check-in, baggage handling, security and border control. ➤

People with Reduced Mobility (PRMs)

A special protocol to meet the needs of People with Reduced Mobility (PRMs) is included with the 11 commitments, which stresses that airports should not pass infrastructure costs for accommodating PRMs directly on to those passengers. Proposals put forward by the European Commission to transfer the responsibility for passenger handling of PRMs from air carriers to airport operators by establishing a centrally administered service, managed by the airport operator, are working their way through the European legislative process.

The proposed legislation will change the current situation whereby airports are required to ensure that infrastructure and facilities are compatible with the needs of PRMs, and air carriers provide whatever special assistance is required as part of their contractual agreement with the air passenger. The change requires airport operators, on behalf of airlines, to ensure that a high-quality assistance service is delivered to all disabled passengers.

Roy Griffins, Director General of ACI EUROPE says: “The goal is to establish a system that guarantees the provision of a seamless service for passengers with special needs, regardless of the airline on which they choose to fly.”

However, he points out that a centralised system would only work effectively if it applied to all airlines across the board and did not allow some carriers to ‘opt out’ unilaterally through self-handling or using a third party ground handling agent. Not only would this risk allowing carriers that are guilty of discriminatory practices to continue them, Griffins warns, but it would also undermine the economies of scale to be gained from a centralised system.

ACI EUROPE insists that airport operators should be able to levy a charge on airlines for the service that the airports will provide to airline passengers and that the charge must cover all the costs of the system (administration, management, supervision, investment in equipment, training of staff, disseminating information). The charge should be independent of the airport charge, reviewed on an annual basis, and allow for a return on investment.



Non-aeronautical revenues

More and more European airports are using their non-aeronautical revenues derived from commercial activities such as retail, restaurants and car parking to assist in the improvements being made to the overall airport infrastructure. Griffins explains: “We must get the airport/retail/suppliers partnership right if we are going to be able to build for the future.” To that end the organisation has launched ARBi, the Airport Retail Benchmarking initiative, which helps airports and concessionaires identify ways of improving performance.

ACI EUROPE has also introduced a range of ‘Best Airport’ awards to recognise airports that achieve the highest standards of excellence and achievement across a whole range of disciplines including retail, security, operations, facilities, community relationships, environmental awareness and customer service. Awards are presented in five categories according to the number of passengers handled. Competition for the 2006 Awards is expected to be fierce, reflecting the additional incentive for excellence that this mark of recognition provides. [O](#)



THE ENVIRONMENT

How can the ATM industry and airports together with their industrial partners contribute to the reduction of airborne and noise pollution with efficient and effective management of airspace and airport operations? **Simon Michell** reports

A recent ACI EUROPE position paper recognises the potential worst case scenario for the industry to go from having a relatively insignificant effect on climate change to becoming one of the worst polluters.

The paper states that aviation's contribution to global warming is currently about 2-3 per cent of global emissions, compared with 25 per cent for energy production. However, the Intergovernmental Panel on Climate Change (IPCC) estimates that aviation's contribution could grow significantly if no action is taken.

Moreover, it is likely that as industries achieve significant cuts in their own greenhouse emissions in line with EU and Member States' objectives, then in the worst case, aviation could become the single biggest contributor to climate change by 2050. Similarly, it is now widely believed that technological improvements in aircraft noise are becoming more difficult to achieve and will no longer off-set the increase in demand for air travel. Thus without a step change in technology, noise impact around many airports could actually grow for the first time in decades. It is a similar



situation with air quality. Because of these trends, airports will find it increasingly difficult to win permission to increase capacity, unless the aviation sector as a whole can convince not only governments but society in general, that its impact on climate change remains affordable.

In the words of the ACI EUROPE Director General, Roy Griffins, “Gone are the days of simplistic ‘predict and provide’ and of government largesse. To get permission to grow, the aviation industry as a whole needs to rise to the environmental challenge. It must pass the green test!” This is set against an efficiency deficit in which the combined worldwide fleet is achieving efficiency gains of 1 per cent per year through the introduction of newer, more efficient aircraft to replace older aircraft being retired from the fleet, but demand for travel is increasing by as much as 4-5 per cent each year.

The Director General of EUROCONTROL, Víctor M. Aguado,

“The aviation industry as a whole needs to rise to the environmental challenge. It must pass the green test!”

said at the Aviation and Environment Summit in Geneva in March 2005, “We are waiting for the next revolution in propulsion systems and new technological breakthroughs – only then will we make a quantum leap ahead. In the meantime we have to adopt a multi-faceted, multi-layered approach.” He also highlighted the fact that a paradigm shift had occurred ➤

There are an increasing number of EUROCONTROL programmes that are taking into account the impact of aviation on the environment

regarding the environment with the entry into force on 16 February 2005 of the Kyoto Protocol, even though civil aviation's effect on the environment has been essentially omitted.

Both EUROCONTROL and ACI EUROPE have their own strong views on how they can each support the best way forward and have already put in place steps to address the challenge. EUROCONTROL members, for example, unanimously approved the Environmental Policy and Strategy in April 2001. This set out the following environmental objectives:

- To permit daily aircraft operations in such a way that all ATM-related environmental impact is minimised
- To be compliant with the appropriate international standards, statutory and regulatory requirements in respect of environmental demands
- To actively support actions, which will contribute to reduce or limit noise and aircraft emissions

There are an increasing number of EUROCONTROL programmes that are taking into account the impact of aviation on the environment. The most prominent of these is the Dynamic Management of European Airspace Management (DMEAN) framework programme which, according to Andrew Watt, EUROCONTROL's Environment Domain Manager, is the first EUROCONTROL programme which has had an environmental case embedded in it from the start. The DMEAN programme aims to allow airspace users access to the most direct routes between departure and arrival as well as achieving the best possible flight profiles. This will result in less fuel being burned which in turn limits the release of aircraft emissions to the atmosphere for a given flight. It is a pan-European effort relying on the involvement of civil and military airspace users, Air Navigation Service Providers (ANSPs), airports

and EUROCONTROL working together to enhance the local and network capacity and flight efficiency through improved planning, demand-capacity balancing, collaborative decision making and information exchange.

EUROCONTROL's Environment Domain as well as its Society, Environment and Economics (SEE) Research Area are jointly involved in ensuring that the DMEAN programme adequately captures any environmental impact that it may have, as well as providing advice to the programme managers on environmental issues. DMEAN follows the successful Reduced Vertical Separation Minima (RVSM) programme, which, although primarily implemented to increase airspace capacity, had a beneficial knock-on effect on the environment by allowing more aircraft to fly at optimum altitudes, letting them burn fuel more efficiently and therefore create fewer harmful greenhouse gases. The next step in creating a more efficient airspace, the Single European Sky initiative, will take this process further.

Additional support comes from the European Union in the form of the Advisory Council for Aeronautics Research in Europe (ACARE), which was created in 2001. Both EUROCONTROL and ACI make significant contributions as members to this organisation, which has identified the environment as one of its major challenges. ACARE has four specific goals for a more environmentally sustainable air transport system. These are:

- To reduce fuel consumption and CO₂ emissions by 50 per cent
- To reduce perceived external noise by 50 per cent
- To reduce NO_x by 80 per cent
- To make substantial progress in reducing the environmental impact of the manufacture, maintenance and disposal of aircraft and related products

More recently, aviation, ATC and condensation trails (contrails) were mentioned in the G8 Gleneagles Plan of Action – Climate Change, Clean Energy and sustainable development communiqué in July 2005. Aviation appears within 'Transforming the way we use energy' section in which aviation is tasked with examining ways to reduce emissions, working with the IPCC to create an updated assessment of the latest evidence on aviation's impact on climate change, supporting research into contrails and cirrus cloud formation and to encourage collaboration between ➤

countries on long-term technology developments for the reduction of emissions.

ACI EUROPE outlined ways to tackle emissions in a position paper published in August 2005. This is examined in more detail in the article on 'Sustainable Development'. ACI EUROPE also convenes an Environmental Strategy Committee managed by Philippe Joppart, which is attended by, among others, EUROCONTROL. Andrew Watt of EUROCONTROL said, "We are delighted to be in this group because it gives us access to airport operators and allows us to undertake joint initiatives such as Collaborative Environmental Management at airports."

EUROCONTROL's airspace, navigation and environmental expertise underpins a series of flight trials at some of ACI

EUROPE's member airports on Continuous Descent Approaches (CDA) techniques, which offer reductions in aircraft noise on approach, generate fuel savings for the airlines, and reduce emissions to the atmosphere. By delaying the point at which descent clearance is given, and by informing pilots of distance to touchdown it is possible to calculate the optimum rate of descent, thus avoiding unnecessary periods of level flight. By keeping aircraft as high as possible for as long as possible the noise impact on the ground is minimised. Other best practice airport noise control techniques are being investigated by EUROCONTROL, including exploiting environmental opportunities from improved aircraft navigation developments. Harmonised pan-European guidance could follow. [O](#)



SUSTAINABLE DEVELOPMENT

Europe's airports have a vital role to play in meeting the environmental challenge if they are to accommodate the doubling of air traffic that is forecast to happen by 2020. **Bernard Fitzsimons** looks at the way forward



Sustainable development is the key to future growth of Europe's air transport infrastructure. Maximising existing capacity will help absorb forecast growth in demand, but new runways and terminals will be needed, too. The permission to build them and the investment to finance them will be forthcoming only if the environmental challenges are addressed and overcome.

There have been significant improvements in aircraft technology and operational efficiency. Emissions, though, have continued to grow as traffic has increased.

"The aviation industry is prepared to stand up and be counted," says ACI EUROPE Director General Roy Griffins. "Our industry colleagues, the airlines and manufacturers, have taken some major steps. They include a multi-pillar approach addressing technological progress, infrastructure improvements and operational measures, as well as economic instruments. Unless we take such concrete measures to tackle climate change, aviation could become the biggest contributor by 2050," Griffins says.

Globally, aviation is currently responsible for around 2-3 per cent of emissions. Without action to reduce them, that proportion is forecast to reach 5-15 per cent, and reductions by other industries could leave it as the biggest single source of greenhouse gases.

Taxation is not a viable solution: aimed simply at reducing demand and pricing people out of air travel, taxes destroy aviation's economic and social benefits – two of the four fundamental elements of sustainable development.

The Association of European Airlines agrees. Its policy on emissions containment points out that various instruments are being used already to mitigate the environmental impact of aviation, including technological development, operational measures to reduce fuel burn and fleet renewal. Therefore

■ Emissions reductions by
■ other industries could
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economic instruments should be only one component of a sound aviation climate change policy.

In July 2005 the European Union published a study by CE Delft, *Giving wings to emissions trading*, which showed how aviation could be brought into the EU emissions trading scheme for carbon dioxide (CO₂). The position taken by Europe's airports is that aviation's real breakthrough on climate change will come when the industry signs up to targeted economic instruments such as emissions trading.

If the radiative effects of oxides of nitrogen (NO_x) and other emissions are to be addressed by aviation, moreover, they should also be addressed by other industrial and transport sectors. In any initiative to tackle climate change there must be equity among transport modes, equity among airlines and equity with other business sectors.

Emissions trading policy

ACI EUROPE has consistently maintained that the best way to deal with aviation's climate change emissions is a long-term global strategy which identifies and phases in the most environmentally effective, economically efficient and politically deliverable measure for each emission. Accordingly, it suggests that the European Commission should establish a road map for long-term global action, along with an action plan setting out the policy milestones for achieving aviation's emissions objectives. ➤





A scheme covering CO₂ only, but with flanking instruments such as flight procedures to counter other emissions, is probably the most appropriate route to follow. It would address the main identified pollutant, could be implemented quickly and would constitute a credible response to aviation's impact on climate change. In line with the conclusions of the CE Delft study, that would leave other pollutants such as NO_x, contrails and cirrus cloud enhancement to be tackled using other, more appropriate local instruments.

The current metric of radiative forcing would not support a solution based on CO₂ plus a multiplier for NO_x, while the alternative – Global Temperature Potential (GTP) – is still under development and in need of further scientific research. A solution based on a single scale for both CO₂ and non-CO₂ pollutants is theoretically feasible, but the necessary scientific development could take up to ten years.

The common classification scheme for aircraft NO_x emissions contained in ECAC Recommendation 27-4 could form the basis for local measures to be applied continent-wide. ACI EUROPE fully supports this scheme, but there is a technological trade-off between NO_x stringency and noise


reduction. So it is therefore vital to ensure that reductions in gaseous pollution are not achieved only at the expense of at-source noise reduction.

Europe's airlines generally agree that aircraft operators should be allocated the emissions permits or quotas, an option that adheres most closely to the principle of 'polluter pays'. They could be allocated either by Member States or by the European Union: ACI EUROPE believes that allocation at EU level would be the better option in view of the international competitive nature of civil aviation and the need to minimise EU-wide market distortions. Allocation by Member States of quotas for fixed sources has already become an issue, and it is important that similar issues be avoided when it comes to air transport.

Allocation could be based on grandfathering, on benchmarking of performance, or on auctioning. The EU Greenhouse Gas Emissions Trading Objective allows EU Member State governments to auction up to 5 per cent of allowances from 2005 and up to 10 per cent from 2008: the rest will be given away free of charge under national allocation plans. It is important that aviation should be treated equitably alongside other sectors within the emissions trading regime.

Allocation by auctioning would not meet that objective, so ACI EUROPE favours a methodology based primarily on grandfathering and/or benchmarking of performance. It is also important that aircraft operators who are already environmentally efficient should not be penalised; they could be allocated early credits in compensation. Nor would new entrants be penalised.

There is no ideal solution. Any option considered should be non-discriminatory and subject to an impact analysis, with the final choice being political. In its first phase, however, ACI EUROPE recommends that only intra-EU flights should be included. Additional bilateral agreements between EU Member States and third countries would then effectively introduce other states into the EU scheme.

The issue of overflights, particularly by third-country aircraft operators, remains unresolved and must be tackled largely through political discussion with individual countries. Nevertheless, to avoid discrimination between EU aircraft operators and those from third countries, all airlines would be included, regardless of their nationality. 



