BRAZIL BOUND:

DECEA aims high for 2014 Football World Cup

ASIA-PACIFIC

Focus on flow management

PLUS: Klaus-Dieter Scheurle on European regulation, inside the FAA's Command Center, Auckland arrivals, SITA steps up to the cloud, NATS redesigns airspace, ICAO 38th Assembly achievements, optimal flight arrivals, plus the latest ATM news.

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Front cover: Dawn arrival at Rio de Janeiro. Photo courtesy of DECEA

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The CANSO Executive Committee

In October I was invited to speak at a conference organised by The Economist on the future of air transport. I made the point that ATM is a fundamental part of the future for air transport, just as it is of the present, but that it is frequently overlooked. That is because day in and day out, ANSPs quietly go about their business, invisible to passengers.

Unfortunately, that could be a metaphor for the ATM aspects of the recent ICAO Assembly. From our perspective, it was a huge success and I wish to once again thank the CANSO team and many Member representatives for all their hard work. The Global Aviation Safety Plan was approved, as was the Global Air Navigation Plan. The ASBU process can now formally begin and we can start to look to an interoperable and seamless future. Yet the Assembly was overshadowed by a discussion about the development of Market Based Measures to mitigate aviation emissions and achieve carbon-neutral growth from 2020.

ANSPs are already doing their bit to make air transport more efficient and environmentally friendly. We are improving routings, finding effective ways for airlines to fly the routes they want, when they want them. This is often overlooked but is of considerable value to our airline partners.

If there is a time when ANSPs are visible it is when there is industrial action – such as was threatened in Europe in October. Those actions can only cause harm to all our stakeholders. There is a time and a place for proportionate responses, but also for dialogue and constructive negotiation. I hope that we can work together to make sure that continues to be the case.

Another opportunity for the ANSPs to be heard is at the annual World ATM Congress and Conference, in Madrid next March. After the success of the first World ATM Congress this year, I am sure that you will all be looking forward to this next one, which will be even bigger and better. I can assure you that the team is working hard to put together a Congress – including both an exhibition and a conference – that is truly global in its reach.

An important part of the week that we spend together in Madrid is the CANSO CEO Conference, this year being held on Monday 3 March, 2014. At that meeting we will look at progress and achievements against the Vision 2020 goals and hear from our Standing Committees on their contributions to making global ATM more seamless, more efficient and better able to serve the entire aviation industry.

I look forward to seeing you there. In the meantime, I take this opportunity to wish you and your families all the very best for the festive season and the New Year.

Jeff Poole

CANSO Director General

✈ NEW AGREEMENTS IN CENTRAL AND EASTERN EUROPE

ANSPs of ten countries in Central and Eastern Europe signed an agreement, GATE ONE, to enhance cooperation among the participating service providers, and coordinate advocacy in the European decision-making processes in October 2013. The agreement was signed by the ANSPs of Austria, Bulgaria, the Czech Republic, Croatia, Poland, Lithuania, Hungary, Romania, Slovakia and Slovenia. These 10 ANSPs cover the area of three functional airspace blocks (Baltic FAB, Danube FAB and FAB CE). GATE ONE was established to develop new regional forms of cooperation among ANSPs, that cross the borders of functional airspace blocks and create interoperability of various technical and airspace systems. It will strive to represent a consolidated position on common technical and economic issues affecting the region and which are vital to the European Union-wide picture of the ATM industry.

In a separate development, the CEOs of all seven Functional Airspace Block Central Europe (FAB CE) ANSPs agreed on a regional network for the transmission of information. The Interconnection Framework Agreement crowns several years of cooperation among network professionals on the development

Total number of FIRs: 11
Total airspace: 1,45 million km2
Direct interface with UK-IR, NEFAB, FAB EC and BlueMed
Inter-FAB partnership with the European Network Manager
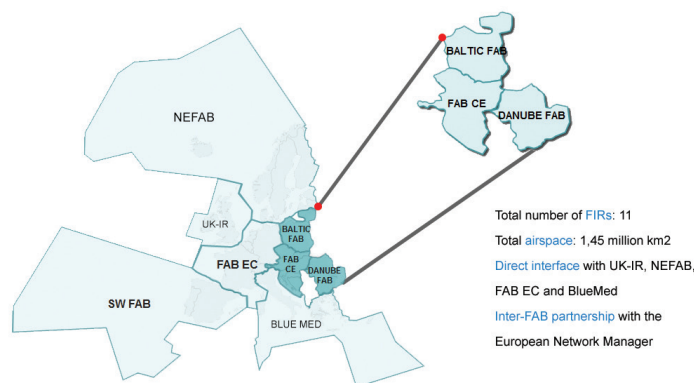
of their ANSPs' cross-border network, called X-bone. X-bone is a fully redundant IPv6 backbone, interconnecting individual networks of national ANSPs. FAB CE is made up of Austro Control, BHANSA, Croatia Control, ANS CR, HungaroControl, LPS SR and SloveniaControl.

✈ ROMATSA INTRODUCES FREE ROUTES

ROMATSA has implemented Night Free Route Operations in the LRBB flight information region (FIR) to provide more efficient services in Bucharest FIR. Night FRA implementation is coordinated through the ICAO EUR/NAT Office and Eurocontrol in accordance with the provisions in ICAO Annex 11 and the European Network Improvement Plan. It represents a first step towards implementation of FRA in Bucharest FIR. Free Route Airspace will be available from 2300 to 0400 UTC during the winter time period and from 2200 to 0300 UTC during the summer time period. Around 250 flights will be operating daily during summer 2014 between 22:00 and 03:00 UTC. The project will save 728.72 nautical miles; 108.42 minutes; 5,754.97 kg of fuel and 18.07 tonnes of CO_2 each day.

✈ SKYGUIDE ADDS ELECTRONIC COORDINATION

Skyguide introduced electronic coordination at its two area control centres, Geneva in November, and Zurich in December, 2013. The new electronic coordination marks a milestone in skyguide's "Stripless" project to gradually replace the paper strips used to record and pass on flight and aircraft information with electronic solutions. This release also includes a new safety feature (described below) to monitor flying altitudes. The new electronic coordination enables controllers to hand over a flight from one sector to another at the click of a mouse without the need for telephonic coordination. This reduces the workload, limits a source of potential errors, and enhances efficiency and safety.

This second release of the new stripless system

enhances the electronic monitoring of flight levels. The Cleared Level Adherence Monitoring based on Enhanced Mode S (EHS-CLAM) function alerts the controller in case of a divergence between the selected altitude in the cockpit and the cleared flight level in the control centre. This new safety feature ensures that working errors of the cockpit crew or air traffic control are detected and corrected, potential infringements of the separation minima avoided earlier, and safety increased.

✈ DFS EXTENDS FLEXIBLE USE OF AIRSPACE

Since 2003, the German Bundeswehr and DFS have tested Military Variable Profile Area (MVPA) procedures as a development of the flexible use of airspace (FUA). This airspace offers more flexible and dynamic procedures for joint civil-military airspace utilisation

than the original European FUA concept. Military training operations take place in a flexibly located airspace which is tailored to the relevant activities and which takes the general traffic situation into account. The introduction of the new training areas responds to the challenge of offering new high-performance military aircraft enough airspace for efficient training while at the same time maximising the availability of this airspace for civil air traffic. DFS has introduced this approach in the Single European Sky ATM Research Programme (SESAR) of the European Commission within the scope of the Advanced Flexible Use of Airspace concept.

NEW MEMBERS
(since 1 September)

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➤ ENAV REDUCES TERMINAL CHARGES

Italian ANSP ENAV has reduced the charges for airport operations by 25%. The new fees, in force from September 2013, will save around €20 million for airlines using Italian airports. Despite the decrease of flights to the levels of 2006, this reduction has been possible due to improved efficiency in recent years at ENAV, leading to a 3.6% containment of costs, in accordance with the targets defined in the Single European Sky National Performance Plan.

➤ AIRWAYS NEW ZEALAND IMPROVES AIRSPACE SAFETY

Airways New Zealand is installing cutting-edge multilateration (MLAT) surveillance technology. The New Zealand ANSP is installing nine MLAT sites in remote mountainous regions throughout Otago and Southland. This will provide Airways air traffic controllers with visibility into valleys and behind mountains, areas which are out of the reach of radar surveillance. The network incorporates Automatic Dependent Surveillance-Broadcast (ADS-B), satellite-based surveillance technology utilising GPS position data. The sensors are deployed with minimal environmental impact, using existing communication sites, or are solar powered.

MLAT technology provides a three-dimensional picture of air traffic and allows Airways to reduce the separation between aircraft as the radar surveillance indicates the exact position of each aircraft. This results in fuel efficiencies and decreased costs for airlines which no longer need to hold aircraft at lower levels, and in fewer disruptions for passengers. The system

begins operations at the end of 2013.

➤ EFFICIENT AIRSPACE AT 10 BRAZILIAN AIRPORTS

GE Aviation is implementing a multi-year programme to improve airspace efficiencies in Brazil. Green Skies of Brazil encompasses 10 airports and is the result of a two-year national research initiative with air navigation service provider DECEA, Brazilian regulator ANAC, trade organisations and the airlines to identify operational efficiencies using data analytics. DECEA will deploy RNP procedures and multiple city pair procedures at 10 key airports in southeast Brazil. This effort ensures an efficient, cost-saving network within the first year.

At Brasilia International airport alone, GOL could potentially save an average of 22 track miles, 7.5 minutes, 77 gallons of fuel and 1,628 lbs of CO_2 per approach compared to the conventional paths, totalling more than $24 million in operational savings over five years.

With Brazil air travel expected to grow 6.5% annually over the next 10 years, Brazil's major aviation stakeholders recognise that airspace efficiency must be improved as quickly as possible. Through the use of RNP and data analytics, increased air traffic demands can be accommodated while simultaneously reducing operating costs and environmental footprint.

