TOWARDS SEAMLESS SKIES IN ASIA PACIFIC

INTERVIEWS
Sarinee Angsusingha, President, AEROTHAI
Eamonn Brennan, Director General, EUROCONTROL

SPOTLIGHT
Air traffic volatility
UAS traffic management
Civil-military cooperation
New partnership models
Letter from Asia Pacific
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IN THIS ISSUE

5 DIRECTOR GENERAL
Jeff Poole explores the role of big data in managing the challenges of air traffic management.

6 SPOTLIGHT
AEROTHAI is undergoing the most important transition in its history to cope with a demand that is surpassing all expectations.

10 EUROCONTROL
Eamonn Brennan, Director General, EUROCONTROL, tells Airspace Editor, Graham Newton, that he aims to put the Agency back on the map.

15 LETTER FROM ASIA PACIFIC
Kevin Shum, Chair, CANSO Asia Pacific CEO Committee, explores how to bring the region closer to seamless ATM through collaboration and innovation.

18 CIVIL-MILITARY COOPERATION
Civil-military cooperation in air traffic management must begin with research and end in operational implementation.

20 MANAGING VOLATILITY
Air traffic volatility is forcing an increased emphasis on planning flexibility.

23 PARTNERSHIP
Partnerships continue to transform ATM even as they adapt to a dynamic market.

26 SESAR
Debating the future of SESAR Deployment Manager.

28 AVIONICS
Trying to keep on-ground infrastructure up-to-date with the avionics on board new generation aircraft may be missing the point.

30 DRONES
The fog is starting to clear around the challenge of UAS traffic management.

32 ASSOCIATE MEMBER SPOTLIGHT
Managing drones requires cutting-edge technologies as well as airspace management expertise.

33 ATM NEWS
News briefs and highlights from around the world.
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Air traffic management has always been dependent on the use of good data for safety and operational reasons but how will this change in the new era of ‘big data’?

The term ‘big data’ refers to the collection of the huge amounts of data generated each day and our ability to analyse it computationally to reveal patterns, trends, and associations across a wide range of areas. Big data works on the principle that the more you know about anything or any situation, the more reliably you can gain new insights and make predictions about what will happen in the future.

Big data has been used by airlines and airports for some time to, for example, analyse passenger needs and habits, airport throughput and behaviours, and operational information from some 100,000 flights a day. Big data can thus be used to predict potential disruptions that could cause ripples in the normal operational flow of flights and people and can allow organisations to take action to prevent or at least better prepare for what is about to happen.

What does big data mean for the ATM industry? Big data potentially gives our industry an opportunity to manage the challenges that lie ahead such as the rapid growth of air transport and how to continue to ensure the safety and efficiency of a changing airspace where balloons, autonomous airborne vehicles, drones, and transiting space vehicles are operating alongside traditional aircraft. Already we are seeing ANSPs help airlines improve efficiency: by analysing actual flown data against flight plans thereby identifying cost and fuel savings; and assessing their flight time and on-time arrival performance against other operators to identify performance gaps. The annual CANSO Air Navigation Services Performance Report and its benchmarking activities also play a big role in helping ANSPs measure performance and identify gaps.

The CANSO Global ATM Summit in Bangkok this June will examine the increasing importance and use of data as a vital tool for air traffic management. Although ATM is, and will become even more, data-intensive, it does not have any holistic approaches to the generation, management and use of the essential data that it requires. At the Summit, we will ask whether this is a fundamental strategic weakness that needs to be addressed proactively by the ATM industry or whether the fast and natural evolution of big data in ATM will be satisfactorily addressed by market forces.

The Summit will explore how the ATM industry can best ensure that the enormous amounts of data are transformed to provide the critical information and consistent key performance indicators that are needed to ensure safety, performance and sustainability. It will address the complex issues of where the essential ATM operational and performance data will be generated in future, who will ‘own’ it and how it will be managed and made available – all in an environment of increasing cyber security challenges. In short, will the ATM industry stay in control of its data requirements and own destiny or become more dependent on others?

I look forward to seeing many of you in Bangkok to discuss these and other issues at the CANSO Global ATM Summit and 22nd Annual General Meeting.

Jeff Poole
CANSO Director General
A brave new world

Aeronautical Radio of Thailand (AEROTHAI) is undergoing the most important transition in its history to cope with a demand that is surpassing all expectations.

According to air traffic forecasts, within the next two decades Asia Pacific will become the largest aviation market in the world. Of the top 20 global traffic flows, 50% will be in the region. Thailand is a key driver in this air traffic boom and is predicted to grow to be among the world’s top ten national aviation markets. In fact, the country’s air traffic is growing so quickly that it regularly surpasses even the most speculative forecast.

To better understand the dynamics, AEROTHAI is in the midst of an airspace study – being done in conjunction with NATS and due to be completed later in 2018 – looking at the design and procedures that will enable the ANSP to handle up to three million aircraft movements by 2035. This is a tripling of current traffic levels.

Sarinee Angsusingha, AEROTHAI’s President, says there has been a focus on increasing capacity and the ability to handle that increase. “We are able to benefit from improvements in airspace management, such as establishing new uni-directional routes to facilitate better flow of traffic for our major city-pairs, which also eases the complexity for our controllers.

“In fact, the Thai Cabinet has just approved the drafting of our new national airspace policy in March which will further facilitate the implementation of flexible use of airspace concept in Thailand. We are confident that we will be able to handle one million flights safely in 2018 and we plan to be well prepared for the future beyond that.”
Suvarnabhumi – Bangkok’s and Thailand’s main gateway – will benefit from an ATM system upgrade for both tower and approach, along with arrival and departure management tools, improving the efficiency performance of AEROTHAI’s service.