ENVIRONMENTALLY SUSTAINABLE AIRPORT OPERATIONS

There is an immediate threat to the air transport industry's ability to meet demand unless it changes the way it operates. **David Learmount** looks at how this threat is directly linked to environmental concerns and how ATM may help to turn the threat into an opportunity

The level of disquiet among politicians, environmental lobbying groups and ordinary citizens about the effect of aviation on the environment is rapidly growing. It is a fact that commercial air transport's global growth means its contribution to the production of 'greenhouse gases' like carbon dioxide – though still small – is increasing as a proportion of the world emissions total. Noise in the vicinity of airports remains a focus of most of the socio-environmental attention aviation receives, but now an acute awareness of air quality is adding to the local pressure to curb traffic growth. Meanwhile, global warming is forcing the hand of national governments because they have emissions targets to meet. Aviation's emissions were omitted from the Kyoto Protocol. But now, in the European Union, moves are afoot to bring aviation emissions within the existing quotas and within the European Emissions Trading Scheme. This, if it succeeds represents a sea-change in attitudes, the effect of which will be that aviation will be held to account, to a degree not foreseen even three years ago, for its emissions production.

Meanwhile, EUROCONTROL has warned for some time now that the most serious constraint on the capacity of the air traffic management (ATM) system as a whole in a populous continent like Europe is not the skies but airports. This is caused by simple factors like having too few runways at the major hubs, and by a general lack of investment in maximising the efficiency of the total ground infrastructure that supports aircraft movements.

Airport managers would protest that the issue is more complex than that. They are right, but they might not explain the situation as EUROCONTROL's Environmental Sustainability Expert, Alan Melrose, does. He says there is a relentless logic leading to the conclusion that the environment is the key to the future of the entire ATM system – particularly in Europe.

According to Melrose the logic is this: airports are the ATM system's bottleneck; they are a bottleneck because, although airports are the air transport industry's most consistently profitable sector, they are not able to invest as much as required in new runways and better infrastructure; this failure to invest occurs because the local and national planning authorities will not give permission to construct much-needed facilities; or at best require onerous planning processes and conditions. The reason permission is withheld is that the

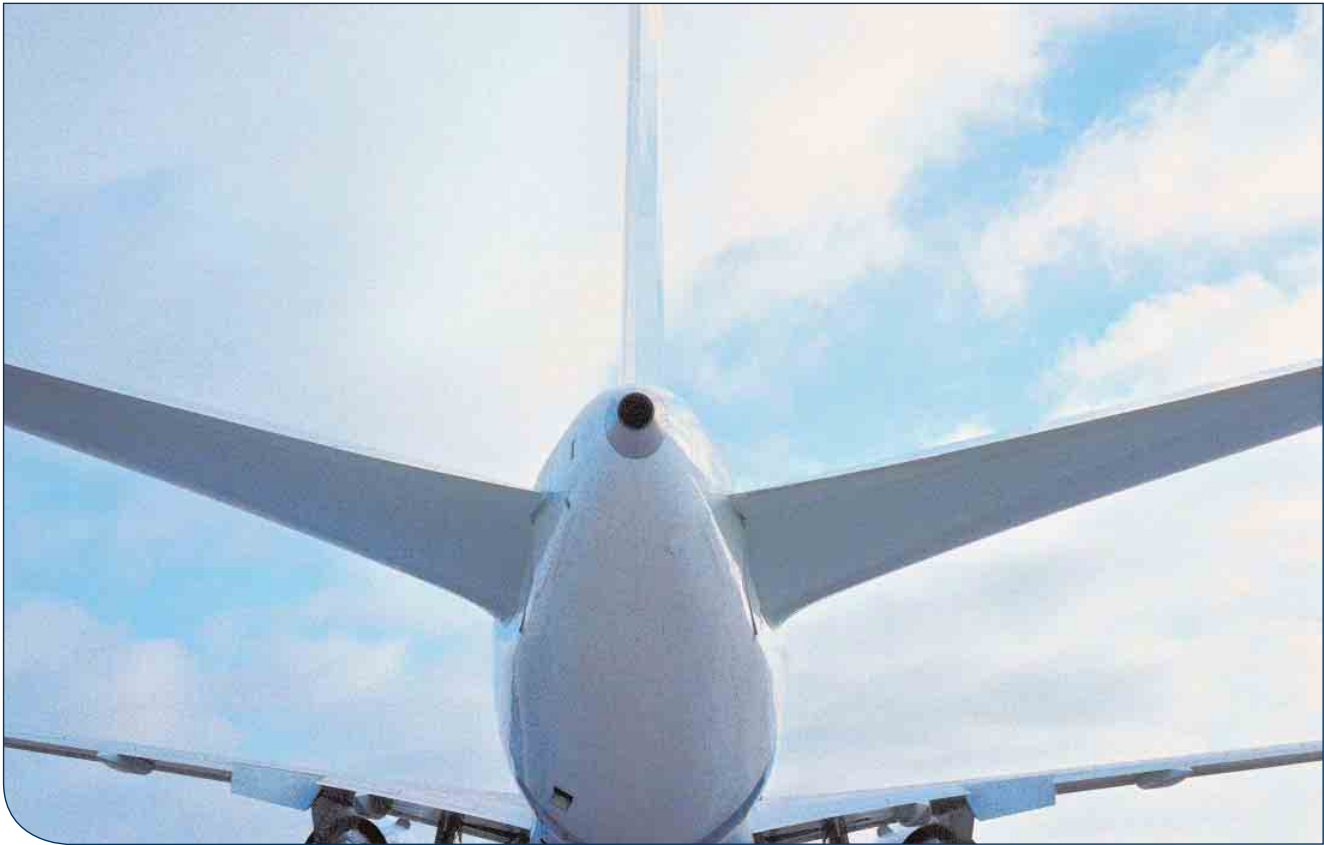
The most serious constraint on the capacity of the ATM system as a whole in a populous continent like Europe is not the skies but airports

authorities fear the environmental effects of traffic growth.

Melrose's conclusion is that unless airport and airline expansion can become more environmentally sustainable, the European ATM system will remain limited by a level of airport capacity because is not permitted to expand effectively.

Sustainable traffic expansion at airports will require co-ordinated effort from all sectors of the industry, and the agency best positioned to lead the strategic campaign in this direction is EUROCONTROL, because it naturally interfaces with all the stakeholders. Its Airport Operations Programme (APR) – the name for a multi-faceted strategy aimed at improving the efficiency of airports so they make the best possible use of existing resources as well as future ones – is well under way. The APR is specifically designed to improve capacity safely, and the central tool for achieving this, explains EUROCONTROL's Airports Chief, Paul Wilson, is known as collaborative decision making (CDM). This system involves tactical information sharing by all the parties to airport operations – the airports themselves, all the service providers, the airlines, and finally air traffic management (ATM) on the surface and in the air. CDM is intended to improve second-by-second information sharing to the point where it begins to perform the function of an organisational nervous system, enabling airports to function organically, making the best use of time, space and resources.

Melrose fully acknowledges that CDM's objective of producing greater efficiency – including less fuel usage and noise per movement on the ground – has a desirable side-effect on sustainability. But it does not go far enough in environmental terms, he points out. Under the general ➤



heading of a programme dubbed Environmentally Sustainable Airport Operations (ESAO), Melrose is masterminding a EUROCONTROL tactical action system, which also depends on collaborative action from all industry sectors. Called Collaborative Environmental Management (CEM), Melrose describes it simply as “planning what you are going to do and then prove that you are doing it”. At the centre of CEM is – or soon will be – a guidance resource for all the players to help them construct their own sustainable operations plan that will dovetail into the whole ESAO system. EUROCONTROL is well aware, says Melrose, that individual situations for airports and operators are all different because the local political priorities vary so widely, influenced by a multitude of considerations – of which just one example would be the location of the airport relative to the urban area it serves. The ‘delivery system’ for the guidance resource will be a website called SOPHOS.

The essential characteristic of SOPHOS is that it recognises the need of the air transport industry to work together if any aircraft related mitigation improvement is to be successful. It emphasises the need to be realistic and not, Melrose insists, “to raise local people’s hopes beyond what the system can deliver.” But if, for example, the local lobby clamours for a change in arrival and departure patterns, or for the use of specific runways to reduce the number of people within the noise footprint, SOPHOS would identify

any need to make sure they are aware that this may add to the amount of fuel burned, increasing emissions and degrading local air quality. This is the reason why SOPHOS is being drawn up; to work as a tool with which local best practice can be worked out for the first time located in a central pan-stakeholder and pan-European resource.

This work is in its early stages as yet, but moving fast. Sponsored by several EUROCONTROL divisions, active trials of environmentally friendly operational procedures like continuous descent approaches (CDA) are in progress at Manchester airport, Stockholm Arlanda airport and Bucharest Henri Coanda airport. Melrose emphasises, however, that almost every programme in which EUROCONTROL is now involved can affect or be affected by environmental issues, because although the emissions issue – like the noise problem – is at its most sensitive near airports, global warming emissions do not stop when aircraft are above, say, 8,000ft. For that reason, Melrose explains, his working relationships within EUROCONTROL have become “more horizontal” – it is necessary for all ATM sectors to include sustainability in their efficiency improvement plans. Fortunately, the two objectives are usually, if not always, compatible. He goes on, “historically, really significant environmental improvements have already been achieved by EUROCONTROL efficiency enhancement activities but these were never specifically recognised at the time.” 



MAINTAINING THE SAFETY OF EUROPE'S ATM SYSTEM

With the Strategic Safety Action Plan (SSAP) due for completion in January 2006, **Julian Moxon** examines how it will impact on aviation safety and reviews the SSAP Implementation Master Plan (IMP)

A call for action

The need to maintain adequate safety levels in European skies has always been of paramount importance and is a principal element of EUROCONTROL's role. The runway collision at Milan Linate airport in 2001 and the mid-air collision over Überlingen, Germany, the year after therefore came as tragic reminders that the constant effort to improve the safety of European skies needed to be strengthened.

Following the accidents, EUROCONTROL quickly took action to establish the High Level European Action Group for ATM Safety (AGAS), which was charged with developing proposals for improvements in the European ATM safety and regulatory system.

After an extremely thorough assessment of every aspect of the European ATM network, AGAS pinpointed several weaknesses, which were identified within eight 'high priority action areas'. These became part of a new Strategic Safety Action Plan (SSAP), which was approved by the EUROCONTROL Provisional Council in April 2003 and enshrined in a SSAP Implementation Master Plan (IMP), which was formally launched in February 2004.

The eight areas are:

1. Safety-related human resources in ATM
2. Incident Reporting and Data Sharing
3. Airborne Collision Avoidance Systems
4. Ground-based Safety Nets
5. Runways and Runway Safety
6. Enforcement of EUROCONTROL Safety Regulatory Requirements (ESARRs)
7. Awareness of Safety Matters
8. Safety and Human Factors Research and Development.

Early action was taken on all areas, except ground-based safety nets, Awareness of Safety Matters and Safety and Human Factors Research and Development, in advance of the formal launch of the programme. Work has been proceeding at an intense level during the last two years to meet the 31 January 2006 deadline for implementation. However, EUROCONTROL has faced a major challenge, achieving more progress in some areas than in others. The implementation of Airborne Collision Avoidance Systems (ACAS), for example, is 92 per cent complete. For Incident Reporting and Data Sharing, however, Member States' ATM Regulators have so far achieved only 43 per cent of its ten requirements, while just 18 per cent of national air navigation service providers (ANSPs) have met their targets.

Establishing a safety culture

The wide disparity between the two areas reflects the relatively straightforward process of meeting the ACAS targets against the difficulty of establishing a safety culture within Member States that encourages the early reporting of safety-related incidents. Very few States, for example, have developed strategies for removing legal blocks to establishing a free reporting 'Just Culture', while there are also concerns that open reporting of incidents may lead to unfavourable comparisons with other States.

The route taken by EUROCONTROL SSAP managers has been to encourage States to set up 'focal points' for safety data collection, and the majority have already done so. A voluntary safety data policy has also been agreed with national ANSPs and, in an innovative move, a magazine called *Hindsight* has been issued to controllers to disseminate lessons learned. In another initiative, which reflects concerns about level busting (aircraft temporarily exceeding their allocated flight levels), EUROCONTROL has issued a 'level bust action plan and toolkit', to help controllers.

The SSAP Implementation Master Plan (IMP) is the central plank in the ambitious effort to enhance the safety of the European ATM system and it embraces elements of both the European Air Traffic Management Programme and the EUROCONTROL Safety Regulation Commission's Work Programme. As work proceeded, however, it became clear that a small percentage of the actions contained in the IMP could not be completed by the 31 January deadline. A follow-up safety programme has therefore been agreed that will continue the work and include elements of the Linate and Überlingen accident investigation reports, as well as new items identified by stakeholders.

Monitoring progress

The key to ensuring that the SSAP objectives are met is to monitor the progress made by individual Member States – a task which SSAP Programme Manager, Tony Licu, describes as "an essential component of any programme that aims to reach agreed targets within a given timescale". Monitoring not only allows a review of progress on SSAP targets, but ensures that States, ANSPs and EUROCONTROL co-ordinate their activities and have a common understanding of the status of implementation.

To do this, EUROCONTROL has established a comprehensive ➤



mechanism for monitoring and tracking the progress made by States on implementing the eight high-priority action areas and associated critical milestones. This makes use of the existing European Convergence and Implementation Plan (ECIP) process, which describes the actions States have agreed should be carried out in order to improve Air Traffic Management (ATM) services. Each State monitors the implementation of ECIP objectives using Local Convergence and Implementation Plans (LCIPs), which are medium-term national plans for achieving the ECIP objectives.

In June, the SSAP Group issued its first report on SSAP implementation, focusing on progress made up to March 2005. The report builds on the findings of an independent study commissioned by EUROCONTROL in 2002, which looked at the overall status of ATM safety in European Civil Aviation Conference (ECAC) States. The study revealed that the level of maturity of ATM systems was uneven across the 41 ECAC States, and that “leadership and commitment was lacking” in some of them.

The level of maturity
of ATM systems was
uneven across the
41 ECAC States

Independent study

This led to another independent study, this time commissioned for the SSAP Programme, which used the earlier report as its benchmark. Based on self-assessment, this found that ATM safety maturity has increased from around 55 per cent to 62 per cent according to the ANSPs contacted, and from 53 per cent to 62 per cent from the national Regulators’ point of view.

The report found, for example, that since 2002 most ANSPs had moved forwards significantly on developing safety management organisations that were compliant with ESARRs (EUROCONTROL Safety Regulatory Requirements). However, it also found that many were inhibited by the practical difficulties of creating workable reporting systems to monitor safety performance, developing safety organisations and carrying out internal safety assessments on the effects of any organisational or infrastructure changes.