➤ AIRSERVICES SUPPORTS RUNWAY SAFETY INITIATIVE

Airservices Australia has launched a range of practical tools to improve runway safety. Developed in conjunction with CANSO and industry workgroups, the initiative aims to reduce 'unstable' approaches,

which can result in runway excursions or aircraft veering off or overrunning the runway during take-off or landing. Among the products released to air traffic controllers and pilots are a smart device-accessible mobile website, educational flyers and a booklet containing key tips for controllers and pilots. A runway safety maturity checklist has also been

developed to assist the wider aviation industry, including airlines and airports, to benchmark its levels of maturity in managing runway safety risks. The booklets, flyers, checklist and link to the CANSO mobile website are available on Airservices runway safety page at www.airservicesaustralia.com/flight-briefing/pilot-and-airside-safety

CANSO DIRECTOR GENERAL SPEECHES

Exploring Keys to Unlock Seamless Airspace in the Middle East Region

At the CANSO MEAUSE Conference on 25 November, CANSO Director General Jeff Poole looked at the challenges faced by air traffic management in the Middle East in the face of increasing traffic demand. He set out a vision of seamless airspace in the Middle East but stressed that this can only be achieved through greater cooperation and collaboration by all aviation stakeholders in the region. The CANSO MEAUSE initiative plays a vital role in bringing ANSPs and stakeholders together to work for common solutions.

Promoting the ATM Agenda in the Africa Region

CANSO Director General Jeff Poole focussed on two key themes in his speech at the CANSO Africa Conference on 8 October: aviation safety and seamless operation of aviation in the Africa region. He called on States to play their part in transforming global ATM performance by ensuring that revenues generated by the civil aviation sector should be re-invested in the sector.

The Future of International Aviation Regulation

CANSO Director General Jeff Poole explored three areas at The Economist 'The Future of Aerospace Summit' on 15 October: what CANSO and the ATM industry are doing to drive performance improvement; the need for a better regulatory framework and organisation of airspace; and better governance and business models for air navigation service providers.

Big Data: Opportunity and Challenge in the ATM Industry

At the SITA Europe ICT Forum on 17 October, CANSO Director General Jeff Poole looked at the strategic future for data management in ATM and how it could revolutionise our industry. He stressed the importance of strong collaboration between industry partners when seizing the opportunities in data management.

Download and read the speeches at www.canso.org/cansonews

Brazil warms up for the 2014 Football World Cup

Brazil is experienced at handling large numbers at international events

According to Brazil's Ministry of Tourism, 617,000 people including Brazilians and foreigners from more than 180 countries came to Rio de Janeiro to celebrate World Youth Day in July 2013. On the last day of the event, the ocher sands of Copacabana Beach were hidden by a crowd, estimated to reach three million, gathered to see Pope Francis. Only weeks earlier, 250,000 people had travelled from city to city to watch the 16 games of the FIFA Confederations Cup that brought international football matches to six cities across the country during two weeks of competition, reports Daniel H Marinho, DECEA journalist.

In the coming year, the Ministry of Tourism estimates that more than 600,000 foreign tourists will come to Brazil to watch the 2014 FIFA World Cup, some of them travelling between the 12 cities hosting the competition. This will be a good rehearsal for two years later when Brazil's tropical sunshine will burnish the gold medals of the 2016 Olympics.

To host a sequence of events of this kind, a country needs an efficient structure of air transport, air navigation services and aeronautical infrastructure. The impact on air traffic flow and all the peculiarities inherent to events that gather large crowds, including close media attention, requires strategic planning and actions aimed directly at the safety of the airspace over all of these activities.

The Brazilian air navigation service provider, Departamento de Controle do Espaço Aéreo – Department of Airspace Control (DECEA) has been addressing these issues for a number

of years, and can point to a series of successful events that have contributed to a growing capability by the Brazilian ANSP to manage air traffic during major international events. This is evident in the strategies and actions undertaken by the organisation during 2013. Planned well in advance, these actions ensured the mobility of visitors and Brazilians in the air transport arena despite a significant increase in the number of flights.

The Brazilian Airspace Control Integrated System is responsible for the infrastructure that manages air traffic control and air defence. This ensures interoperability and cooperation between the civil and military sectors. During the Confederations Cup, the airspace above some pre-determined locations, such as stadium surroundings, became exclusion areas in order to guard the location and nearby airspace. One hour before, and four hours after, each game, the exclusion zones were activated to guarantee the safety of the surrounding airspace and manage the temporary rearrangement of traffic flow.

The procedures require reorganising some routes and imposing temporary exclusion zones over some large cities. Military aircraft are kept on standby to take any measures required such as interceptions in case of any breach of the rules. This relies on close cooperation between the Brazilian Area Control Centers (ACC) and the equivalent Military Center of Operations (COPM).

At other facilities such as approach controls, control towers and military airbases, professionals were intensely mobilised to meet the demands of the

planned operations to support the air traffic management procedures and to observe the flight restrictions and airspace exclusion areas.

At the Centre of Air Traffic Management (CGNA) – an organisation subordinated to DECEA, in Rio de Janeiro – a special forum with representatives from air traffic management, air defence and key stakeholders was open 24 hours a day. Referred to as the 'Master Room of Command and Control', the forum will be reconvened for the 2014 World Cup. It features screens detailing real-time data on runway status, taxiways, airport terminals and radar tracks affecting all the host cities. It played a key role in ensuring safe and smooth air traffic operations during both the Confederations Cup and World Youth Day. The initiative resulted in more flexible responses to decisions taken at various times during the events and enabled the operational capacity provided by DECEA to absorb the growth in air traffic.

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Director General of DECEA, Air Lieutenant Brigadier Rodrigues Filho, ensures the organisation stays up to date.

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Research indicates that Brazil will continue to lead traffic growth in Latin America at least for the next 20 years, with an annual average rate estimated at 6.9%.

Since 2011, about 2,500 air traffic controllers have enrolled on an intensive training programme oriented exclusively to manage the anticipated traffic growth during the FIFA 2014 World Cup. Each controller receives 150 hours of training in these scenarios and experiences simulated civil and military air traffic in terminal areas, routes, approaches and control towers. The simulated scenarios predict situations of excess demand, contingency, air traffic incidents and other atypical situations such as aircraft hijacks. While traffic has grown 18% on average during recent international events, Brazilian controllers are qualified in simulated scenarios to deal effectively with up to a 30% traffic increase.

Brazil's efforts, however, are not exclusively driven by the 2014 World Cup. The steep rise in flight movements in recent years calls for permanent and effective solutions to accommodate this growth and continued expansion in the coming decades.

Director General of DECEA, Air Lieutenant Brigadier Rafael Rodrigues Filho explains: "The positive results achieved in the events of 2013 are the culmination of strategic plans that take into account Brazil's long term

demand growth. DECEA is in charge of the airspace control of an enormous area of 22 million square kilometres. The challenge is to keep updating the system to stay ahead of the demand." According to the Airbus Global Market Forecast published in September 2013, Brazil will continue to lead Latin America's air transport growth at least for the next 20 years. Annual average growth is estimated at 6.9%, compared with 4.7% average annual growth for the rest of the world over the same period.

It is no coincidence that Brazil has a well-advanced modernisation programme called SIRIUS, focused on high technology solutions. Like the European modernisation programme SESAR, and the US Next Generation Transportation (NextGen) programme, SIRIUS employs satellite technology and digital communication solutions. Brazil is a regional leader in the adoption of communications, navigation and surveillance (CNS) concepts. Performance Based Navigation (PBN) has been in operation since 2010. As of December 2013, PBN will be introduced at two major South American hubs: Sao Paulo and Rio de Janeiro. The new procedure is expected to reduce average flight time

by eight minutes between these cities' domestic airports (18% of the current 44-minute flight). Some eight million passengers travelled this route in 2012, making it the third busiest in passenger volume in the world according to Amadeus Air Traffic Travel Intelligence. New PBN routes are planned between other cities hosting the World Cup. The route between Sao Paulo Congonhas Airport and Brasilia will have an average reduction of 11 minutes cut from a journey that usually takes an hour and a half, while flights between Brasilia and Rio de Janeiro are expected to benefit from an average decrease of seven minutes.

Other SIRIUS initiatives include Controller Pilot Data Link Communications (CPDLC) and Automatic Dependent Surveillance by Contract (ADS-C) which have been in use since 2009 to track equipped aircraft under Brazilian control over the Atlantic Ocean.

DECEA is also implementing technologies such as Automatic Dependent Surveillance-Broadcast (ADS-B), Multilateration (MLAT), HF Datalink and VHF Datalink as part of long term performance enhancements to maintain the safety of the airspace that extends far beyond international soccer contests.

When the 2014 World Cup begins, the world's attention will turn to Brazil and DECEA will be ready for another successful international event.✈

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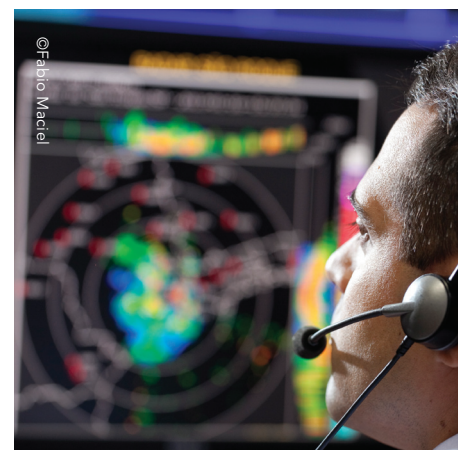
Brazilian air traffic controllers have been qualified in simulated scenarios to deal effectively with up to 30% increase in traffic.

TRAFFIC JAM AHEAD. PLAN ACCORDINGLY.

Transforming the air traffic management (ATM) system is essential for improving safety, efficiency and the environment around the globe. Boeing is fully committed and uniquely qualified to help make ATM transformation a reality. It's the right time and Boeing is the right partner.

Letter from America

Teri Bristol, Deputy Chief Operating Officer of the FAA's Air Traffic Organization

The FAA's Air Traffic Organization (ATO) safely and efficiently handles approximately 50,000 flights per day under instrument flight rules (IFR). This is no easy task, given the complexity of the US system. To make it happen, the ATO's Command Center makes decisions throughout the day to adjust traffic demands to system capacity, which can be affected by factors such as adverse weather, equipment outages, runway closures and national emergencies.