The picture for regulators was more mixed. On one hand they are positive about the improvements made by their ANSPs, while on the other many are frustrated at the slowness of their governments to introduce the legal requirements necessary to facilitate further progress. Regulators also complain that they do not have sufficient staff to carry out the ATM regulation and supervisory roles properly. According to EUROCONTROL’s SSAP Group, this reflects the fact that there is often a lack of priority for aviation amongst lawmakers, coupled with inadequate financial rewards to attract the kind of talent needed to carry out ATM regulatory work. ➤



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States that report the least progress are facing the highest increase of traffic

Another important factor behind the slow introduction of new legislation is the apparent confusion over where the aviation legislative environment is heading. The European Commission, for example, has issued its Single European Sky directives, while the European Aviation Safety Agency (EASA), still in its formative stage, is looking to take on an international rulemaking role, which will supersede existing national regulations.

This, says the SSAP group, is leading many to adopt a ‘wait and see’ approach while questions about differences between ESARRs and European Commission legislation are resolved. The recent SSAP report indicates that there are also worries about the future role of EUROCONTROL. It says: “Some States fear that the technical capability of the Commission (or indeed EASA) with regard to ATM is inadequate to establish appropriate regulation and to deliver sufficient support for implementing the technical harmonisation and improvement programmes now being implemented by EUROCONTROL.”

Significant improvements

Notwithstanding these issues, the 2004 SSAP report found that there have been “significant improvements throughout the ECAC area” and that the SSAP has helped raise the overall level of awareness of ATM safety matters. It adds: “Both ANSPs and State ATM regulators that were showing significant deficiencies in their ATM safety systems now have a much better understanding of what is required and are making good progress in putting the required safety structure in place.”

There is still a long way to go, however. Perhaps not surprisingly, the 2004 study reveals, for example, that it is those States with the most advanced safety maturity levels that are making the most progress, while in those with lower maturity levels, “where progress has stalled, several have reported zero or negative progress”.

In general it is the least developed States that report the least progress in moving forward with ATM safety. There is therefore significant concern, as it is some of these very States which are experiencing the highest traffic growth, and it is these States that are being offered support by EUROCONTROL. The SSAP report therefore agrees with the conclusions of the 2002 study that “if there is a correlation between traffic volume and safety, the risk will increase in less developed States, and since they already lag in implementing formal safety mechanisms, they will require ➤

more and special attention in order to catch up”.

ATM regulators often struggle with a lack of sufficient resources for the rulemaking and oversight functions, while the ANSPs are managing to find the right staff for key safety roles. The SSAP report says: “Pay systems are still such that it is difficult to get air traffic controllers to leave the control room for a job in safety”.

Runway safety

Another area of major interest to the SSAP effort, which was highlighted tragically in the Milan Linate accident, is in runway safety, dealt with in more detail in Mark Pilling’s article on ‘Airport safety’. According to the SSAP report: “The predicted growth in air traffic implies that the actual number of incidents may rise, unless held in check by preventative actions such as those recommended in the European Action Plan for the Prevention of Runway Incursions (EAPPRI).”

ACI EUROPE has already been working on the issue of runway incursions for at least six years, following initial contacts with the Federal Aviation Authority (FAA) in the late 1990s. Steering level input was provided by Philippe Joppart, ACI EUROPE Policy Manager. Following the Linate incident and the development of the SSAP plan, this work was continued as part of the EAPPRI effort. Joppart explains: “I would not go as far as to say that the EAPPRI plan could not have gone ahead without us, but we were instrumental in its development.”

Joppart continues, “Credit should be given to the ACI EUROPE Technical and Operational Safety Committee (TOSC) who were instrumental – within the airport community – in generating the initial interest in runway safety aspects, and then in assisting me with the work ACI EUROPE carried out to develop the EAPPRI plan.”

A detailed survey of more than 120 airports from all ECAC States provided the first ever estimates of the number of runway incursions within the ECAC area and found that “there are clear indications that progress is being made and the recommendations in the Action Plan are being implemented”. Local runway safety teams have been established at more than 90 per cent of the airports designated for EAPPRI implementation and the majority of these have carried out local runway safety awareness campaigns.


Overall, the SSAP report finds that “satisfactory progress is being made with implementing EAPPRI, but there is a need for continued pressure on stakeholders to ensure that implementation of all EAPPRI recommendations is achieved where appropriate”. The EUROCONTROL Joint Steering Committee and Working Group for Runway Safety has undertaken an extensive European awareness campaign to help airports reach the EAPPRI targets, which is expected to contribute to the continuing progress in improving the safe operation of runways and the adjacent taxiing and manoeuvring areas.

The future

As the SSAP implementation programme nears its completion date at the end of January 2006, thoughts have turned to what should follow.

Because of resource and other limitations, a small number of the SSAP tasks will not be fulfilled by the original deadline. Added to which, at the time the SSAP was being developed, the accident investigation reports into the accidents at Linate and Überlingen were not completed. While most of the actions recommended by the accident investigators were covered in the SSAP, a small number remain to be addressed. Additionally, the expected increases in traffic, the growing complexity of the ATM system and implementation of the Single European Sky mean that ever higher safety standards, coupled with further regulatory requirements mean further action will be needed.

A draft new safety plan has therefore been developed that aims to be proactive in anticipating emerging safety requirements, rather than being reactive like the SSAP. It focuses on five main fields of activity: implementation and support of European safety legislation / regulation, incident reporting and data sharing, operational safety culture and risk assessment, system safety defences and safety management enhancement. The aim is for this new European ATM Safety Plan to be a seamless continuation of the SSAP. This will ensure that it builds on the extensive work that has been carried out to improve European ATM safety over the last two years through the success of the initial SSAP effort.

The new European Safety Programme (ESP) for ATM has been fully consulted and reviewed with all stakeholders and has just recently been endorsed by the Provisional Council at its November 2005 session. 



AIRPORT SAFETY

Safety at airports during the take-off and landing phases of a flight is critical. **Mark Pilling** looks at the steps being taken to improve safety as aircraft approach or leave the runway

It is regrettable, but often the case, that in the world of airport and air traffic management it sometimes takes a tragic accident to initiate industry-wide action. That is not to say the aviation industry has been inactive in any way. Europe's record on safety is second to none, but incidents both major and minor are used as stimulants to introduce new working practices, prompt a fresh look at procedures and focus attention even harder on safety critical areas.

In the field of airport safety, high profile accidents have provided this stimulus.

As a direct result of a number of tragic accidents, EUROCONTROL was prompted to establish a group to examine existing procedures and standards. The objective was to propose enhancements in ATM safety within the 41 States of the European Civil Aviation Conference (ECAC). The Group, which is known as the High-Level European Action Group for ATM Safety (AGAS), is dealt with in detail in the article on the Strategic Safety Action Plan. The picture that emerged from their findings showed a significant variation in actions between States when it came to actually putting safety measures in place and that a number of safety-related enhancements have not been implemented in some States.

This was not necessarily a new conclusion for some. Experts from around the industry had already recognised that greater effort was needed in airport safety. In mid-2001 a joint industry initiative was undertaken by EUROCONTROL, ACI, JAA, ICAO, the Group of Aerodrome Safety Regulators (GASR), IATA, IFATCA, IFALPA, IAOPA, ECA, and ERA to investigate specific runway safety issues and to identify preventative actions. Its first requirement was to gain a better understanding of how many incidents were occurring and why. This led to a survey of pilots and air traffic controllers to determine the factors that led to potential or actual incursions. The data collected led the initiative partners to believe that there was at least one runway incursion every day within the region.

In September 2002 EUROCONTROL hosted the Runway Safety Workshop to take a comprehensive examination of the work done to date. Even more importantly its mandate was to come up with an action plan complete with recommendations to improve the situation, recognising that runway safety is a vital component of aviation safety as a whole. The European Action Plan for the Prevention of Runway Incursions (EAPPRI) was the outcome.➤



Experts from around the industry had already recognised that greater effort was needed in airport safety

Prior to the creation of EAPPRI, Europe alone had 14 different definitions for incursions

This action plan, which was approved by EUROCONTROL's Provisional Council in April 2003, and distributed as part of the Strategic Safety Action Plan (SSAP) in April 2004, offered a series of recommendations, some general and some aimed directly at specific industry stakeholders. The recommendations were divided into eight sections:

- General principles
- Aerodrome operator issues
- Communications (language, radiotelephony, phraseologies and procedures)
- Airline operator issues
- Air Navigation Service Providers (ANSPs)
- Data collection and lesson sharing
- Regulatory issues
- Aeronautical Information Management

Once implemented, the recommendations would enhance runway safety by the consistent and harmonised application of existing ICAO provisions, improved pilot-controller-vehicle driver communications and working procedures at the aerodrome, and by the subsequent increase in situational awareness. Application of these recommendations will also contribute towards Member States' preparation for the ICAO Safety Oversight Audit Program.

The plan was careful to point out that the recommendations were just that, and it would be up to national aviation authorities to assess and then decide which strategy they should adopt taking into account their own specific local conditions. For example, at airfields where joint civil and military operations take place.

Each recommendation was followed by a list that showed

which stakeholder needed to take action and by when; appropriate guidance material was also provided. One of the first recommendations was that each national authority should establish a Runway Safety Team at each individual airport to lead action on local runway safety issues. These were to be created as soon as possible, with airport operators, airlines and ANSPs all involved.

A recent survey of 120 ECAC airports found that 91 per cent have now established such teams, that progress is being made and that the recommendations in the action plan are being implemented. One of the first recommended tasks for these teams is to undertake a local runway safety awareness campaign for air traffic controllers, pilots and drivers and other staff working on or near the runway. Where they have been established, most, said EUROCONTROL, have conducted these campaigns.

By June 2006, the runway safety teams should also have conducted joint training in the prevention of runway incursions with the same groups of staff, the aim being to make each familiar with the roles and responsibilities of the other. This may include visits to the manoeuvring areas to increase awareness of signage and layout where necessary. EUROCONTROL itself has produced a number of posters with headlines like "Be careful out there" and "Runway safety is no accident" to highlight the issue.

The issue of communication has been critical to getting a grip on the scale of the runway incursion problem. Prior to the creation of the European Action Plan for the Prevention of Runway Incursions (EAPPRI), Europe alone had 14 different definitions for incursions. With such a diversity of reporting ➤

The Action Plan is clear on the need for effective data collection and lesson sharing

systems it was almost impossible to determine any trends in this area. ICAO has since moved to produce a global definition: “Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft.”

Coupled with this new definition, the Action Plan is clear on the need for effective data collection and lesson sharing: “The need to share safety related information and introduce a consistent and harmonised approach to the collection and analysis of data is key to reducing the risk of runway incursions.” This has been enhanced, as some States have moved to a ‘No blame’ or ‘Just Culture’ in safety management together with an open reporting system, which has seen the number of incursion reports dramatically increase. In 1999 just 55 reports on risk-bearing runway incursions were received, compared to 543 by 2004. And while incursion reports have risen steeply due to increased awareness, EUROCONTROL notes that in countries that have mature reporting systems there is a sharp reduction in the number of high-risk incidents.

Efforts to keep incursions to a minimum must be part of an on-going process that never ceases. Further areas of



research have been identified, such as a programme to better understand the human factor’s contribution to runway incursions.

In addition, the plan recommended looking at the ‘heads up, heads down’ time requirement needed by pilots, drivers or controllers during their working methods and procedures to assess their impact on runway safety, and to suggest improvement where necessary. EUROCONTROL’s Human Factors Unit in co-operation with the Joint Aviation Authorities has developed an Aerodrome Resource Management course that is intended to enhance teamwork between pilots, controllers, aerodrome operators and vehicle drivers. This is needed because a common causal factor in actual runway incursions is a breakdown in teamwork.

New technology is also likely to have a role to play. For example, the Advanced Surface Movement Guidance and Control System (A-SMGCS) provides a display to controllers that identifies all aircraft and vehicles equipped with a transponder in the manoeuvring area, which is particularly useful in conditions of restricted or reduced visibility. This system will not only enhance safety but also release latent capacity in airports particularly those that are badly affected by adverse weather conditions. [O](#)



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INTRODUCTION TO ATM SAFETY

Ensuring that their Air Traffic Management (ATM) system is safe has traditionally been the responsibility of the Air Navigation Service Providers (ANSPs) within every EUROCONTROL Member State. **Julian Moxon** reviews the process

Tasks carried out by the ANSPs and by safety oversight and regulation bodies were often contained within a single national civil aviation authority. However, this is now regarded as unsatisfactory. In many cases, the ANSP was self-regulating and some still oversee ATM safety in this way. But today, under the stimulus of EUROCONTROL safety regulation harmonisation and more recently of the Single European Sky (SES) initiative, the majority of EUROCONTROL States have achieved at least some functional separation between the service provision and regulatory roles.

EUROCONTROL strongly supports this separation. “Every State should have an independent body for safety oversight which is totally removed from commercial pressures,” says Erik Merckx, the Head of EUROCONTROL’s Safety Enhancement Business Division. Within the SES approach, regulation and oversight are provided by independent national regulators termed National Supervisory Authorities (NSAs).

Regulatory approach

In the safety field, EUROCONTROL’s approach to ATM regulation is based on its Safety Regulatory Requirements (ESARRs), the most recent being ESARR 1, which provides a set of safety regulatory requirements “for the implementation of an effective ATM safety oversight function”. Introduced in November 2004, ESARR 1 is the first ESARR to be fully co-ordinated with European Union legislation for the Single European Sky (SES) and it provides the means to ensure the NSAs implement safety oversight as part of their overall ATM supervision role.

The European Commission (EC) has already mandated that Member States appoint NSAs and establish a system under which the service provider complies with the SES regulations. Once achieved, the NSA issues certification to the ANSP – the first time in aviation history that service providers have had to be certified within an international regulatory system, says Merckx. Some NSAs are already harmonising their approach to ANSP certification – Belgium, the Netherlands, Luxembourg, Denmark and Germany have already done so, and included in this is the Maastricht Upper Area Control Centre.

ESARR 1 also provides the means to ensure that the ten EUROCONTROL Member States that are not members of the European Union (EU) implement an appropriate ATM safety oversight function in view of potential future EU membership

“The main problem is a serious lack of resources to monitor and put safety systems in place”

of these States; however, the European Commission is planning bilateral agreements with them.

To help establish the status of Member States’ implementation of ESARRs, the EUROCONTROL Safety Regulation Commission (SRC) has been conducting visits under its ESARR Implementation Monitoring and Support (ESIMS) programme. The success of the ESIMS approach has led to close co-ordination and joint activities with the International Civil Aviation Organisation’s (ICAO) approach to auditing Member States for their compliance with ICAO requirements under its Universal Safety Oversight Audit Programme (USOAP).

ESIMS oversight is conducted in two phases, the first being a review of compliance with the relevant ESARR documents, which are then kept up to date as an ongoing status record. In the second phase, a series of visits is carried out by a EUROCONTROL audit team to perform an on-site audit of the State’s safety oversight capability.

The first round of ESIMS visits to EUROCONTROL Member States was completed between 2002 and the end of 2003, the experience gained being used to strengthen the programme for the second round, which began in June. This revealed that there remained several outstanding regulatory issues, says Peter Stastny, Head of the Safety Regulation Unit. “The main problem is a serious lack of resources to monitor and put safety systems in place. To be properly implemented, ESARR 1 needs commitment and resources in a new area of activity for national administrations, so progress is slow and difficult in some cases”.

Getting the required ATM expertise within the NSA often requires recruitment of staff from ANSPs. “This proves to be very difficult in practice,” says Stastny. He points out that salary levels for regulators in civil administration are up to 30 per cent lower than for similar levels in ANSPs. “So there is very little financial incentive to move to regulation.” ➤



“If we want to learn from mistakes and how to avoid them in the future, we first have to know what they were”

Safety Management function

Managing the safety function is another important component of the overall task of ensuring ATM safety, and the need for good safety management is recognised in ESARR 3, which says: “The prime responsibility for the safety of an ATM system rests with the service provider.”

A key element of this ESARR is that it requires ATM service providers to establish complete Safety Management Systems (SMS) to ensure a “formalised, explicit and pro-active approach to systematic safety management”. The SMS should operate throughout the ATM system and supporting services and should include a statement of safety policy that defines the approach a State takes to managing safety.

A functional SMS also calls for the service provider to carry out regular safety surveys, monitor safety standards and maintain comprehensive records of actions taken. An additional SMS task is risk assessment, to ensure that any significant change to a system is documented.

Under the EUROCONTROL Strategic Safety Action Plan (SSAP) implementation programme, Member States were assessed in 2002 as to how far they had progressed in establishing an SMS. “We found that some were doing very well, but that others still had a long way to go,” says Merckx. Two years later, things had “improved significantly”, he says. “At the end of 2004 we found that almost 50 per cent of the ANSPs in the ECAC States had a mature SMS in place.”

He points out, however, that from the passenger’s point of view, the fact that SMS application is still not comprehensively implemented is unsatisfactory. “SMS has to be working well over all of the European airspace. Passengers can only feel really safe if all of the countries are up to same standard.”

Another important element to safety management is the ongoing issue of reporting operational problems that occur. ESARR 2 requires that States set up an “occurrence reporting and assessment scheme for ATM Safety” and that they establish a formal reporting system. Many States are experiencing problems doing so, however, despite the existence of international aviation law that uses the idea of ‘Just Culture’ to protect controllers from prosecution if they admit to mistakes while performing their tasks.

The EUROCONTROL Provisional Council therefore recommended that the Agency sets up a task force, under Director General Víctor M. Aguado, to look into why these States have difficulty reporting problems. The task force reported in November and its recommendations will be implemented in a new safety programme. “We need a much higher emphasis on the benefits of safety reporting,” says Merckx. “If we want to learn from mistakes and how to avoid them in the future, we first have to know what they were, not to point the finger at anybody, but look at what caused them in a scientific way.”

RECENT IMPROVEMENTS IN ATM SAFETY

EUROCONTROL's Strategic Safety Action Plan (SSAP) results are being delivered by a host of smaller, highly specific – even localised – action plans, each with researchers, leaders and front-line practitioners. **David Learmount** looks at progress so far



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These specialist Air Traffic Management (ATM) improvement projects have names like the Level Bust Initiative, Runway Safety Initiative, and the Air-Ground Communications Initiative. Not all the programmes are at the same stage in their development or implementation, but they are all advancing. SSAP Programme Manager Tony Licu, who has to keep tabs on progress, explains: “At the end of 2005 we will be approaching the signing off of SSAP implementation, and the programme is seeking an in-depth scrutiny of what went well and what we can improve. At the final signing off in 2006 we ought to be able to fully

demonstrate how we solved the identified safety issues.” In February 2004 a SSAP compliance group was put in place, its job defined as being to ensure that “SSAP implementation is tracked and monitored to ensure that all stakeholders have a common understanding and that areas of slippage are identified.”

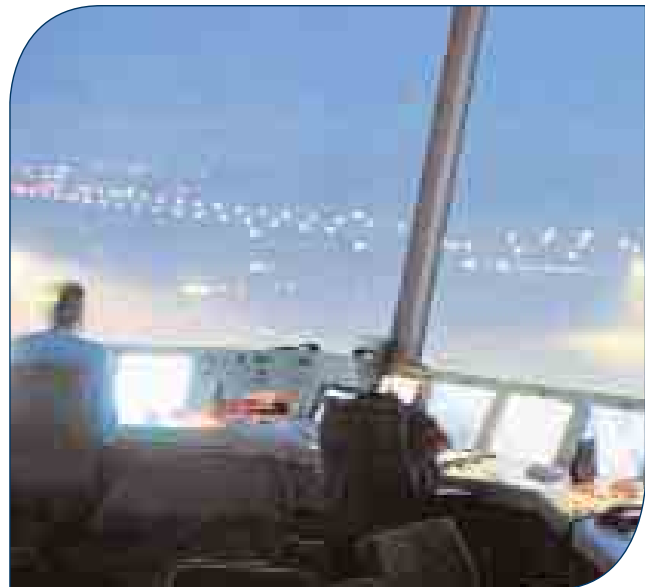
Underpinning all the initiatives is the process of gathering the data that enables SSAP participant groups to identify a problem, understand and quantify it, develop strategies to overcome it, implement the strategy and then monitor the effectiveness of the countermeasures. This system – Europe- ➤

With EUROCONTROL's encouragement and co-ordination, reporting and data sharing has become gradually more effective

wide ATM Incident Reporting and Data Sharing – is vital to the SSAP programme as a whole and to every component task force within it as well as for any future safety initiative. With EUROCONTROL's encouragement and co-ordination, reporting and data sharing has become gradually more effective, but it is still, according to Licu, “an area of concern”, with some states performing well, others lagging.

The Runway Safety and Level Bust initiatives are in their implementation and monitoring phase, whilst the current Air-Ground Communications (AGC) Safety Initiative task force has gathered the basic data it needs on communications breakdowns and has been studying the causal factors analysis so it can develop and validate recommendations.

It is not surprising that the Runway Safety and Level Bust initiatives were taken up among the early issues for specialist task force study and action. They are obvious, direct causes of potential collision. However AGC safety, seen as an important but more general issue, is lagging a little behind these more visible programmes. Yet voice communication remains – above all others – the fundamental ATM tool, and it is a fact that misunderstanding or communications breakdown is frequently the triggering cause of runway incursions or level busts leading to actual or near-collisions. There are frequent occurrences of call-sign confusion, undetected simultaneous transmissions, radio interference, equipment malfunction, frequency-change error, and the use of phraseology other than the International Civil Aviation Organisation (ICAO) standard. Despite all this, the use of voice communications is



so much taken for granted that the industry has not given its weaknesses the attention they deserved, until now.


On 30 September 2005, an AGC Safety Workshop was held at EUROCONTROL's headquarters, with IATA, the Flight Safety Foundation (FSF), the European Cockpit Association (ECA) and the European Regions Airline Association (ERA). The idea was to bring – especially – pilot and controller expertise together to validate proposals for solving AGC problems. Safety Improvement Initiatives Coordinator Tzvetomir Blajev reveals that in a survey of 535 AGC problems, loss of communication was found to be the most common reported cause – it occurred in 26 per cent of the incidents. Readback or hearback problems accounted for 10 per cent of the events, and communications equipment problems caused 8 per cent. Analysis suggested that call-sign similarity caused 33 per cent of the identified incidents, incorrect frequency change 12 per cent, and so on. The incidents were analysed in detail, and so were their consequences. In 36 per cent of the cases there were no adverse consequences, but in 23 per cent the nightmare of all controllers occurred: Prolonged Loss Of Communications (PLOC). If a controller has delivered a new clearance and does not get an acknowledgement before losing communication with the cleared aircraft, the stress among all parties to the situation is high while the controller battles to keep other aircraft clear as he/she watches to see whether the clearance instruction is carried out or not.

One part of the solution that EUROCONTROL is pushing is the replacement of voice communication with VHF datalink

(VDL). The use of controller/pilot datalink communication (CPDLC) for routine clearances, as set out in EUROCONTROL's CASCADE (Co-operative ATS through Surveillance and Communication Applications Deployed in ECAC)/Link 2000+ programme, replaces voice on busy airwaves. It also reduces the chance of the wrong aircraft picking up a clearance intended for another; it sidesteps the problems associated with stuck transmitter switches or simultaneous transmissions, and is an alternative means of contact in the event of the loss of voice communications.

However VHF datalink communication is only one part of the strategy being pursued by Blajev's team. Most of the outcome of his analysis looks as if it will concentrate on promoting awareness of the need for communications discipline: that is to say, the use of ICAO standard phraseology, standard operating procedures, and care in the operation of communications equipment.

Reducing AGC problems will reduce the risk of inadvertent runway incursion and of level bust by misunderstanding. But it will not eliminate them. Some incursions or level busts are the results of other forms of Human Factors (HF) problems, or they may be the results of airports with poor signage or lighting, or of standard arrival and departure procedures that are poorly designed and thus overly demanding. The HF influence in all the problems identified within the SSAP are a major EUROCONTROL concern, and the means of tackling the problem is a combination of providing information designed to generate awareness of the specific problems, backed up by education and training courses.

So the information is being gathered, the lessons are being learned, the messages are being delivered, and delivery of results is being measured. There is still a lot of work to be done to improve ATM safety, but all the participants are now united in working toward the same objectives. 



SYSTEMATIC SAFETY ASSESSMENT FOR EUROPEAN ATM

The introduction of the Safety Assessment Methodology (SAM) is giving Europe's air navigation service providers a set of qualitative and quantitative tools with which to ensure that new systems or changes to existing systems are safe when they enter service and stay that way throughout their operational lifetimes. **Brendan Gallagher** looks at the methodology and how it is being used

The Safety Assessment Methodology (SAM) is a tool that is now being implemented in part by a number of Air Navigation Service Providers (ANSPs) within ECAC States. It allows for a systematic approach to assessing the safety implications of changes to existing systems and procedures and the introduction of new ones.

SAM is being developed and disseminated to national service providers by the Safety Assessment Methodology Task Force (SAMTF), created by EUROCONTROL and more than 20 of Europe's ANSPs. The methodology is based on a rigorous sequence of hazard identification, definition of safety and objectives and requirements and implementation of measures to bring risk within defined and acceptable limits. It is intended to come into play every time a change within the European ATM system is proposed – whether by adding a new function or enhancing an existing one – and then to operate throughout the lifetime of the resulting modifications.

SAM is flexible, describing the underlying principles of the safety assessment process and leaving to the national service provider the details of how they are applied in each specific project. It comprises three major steps: the Functional Hazard Assessment (FHA), the Preliminary System Safety Assessment (PSSA) and the System Safety Assessment (SSA). The ultimate aim is a regime in which no change to the ATM system can be made before it has first been shown that it will not result in an unacceptable level of risk of an accident.

The FHA is carried out right at the beginning – when a new system is being defined or when a change to an existing system is contemplated – with the objective of determining exactly how safe the system needs to be. The process identifies potential hazards and assesses their consequences for the safety of operations. It then specifies safety objectives: that is, the safety levels to be achieved by the system.

The PSSA runs in parallel with the design of a new system or a modification to an existing design and is intended to show whether the architecture can reasonably be expected to achieve the safety objectives set by the FHA. It translates safety objectives into safety requirements and specifies the maximum contribution to risk to be achieved by each element of the system. If it is found that parts of the architecture are incapable of offering an acceptable contribution to risk, additional mitigations such as back-up equipment, new procedures and additional training may be

specified or changes to the proposed design may be required.

In the final stage, at the beginning of implementation of a new system or a modification, the SSA poses the following question. Does the system, as implemented, offer acceptable levels of risk? This stage is designed to verify that past assumptions remain valid before implementation gets under way. Its measures are also designed to be applied throughout the life of the system, to ensure that risks remain acceptable until the system is decommissioned.

SAM is now being applied in practice by EUROCONTROL itself and by many individual national Air Navigation Service Providers.

EUROCONTROL is using SAM for developing the required safety assurance of EATM programmes according to EUROCONTROL Safety Regulatory Requirement ESARR 4 – Risk Assessment and Mitigation. ANSPs are as such benefiting from a harmonised safety case that can be further used and validated using the local conditions.

National service providers already using SAM, or an adapted version of SAM tailored to suit their particular circumstances, include those of Germany, Belgium, Sweden, Norway, Denmark, Ireland, the Czech Republic, France, Slovakia, Romania, Bulgaria, Italy, Portugal, Malta, Austria and Switzerland. Anne Paylor's article, 'The perspective of ANSPs on safety and risk management', in section one, examines the tools and programmes being implemented to enhance safety in greater detail.

Several ANSPs have learned a number of lessons about the practical application of SAM. "Usually nobody seems to have a problem with the FHA phase – it's a creative process to identify hazards and that is always done well enough," says Patrick Mana the EUROCONTROL Safety Assessments >

 SAM is now being applied in practice by EUROCONTROL itself and by many individual national Air Navigation Service Providers



Co-ordinator. “The PSSA phase turns out to be much more difficult because it is less systematic and we do not have that many tools and guidelines yet. So we are trying hard to find a more systematic approach.” The culminating System Safety Assessment (SSA) is comparatively straightforward, according to Mana: “It’s mostly covered by the software tools we use.”