But these decisions are not made in isolation. The Command Center relies on collaborative decision making (CDM), a joint government-industry initiative that the FAA has been employing since 1995. This inclusive philosophy is a proactive effort to ensure that all stakeholders have common situational awareness of weather and other potential constraints in the National Airspace System (NAS).

CDM implementation requires active two-way communication. The ATO takes input from airspace system users, including the airlines, the general aviation community, and FAA's air traffic facilities. There are two key tenets of CDM. One, stakeholder input leads to better strategic decision making; and two, stakeholder input helps to make tactical adjustments to rapidly changing conditions. CDM is an essential process through which we can ensure greater operational predictability and reduce the number and length of air traffic delays – which cost the US economy an estimated US$19 billion in 2012.

There are many ways in which the FAA engages stakeholders as part of the CDM process. One of the most visible is the operational teleconferences held with CDM members, including all major airlines and the National Business Aviation Association (NBAA), which advocates for general aviation interests. Calls are normally conducted every two hours from the Command Center, with the first one being held at 7:15 am EST, and the last one at 9:15 pm EST. Stakeholder groups including Airlines For America (A4A), the International Air Transport Association (IATA) and the NBAA are stationed at the Command Center to advocate for their customers.

Each telcon usually lasts about 10-30 minutes. The Command Center takes into account operators' and facility concerns and makes decisions that will ensure the safety of the system while providing maximum efficiency given the weather and traffic situation. For example, on 21 October 2013, we had a case of reduced visibility, due to fog, that affected San Francisco International Airport (SFO). SFO's arrival rate was reduced to 30 aircraft an hour at 7:12 am EST/12:12 GMT, down from a normal rate of 54 during normal weather conditions.

The collaborative plan was to project the time the weather would improve enough to allow for an increase in the arrival rate. This pending decision would certainly affect the schedule planning for customers with flights en route to SFO. As part of the CDM process, the ATO considered everyone's input on varying forecasts for the time the low ceilings at SFO would improve. One customer's meteorology group forecasted that the fog would lift sooner than the forecast issued by the Center Weather Service Unit located in the FAA's Oakland Center, which handles high altitude air traffic in Northern California. Collaborative discussions occurred, and there was a request to increase the arrival rate to the optimal rate of 54 to coincide with the more optimistic forecast. Each stakeholder had the opportunity to contribute to this decision and the parties agreed to raise the arrival rate to 45 at 1:53 pm EST/18:53 GMT.

When the fog did not lift at the predicted time, demand slightly exceeded the actual arrival rate and holding was initiated. As delays started to increase, the Command Center initiated another collaborative discussion to address the building demand. The determination was made to revise the parameters of the Ground Delay Program to redistribute the delay. In this case, the forecast was incorrect and action was needed to mitigate the excess demand that resulted. The key point is that all stakeholders cooperated in the collaborative process prior to, and during the event to minimise delays and impact to the airline schedule.

Another aspect of the CDM process at the Command Center involves the use of the Tactical Customer Advocate (TCA). Customers call the TCA desk for a variety of reasons including seeking exemptions from control times or mandatory routings when other agreed CDM measures are either unsuccessful or unavailable. The TCA desk will evaluate the request in the context of the current traffic situation and make appropriate adjustments when able. The TCA is often used to conduct special or ad hoc collaborative teleconferences with stakeholders when unexpected events or developing weather may have a negative impact on operations.

CDM creates a forum through which we can realise operational benefits by drawing upon the talents and strengths of airspace experts in both industry and government. This benefit extends across international boundaries as well.

COMMENT

The FAA's Air Traffic Control System Command Center in Warrenton, Virginia, began full operations in 2011. The Command Center balances air traffic demand with system capacity and works with stakeholders to handle constraints such as weather, runway closures and delays in the national airspace system.

The ATO regularly shares National Airspace System (NAS) status and performance with international partners. For instance, a daily web conference is held with the Eurocontrol ATM Network Manager. This process enables information, such as airport volume constraints, to be shared with European customers that have flights bound for US airports like Boston, Kennedy and Newark. The Command Center also conducts weekly teleconferences with the Caribbean States with conferences added during peak vacation travel periods. The CDM stakeholder community functions on timely, relevant information exchange. This is a foundation of any high performing CDM activity.

The ATO is eager to share what it has learned with international colleagues to enhance air traffic flow management. It is working to promote the principles and practices of CDM through workshops and webinars and has hosted many visitors at the Command Center, including officials from the China Air Traffic Management Bureau in mid-2013. Through these efforts, the ATO is able to discuss how CDM can help to achieve operational goals including reducing delays and increasing operational predictability, and also discuss ways in which air navigation service providers (ANSPs) can establish an efficient CDM framework with their stakeholders.

Clearly one size doesn't fit all, and each ANSP has unique circumstances. Traffic mixes, weather conditions, technological capabilities and institutional arrangements vary from one service provider to another. An ANSP does not need expensive air traffic technology, an elaborate centralised command authority, or a large economy to use CDM. CDM can be effectively achieved by establishing equitable information sharing and transparency in standard operating practices among service providers, airspace users and airports.

The global aviation community is seeing the value of CDM. It was one of the initial topics discussed at the Advanced ATM Techniques Symposium and Workshops, held at ICAO headquarters in Montreal, from 4-6 November 2013. This meeting was the first jointly-sponsored training conference by CANSO, ICAO, IATA, and ACI. CDM's basic principles and philosophy were discussed, with examples of CDM applications provided by Aerothai, Direction des Services de la Navigation Aérienne (DSNA) of France, and the FAA. This symposium has helped to heighten the importance of CDM in the global aviation community, and it supports a key component of CANSO's vision – to create value for its members and their stakeholders. ✈

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GE imagination at work

Asia-Pacific links city pairs for efficiency gain

Asia-Pacific region looks to develop seamless flow management

Trials using collaborative decision making (CDM) to enhance flight efficiency on routes between Bangkok and Singapore are part of a wider air traffic flow management initiative in the Asia-Pacific, reports Hai Eng Chiang, CANSO Director Asia Pacific Affairs.

It was just two years ago when CANSO initiated a CDM project with the aim of improving air traffic management efficiency between the two capital cities of Bangkok and Singapore. The project helped showcase the power of collaboration not only among ANSPs but among airport and airline partners across the entire aviation value chain. It has sparked much interest among the various air traffic management stakeholders and served as a catalyst for further innovation in CDM and air traffic flow management (ATFM).

The work gathered momentum in October 2013 when the ICAO Asia Pacific ATFM Steering Group met in Hong Kong to discuss a coordinated strategy for the region. At the meeting, IATA and CANSO tabled a joint paper highlighting the need for a distributed

collaborative ATFM framework, starting with implementation at the sub-regional level. The meeting agreed to support a project to be funded by IATA that would study current and planned ATFM initiatives in the region and to recommend regional and sub-regional ATFM implementation strategies.

Meanwhile the Hong Kong Civil Aviation Department (CAD) has joined the ANSP of Singapore (CAAS) and the ANSP of Thailand (AEROTHAI), to develop a distributed CDM/ATFM concept to help balance capacity and demand and enhance flight safety and efficiency. The concept involves the development of a sub-regional distributed ATFM network that is scalable and potentially expandable to the rest of the region. Participating ANSPs and airports are now working on a common set of agreed principles and plan to carry out a simulation involving the various parties.

Improved efficiency

The pilot Bangkok-Singapore CDM project examined all phases of flight from scheduling, flight planning, surface movement at airports and integration with en route CDM processes. Two trials were conducted for the city pair involving the ANSPs of Thailand, Singapore and Malaysia; the national carriers Singapore Airlines and Thai Airways; as well as airport operators Changi Airport Group and Airports of Thailand. The trials were conducted once the operational concept and the information exchange process were finalised. The first trial took place between 23-29 July 2011 involving eight daily return flights operated by Singapore Airlines and Thai Airways. A second trial conducted in August 2011 incorporated process enhancements based on lessons learnt from the first trial. An Excel information sharing template was hosted on Microsoft SkyDrive to enable all
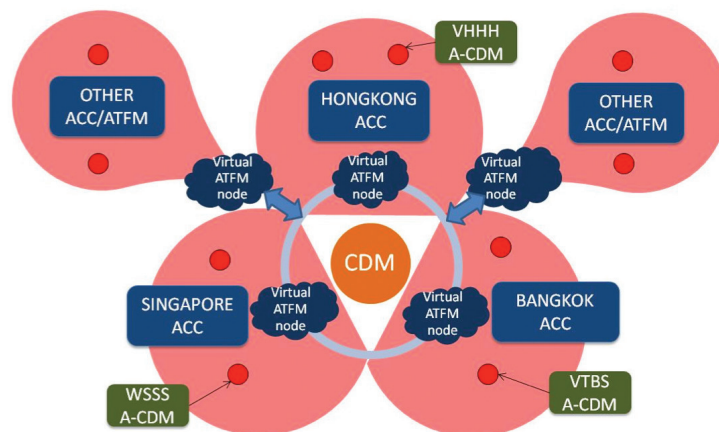
Distributed Collaborative Decision Making/Air Traffic Flow Management concept.

partners to share data on the progress of the flights and information was constantly updated in terms of scheduled, targeted and actual times.

All the stakeholders were required to provide and input data into the CDM platform and were also able to share a common picture of the flights in progress. Flight data input began in the days prior to the flight, followed by stand allocation, planned off-block time, and runway assignment in the hours and minutes leading up to departure. The target off-block time (TOBT) agreed between the airline and airport operator was recorded and compared with the actual off block-time (AOBT). A similar procedure was conducted at the destination airport, where the target landing and target in-block times (TLDT and TIBT) were compared with actual arrival times (ALDT and AIBT).

Sharing CDM information among aviation partners was expected to provide benefits especially from improvements in flight predictability due to shared target times rather than flight schedules. More than 100 flights were involved in total and a comparison was made between the target times and actual operations. Data analysis confirmed that the effort of updating off-block and in-block times beyond existing schedule information resulted in increased predictability when compared to operations solely based on schedule. For example, while 45% of aircraft were likely to meet the scheduled off-block time (within a five-minute window) in the first trial, this increased to more than 50% when shared targets were introduced. The second trial saw predictability rise to 60% when partners shared target data.