Mana is keen to make it clear that the SAM process does not end with the System Safety Assessment at the time of switching to operations. “We require every safety assessment to be followed up periodically, typically every year,” he says. “The experts should check whether all the assumptions and results are still valid. Are there new hazards? Have the probabilities changed?” ANSPs should also have a formal safety monitoring and control process – based mainly on incident reports but also on a regular

analysis of system performance data – as well as a system of regular audits of operational units.

Patrick Mana also says, “Some parts of the methodology are already very mature and some are still being developed, but I think most of the work has been done and the first elements of SAM have been applied very successfully.”

At this point he can see only one possible brake on continuing success – lack of manpower. “Only trained and qualified people can do the assessments, and they are in short supply in some of the service providers,” he comments. “It’s a matter of having enough resources and incentives to bring and maintain operational expertise working in safety management. There simply aren’t enough people moving into the safety field, even though AGAS/SSAP made it clear at the beginning that the national administrations should make this happen.” ○



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SAFETY WORK IN SUPPORT OF EC MANDATES

The European Commission has drafted a series of mandates to drive forward the creation of a Single European Sky and to ensure that safety remains the paramount priority. **Simon Michell** looks at the development of the Implementing Rules' safety arguments in relation to the deployment of EC regulations

The European Commission issued four regulations, one each for the framework, service provision, airspace and interoperability in March 2004. As Europe moves into the Air Traffic Management network proposed by the European Commission it is essential that the safety aspects related to the regulations and their associated mandates are thoroughly examined so that the necessary safety arguments are developed. This will ensure that the implementation will not only guarantee that safety remains as good as it was prior to implementation but is enhanced because of it. According to Dr Bernd Tiemeyer, EUROCONTROL Co-ordinator for the Agency & EATM Safety Management Systems, “The objective of these safety arguments and their supporting safety assessments is to provide the basis for the safe implementation of the Implementing Rules (IRs) on national levels.”

With the adoption of the SES legislative package in March 2004 by the European Parliament and Transport Council, work has begun in creating the necessary IRs complementing and refining the Essential Requirements (ERs). The first two sets of mandates for the development of IRs were issued by the European Commission to EUROCONTROL in February and April 2004. Work on the first set of mandates covering the flexible use of airspace, airspace design, Functional Airspace Blocks (FABs), and the charging scheme was completed in 2005.

Work on the second set of mandates covering ‘Interoperability’ was also completed in 2005 and relates to the interoperability aspects of the SES initiative, in terms of seamless operations, support of new concepts of operation, safety and civil-military co-ordination.

The ‘Interoperability’ mandates were delivered to EUROCONTROL in two batches. The first batch, delivered in 2004, consisted of mandates for the development of IRs for interoperability on the Initial Flight Plan (IFP), the Flight Message Transfer Protocol (FMTP) and Co-ordination and Transfer (COTR). The Final Reports for the first three were delivered to the European Commission in March 2005. The second batch of ‘Interoperability’ mandates, delivered in 2005, covers Aeronautical Data Integrity, Data Link Services and Air Ground Voice Channel Spacing.

Safety arguments have been, or are being developed for all of the ‘Interoperability’ mandates under the supervision of the EUROCONTROL Directorate of ATM Programmes / Safety Enhancement (DAP/SAF) Business Division in

collaboration with the Safety Regulation Unit (SRU). They form part of the process used to create the IRs in response to the EC mandates. In short they are the link between the safety argument and safety requirements. Dr Tiemeyer explained, “For each of the of the IRs on interoperability we established a multi-disciplinary team, a so-called Safety Focus Group, which was responsible for the delivery of the Safety Assessment.”

A look at how safety assessments are developed for one of the mandates illustrates how the process works.

As part of the first batch of European Commission mandates covering interoperability issues in ATM, EUROCONTROL has developed an IR for interoperability of the Initial Flight Plan (IFP) in order to ensure flight plan consistency between operators, pilots and air traffic service units throughout the Integrated Initial Flight Plan Processing System (IFPS) in the pre-flight phase.

EUROCONTROL DAP/SAF personnel supervised the safety assessment of the IFP process described in the IR in order to derive Safety Requirements and related safety material for inclusion of the IR itself. The primary aim of the safety assessment is to provide assurance, in the form of arguments and evidence, to support the claim that changes to the IFP process will be acceptably safe. The scope of the assessment of the IFP IR was defined first to clarify exactly what was being assessed. For IFP it was limited to the risks associated with the discrepancies in key items of the flight-plan in the pre-flight phase. This criterion accepted that the system covers all aspects of the ATS environment including people, procedures and equipment. The assessment therefore concentrated specifically on the following:

- Hazards that could lead to incidents or accidents
- The potential causes and consequences of those hazards
- Necessary risk reduction measures and resultant safety requirements

A functional model was constructed for the IR along with models of the logical architecture and timeline. These were used to help identify the potential hazards that needed to be mitigated. Once completed, they were taken to a hazard assessment workshop where experts from Air Navigation Service Providers (ANSPs) and EUROCONTROL checked them out to make sure they were complete and correct. The workshop looked at the models to identify, categorise and confirm ➤


potential hazards applicable to the situation prior to implementing the changes to the IFP process and after its implementation. Having categorised hazards common to both pre- and post-IFP they then identified unique hazards.

Once the Workshop had decided where the IFP implementing rule could alter the consequences or causes of the common hazards it then looked for the potential consequences of each hazard using Event Tree Analysis. Following that, the Workshop used Fault Tree Analysis to identify the possible causes of each IFP hazard. The same process was then used for the unique hazards. Having done this the workshop then compared the hazards, consequences and causes for the pre- and post-IFP situation. This provided the basis for the determination of the Safety Requirements. Subsequently, they identified any potential safety benefits from implementing the proposed IFP process and documented their findings.

The output from the Workshop was then put through additional analysis again using Fault and Event Trees to construct causal and consequence models. These hazard models have since been used to derive the safety requirements for the IR covering the IFP ‘system’ at a logical-architecture level as well as issues relating to the safety process which are to be addressed by those people and organisations affected by the rule. Dr Tiemeyer explained, “The safety assessment demonstrated that a sufficient and necessary set of Safety Requirements had been specified, and that the overall risk of an accident or safety incident will be reduced as a result of the IFP IR Safety Requirements, subject to confirmation at the implementation stage.”

The safety argument is based on the top level claim that, within the scope, and subject to the assumptions presented in the Implementing Rule, the implementation of the IFP IR will be acceptably safe in principle, where:

- acceptably safe means that the risk of an accident or safety incident is no higher, and preferably lower than that for the pre-IR situation
- in principle means that the validity of the Claim is subject to the complete and correct satisfaction of the requirements of the IR by the responsible agencies

The first batch of the interoperability IRs is now with the European Commission for discussion and completion and is expected to be approved by the Single Sky Committee before the end of 2005. 



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“The safety assessment demonstrated that the overall risk of an accident or safety incident will be reduced as a result of the IFP IR Safety Requirements”



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IATA PERSPECTIVE ON SAFETY

Safety issues are extremely high on the agenda of IATA's European Safety, Operations and Infrastructure group. "For IATA it is simply the most important activity – priority number one," says Dragica Stankovic, Assistant Director Safety, Operations & Infrastructure. **Mark Pilling** reports

Safety is IATA's top priority. IATA continues its campaign towards reducing the accident rate by 25 per cent by 2006 through the implementation of a six-point operational safety programme in the domains of Safety Auditing, Infrastructure Safety, Safety Data Management and Analysis, Safety Training, Cabin Safety and Cargo Safety. Combined, these components have each contributed effectively to the industry-wide effort, which has brought about a marked decrease in the accident rate.

IATA's Brussels-based European Safety, Operations and Infrastructure Group is working with EUROCONTROL in the Infrastructure Safety sector on a variety of airport- and ATM-related projects where safety issues are paramount. Many fall within Europe's ATM 2000+ Strategy, which has at its heart safety, capacity enhancement, and unit cost reductions

between 2000 and 2015. Europe's ATM 2000+ Strategy is fully in line with the Industry Global ATM Roadmap developed jointly by EUROCONTROL, the FAA, Boeing, the Air Traffic Alliance and IATA and the basis for the new ICAO Global Plan. The IATA EUR office is also highly active in other safety issues like level busts, runway incursions and air ground safety communication.

Many of Europe's initiatives in ATM feature harmonisation across the continent at their core. When it comes to the reporting of air-related incidents IATA is asking for a significant improvement at the pan-European level. The Brussels office receives many incident reports from airlines about safety issues related to civil flights within Europe. From an operational level through to official investigations and the possible involvement of civil aviation authorities, the practices adopted to investigate and act on these reports differ widely.

"We need to have harmonisation of incident reporting regulations across Europe so there is immediate action where safety is concerned," says Stankovic. "Today, some Air Navigation Service Providers (ANSPs) deal speedily with incident reports, but others are very slow or do not react at all," she explains.

EUROCONTROL's Safety Regulatory Commission has been working in this area. Stankovic notes, "Regarding regulatory issues we are satisfied that EUROCONTROL has provided the answers as recommended documents and practices – they exist. Now it is up to States to transpose them into national law within the framework of the Single European Sky initiative.➤"

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IATA is not satisfied that all the States have done it quickly enough. The current situation is far from satisfactory and there must be continuous safety improvements by all participants." In the medium- to longer-term, the role of the European Aviation Safety Agency (EASA) will expand, ensuring that Europe continues to improve its safety performance as traffic doubles by 2020.

As it lobbies for States to speed up their law-making, at the operational level, IATA is keen that close contacts are kept between carriers and ANSPs on incident reporting, citing its relationship with UK NATS as an example of excellent co-operation. "It is about spreading best practice and taking immediate action," says Stankovic.

EUROCONTROL and IATA agreed an action plan in 2003 that addresses one of the first major projects under the ATM 2000+ Strategy – runway incursions. "IATA's role is to promote the implementation of this plan among airlines and airports and put them together to ensure that best practices are followed and that lessons are learned," she says. "This is a process that never ends." The group also monitors new technologies and procedures with a view to updating the existing recommendations if a further safety benefit can be gained.

In October 2004, Europe's action plan to address the issue of level busts – when an airliner has an unauthorised altitude change of greater than 300ft – was launched. This work included input from a large number of airlines and ANSPs in identifying the main causes of level busts and then developing the necessary measures to stop it. One of the ideas is to make pilots, air traffic controllers, safety managers, etc much more aware of the problem. The action plan created is seen as a very good toolkit for airlines, airspace users and ANSPs according to Stankovic.

One of the difficulties in the work on level busts is judging where the trend lies. The statistics show the number of level busts is rising, leading to the conclusion that the situation in Europe is getting worse. However, the reporting culture among airlines is improving as awareness of the issue increases, and so more incidents are being logged. Therefore situations like these often require more time for the underlying trend to become apparent.

This issue of measurement is very much on IATA's mind

when it comes to ATM safety. "The key safety performance indicators at the pan-European level have still not been agreed," says Stankovic. "The main issue for airlines is that they want to see a reduction in the number of incidents." It is an area that is at the top of IATA's priority list. But the association does not underestimate how tough it will be to achieve a common European viewpoint.

One of the issues is the availability of data both from airlines and ANSPs. Some carriers are reluctant to produce such information. "It is a very sensitive area," she says. In addition, IATA recognises that there are wide differences in the safety reporting systems of airlines. "We are working on agreeing which kind of data and in which form it will be presented," says Stankovic. "The discussion is on-going and we hope that maybe in 2006 or 2007 we could have something tangible."

However, IATA is not content to wait before taking preliminary action. At this stage, despite the absence of the formal backing of agreed statistics, IATA is trying to identify any safety trends that may be of concern, for example on runway incursions. "If we highlight an area, we agree on local measures with the airlines and authorities involved," she says.

One of the latest initiatives that IATA, together with EUROCONTROL and other associations, is working on is air ground safety communication. The initiative for the action plan for this area was kicked off last year. "Again we asked the airlines to identify the main problems," says Stankovic, "ANSPs are also contributing their data and it is how we compiled a list of the main causes". For example, an air traffic controller can become confused when monitoring airlines with similar call signs, frequency changes can be incorrectly applied or the wrong information can be captured by the flight crew. The first draft for the AGSC action plan is being prepared this year with the target to produce the full plan by October 2006.

IATA's perspective on European ATM covers many areas in addition to safety, both as part of the ATM 2000+ Strategy and as part of other initiatives. They include ATC delays, airport/airside capacity enhancement, ATM capacity enhancement measures, collaborative decision making, aeronautical information services, European and Russian routes and the Single European Sky. [O](#)

SAFETY REGULATION: THE ROLE OF EUROCONTROL

EUROCONTROL plays a central role in European safety regulation. **Bernard Fitzsimons** reports on how it is intensifying its efforts to enhance safety and ensure that public confidence remains undimmed

Safety regulation is the process applied by States, within national legal frameworks, for establishing, overseeing and enforcing minimum safety levels in the public interest. It includes rulemaking, usually in the form of safety regulatory requirements, together with a means for ensuring compliance by those subject to safety regulation. The purpose of safety regulation is to ensure safety in the public interest. This is achieved by the development of a safety regulatory framework, and its application to the services being regulated.

Ministers of the European Civil Aviation Conference (ECAC) decided in 1997 to establish a formal mechanism in Europe for the multilateral development and harmonisation of an ATM safety regulatory regime, separate from service provision, within a total aviation safety system approach. Therefore the EUROCONTROL Permanent Commission established the Safety Regulation Commission (SRC), as a body independent from the EUROCONTROL Agency, to provide advice in order to ensure consistently high levels of safety in air traffic management (ATM) within the ECAC area. The SRC reports to the EUROCONTROL Permanent Commission through the Provisional Council on all matters relating to the safety regulation of Air Traffic Management (ATM), including recommendations for improvement of ATM safety. It is the focal point for safety regulation within EUROCONTROL as it is responsible for the development and harmonisation of an





ECAC-wide ATM safety regulatory regime. It co-ordinates and harmonises the States' safety regulatory approaches and requirements to assist them to implement and enforce safety regulations. In the case of the SRC, its multi-national role also calls for it to ensure that the agreed regulatory principles are being applied in each nation and by the EUROCONTROL Agency itself, in a uniform manner.

The SRC is composed of senior executives from within organisations responsible for ATM safety regulation at national level. The Commission is responsible for the development and uniform implementation of harmonised safety regulatory objectives and requirements for European ATM, and for ensuring their effectiveness through measurement of safety performance. Within its role, the SRC also handles the working interfaces with other aviation bodies and interested parties. The SRC's day-to-day work is supported by the Safety Regulation Unit (SRU), whose job it is to progress the SRC work programme.

The SRC work programme further develops the task of harmonisation by identifying more detailed activities that enable, support and contribute to that process. Some of the

tasks complement or supplement activities carried out at State level by national regulatory bodies.

The advent of the Single European Sky (SES) initiative has presented a new opportunity to enhance ATM safety through the increased application of necessary binding regulations. EUROCONTROL Safety Regulatory Requirements (ESARRs) are developed by the SRC for approval by its Permanent Commission. ESARRs define the minimum safety levels these regulations should achieve, and a number of key ESARR provisions are being transposed into Community Law. This has been achieved through the Common Requirements for ANS Provision, as well as EC Directives in the fields of controller licensing and incident investigation and analysis. EUROCONTROL will contribute to the SES implementation through the development and safety regulatory review of implementing rules that will complement the high level regulations.

To ensure uniform ECAC-wide implementation of ESARRs, the promotion of their continuous improvement and support to States' own efforts, the EUROCONTROL Provisional Council approved the creation of the ESARR Implementation [➤](#)

It is generally accepted that the regulation of air traffic management should be a separate activity from the service provision

Monitoring and Support (ESIMS) programme.

Between mid-2002 and mid-2004, SRU staff, supported by national secondees, visited most EUROCONTROL Member States as well as several other ECAC States, the latter on a voluntary basis. The visits revealed that much development work was required in the field of ATM safety regulation across a significant part of the European region.

The SRC subsequently redesigned ESIMS and has started a new programme of audits tailored to the complexity and level of aviation activities within individual States. The intention is that each State will receive an audit at least once in any six-year period, alternating in a co-ordinated manner with related ICAO audits. The approach will be the same, but in a strengthened way, fully consistent with the ICAO Universal Safety Oversight Audit Programme (USOAP) approach.

EUROCONTROL and ICAO co-operate in the conduct of their respective safety oversight programmes in order to optimise their effectiveness while preserving the integrity of each individual programme. This approach was formalised in a Memorandum of Co-operation signed by EUROCONTROL's Director General and

the President of the ICAO Council in March 2005.

It is generally accepted that the regulation of air traffic management (ATM) should be a separate activity from the service provision. EUROCONTROL, accordingly, established a Regulatory Committee (RC) and a supporting Regulatory Unit (RU), in addition to the SRC. The RC's task, which addresses areas other than safety regulation, is to ensure that all other ATM regulations for the Organisation's Member States are both drawn up correctly and implemented without the risk of a conflict of interest. The RC is a high-level committee of senior aviation experts who provide advice through the Provisional Council to EUROCONTROL's Permanent Commission on ATM Regulations.

The RU falls under the responsibility of EUROCONTROL's Director General and is functionally separated from the rest of the Agency in order to increase transparency, clarify accountabilities and avoid any risk of conflict of interest. The SRU is even further separated as it reports functionally and solely to the SRC and is linked to the Agency Director General for administrative purposes only.

In both cases regulatory material is developed through the EUROCONTROL Notice of Proposed Rulemaking (ENPRM) process, established to ensure traceability to, and compatibility with, related ICAO provisions. It enables all interested parties – including the public – to comment on draft rules before they become binding on EUROCONTROL Contracting Parties. To ensure the best possible harmonisation between EUROCONTROL and European Community regulatory provisions, those concerning implementation dates are kept separate from the main technical provisions. An ENPRM compliant process is used by the SRC for the development of ESARRs.

The European Commission has signaled an intention to transfer rule-making responsibility for ATM, which would include safety regulation, to the European Aviation Safety Agency (EASA), possibly by 2010. Therefore, for those EUROCONTROL States that are also members of the European Union some of the responsibilities currently handled by EUROCONTROL may, under this proposal, be transferred to EASA. However, through its work, EUROCONTROL will continue to ensure that safety regulation requirements are a key priority and that the public interest is paramount. 



SAFETY RESEARCH AND DEVELOPMENT

Research and development at the EUROCONTROL Experimental Centre includes several activities designed to enhance the safety of current systems and ensure that future systems include safety as a fundamental design feature. **Bernard Fitzsimons** looks at the latest projects

It is important that designers and the developers of new concepts need to consider safety as an integral part of their work

The basic function of the air traffic controller is to ensure the safe separation of aircraft, and the safety of air navigation is EUROCONTROL's reason for being.

So safety research and development is one of the organisation's fundamental activities. R&D is the responsibility of the EUROCONTROL Experimental Centre (EEC) at Bretigny-sur-Orge, near Paris, and the EEC's safety research is focused on the two main areas of current and future safety.

Current research is organised around key risk areas covering level busts, unsafe interactions of ground and airborne safety nets, controller performance in low vigilance situations and ways to help controllers deal with increasing levels of airspace and traffic complexity.

The work on level busts has produced a model of the safety architecture relating to their prevention: its main recommendation concerns the up- and down-linking of critical information so that level busts are not caused by communication errors between controllers and pilots.

The two principal ground and airborne safety nets are the ground-based short-term conflict alert (STCA), which warns controllers of the imminence of a separation violation, and the airborne collision alert system (ACAS), which advises pilots to climb or descend by displaying what are known as resolution advisories (RAs) 15-35 seconds in advance of potential collisions. The two systems do not communicate, and controllers only know that a crew is responding to an RA if the pilots tell them by radio.

The Feasibility of ACAS RA Downlink Study (FARADS) is assessing the possible technologies for downlinking the RA, analysing hazards, operability and failure modes and effects, and evaluating procedural and display options. The work has

included experiments and simulations, and has identified the potential strengths and weaknesses of adding the function.

Surveys of controllers at four ANSPs have revealed the manifestations and potential seriousness of controller performance in low vigilance periods. Follow-up work is drawing on insights from other industries such as rail to determine measures that could be applied to combat the effects of low vigilance in Area Control Centres (ACCs).

On-going work addressing the issue of airspace complexity has included three iterations of a hazard and operability (HAZOP) tool that could be used to determine complexity-related safety issues at the airspace design phase.

Meanwhile, ensuring future ATM system safety is the EEC's main focus in terms of resource allocation. Research at the EEC examining a range of industries has revealed that design errors can make a more substantial contribution to accidents than had been expected, sometimes amounting to as much as 50-60 per cent. So it is important that designers and the developers of new concepts need to consider safety as an integral part of their work.

Many EEC-based projects already apply the Safety Assessment Methodology (SAM), which was developed by the Safety Enhancement Business Unit (SAF) in the organisation's headquarters and is recognised by the Safety Regulation Commission to a large extent to be an Acceptable means of Compliance to the ESSAR 4 (EUROCONTROL Safety Regulatory Requirement – Risk Assessment and Mitigation in ATM). The SAM approach requires major assessments during the design phase, an intensive process known as the Functional Hazard Assessment (FHA), which may be inappropriate for projects >



that do not proceed to the European Air Traffic Management (EATM) design phase. For a more comprehensive look at the SAM process see Brendan Gallagher's article 'Safety assessment'.

To provide a safety assessment methodology compatible with the full range of EEC projects, the Safety Assessment to New Designs (SAND) project aims to develop a safety methodology that is flexible and adjustable and enables an appropriate level of resources to be applied to different project needs.

Areas covered by SAND include an initial assessment of the safety impact of a project to determine the appropriate level of assessment; a safety plan; an appropriate level of risk assessment; a safety issues recording and monitoring system; and a safety summary document. The safety assessment is able to propose the use of tools that can be applied alongside or instead of the SAM FHA approach, such as HAZOP and the Technique for the Retrospective and Predictive Analysis of Cognitive Errors (TRACER).

HAZOP and TRACER were developed as part of another EEC project, which aims to develop techniques and tools to support the safety assessment methodology. Safety Modeling (SAFMOD) responds to a Survey of Safety Methods, which identified 19 areas for further safety assessment methodology support.

The related SAFBUILD project addresses means for building safety into the design process of ATM systems. The objective was to mirror the safety assessment methodology to ensure that safety insights are used to improve designs. The result should be that confidence in safety is accumulated throughout the design process rather than being tested at a stage when it may already be too late to alter design concepts.


One important aspect of the safety R&D programme deals with safety culture. The term refers to the way safety is carried out at any operational location, and the degree of importance placed on safety in contrast to other drivers such as productivity, which would be measured in an air traffic management environment in terms of parameters such as aircraft throughput and delay reduction.

The EEC addressed this field initially by carrying out a safety culture survey to determine its own level of maturity in safety terms. That has been followed by work to assess the effects that future ATM development plans, such as the

provision of automated support tools to air traffic controllers, can have on controllers' safety culture. Interviews with controllers at the Maastricht, Zurich, Shannon and Lisbon Area Control Centres have suggested that future systems will have their main impact on safety culture in the areas of teamwork and communications.

Another objective is known as safety learning, which means learning lessons from past mistakes through data such as incident reports so that they are not repeated when new systems are designed. As part of the Safety Learning for R&D (SAFLearn) project, data from several Air Navigation Service Providers (ANSPs) is gathered, de-identified and stored so that it can be used to inform the development of future concepts. The repository for the de-identified data is a computerised platform called Saftool. The SAFLearn process has been used to extrapolate recent incident experience to new airspace design tools and concepts, including conflict resolution tools and airspace complexity.

A Safety Assessment Technique Toolbox has been developed in conjunction with the US Federal Aviation Administration (FAA). The second version of the toolbox was released in mid-2005, with the addition of safety data analysis tools from the US National Aeronautics and Space Administration (NASA).

At the same time, the first version of the Integrated Risk Picture (IRP) project, which shows the relative risks in the ATM gate to gate cycle, including what types of controller error are dominant, has reached the validation stage. A parallel IRP for 2012 is being developed to determine where safety investment is most needed. This will pave the way forward for a 'Safety Roadmap', which will help ensure that the mid-term ATM vision (2012-2017), and the transition towards that vision, remain safe. It will also enable safety monitoring of the evolution of ATM towards this vision as new ATM system elements and changes are implemented, and 'correction' if it should become required (if safety 'tracking' indicates a safety 'shortfall' during this transition period). 



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HARMONISING THE USE OF GROUND-BASED SAFETY NETS

David Learmount examines the need to standardise ground-based safety nets

It seems obvious that ground-based safety-net systems – tools that alert air traffic controllers to impending potentially hazardous situations – are essential to all modern Air Navigation Service Providers (ANSPs) in Europe’s increasingly busy skies. But apparently this is not so – there is a wide divergence of opinion among ANSPs on how important such systems are, and what form they should take.

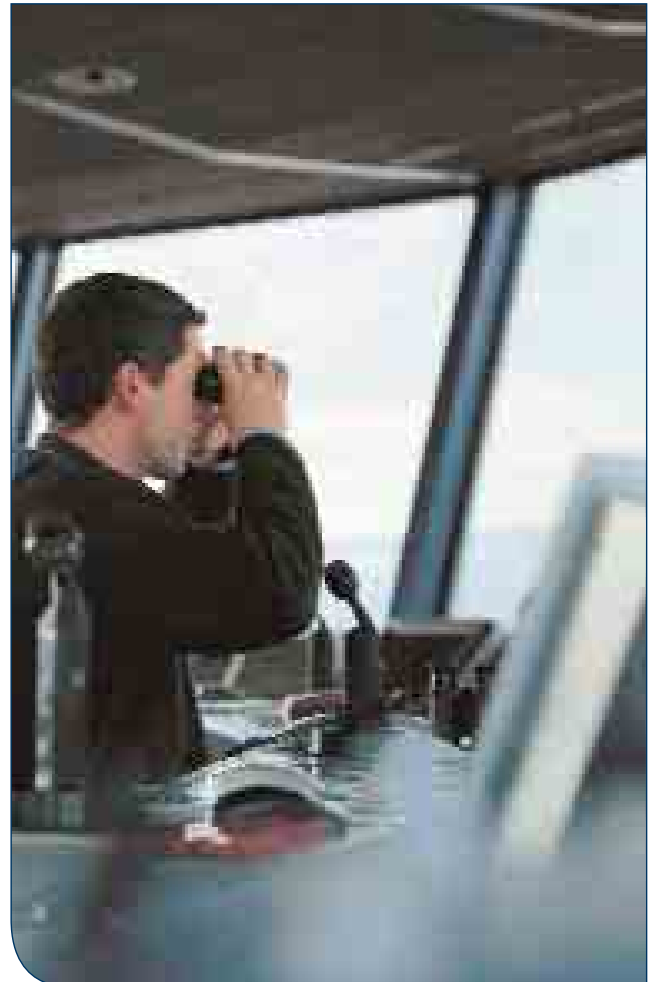
Perhaps it is not surprising that, at a time when most of the air transport industry is still managing safety reactively, some ANSPs will not see safety-net systems as a priority. Their rationale is that safety nets are not fundamental to the functioning of the air traffic management (ATM) task as a whole – by definition they are there only to save the situation when the ATM system has failed. Pilots are blessed with an on-➔

EUROCONTROL's SPIN survey highlighted that there are no harmonised or uniform optimisation procedures and validation criteria

board safety-net system that warns them of conflicting traffic and directs their evasive action; this is the Airborne Collision Avoidance System (ACAS). Its ground-based counterpart for controllers is Short Term Conflict Alert (STCA). STCA is a system that detects and highlights potential hazardous situations in time for controllers to intervene and prevent them becoming collisions. It works simply by causing the on-screen data blocks associated with the two conflicting aircraft to flash, giving the controller some 30-90 second warning, which is enough time for him/her to order an immediate trajectory change for one or both aircraft.

When EUROCONTROL's expert on the subject, Ben Bakker, carried out a continent-wide survey of safety-net systems he found practices differed wherever he looked. He says that, in terms of feasibility and of priorities, at least everyone is agreed that the first ground-based safety net that must be universally applied is STCA, so it is this system that has been the subject of the early studies. There were many causal factors involved in the 2002 mid-air collision over Überlingen, southern Germany, but two were related to the safety-net systems: one of the pilots countermanded his ACAS advisory and descended instead of climbing; and the controller had no STCA because it was undergoing maintenance. The STCA alone could have prevented the accident. Yet today there are some European ANSPs without operational STCA.