Anecdotal evidence was also collected. Although a flight from Bangkok to Singapore had departed late, the airport operator in Singapore was able to make use of the flight's up-to-date arrival time in Changi to better resource manage the ground handlers and airport operations. There was no requirement to allocate a new gate to the arriving flight. With improved predictability the airline could also reduce its built-in time buffer for the arriving flight.

The results from the pilot project were encouraging and showed that it is feasible to identify the benefits

@Changi Airport Group

Singapore Changi Airport, one of the aviation partners in the Bangkok-Singapore CDM city pair trial.

and measure performance from the data collected. While a cost benefit analysis is needed to provide a more compelling case to implement CDM, the project already shows that a system wide approach can deliver benefits to all stakeholders in terms of enhanced predictability, greater flexibility and better use of resources.

The review of the trials also noted that information updates by some stakeholders were not consistent. While there was great enthusiasm in the build-up of the project, the anticipated actions during the trials were not immediately carried out. This could be due to a perception of some staff that the reliability of the information from CDM did not contribute to the potential benefits. It therefore highlights the need for the staff of all stakeholders to 'buy in' to the CDM concept so that CDM

behaviour is properly exhibited by the parties involved.

The trials also highlighted the need for greater automation in the exchange of information updates. This will relieve the burden on operators of having to enter information manually, thus leaving them to concentrate on analysing the information coming in to make operational changes or decisions.

As more ANSPs show interest in the project, driven in part by rising air traffic in what is already the world's largest aviation market, the Asia Pacific region could be among the first to combine CDM and AFTM measures within a seamless regional framework. CANSO welcomes this development and will work closely with ICAO, States, ANSPs and industry partners to help develop CDM/ATFM in the Asia-Pacific region.

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A review of European regulation

Klaus-Dieter Scheurle offers an alternative route to efficiency improvements

Klaus-Dieter Scheurle, CEO of the German air navigation service provider DFS, calls for an incentive-driven regulation scheme in Europe. This scheme should take the regulated asset base into account rather than focus on revenues and unreliable traffic forecasts.

European air navigation service providers (ANSPs) are well aware that it makes sense to have a form of performance regulation in place, especially for organisations that are monopolies like ANSPs. We are accountable for the efficient use of the funds obtained from the air navigation charges paid by our customers.

ANSPs are committed to the Single European Sky (SES) concept and legislation. It is in their interest to deliver safe services in the most efficient way across the whole of Europe. They acknowledge that airspace needs to be defragmented to reduce delays and costs, to further improve air safety and minimise the impact of air transport on the environment.

The overall mission of the ANSPs is to provide safe services for airspace users. ANSPs have a successful track record to date and the FABEC performance figures support this assertion. FABEC is the largest functional airspace block at the heart of Europe. It handles almost 60% of the air traffic in the European Union and operates at an extraordinarily high safety level. Air traffic controllers guide flights along routings that are nearly direct and ensure that they arrive on time. Furthermore, cost-efficiency is improving. During the current reference period which runs from 2012 to 2014, unit rates will fall by 6% and will result in savings of more than €270 million which will add to the value chain of the airlines. Nevertheless, it has become clear that the current regulatory approach has failed to achieve what it originally set out to do and has placed the financial stability of the ANSPs at risk.

The current regulatory model is focused on revenues that are in turn based on traffic forecasts. However, these forecasts have proven to be unreliable. Traffic has been stagnating for years and yet regulation continues to be based on over-optimistic expectations of the past. In the first reference period (2012-2014), FABEC expects a decline of €226 million in revenues due to the sharp drop in traffic volume. In 2013 air traffic in Germany, for example, has fallen more than 8% below the forecast volume used to draw up the performance plans in 2011, and is expected to fall more than 9% below the forecast by the end of the reference period.

Coupling regulation targets to forecasts puts the viability of the ANSPs at risk. The fact that the ANSPs employ highly qualified and well-paid staff and also face costly long-term investments means that they need financial predictability. They face strict labour conditions and also experience much longer investment cycles than most other industries. These conditions require that an effective economic regulation be put in place. This is needed so that the ANSPs can react flexibly to volatile conditions in the short-term without endangering the long-term stability of their infrastructure.

Without a sound financial basis, the ANSPs will not be able to meet the performance targets for capacity, environment and cost-efficiency and, at the same time, maintain the high safety standards.

The SES is based on two contradictory approaches. On the one hand, the ANSPs are required to cooperate with each other, for example by establishing FABs, SESAR and the Centralised Services. On the other hand, they must compete with each other at the same time. For example, there are efforts to unbundle services that are not a natural monopoly. What is needed is more clarity about the actual goals of SES. Is it a consolidation or is it competition? The European Commission must be decisive on this issue; otherwise the ANSPs are not in a position to move forward.

National diversity

Independent and competent regulatory bodies should be established in every EU Member State. The European Commission sets the regulation principles to which EU Member States have to adhere. However, this is not all that is needed. States need strong national regulatory authorities with the power to implement the rules in a reliable manner and the ability to take into account the differing conditions

in the various countries. These include such things as the different legal structures of the ANSPs, the vastly different pension schemes, VAT and specific airport requirements.

Economic regulation would focus on the costs that ANSPs can actually influence and manage. This would replace the current revenue-oriented approach which is based on unreliable traffic forecasts. The regulated asset-base should consist of operational costs, capital expenditures, depreciation and adequate cost of capital. While it makes sense to set high-level targets as an incentive to improve performance, it is perhaps even more important to motivate the ANSPs by rewarding them when they achieve a target ahead of schedule or at a higher level than required by the regulation. The point of regulation is always to encourage monopolies to act as efficiently as possible. Rewarding them when they perform well is also in the best interest of their customers.

Investments made under the European ATM Masterplan, for example, as part of SESAR and services contracted in a competitive manner (such as Centralised Services) or those due to European legal requirements should be excluded from economic regulation. As the overall interest of the SES regulation is to consolidate, it is also important to exclude costs for bi- and multinational restructuring activities from economic regulation.

Total economic cost

The goal and purpose of air navigation services is the safety of air traffic. At the same time, improvements in capacity or flight efficiency may impact the other Key Performance Area of cost-efficiency and vice versa, so a holistic understanding of the performance concept is necessary

The total economic cost concept is a tool used to assess interdependencies and trade-offs among the Key Performance Areas with the goal of attaining a fair balance between them. This tool is used to express all Key Performance Indicators in monetary terms. A balance needs to be ensured when defining targets for a reference period, for example, a capacity target should be linked to traffic development.

Economic regulation must not make the ANSPs alone bear the costs related to measures to increase safety or flight efficiency, while allowing customers to be the only ones to benefit from the savings.

The DFS has initiated discussions with the European Commission, airspace users and regulatory authorities on proposed changes to the regulatory model. This is in the best interest of aviation as a whole and will deliver a sustainable and reliable increase in performance. ✈

Before taking on the role of DFS CEO, Klaus-Dieter Scheurle was State Secretary at the German Federal Ministry of Transport, Building and Urban Development. As the head of the Minister's Office and later as head of the department responsible for regulation, he was in charge of the privatisation of the German Federal Ministry of Posts and Telecommunications. He oversaw the Regulatory Authority and the introduction of more competition.

New procedures boost network

Optimal flights are improving overall network efficiency and performance

A joint programme launched by Boeing and KLM aims to benefit all flights, reports Mike Caflisch, Director of Airspace Programs for Boeing's Digital Aviation Customer Solutions. Over the last few years there have been a number of programmes looking at ways to reduce fuel burn, and thus emissions, on single flights. The Atlantic Initiative to Reduce Emissions (AIRE), the Asia and Pacific Initiative to Reduce Emissions (ASPIRE) and the Indian Ocean Strategic Partnership to Reduce Emissions (INSPIRE) are all examples of airlines, airports and ANSPs working together to find the perfect flight. These have proved to be a great test-bed for what is possible.

But single flights are just that, single flights. For airlines, a single flight is interesting but what is important is that the entire network can deliver optimised flight profiles across the day, across the network.

Airlines' imperative to reduce fuel burn is well known and well understood. The less fuel burnt, the lower the emissions and, just as importantly for the airlines, the lower the airlines' costs. What is less well understood is how to do it, flight after flight, operational day by operational day.

Boeing launched a programme called Optimal Flight with the Dutch airline KLM to address these issues, specifically drawing on shared knowledge and innovative ideas to improve the efficiency of every flight. Optimal Flight is the first step in a research and development effort under a joint agreement between Boeing, KLM, Amsterdam Airport Schiphol and LVNL in the Netherlands. This agreement is an extension of an agreement first signed in 2002 to develop solutions for the sustained growth of aviation in the Netherlands.

What became clear very early on, as the programme started to look at how to optimise KLM's operations, was the need to work just as closely with LVNL, the Dutch ANSP. As a member of CANSO, Boeing has a good relationship with LVNL, along with a number of other ANSPs around the world, which made the project considerably easier. Equally important is the relationship with Schiphol Airport, which is KLM's home base.

Boeing believes an ecosystem operates in aviation, whereby all parts need to work together to optimise results. That can only happen if there is a flow of relevant data between the various players in the ecosystem. The flights feature new services that provide advisories directly into the aircraft's flight management computer (FMC) and mobile devices in the flight deck. Developed by Boeing Research & Technology, the flight services highlight applications that increase real-time situational awareness for pilots using advanced digital aviation and air traffic management concepts. They include automation to integrate the dispatch and modified versions of the flight plan and performance data into the FMC. This saves work for the flight crew, allows for real-time adjustments and reduces errors by eliminating the need to make repeated FMC entries. It also shows how important digital information is to modern aviation. It is how that data is managed and shared that will make the difference.

Boeing also worked on procedures and software applications that provide the air crew with recommendations to optimise the aircraft's speed variance, while providing real-time weather advisories in flight. This not only saves fuel, it enables more accurate waypoint arrival predictions. Boeing is using a new laboratory in Seattle to play out scenarios and options to see how they improve network efficiency and performance.