Under Bakker's direction, EUROCONTROL's Survey of Practices in Safety Nets (SPIN) "highlighted that there are no harmonised or uniform optimisation procedures and validation criteria. In most cases, there is no explicit, overall policy and little or no involvement of the Regulatory Authorities". The split between those ANSPs with effective




STCA and those without it, Bakker discovered, seemed to be the result of each organisation's safety management policymaking style: if management tended to be reactive, the ANSP would either have no STCA or be content with a flawed one that had probably been installed as part of a radar replacement package rather than as a buyer-specified tool – with the result that there was inadequate transfer of system knowledge from supplier to user. On the other hand, the ANSPs that have implemented an effective STCA have usually done so as a part of a deliberate, specified systems upgrade or as the result of a safety management appraisal, both of which are the hallmarks of proactive safety management style.


Having revealed this wide divergence in equipment standards, management style, local regulatory requirements and attitudes to safety-net systems, Bakker determined that he would have to establish a case for action. This, he says, would have to quantify “all the direct, indirect and hidden costs and benefits of safety nets”. It is imperative to persuade all the ANSPs that safety nets are needed, he argues, because the installation of STCA was specified in the late 1990s as a harmonisation objective. That voluntary basis did not work, he says, so now STCA needs to be made a compulsory standard, like ACAS was in 2000. The problem with ACAS at Überlingen was that, although the standards for the equipment had been globally harmonised, the standard operating procedures for pilot reaction to its alerts had not. Differences of interpretation about how STCA should be operated cannot be allowed to fall into the same trap.

Bakker refers to safety nets in the plural: programmes now have to bear in mind not only the need for Europe-wide implementation of effective STCA as soon as possible, but in the slightly longer-term the introduction of Minimum Safe Altitude Warning (MSAW). Like STCA this is a radar-display focused warning system that alerts the controllers to the fact that climbing or descending aircraft are below the safe altitude for their navigational position, hence are in danger of colliding with terrain. Although keeping the aircraft safe from terrain is primarily the pilot's role, an independent safety-net system that alerts the controller in time to warn the pilot of danger is a comforting backup, especially considering that this kind of accident – the category known as ‘controlled flight into terrain’ (CFIT) – kills more passengers and crew than

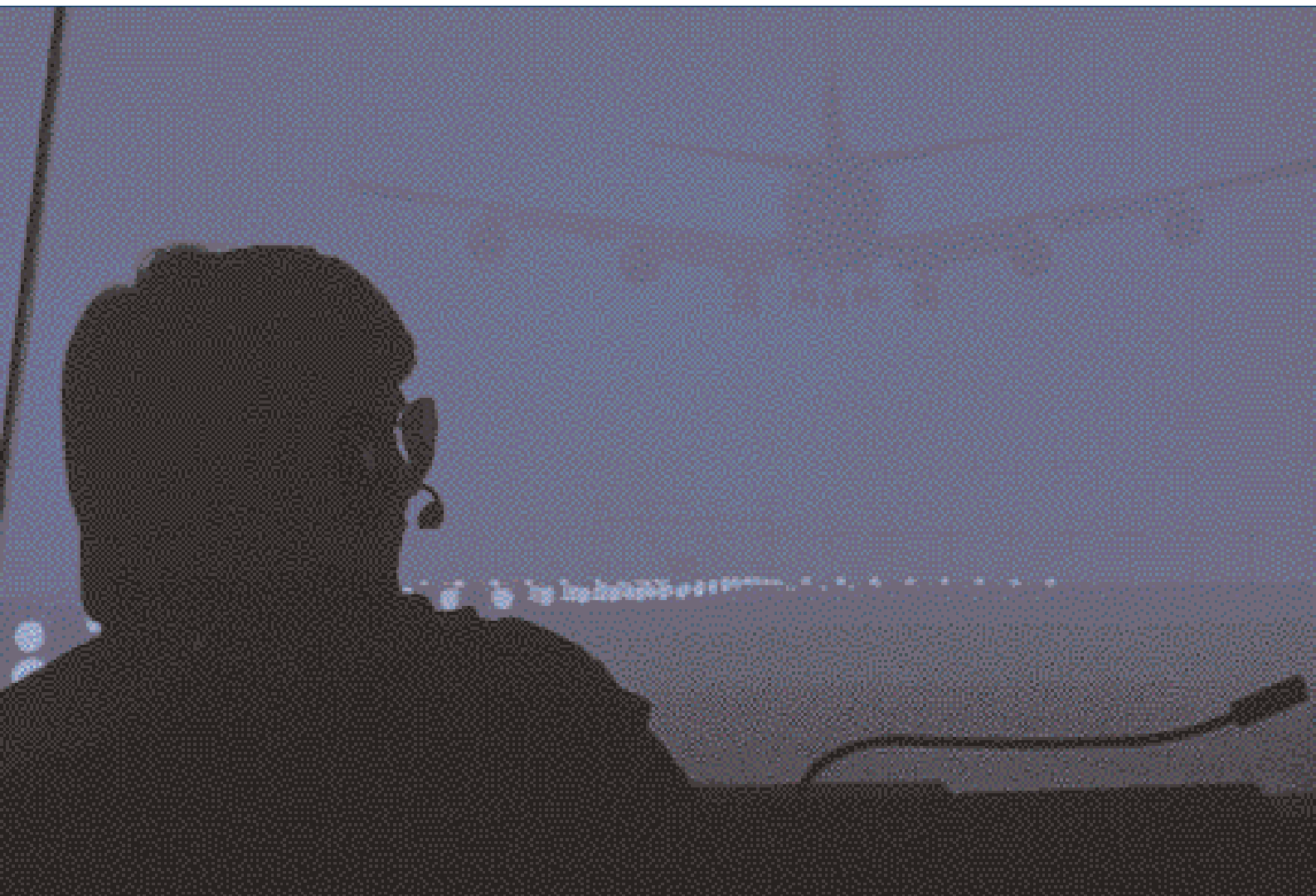
any other type. The onboard safety-net system – the Terrain Awareness Warning System (TAWS) – is reckoned to be almost completely effective, but older aircraft and smaller ones are not fitted with it.

There are two other ground-based alert systems on the cards: the Approach Path Monitor (APM), which is rather like a precision MSAW for the final approach to the runway, and the Area Proximity Warning (APW), which warns controllers that an aircraft is about to penetrate airspace it should not enter. The problem with all these systems, Bakker says, is that although off-the-shelf technology with these capabilities exists today, each installation has to be customised to its local area, and this requires considerable expertise of a type not all ANSPs have, and that customisation process requires a lot of time.

Among those ANSPs that have STCA but are not using it fully because of controller objections to nuisance alerts, Bakker believes the system might work better if the organisation were able to provide a higher standard of technical expertise in managing and maintaining it, and could provide improved training for the controllers who use it. All these results of early investigation need validation, explains Bakker, but when the problems are fully understood, the work to agree common definitions for safety-net usage and operation can be finalised. Bakker says that agreement on STCA standards should be achieved by the end of 2005, and those agreed standards should have been validated within a year. Implementation should then be achieved by 2008, he estimates. He adds the proviso that, even then, some ANSPs may need additional time and assistance to reach the standards required. 



It is imperative to persuade all the ANSPs that safety nets are needed



SAFETY CRITICAL HUMAN FACTORS

Safety is at the heart of a functional aviation system, and human beings remain essential to ensuring that safety is not only maintained, but improved. **Julian Moxon** reports

While there are an increasing number of technology-based solutions available to help air traffic controllers, managers and other critical stakeholders to do their job, human failures continue to occur.

The legacy of years of often non-harmonised European ATM development is that the specification and planning of facilities and equipment and the design of work places have

often been completed without the active involvement of air traffic controllers (ATCOs) and without sufficient consideration for human factors. If the resulting systems then failed to perform adequately, ATCO workload often became higher instead of lower. In addition, the resolution of strong traffic growth is bringing changes to working practices alongside the new technological developments, not least as a result of the Single European Sky (SES) programme.➤



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Involving the controller

Today the aim is, therefore, to involve the ATCO community in all aspects of ATM development and in particular to ensure that the human factor is taken into account at every stage.

EUROCONTROL is working hard to understand and manage safety-critical human factors and has a number of programmes under way. The need to recruit and train quality ATM safety staff is recognised as a major issue in many European Civil Aviation Conference (ECAC) states. Addressing the differences in safety-related ATM staff training carried out across the ECAC area is also considered to be an important contributor to safety.

Air Navigation Service Providers (ANSPs) are, however, making ‘considerable efforts’ to provide sufficient human resources for the safety role. For example, 65 per cent of ECAC States have begun implementing the EUROCONTROL guidelines for staffing and 41 per cent of ANSPs were implementing the Critical Incident Stress Management techniques.

The main human factor issues in ATM are to do with human error, the relationship between humans and machines – the man-machine interface – and the role of humans in future ATM systems. EUROCONTROL Human Factors expert, Dominique Van Damme says: “We must support human performance in ATM and mitigate human limitations. Any new ATM system must fit into the human cognitive process. We have to ensure that these systems are acceptable and user-friendly for air traffic controllers (ATCOs).”

Internet advice

EUROCONTROL has therefore developed an internet-based tool for systems developers to find out how ATCOs will adapt to any new equipment being developed. “It is essential that the ATCOs are supplied with the right data at the right time to enable critical decisions to be taken,” says Van Damme. “There has to be a real harmony between man and machine. This has a big impact on safety, because if the equipment is

■ “There has to be a real harmony between man and machine. This has a big impact on safety – if the equipment is easy to use safety is improved”

easy to use safety is improved.”

New equipment is not always introduced in a structured way, however. It is up to programme managers to decide whether the human factors element will be taken seriously from the beginning. “Often, the human element comes in too late in the programme,” says Van Damme. “And that can have a negative effect on the way ATCOs relate to new equipment. There are many examples of this.”

Tools for the job

The constant move towards more systems automation must be handled within the context of the human controller's ability to effectively monitor the process, intervene as failures in the software or environmental disturbances require, or assume manual control if the automation becomes untrustworthy.

Under EUROCONTROL's Solutions for Human Automation Partnership in European ATM (SHAPE) project the questions

associated with new automation are looked at from the perspective of the operator. Within the project, a number of tools for assessing the impact of new automation have been developed. They fall into different categories: guidelines, predictive tools and measurement tools. Guidelines providing a set of principles facilitating the successful introduction of new automation systems have been carefully formulated so as to encourage operator's trust in ATM systems.

SHAPE predictive tools are aimed more at manufacturers and provide a means of analysing the impact of new automation systems on the human operator and on human performance. Two predictive tools have been developed, one for looking at likely future controller skill requirements, including knowledge and attitudes, the other for recovering from automation failure.

Measurement tools are used to support the empirical evaluation of new automation, using either simulator or operational settings. The project has so far developed a ➤

Human Trust Index, an evaluation of situational awareness issues, a way of assessing the impact of new automation on mental workload, and another dealing with skills, knowledge and attitudes for teamwork. The tools are available free of charge to human factors experts, designers, researchers and training specialists in order to assess the impact of any new designs on the human operator.

EUROCONTROL is also working on helping project managers to understand the human factors challenges. Some managers do not always find it easy to integrate human factors into their projects because of their complexity and because human factors elements are often introduced into the project cycle too late to make a real difference. “Making a case for systematically including human factors elements from the beginning of the project design phase is challenging,” says Van Damme.

EUROCONTROL recommends that any new development programme should take account of its Human Factors Case, analogous to a safety case, which offers a simple, practical and effective process to improve human factors inclusion in ATM systems development projects. Based on expert assessment, simulations and pre-operational studies, the plan helps to ensure that a proposed system or procedure complements, rather than complicates, human abilities. The Human Factors Case aims to extract human factors considerations at the beginning of a design process. It is based on a highly interactive four-stage process: fact finding; human factors issue analysis; a human factors plan and human factors case modelling.

“A number of projects have already benefited from applying the Human Factors Case,” says Van Damme. This includes a cockpit tool to improve airborne traffic situational awareness; an investigation into phraseology confusions; airborne collision avoidance resolution and advisory system downlink and concepts for mixed landing system operations.

Understanding human failures

In aviation, as in any industry, statistics indicate that human error is the primary cause of the majority of incidents and accidents, although EUROCONTROL points out that no reliable sources are available for ATM. It says, however, that: “Human error is a potential weak link in the ATM system, and therefore measures must be taken to prevent errors and their impact as

well as to maximise other human qualities such as error detection and recovery from errors.”

The Human Error in ATM (HERA) project evaluates the human factors relating to accident and incident investigation, safety management and new forms of errors arising from the introduction of new technology.

The work included joint research and development with the US Federal Aviation Administration (FAA), in a programme called HERA-JANUS, in order to harmonise a common approach to understanding the issues involved.

The next phase developed tools and methods for observing and analysing human error situations through simulation. It attempted to predict new forms of errors arising from new ATM concepts and technology. A concept for integrating the management and mitigation of human errors into safety management practices, and a training package for HERA-JANUS was also developed.

One of the HERA objectives is to look closer at incident reporting, “We’re performing a very important investigation to see where human failures have occurred and the contextual conditions around those failures,” says Van Damme. “We want to understand better what actually happened from the ATCO point of view.” She says this should lead to improved human-machine interfacing and procedures which reflect the latest practices. “We have to look at whether existing procedures are obsolete, or if they work better under some conditions than others,” she adds. “It is really important to understand what happened from the ATCO perspective to find out why they had a problem.”

Developing a culture that encourages reporting of failures or potential failures is vital, says Van Damme. “We want to provide more confidence that the process is objective. We have found that service providers who use HERA have developed a much better reporting culture. We’ve had very positive feedback from some of them.”

New Programmes and development

To support Air Traffic Service Providers to cope with the challenging changes in European air traffic management a new project is being undertaken to gather best practises in change and transition. Another initiative will focus on the development of guidelines, methods and tools encouraging human-centred safety management systems. 



JUST CULTURE

Europe needs to improve incident reporting and the sharing of lessons learnt to achieve real progress in enhancing ATM safety. **Jenny Beechener** reports

Work on the eight high-priority areas identified in the Strategic Safety Action Plan (SSAP) is well advanced in the lead up to the 2006 completion date. The exception, however, is incident reporting and data sharing. Lack of compliance in this area is attributed to legal impediments, fear of reprisals and absence of a culture within States that encourages open and honest reporting. The EUROCONTROL Safety Regulatory Requirement 2 (ESARR 2) that requires States to report and assess safety occurrences has been in place since 1999, yet compliance varies between States.