The first of the flights was a KLM Boeing 777-200 aircraft flying a round trip from Amsterdam Airport Schiphol to John F Kennedy International Airport in New York in March 2013. The programme is scheduled to continue until the end of 2013. Boeing is discussing with KLM how to take the project across the entire KLM network. KLM Senior Manager Strategy and Charges, Joost Konnen adds: "To implement Optimal Flight, we needed air traffic control centres to cooperate. We actually wanted something from them that many in KLM thought was impossible. But their response to our request was 'Perfect! We're working on that ourselves. Want to join us?' What an incredible boost!"

Furthermore, each flight is powered in part by sustainable aviation biofuel sourced from used cooking oil. This draws on Boeing's work to develop and commercialise renewable fuel sources that don't compete with food, water or land resources.

Caflisch says: "I like to think of this as the art of the possible. It combines all of Boeing's current flight efficiency projects in a single programme to demonstrate the most efficient, environmentally progressive flight possible. Furthermore, this demonstration programme is helping us determine where next to focus our research and development to deliver improvements to air traffic management and airline services for our customers."

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Collaborative flow management
Integrated flow and arrival management is saving airlines millions of dollars in fuel

©Airways New Zealand

An Airways radar controller uses the CFM/AMAN solution, now in operation for flights into Auckland, to manage traffic bottlenecks and reduce airborne holding. Photo credit: Airways New Zealand

Airline customers are benefiting from an integrated flow and arrival management solution for flights into Auckland reports Chelsea Halliwell from Airways New Zealand. Airlines are able to interact directly with the system in real time to prioritise their flights according to their own operational needs, subject to available slots, runway capacity and trajectory predictions which are updated by the system in real time.

Back in 2005, Airways New Zealand asked its major airline customers, "If we weren't here, what would you do?" That question was the catalyst for Airways to morph "from an air traffic controller to an air traffic enabler", recalls Lew Jenkins, Airways Air Navigation Systems Advisor. In an ideal world, an aeroplane's pilot would take the most direct route possible,

with no obligation to consider other aircraft. In our congested air traffic environment, however, the role of an ANSP has traditionally been to mediate an air traffic control point-to-point solution, managing the aircraft of several airlines, each with similar schedules. Airways set about resolving this issue as any customer-focused company would: it let the airlines tell it which of their flights should have priority.

The industry required a solution to the compounding effects of outdated queue management technology. Long in-flight holding patterns were commonplace, with snowballing effects. Millions of dollars were wasted in fuel consumption; CO_2 levels were on the rise; airports were planning to invest in additional runways to increase capacity, reduce holding and congestion; and the travelling public were

accumulating many hours in delayed arrivals.

Following that game-changing conversation in 2005, Airways developed its optimum flight plan for jet flights between city pairs. One key element to ensuring the success of a flight plan was the development of an effective collaborative flow manager, or CFM. CFM is an online tool that enables airlines to manage their resources and meet their business requirements, while taking a whole-of-system approach to managing airline demand into an airport. The outcome is significant – reduced airborne holding. "CFM allows airlines to move their aircraft around to best suit their fleet and their customers' needs," explains Jenkins. "It results in better on-time performance as well as reduced fuel consumption and greenhouse gas

emissions because holding patterns in the air and engine idling on the ground are significantly reduced."

CFM was installed in November 2008 and changed the entire operating environment of domestic passenger flights in New Zealand. Over one year, it reduced airborne delays into Auckland and Wellington from an average of over 28,000 minutes per month to less than 5,000 minutes per month. Since CFM was installed, airlines have saved 62 million kg of fuel; 196 million kg of CO_2 emissions; and US$62 million in fuel costs. Airways has been awarded two IT Industry Awards for CFM, recognising its use of CFM as an innovative, leading-edge use of technology.

Increased efficiency

In 2011, Airways partnered with global air traffic management software experts Barco Orthogon GmbH to integrate and deploy Barco's OSYRIS Arrival Manager (AMAN) into its CFM system. The result is a CFM/AMAN solution, in place since April 2013, which manages traffic bottlenecks and airborne holding, and provides greater certainty of optimum descent profiles for arriving flights into Auckland, one of Australasia's busiest airports.

CFM/AMAN was developed in consultation with Airways' airline customers as an integral part of the perfect jet flight profile between city pairs. "Through a process of collaboration and trust-building, we established a working model with airlines to help them manage their business in an even more effective manner," says Jenkins.

"Airways moved from a 'command and control' ANSP approach to one of enabling, and we were only able to do this once we'd established a true sense of partnership with our customers. They needed to trust that we would manage their flights in the most effective way, taking account of all the other airlines in the network. It's this commitment to customer engagement and collaboration which holds the key to the success of the Airways-Barco CFM product. The resulting performance data is clear evidence of our success."

Captain David Morgan, Air New Zealand Chief Flight Operations and Safety

Officer, agrees: "Through a high level of airline collaboration and compliance, CFM delivered a dramatic reduction in airborne delays. With the addition of AMAN, Airways is now able to further optimise the arrival for the airborne aircraft. The combined CFM/AMAN system, with the use of continuous descents and track shortening RNP AR arrivals, means Airways is well on the journey to creating a truly optimum terminal arrival experience."

Assisting on-time arrivals

This system is saving airlines millions of dollars in fuel and reducing CO_2 emissions, by making in-flight holding and air traffic management delays insignificant, especially when compared to European norms. In Auckland, airborne delay has reduced from an average of 3.5 minutes per flight in 2007 before CFM was introduced, to an average of 23 seconds per flight in 2013 with CFM – an 89% reduction. Airways measures delay based on the amount of deviation from the most efficient flight profile possible.

Airlines arriving into Auckland Airport are experiencing an additional 2-4% reduction in delay as a direct result of the

A screenshot of the arrival management system used to streamline Auckland arrivals. Photo credit: Airways New Zealand

AMAN deployment into the CFM system. Airways Chief Operating Officer Pauline Lamb says that this reduction will improve further as the system is fine-tuned. She believes the CFM technology in place in New Zealand will one day lead to a change in mind-set for the industry. "When I joined the company in 2012 I was highly impressed with what Airways had achieved. Through collaboration with airlines, we've been able to adopt this leading-edge CFM methodology, which has all but eliminated arrival delay in New Zealand."

Airways has an agreement with Barco to distribute its CFM technology to ANSPs. Lamb adds: "I'd like to put the challenge to our industry – if we're serious about delivering efficient flight profiles, let's change our behaviour to incentivise arriving on time, which is what matters most for airline passengers and the environmental and financial bottom line. Focusing on arriving on time rather than departing on time can be managed far more effectively, especially in congested airspace and airports." ✈

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Middle East capacity challenge

A stakeholder engagement group is addressing barriers to safe, efficient and seamless airspace in the region

Captain Mohammad Amin Al-Quran, Chairman CANSO Middle East Committee and Chief Commissioner Jordan Civil Aviation Regulatory Commission (CARC Jordan) explains how the Middle East ANSP, Airspace User and Stakeholder Engagement (MEAUSE) Initiative is working towards closer collaboration and regional integration.

The Middle East has become the world's fastest growing region in terms of traffic growth. What is failing to keep pace, however, is the region's airspace, and the lack of a coordinated approach to air traffic management has become one of the major constraints to growth and expansion. The airspace is fragmented and saturated and a large part is out of bounds for civilian use. If the region's air traffic management (ATM) continues to operate unchanged, the expected economic benefits of that growth may be jeopardised by an inability to manage airspace effectively. There are three key areas that need to be tackled if we are to transform ATM performance in the region.

First, airspace needs to be organised, and air navigation services need to be delivered, in line with the operational requirement of airspace users, rather than according to national borders. For too long we have suffered under the 'one State – one ANSP' model. We therefore need to look into more efficient ways of service provision. States can delegate service provision to other States and designate a service provider to provide service coverage for a larger airspace. The best solution for the region is to have a single Middle East (ME) sky or sub-regional airspace blocks. Certain ANSPs are fully aware of the challenges. However, fragmented initiatives, duplicated efforts, military restrictions and the absence of a regional strategic plan are still the major barriers which need collective efforts and cannot be solved by individual ANSPs despite all available resources.

The second issue is the limitations imposed by military airspace restrictions. The military still commandeers large tracts of Middle East airspace for its exclusive use, even when it is not actually using that airspace, forcing civil air transport operations into increasingly congested corridors. In fact only about half of the airspace across the region is open to civil aviation. This is neither environmentally friendly nor conducive to safety, and it does not exploit the sophisticated capabilities of today's aircraft. We are trying to create better coordination between the military and the civil aviation community to the enhanced financial, safety, and efficiency benefit of both. The progressive opening of military airspace to civilian operations would allow Flexible Use of Airspace, shorter routes, cost savings, fuel efficiencies and fewer delays.

The third key issue is the need to separate regulation from service provision, one of the core goals of CANSO globally. Most ANSPs in the region are owned and operated by the government bodies that regulate them, which can create conflicts of interest, and hinders the implementation of performance-driven air navigation services. A proper separation between regulation and service provision has the potential to unlock the full value so that ANSPs can concentrate on the delivery of efficient, cost-effective and customer-oriented air navigation services.

Stakeholder engagement

What is the best way and the best platform to tackle these three key challenges? The transformation of ATM performance is only possible with the full support and involvement of all States, ANSPs, airspace users, military organisations and airports in the Middle East region.

CANSO established the MEAUSE (Middle East ANSP, Airspace User and Stakeholder Engagement) initiative in 2010, with the strong support of ICAO, IATA and other stakeholders, to raise awareness of the challenges facing the region and the need for much closer collaboration and integration. MEAUSE has been instrumental in identifying the challenges facing Middle East airspace and working towards commonly agreed solutions. MEAUSE has also focussed on building structures and best practices to assist collaboration. These include developing a guide and conducting a pilot on customer relationship management (CRM); as well as conducting a pilot on airport collaborative decision making (A-CDM).

ANSPs and the industry are playing their part but it is vital that governments in the region also step up to the challenge. If we learn anything from the delays in implementing Europe's Single European Sky initiative, it is the need for political will to back change. Middle East governments fully understand the importance of civil aviation to their economies but they must now work with the industry and cooperate with each other to break down the barriers to efficient and seamless airspace management across the region. ✈

Managing a dynamic workforce

Manpower resources are fundamental to aviation growth in emerging markets

Growing aviation markets such as the Middle East need to invest in workforce management research to ensure long-term success explains Dr. Ashley Nunes, a Principal Scientist at ISA Software.

The remarkable story of aviation growth in the Middle East is due in no small part to the vision its leaders have shown in recognising the economic power of connectivity. Local governments are competing to ride the economic globalisation wave by investing in aviation infrastructure such as the US$15.5 billion airport in Doha, and US$2.94 billion midfield terminal complex in Abu Dhabi. Aircraft movements in the region are growing at an annual rate of 7.6% as passengers who have historically used London, Amsterdam and Frankfurt as layover points are increasingly switching planes in Dubai, Doha and Abu Dhabi.

Yet, despite this investment in infrastructure, aviation continues to be a human enterprise. The economic benefits afforded by aviation are dependent on a specialised workforce

and it is a workforce that is rapidly evolving. According to the Boeing Pilot and Technician 2013 Outlook, the world will require 498,000 new commercial airline pilots and 556,000 new commercial airline maintenance technicians by 2032. Additionally the international aviation community will require many more air traffic controllers and cabin crew to keep the industry moving. A White Paper published by the Aerospace Industries Association in 2008 found not enough qualified workers available to fill important aviation jobs and warns of an increasing shortfall as retirements grow in coming years. It also found countries are not producing the quantity or quality of workers required to replace those already serving the industry.

This growing imbalance between workforce supply and service demand is one of the aviation industry's greatest challenges. These shortages have many causes, but high attrition rates associated with the initial selection and subsequent training of potential recruits is among the most important. For example, Eurocontrol says the selection rate of the student recruitment campaign for air traffic controllers in 2013 was about 6%. While such standards may seem stringent, they are necessary given the safety-critical nature of the industry. The immediate consequence of reduced access to this workforce is a reduction in service provision, a move that has serious economic consequences. For example, Austrian Airlines claimed that air traffic delays and cancelled flights resulting from a shortage of controllers at Vienna International Airport produced €8 million in costs in 2008. Similarly, China and Indonesia

– two of the world's fastest growing markets – have seen economic growth impacted as air carriers cope with severe shortages in pilots. These shortages are capable of having significant economic consequences.

The most common solution to addressing these shortages has been increased workforce productivity, a move that often involves increasing shift length (i.e. working longer) or intensity (i.e. working harder). ATC service providers that wish to minimise service disruption to airlines particularly

"Economic benefits associated with increased productivity in response to workforce shortages may be offset by costs associated with limits in human abilities"

Air traffic controllers employed by Serco work at major international airports and control centres across the Middle East region.

favour this solution. However, this approach carries consequences of its own. Although these consequences are usually expressed in terms of decreased safety, recent research suggests that increasing workforce productivity carries economic consequences of its own. A study by Nunes, Borener and Crook carried out in 2012 entitled ATC Complexity, Fatigue & Service found that controller exposure to higher levels of traffic diminished the quality of efficient service afforded to aircraft by 30%. The propagation of this effect in multiple airspace sectors, at increasing frequency, across the entire schedule of an air carrier, would bring serious economic consequences. Hence, the economic benefits associated with increased productivity in response to workforce shortages may be offset by costs associated with limits in human abilities.

While this suggests that aviation workforce shortages are poised to have negative impact on global economic growth, this impact may be particularly profound in the Middle East for two reasons. First, the region's aviation industry is heavily reliant on an expatriate workforce where the majority of these skilled professionals migrate from industrialised nations which are experiencing workforce shortages of their own because of global aging. Consequently, as these workers retire and the global workforce contracts, replacing them will become increasingly difficult. And because the Middle East is disproportionally reliant on this workforce, the resulting economic impact may well be more profound compared to other regions. Secondly, the region has historically been highly dependent on income from oil and gas exports and is increasingly moving towards air travel and allied industries as a potential means of diversifying its economic portfolio. But if this diversification relies on an industry that is itself dependent on a contracting expatriate workforce, any fluctuation in workforce access is likely to profoundly impact the country's economic growth.

Governments in the Middle East acknowledge that traditional means of meeting workforce demands by importing foreign skilled labour is unsustainable, and have spearheaded initiatives to recruit local talent through nationalisation programmes. Yet, such programmes present their own challenges. First, nationalisation programmes have been implemented uniformly across all sectors, a move that does not address disproportionate workforce gaps in specific sectors (such as aviation) that are considered to be critical to the long-term economic security and welfare of the country. Secondly, the sudden influx of inexperience may impact regional air safety. An investigation carried out by Nunes, Crook and Rakopoulos in 2012 into how an evolving workforce impacts air safety risk found that safety errors are disproportionally likely to be committed by less experienced controllers. Finally, whereas nationalisation may reduce reliance on foreign labour, it cannot circumvent the cumulative effects of global aging. For example the population of the United Arab Emirates and Qatar over the age of 60 was 1.4% and 2.2% respectively in 2012. These numbers are expected to grow to 36.3% and 27.9% respectively by 2050 according to Global Age Watch. Therefore nationalisation might offer only a short-term solution because the most prominent factor in workforce contraction is an aging population.

One way forward is to explore various initiatives that examine how a diminishing aviation workforce can best be managed to accommodate increasing service demand. Such initiatives, require interdisciplinary expertise in fields such as psychology, physiology and economics, and must address fundamental research questions such as: What are the trade-offs that exist in terms of cost, safety and efficiency at varying levels of shift duration and intensity for workers? What types of technology are most appropriate to supplement workforce capabilities? And perhaps most importantly, what are the optimal conditions under which humans and technology can work together to ensure the continued safety and profitability of the aviation system? These questions are precise and timely, in that while they respect the capabilities that new technology offers aviation, they acknowledge that during unexpected circumstances, when technology is most likely to behave unreliably, humans will still be called upon to act as a backup, and fulfill their role as ultimate guardians of the aviation system. ✈

The cloud in practice
How to take advantage of cloud computing

Benoit Verbaere, SITA's Portfolio Director, Air Transport Industry (ATI) Cloud Applications, describes how to reach the cloud in four easy steps.

Cloud computing is having a significant impact on the air transport industry. The cloud gives rapid, flexible and scalable access to everything from infrastructure to specific applications over a network. By allowing organisations to consume systems and information technology (IT) virtually on demand, the cloud can increase agility, support new service models and cut costs. But the journey to the cloud is not the same for everyone. Routes vary with many factors such as maturity of IT infrastructure, the readiness of a system or application for a new distribution model, and the overall willingness to embrace change. But you can learn from the success of others and avoid their mistakes by looking at real cloud computing cases in practice.

The flexibility that cloud computing offers can help meet many of the demands that the air traffic management community faces today. This article looks at ANSPs that are – or could be – using the cloud to deliver applications to staff; air traffic management systems and software vendors that are extending their market reach by converting their applications to run in the cloud; and IT departments that are able to be more responsive to demand with a more agile service offering.

One of the first examples that the air traffic management community has embraced in the light of cloud computing has been Eurocontrol's PENS managed regional backbone service. The Pan European Network Service (PENS) enables Member States to exchange operational air traffic communications by providing an alternative to ad-hoc bi-lateral communications and contributes to increased service levels and reduced overall costs.

PENS is a joint initiative by Eurocontrol and ANSPs of Member States that provides a common IP based network service. It supports both existing services and new requirements that are emerging from future air traffic management concepts. It delivers a framework for voice and data communication and is pre-connected to the shared private Air Transport Industry (ATI) Cloud which is managed by SITA.

SITA's ATI Cloud is designed to support business-critical operations and includes service level agreements that are created for real-time ATI operations. The ATI Cloud provides end-to-end access across all regions and airports, mitigating the risk and cost of integrating multiple cloud providers with different IT and systems environments. It is specifically designed for air transport business needs and meets mission-critical industry standards.

Another example of a fully managed cloud-based offering is the Flightyield billing, invoicing and revenue collection service developed by the partnership between CANSO, SITA and Airways New Zealand. The Flightyield team recognised that ANSPs which were dealing with the complexity, inefficiency and cost of collecting air navigation charges from each individual airline separately could benefit from a different model. Flightyield is an automated service that uses a patented billing engine and a cloud-based revenue management system. It runs in the cloud and is in the process of moving to a pay-as-you-use model to appeal to medium and smaller organisations that do not want to invest in local servers and traditional software licenses.

Working with architects using cloud assessment and design workshops, the Flightyield team transitioned Airways New Zealand's proven billing application to the ATI Cloud. SITA virtual data centres adapt to the specific architecture requirements to deliver a virtual and scalable multi-
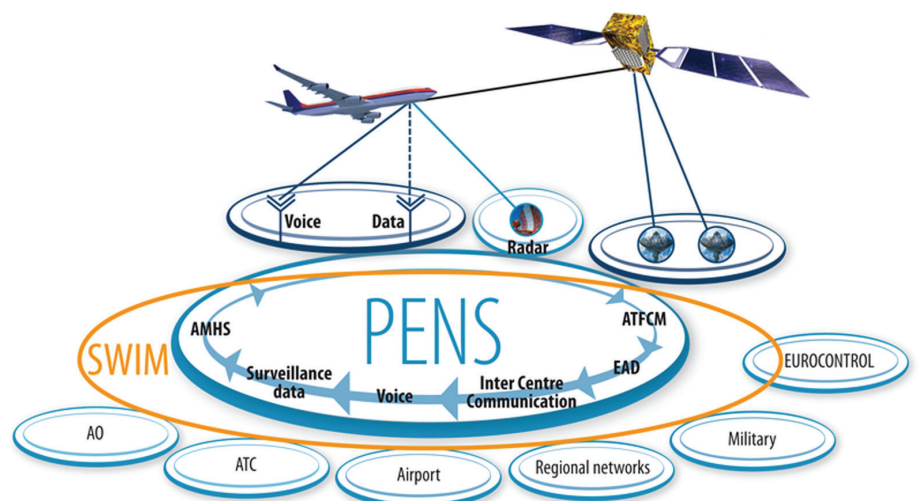
The Pan-European network service is a common IP-based network service jointly implemented by Eurocontrol and ANSPs for voice and data communications.