“Until you have an open reporting culture, you will never have a true idea of what is actually happening, and until you have an idea of what is happening, there is not a lot you can do about it,” says Paul Wilson, Head of the EUROCONTROL Airport Business Unit. Recognising the importance of incident

reporting to improving safety, EUROCONTROL set up a Safety Data Reporting & Data Flow (SAFREP) task force at the start of 2005 to address the shortcomings in this area. This group, which included representatives from navigation service providers, controllers associations and airline groups, put forward its recommendations to the Provisional Council in November for inclusion in the New European Safety Programme, which is due to start at the end of the current SSAP in February 2006.

“Among the task force recommendations, States’ service providers and regulators are urged to contact their ministry of justice and ensure the legal situation is such that the impediments we have are no longer the case in the future,” says Erik Merckx, Head of the EUROCONTROL Safety Enhancement Business Unit. ➤

Some States are more successful than others in achieving the right balance between the relevant aviation, judicial and political authorities



Nevertheless, the task force does not advocate legal change, and stands by existing regulations that already mandate incident reporting. “The regulations are clear,” says Wilson. “Those involved in air traffic control, pilots and vehicle drivers are legally bound to report the details of an occurrence or an incident using one of the various reporting schemes.”

Since July 2005, States have to comply with European Directive 03/42 which mirrors to a large extent the content of ESARR 2. Merckx says, “Whereas ESARR 2 is binding for EUROCONTROL Member States, if these States decide not to do anything, then there are very little enforcement means that our Organisation can apply. But if States do not comply with the EU directive, they can be taken to the European Court”. Incident reporting has also been an ICAO requirement since 1994. “Yet despite all the regulation in place, including ESARR 2, a number of States still do not fully comply.”

Against this trend, Denmark took the bold step of passing a new law in 2001 to mandate compulsory, non-punitive, strictly confidential reporting of aviation incidents. Not only are those people who report incidents protected from penalties and disclosures, but breach of the non-disclosure guarantee is a punishable offence. “Denmark is the only country to have changed the law to this extent,” says Peter Majgard Norbjerg, Head of Incident Investigation for Danish navigation service

provider Naviar. “In most countries there is a tendency to punish people for unintentional behaviour.” Norbjerg says a change of law is crucial in order to communicate a new way of thinking and ensure trust in the system.

In the year following the law change, incident reports increased from 15 to 980. In terms of losses of separation, reports increased by a factor of three. This does not reflect an increase in the number of incidents, but alerts the authorities to possible causal factors. Naviar expanded its safety programme to focus on procedures, technology and culture and says reports of separation loss have started to fall.

Another country to take this route is Switzerland. A legal proposal before Parliament could, if approved, see a similar law in force within two years. “There were legal constraints preventing us from going as far as we wished in respect of incident reporting,” says Francis Schubert, legal representative of Swiss navigation service provider Skyguide. “A proper legal framework would give secure legal certainty regarding protection. It would also make the EU directive for incident reporting applicable in non-EU Switzerland.”

Schubert wants more clarity to be introduced. “The most dangerous situation is legal uncertainty, where people who report don’t know exactly what will happen. We have to recognise there are different, equal, legal interests involved. It is not only about safety, it is also about proper administration

of justice and somewhere there must be a balance. It is up to the State to decide where it wants that balance.”

Some States are more successful than others in achieving the right balance between the relevant aviation, judicial and political authorities. The UK and Sweden have set up practical working arrangements in which the Ministry of Justice does not interfere when a controller reports an incident. The regulator has an agreement with the judicial authorities that allow it to act as the guardian of confidential information. The arrangements ensure lessons are being learnt rather than taking people to court and the UK has been able to amass a large amount of data that it uses to contribute to safer working practices.

In all these instances, the protection from immunity is qualified and the regulator provides confidentiality except in cases of gross negligence, substance abuse or incompetence.

Tony Licu, EUROCONTROL SSAP Programme Manager believes a great deal of progress can be made by States themselves.

“Internally they can fix most of the legal, managerial and organisational problems.” For example, since the start of the European runway incursion programme by EUROCONTROL, incident reports have risen from zero to one per day. “There are no more incidents than before, but operators now have an increased awareness and confidence to report.” Licu makes the point that a just culture has been established, where the regulator allows independent reporting and acts as a guarantor in front of the judicial system that the cases of negligence, wilful or destructive acts will not be tolerated.

The SAFREP task force found that punishing air traffic controllers or pilots with fines or license suspension, as well as biased press reports, has led to a reduction the reporting of incidents and sharing of safety information. It also recognises that the need for a culture that encourages honest reporting is not yet reconciled with the judicial system and legislators. It warns that the situation may get worse if no immediate action is taken. [O](#)



WHAT IS EUROCONTROL?

EUROCONTROL overview

EUROCONTROL is an intergovernmental organisation with 35 Member States¹. Its primary objective is the development of a seamless, pan-European Air Traffic Management (ATM) System.

Originally established in 1960 as an international organisation dealing with air traffic control for civil and military users in the upper airspace of its six founding European Member States (Belgium, Germany, France, Luxembourg, the Netherlands and the United Kingdom), EUROCONTROL now pioneers advances in air traffic management technology, operational procedures and system interoperability.

EUROCONTROL mission

Working closely with Member States, Air Navigation Service Providers (ANSPs), civil and military airspace users, airports, the aerospace industry, professional organisations and European institutions, EUROCONTROL is committed to ensuring that airspace users and passengers can continue to benefit from a safe, expeditious and efficient European air transport system. Its goals are to:

- Heighten air traffic safety
- Increase airspace capacity
- Reduce air traffic delays
- Enhance the air traffic management system's cost-effectiveness
- Minimise the impact of air traffic on the environment

EUROCONTROL activities

With some 2,400 experts based in seven European countries, EUROCONTROL's core activities are spread over four main areas of activity:

1. Co-operative Network Design covers ATM strategies and concepts (developed in the European Air Traffic Management programmes in Brussels); research and development (carried out at the EUROCONTROL Experimental Centre (EEC), at Brétigny-sur-Orge in France) and training (at the Institute of Air Navigation Services (IANS), Luxembourg).

Co-operative Network Design is one of EUROCONTROL's core activities, bringing together all stakeholders in the development of the ATM system, along the lines laid down in the ATM 2000+ Strategy and the aims of the Single European Sky.

Activities which come under the Co-operative Network Design heading are grouped into these areas:

- Strategic Planning and Monitoring
- Innovative Research
- Safety, Human Factors, Security and the Environment
- Network efficiency improvements
- Sector productivity
- Airport operations
- Communications, Navigation and Surveillance

2. Pan-European functions. By definition, EUROCONTROL's work is carried out on a European level, with the aim of maximising the safety and efficiency of the civil and military ATM networks. There are substantial economies of scale to be gained through the synergy of working on a pan-European basis and EUROCONTROL brings even more added value through its impartial, transparent and accessible services.

The dynamic management of air traffic flows in the short-, medium- and long-term is carried out by the Central Flow Management Unit, the CFMU. The CFMU began operations in 1995, paving the way for a common European Air Traffic Flow and Capacity Management (ATFCM) System, in the context of a uniform European ATM System. Key interdependent functions include ATFCM, flight planning, airspace data operations and data provision and reporting.

The collection of route charges for Member States – and upon the request of other countries – is another key activity in this area. The system used by the Central Route Charges Office (CRCO) is based on the International Civil Aviation Organisation's recommendations for air navigation charges. The CRCO works closely with national administrations and charging offices.



3. The provision of regional air traffic control services on behalf of Member States who have requested it is currently done at the Upper Area Control Centre (UAC) at Maastricht, the Netherlands, and is planned in the context of the Central European Air Traffic Services programme, CEATS, for the near future.

Regional co-operation makes for considerably improved safety, greater capacity and better efficiency.

The Maastricht Upper Area Control Centre Agreement in 1986 and the Central European Air Traffic Services Agreement in 1997 were signed in recognition of this fact.

The Maastricht Upper Area Control Centre has managed the upper levels of the skies over Belgium, Luxembourg, the Netherlands and north-western Germany – airspace which is amongst the busiest and most complex in Europe – for nearly three decades.

The CEATS UAC will bring increased airspace capacity and greater efficiency than can be achieved by each of the separate national systems operating on their own. The CEATS UAC will enhance safety by eliminating the need for flights to be handed over from one State to another and will bring controllers together to work using the same data, common technologies and identical procedures.

Both the Maastricht and CEATS UACs can be seen as precursors of the Functional Airspace Blocks (FABs) which are now being planned. As such they will form part of the overall design for the Single European Sky. The Functional Airspace Blocks are integrated blocks of airspace formed according to operational requirements, regardless of national boundaries.

4. Support to regulatory activities addresses EUROCONTROL's safety regulations, the so-called EUROCONTROL Safety Regulatory Requirements (ESARRs) and also assists EC regulation, through the drafting of implementing rules for the Single European Sky.

EUROCONTROL structure

The EUROCONTROL Organisation comprises:

- a Permanent Commission
- a Provisional Council
- the Agency, under the responsibility of the Director General
- the Performance Review Commission
- the Safety Regulation Commission
- the Civil and Military Interface Standing Committee
- the CEATS and Maastricht Standing Committees
- an Audit Board
- a Committee of Management
- an enlarged Committee for Route Charges
- the Chief Executives Standing Conference

Key personnel

Director General: Víctor M. Aguado

Director, Air Traffic Management Strategies (DAS): Bo Redeborn

Director, Air Traffic Management Programmes (DAP):

George Paulson

Director, CFMU: Jean-Robert Bauchet (until 31 December

2005) Jacques Dopagne (from 1 January 2006)

Director, CRCO: Massimo Fusco

Director, CEATS: Guido Kerkhofs

Director of the General Secretariat: Gerhard Stadler

Director, Finance: Francisco del Pozo

Director, Human Resources: Volker Thiem

Director, Eurocontrol Experimental Centre (EEC): Jan Van Doorn

Director, Maastricht Upper Area Control Centre (MAS UAC):

Karl-Heinz Kloos

Director, Institute Air Navigation Services (IANS): Lars Wedbäck

1 Albania, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the former Yugoslav Republic of Macedonia, Malta, Moldova, Monaco, the Netherlands, Norway, Poland, Portugal, Romania, Serbia and Montenegro, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, the Ukraine and the UK

WHAT IS ACI EUROPE?

ACI overview

Airports Council International (ACI) is the only worldwide professional association of airport operators. It represents over 1,550 airports in over 170 countries and territories worldwide. ACI EUROPE, formed in 1991, is one of ACI's six geographical regions. The other five are Africa, Asia, Latin America/Caribbean, North America and Pacific. Each of these regions has its own board of elected airport leaders. In 2004, ACI member airports welcomed 3.9 billion passengers and handled 78.8 million metric tonnes of cargo and 69.4 million aircraft movements.

ACI EUROPE

ACI EUROPE has its headquarters in Brussels, Belgium and represents the interests of some 400 airports in 45 European countries. Membership accounts for more than 90 per cent of commercial air traffic in Europe. In 2004 ACI EUROPE member airports handled over 1.2 billion passengers and over 15.6 million metric tonnes of cargo and 17.8 million aircraft movements. These figures represent an increase over the 2003 statistics and already the 2005 figures are showing further increased growth with a 5.8 per cent expansion in passenger traffic.

ACI EUROPE aims to represent the views of its member airports and to promote co-operation with airlines and other industry partners to further a fuller understanding of the benefits of civil aviation in terms of social and economic progress. ACI EUROPE collaborates with all interested parties to achieve these benefits in a sustainable and environmentally responsible way, whilst ensuring that security and safety remain of paramount importance and passenger requirements can be met.

An intelligence network has been created through member airports and associated organisations, which enables ACI EUROPE to track the development of legislative and regulatory initiatives affecting member airports and the entire aviation industry, right from the moment they are conceived.

ACI EUROPE structure

ACI EUROPE's current President is Professor Manfred Schölch of Fraport, supported by a Board responsible for determining the Council's strategy and policies.

Roy Griffins serves as Director General of ACI EUROPE. Griffins was previously the UK's Director General of Civil Aviation from 1999 to 2004 and was responsible for drawing up the recent UK Air Transport White Paper, which has been viewed as the UK's most important aviation strategy document of the last 20 years.

ACI EUROPE activities

Legislation and regulation affecting civil aviation is increasingly enacted at the European level. ACI EUROPE aims to convince European and national level legislators and regulators to create the conditions in which airports in common with other industry partners may prosper in an environmentally sustainable manner and thereby deliver significant social and economic benefits to the communities that they serve. ACI EUROPE works on a daily basis with the institutions of the European Union, the European Civil Aviation Conference (ECAC) and the European Agency for the Safety of Air Navigation (EUROCONTROL). This work takes place alongside the mission of ACI globally with the International Civil Aviation Organisation of the United Nations (ICAO) and other world organisations.

ACI EUROPE aims to represent the views of its member airports and to promote co-operation with airlines and other industry partners



The 12-strong ACI EUROPE team led by Griffins works closely with experts and managers from member airports in 45 European countries. ACI EUROPE keeps in regular contact with legislators, policy makers and regulators in order to influence the development of policies, laws and regulations as they develop.

Six specialist committees – on Aviation Security, Economics, Environmental Strategy, Facilitation and Customer Services, Technical and Operational Safety and Policy – serve to develop strategy. The committees develop common policies, which, subject to the approval of the ACI EUROPE Board, are then presented to the legislative and regulatory bodies at both the European and national levels. This process also provides the European input to ACI policy at the world level. By appointing representatives to these specialist committees, all ACI EUROPE airport members are able to participate in the formulation of policy and to benefit from in-depth analysis of the issues affecting them.

ACI EUROPE's mission to promote the exchange of

professional know-how and information between members is achieved not only through the efforts of the 340 airport managers working in the Committees and Task Forces, but also through a programme of conferences and exhibitions organised throughout the region. A comprehensive roll-out of policy driven communications, both online and print, also serves as a key tool in helping public policy makers, regulators and the media understand the essential nature of the airports sector.

ACI EUROPE facilities

The ACI EUROPE Office is located next to the key European Institutions on the Square de Meeüs in the Leopold district of Brussels. ACI EUROPE members can use the extensive office facilities, which include a conference room seating 40 people as well as a smaller 20-seat room, both of which are fitted with full audio-visual equipment. The offices are also home to an airport library, which is open to members.

www.aci-europe.org