The Eurocontrol Network Manager Operations Centre manages air traffic flows across the European region.

tenant environment. The application uses the distribution model known as Software-as-a-Service (SaaS) in which applications are hosted by SITA. ANSP customers can go live in as little as days, compared to several months before cut-over in the previous licensing model, which relied on dedicated physical IT infrastructure at each of the ANSP's premises.

Step by step

To get the most from cloud computing, organisations need to take a detailed look at their strategic needs, operational processes and IT environment. That approach must embrace the present and the future, with considerations for governance, availability and security, and the ability of teams to take informed and realistic implementation decisions. SITA has developed a four-step methodology to help on the journey to the cloud. It incorporates assessment, design, implementation and operational support and works just as well for a single application deployment or a wider transformation project.

Step One: Whether for an ANSP looking for efficiencies or an ATM systems vendor in need of a new distribution model, the cloud works in different ways for different companies. This first step is to discover and assess the requirements. Preparation time must be set aside to understand priorities, assess opportunities and identify obstacles. What are the best sharing mechanisms, technologies, tools and processes? Is there a need to address one specific software requirement or a package with additional business intelligence and portal capabilities? Given the proliferation of material on the cloud, any preconceptions about what it can achieve must be identified and challenged.

Step two: The second step is the design phase – a detailed plan to turn ideas into action. This needs to focus on technical design, operational design, and business process design. There are many other questions here: What levels of security and availability are needed? How will the design fit and operate into an existing environment and in a relationship

with multiple stakeholders? What is the network that will be used for end users access, back-end integration and information exchange? Which of the cloud enablers are needed for now and later? With most of our industry considering security and integration as their key concern to further cloud adoption, solid design expertise is needed for a future proof setup.

Step three: This is the big step that makes it all happen and centres on implementation and transition. After an incubation phase – that allows testing in a real world environment – SITA offers a multiple development, pre-production and production setup accelerating transition to the cloudbased solution. SITA believes a phased approach usually gives more control and consolidated learning. Overall the approach is incremental bringing optimisation at each iteration.

Step four: The fourth and final step concludes this cloud journey but initiates another as cloud begins to deliver against the assessment, the design, and the technical implementation. This step is the process of support and lifecycle management, fine-tuning in response to potential user impacts, managing change, training, adding functionality, increasing capacity. Cloud requires a very specific approach to service. It supports operations and services provided simultaneously to many customers, which rightly demand a full service availability approach.

The potential exists in airspace management to provide air traffic management solutions to ANSPs "as a service" based on new business processes, integration support and robust infrastructure using networks and data centres. Leveraging best-of-breed systems and applications, a trusted cloud offering and the appropriate methodology offers the opportunity to deliver sustainable benefits to the air traffic management community. Four steps are all you need to embrace the full cloud potential. ✈

UK consults on airspace design
NATS explains how consultation lies at the heart of airspace redesign

New European legislation requires all member States to revise their airspace plans to incorporate latest technology, including Performance-Based Navigation (PBN). This also gives NATS the opportunity to modernise airspace structures to improve efficiency, and to reduce the environmental impact of air traffic reports Jane Johnston, NATS Head of Corporate Affairs.

In the UK there is a real imperative for change. Aviation is essential to trade for the UK. It is Europe's transatlantic gateway and needs to operate at maximum efficiency. UK airspace, especially in south-east England, is some of the busiest and most complex in the world; it also sits over the country's densest populations where noise is a real concern for residents.

Airlines, airports, general aviation and military have set up an Industry Implementation Group (IIG) to create a plan for delivering the UK's Future Airspace Strategy (FAS), a blueprint established by the Civil Aviation Authority and NATS, and endorsed by the UK Government.

The so-called FASIIG has now met in plenary nine times and members have also committed to working groups to explore particular aspects of implementing the technologies that will deliver the FAS. These are the technologies that underpin the European modernisation programme SESAR, which in turn makes FAS the vehicle for delivering SESAR into the UK.

For doubters who think that Single European Sky (SES) is still a long way from happening, the FAS is fast turning it into reality for the UK. The FAS Deployment Plan was published in December 2012 setting out the common lines of action needed across the aviation community.

Members of the FASIIG have signed a Memorandum of Understanding to demonstrate the broad base of

London Gatwick, where noise is the primary consideration, is leading the consultation around departure and arrival routes.

industry support for FAS and set out the roles and responsibilities of the different stakeholder groups involved. The Memorandum also provides a mechanism to capture key operational and commercial issues that shape how and when different organisations can contribute to airspace modernisation.

One of the most important issues for the plan in the near term is navigational capability. PBN is under-utilised in the UK, especially in busy terminal airspace and at low levels around airports where more precise navigation has the greatest potential to deliver safety, operational and environmental benefits. Modernising the airspace to make the most of today's aircraft performance, and developing PBN capability will deliver significant benefits including fuel savings for airlines – which will also mean fewer CO_2 emissions – and less noise overall for people on the ground.

The London Airspace Management Programme (LAMP) is a major NATS programme to deliver modernised structures and procedures across the London terminal area by 2020. Some of the improvements may be delivered as early as 2015. NATS launched a consultation on the first stage of proposed change: for airspace supporting London City, Biggin Hill, Southend and London Gatwick airports in October 2013. The new legislation makes change inevitable. The consultation is about the best way of making those changes.

It is an interesting proposition. Last time NATS consulted on suggested airspace changes, proposed routes had already been marked out. The only people who responded to the consultation were the people living under them. This time the consultation is much earlier in the design process, before route positions have been determined. Swathes of airspace within

which new routes will need to sit have been put forward.

NATS Operations Director Swanwick, and Chair of the LAMP Programme Board Juliet Kennedy said: "We are asking everyone in these geographic areas to assume that a new route may go over them and therefore to provide us with the local information they believe we should factor into designing final route positions.

"People are naturally suspicious of change and generally expect that any change will mean more noise, rather than less, or that this is all part of a wider plan of airport expansion. In fact, it is an opportunity to make what we have today work better. We need to make a real breakthrough in helping people realise that change can be good, and I hope that by delivering tangible improvements in the first phase of change, it will make consultation easier in subsequent phases."

The consultation in respect of London Gatwick is being done jointly with Gatwick Airport as it owns the low level routes below 4,000ft which it wants to change to increase the efficiency of its single runway. The working group is also exploring innovative ways of providing noise respite with additional routes which could be alternated – something that PBN makes possible.

NATS' designs include continuous climb and descent, both of which deliver fuel efficiency and noise mitigation, and new structures for holding that move away from conventional race-track holds, which are deeply unpopular. PBN enables the introduction of Point Merge which is proposed for both London Gatwick and London City with the holding structure higher up and importantly positioned to a greater extent over the sea, instead of over land.

London Gatwick Head of Corporate Responsibility Tom Denton added: "Gatwick is committed to leading the way in terms of airspace innovation and operation, which is why we were so keen to be the first major UK airport to work with NATS to fully review and consult on our airspace. As well as aiming to reduce the number of people affected by noise, this consultation is key because it will help further reduce CO_2 emissions and air quality impacts. Overall it will also

make our single runway and the airspace around much more efficient."

The challenge with a consultation like this is public distrust of any kind of change, particularly in an area which is already overflown today and will continue to be overflown in the future. But CAA guidance on airspace change is very clear in setting out the parameters of consultation:

• Below 4,000ft, Gatwick Airport leads the consultation specific to the departure/arrival routes. Noise is the primary consideration
• Above 7,000ft, NATS leads the consultation. Efficiency (fuel burn/ emissions) is the primary consideration
• Between 4,000-7,000ft, where low level and network airspace connect, NATS and Gatwick Airport are consulting jointly. At these heights there needs to be an optimum balance between noise and efficiency.

The next phase of the LAMP is planned for delivery in 2016/17 and includes re-sectorisation of London Terminal and London Area control, enabling changes to remove complexity from the airspace over London. The main phase of change for London-Heathrow, -Stansted and -Luton is planned for 2018/19. These changes are dependent on raising the UK Transition Altitude, a big change which ideally would be part of a wider mover towards European harmonisation. The UK has made a commitment to change by 2017 so that the full benefits of the LAMP proposals can be delivered.

There have been many simulations, workshops and other resource invested in the LAMP over the last three years, which have resulted in robust and workable designs. The final outcome is still incomplete and will continue to evolve even while the first phase is being delivered into operation. All phases of the programme will be subject to consultation, which will further influence design decisions. In terms of public consultation, NATS hopes that first phase delivery will give people confidence that change can be good.

The London Airspace Consultation runs until 21 January 2014 and can be viewed at www. londonairspaceconsultation.co.uk

Point Merge

Point Merge is a system by which the aircraft in a queue to land fly an extended flight path around an arc instead of holding in circles.

Aircraft fly along the arc until the next slot in the landing sequence is free, at which time air traffic control (ATC) will turn the aircraft off the arc into the landing sequence.

1 Aircraft arrive at the Point Merge arcs on a set route; this goes via a hold if there are more aircraft than a system can accommodate.

2 Aircraft fly the arcs, which are between 15 and 40 nm long, from opposite directions. The arcs are separated vertically by 1,000ft.

3 When instructed by ATC, aircraft turn towards the Point Merge, this sequencing helps ensure the most efficient use of the runway.

4 The Point Merge is where the routes merge, and aircraft pick up a fixed route to the runway.

⋯⋯ Point Merge Concept flightpath   ⋯⋯ Traditional stacking flightpath
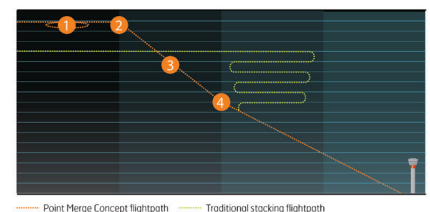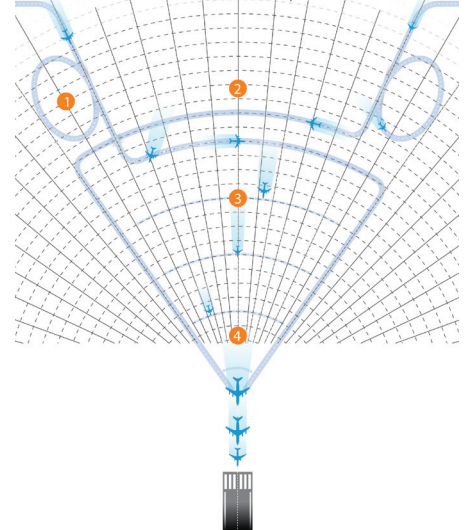
The benefits
The introduction of Point Merge will deliver a range of generic benefits, including:

Reduced delays
Point Merge helps sort the air traffic into an efficient sequence at higher levels, reducing the complexity of the operation and therefore increasing the number of aircraft the controller can handle.

Reduced area overflown at low altitudes
Air traffic control can sequence aircraft higher, and routes can be positioned to avoid areas of population and/or environmental sensitivity.

Additional continuous climbs and descents
Point Merge provides more predictability, which means pilots can plan a more gradual continuous descent, which can reduce noise and emissions. The predictable approach path of the arrivals enables us to design departure routes to avoid the arrivals allowing those departures to climb to high altitudes quicker, where aircraft are most efficient.

Reduced average fuel burn and CO_2 emissions
Reduced delays, more continuous climbs and descents, and aircraft's ability to fly more defined routes will reduce fuel burn and CO_2 emissions.

Point Merge procedures are proposed for both London Gatwick and London City airports, where the holding structure positioned to a greater extent over the sea.

Assembly approves global plans
ICAO Assembly agrees strategic plans to achieve common global objectives

The 38th Session of the ICAO Assembly, held from 24 September to 4 October 2013, was a particularly significant event. Governments agreed global policies and standards that will ensure continued expansion and successful development of the international aviation sector. Eugene Hoeven, CANSO Director ICAO Affairs explains how coordination and collaboration with industry was an underlying theme throughout the 38th Assembly, with increasing focus on common objectives and priorities.

"States took important steps that support the realisation of CANSO's Vision 2020 which will deliver the transformation of global ATM performance, and enabling aircraft operators to fly in seamless airspace, across 'invisible' borders," said Jeff Poole, CANSO's Director General. The Assembly endorsed the 1st edition of the Global Aviation Safety Plan (GASP) and the 4th edition of the Global Air Navigation Plan (GANP). Together, they provide the planning and implementation framework to ensure a safe and globally harmonised aviation system.

"The global plans are instrumental to how States and industry will work together, as they promote collaborative approaches involving all stakeholders and are supported by clear operational performance objectives in the areas of safety and air navigation CANSO and its Member ANSPs have a significant role to play in achieving our collective goals and ambitions," said Roberto Kobeh González, President of the ICAO Council.

The overarching objective of the GASP is to continuously improve the States' safety oversight capabilities, while ICAO transitions its universal safety oversight audit programme (USOAP) to a continuous monitoring approach (CMA). In this regard, the 38th Assembly noted the importance of separating the functions of regulator and service provider, a long-held CANSO policy position. They agreed that this distinction be appropriately reflected in the new continuous monitoring protocol questions regarding air navigation services provision as they relate to the new ICAO Annex 19 on safety management.

During the Assembly, CANSO also emphasised the importance of safety culture to the future enhancement of ICAO provisions related to SMS implementation, and a number of papers submitted by States cited the importance of a "Just Culture" to safety reporting – a welcome sign that the "soft side" of safety management is gaining the attention it requires from policy-makers and regulators.

The Assembly also recognised the value of industry best practices, such as the CANSO Standard of Excellence in safety management systems (SMS), for the positive role they play in improved compliance with ICAO provisions and national regulations relating to safety management. Interestingly, a proposal by Jamaica that ICAO should develop standards and guidance material for the certification of ANSPs received broad support from a number of States, and the Assembly recommended that the ICAO Council consider the proposal, taking into account the resource implications of such an undertaking. "This is a significant development," said Poole, "since CANSO's Vision 2020 includes the launch of an exercise to consider the possible development of a CANSO Safety Certificate, and now we have a number of States, particularly in developing regions, seeking guidance on the development of such a scheme, in the interest of safety and efficiency improvements."

States also approved the Global Air Navigation Plan (GANP), which provides a strategic framework for planning and implementation of operational improvements by way of the ICAO Aviation System Block Upgrades (ASBU). ASBUs provide the scalable building blocks for ATM modernisation. They comprise a package of capabilities which have the essential qualities of a clearly defined and measurable

> "CANSO and its Member ANSPs have a significant role to play in achieving our collective goals and ambitions"

operational improvement; the necessary equipment and/ or systems in aircraft and on the ground; along with an operational approval or certification plan and the standards and procedures needed for the airborne and ground systems, all supported by a positive business case. Given the importance of this new construct, CANSO has already developed guidance on business case development and cost-benefit analysis, as well as a needs and dependency analysis (NDA). In association with MITRE, CANSO will facilitate the delivery of a training programme for ASBU implementation, which generated a lot of interest during the ICAO Assembly. There was a general concern with a fragmented and uncoordinated regional approach to the implementation of system-wide information management (SWIM), the net-centric information management architecture that will support the ATM of the future. The Assembly therefore called on ICAO to take a lead role in defining SWIM standards and protocols to ensure global harmonisation. As global navigation systems evolve, States were also encouraged to develop equipment standards based on capabilities and refrain from mandating the use of specific satellite navigation systems.

The most contentious topic for discussion at the ICAO Assembly was how to curb aviation emissions, and achieve carbon-neutral growth by 2020 through the use of a global market-based measure (MBM). New technology, including alternative fuels, more efficient operations, and improved infrastructure alone would not be sufficient and the development of a global MBM is required to meet the objective. While a complex issue on which to achieve consensus among States, in the end it was agreed to develop a global MBM through ICAO. At the same time, improvements in ATM will continue to play an important role in reducing emissions and the industry has already made significant progress through real operational improvements. These include: shorter routes; techniques such as continuous climb and continuous descent operations; and more efficient routing through performance-based navigation and other measures.

Aviation security was also discussed by States, which requested ICAO to continue to address other emerging threats and risks, including cyber threats and risks to the landside areas of airports and air traffic management facilities. CANSO recently established an ATM Security Workgroup, which will help develop best practice for the ATM industry and support its future participation in the ICAO Aviation Security Panel (AVSECP.)

And finally, the Assembly endorsed the recommendations of the 6th Air Transport Conference (ATConf/6) held in March 2013, giving ICAO a stronger mandate to lead the development of a long-term vision for air transport liberalisation and the related global policy and regulatory framework. Apart from efforts in support of international air transport liberalisation, ICAO was also directed to provide guidance on the funding and financing of aviation

Roberto Kobeh González retires at the end of 2013 after seven years as President of the ICAO Council, following a long and distinguished career in civil aviation. A special luncheon was held in his honour in November, jointly hosted by the three Director Generals ACI, CANSO and IATA. In the picture, from left to right: CANSO Director General Jeff Poole, ACI Director General Angela Gittens, Roberto Kobeh González, IATA Director General Tony Tyler, and President-elect, Dr. Olumuyiwa Benard Aliu, whose three-year term takes effect on 1 January 2014.

During Kobeh's two periods of office at the Council, he has presided over many initiatives designed to further improve the safety, security and environmental sustainability of international civil aviation. The most recent, approved at the 38th Assembly in October 2013, secured agreement for global air navigation and safety plans. Kobeh also granted CANSO official Observer status at the ICAO Council and on its Air Navigation Commission. Since that time CANSO has increased its standing and its contribution to ICAO. CANSO has driven the development of best practices on a range of subjects and contributed to the formulation of policy that supports a more efficient air navigation system and the sustainable development of aviation.

CANSO Director General Jeff Poole said, "At ICAO, Roberto faced many challenges in international civil aviation with diplomacy, patience as well as firmness, drive, charm and enthusiasm. He successfully built consensus on issues that would have defeated most people, such as on aviation and the environment and on improvements in aviation safety. Roberto brought to the role, not only his broad knowledge of the aviation industry, but also his expertise and experience in air traffic management through his 20 years as Director General of Mexico's ANSP, now called SENEAM."

infrastructure development; safety, security and economic oversight functions; as well as incentive mechanisms to support the timely implementation of the aviation system block upgrade (ASBU) modules.

"The discussions during the Assembly and the decisions taken by States were in full recognition of the value of partnership with industry, and to ensure international aviation continues to develop in a safe, secure, environmentally-friendly and sustainable manner," said Eugene Hoeven, CANSO Director ICAO Affairs. "This is good news, but also carries with it the challenge for industry to deliver."

CANSO Members

CANSO – the Civil Air Navigation Services Organisation – is the global voice of air navigation service providers (ANSPs) worldwide. CANSO Members support over 85% of world air traffic. Members share information and develop new policies, with the ultimate aim of improving air navigation services (ANS) on the ground and in the air.

CANSO represents its Members' views in major regulatory and industry forums, including at ICAO, where it has official Observer status. CANSO has an extensive network of Associate Members drawn from across the aviation industry. For more information on joining CANSO, visit www.canso.org/joiningcanso.
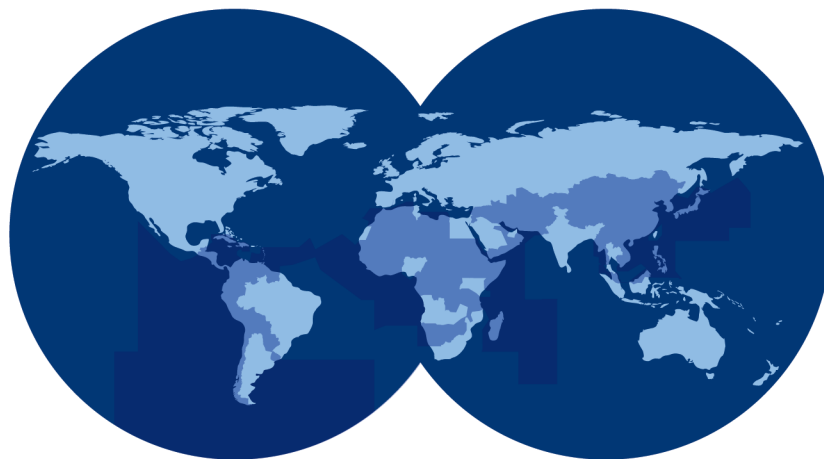
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