Multiple layers

“Well prepared” may be an understatement given the size and scope of AEROTHAI projects.

The Thailand Modernization of CNS/ATM System (TMCS) can rightly be described as a massive undertaking, covering upgrades for all air traffic control (ATC) units in Thailand.

“We are a country with many control centres and airports that are inter-connected, so we believed it would be in our best interest to upgrade the whole country within one project to ensure seamless connectivity and efficient operations,” says Angsusingha.

The main features of the new system include multi-surveillance sensor processing, greater automation and digital communication/coordination, more safety net tools and multiple layers of redundancy.

Suvarnabhumi – Bangkok’s and Thailand’s main gateway – will benefit from an ATM system upgrade for both tower and approach, along with arrival and departure management tools. Angsusingha expects this to improve the safety and efficiency performance of the ANSP’s service. A shadow operation of TMCS has already been successfully conducted at Suvarnabhumi Airport.

The improvements will be integrated into Bangkok’s two-airport environment (Suvarnabhumi and Don Mueang) and will also cope when this moves to a three-airport environment in the near future with the growth of U-Tapao airport.

Outside of Bangkok, the TMCS project covers new ATM systems for all regional approaches and towers as well. In total, six regional approach centres and 38 towers, including four military towers, will be upgraded.

“We will benefit from the enhancement to surveillance coverage with data feed from new secondary surveillance radars,” says Angsusingha. “We will introduce arrival management tools at a few major regional airports as well.

“In addition to that, we are working to interface with the airport information management system at four major regional airports. All in all, there will be major improvements for our regional units.”

Smooth transition

Air traffic flow management (ATFM) is another key development in AEROTHAI. Angsusingha notes that with the ever-growing traffic demand, ATFM has become one of the most important tools in AEROTHAI’s armory to help manage its airspace and airports.

“While we are working hard to enhance our capacity to cope with foreseeable growth, the process will take time before we can reap the benefit,” she says.

“ATFM, as a tool to balance demand against existing capacity, will thus be an important part of our air navigation service provision. We expect to use ATFM to help cope with the growing demand, manage adverse situations with reduced capacity, and assist the smooth transition to our new ATM system.”

ATFM will also be critical to enhanced capacity, resilience and safety at the regional level. Major flows of traffic in the region include traffic to/from East Asia, Middle East, and Europe.

“The concept of ATFM in Asia Pacific is cross-border by nature,” says Angsusingha. “Recognising this, Asia Pacific States have come together to develop a framework and implementation roadmap for cross-border ATFM.

“The concept being explored is focused on building a distributed ATFM network based on system-wide information management (SWIM).”

Regional network

Another crucial project that will facilitate closer cooperation at the regional level is the Common Regional Virtual Private Network (CRV).

The CRV project will create a region-wide communication network based on digital connectivity. Its implementation will create the fundamental infrastructure necessary for the future development of all aspects of ATM.

Risk management

AEROTHAI’s strategy has emphasised risk management techniques that follow internationally-accepted enterprise risk management standards, ensuring they are fully integrated into the organisation’s key processes.

Should a disruption occur, AEROTHAI’s business continuity plan – routinely practiced every year – is immediately activated. This plan covers all service areas and conforms with the ICAO regional ATM contingency plan.

“We are also considering the concept of ultimate back-up sites for our major units to ensure service provision continuity,” informs Angsusingha. “In addition, we have a strong internal audit system with direct supervision from the board of directors, which reviews the effectiveness of the company’s risk management system, internal control and business continuity management.

“With a robust reporting system and a fully integrated process of corporate governance, risk management, and compliance, we are confident of handling all possible issues and events.”
safety and flight efficiency are paramount to us
“Of course, the immediate benefit of CRV will be cost effectiveness and scalability,” explains Angsusingha. “The communication cost will be lower, while the network will be able to handle more traffic and different types of applications.

“These benefits have already been proven by similar communication networks in other regions,” she adds. “In addition to that, a key future benefit will be using SWIM to advance future communication and information exchange.”

**Simply the best**

AEROTHAI has always believed in the concept of ‘Partnering for Success’ and CANSO provides the perfect platform.

“We believed in that from day one, which led us to become a founding member of CANSO,” says Angsusingha. “We actively participate in many CANSO groups and forums and have gained tremendous knowledge from all of them.

“CANSO provides access to best practice in many aspects of air navigation service provision. We aspire to be one of the best, and CANSO helps us see what the best looks like.”

**Elusive skies**

Angsusingha warns that these developments are no guarantee of regional success. “It cannot be denied that Asia Pacific is the region with the highest diversity – and the highest number of related challenges – in terms of national interests and investment capabilities,” she says.

Nevertheless, she is confident that the elusive seamless Asian sky is on the horizon. Close collaboration and coordination to harmonise the implementation of technologies and procedures is providing the perfect platform.

Additionally, there is the Asia Pacific Seamless ATM Plan, developed by the ICAO Asia Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG), which prioritises the necessary steps.

Moreover, at the Association of Southeast Asian Nations (ASEAN) sub-regional level, there is the ASEAN ATM Master Plan. This establishes the sub-regional implementation guidelines for ASEAN Member States and is similarly aimed at progressive development towards seamless ATM services.

AEROTHAI is host of the CANSO Global ATM Summit and 22nd AGM and the CANSO Asia Pacific Conference 2018
Responding to Europe’s needs

Eamonn Brennan, Director General, EUROCONTROL, tells Airspace Editor, Graham Newton, that he aims to put the Agency back on the map.

What are your plans for EUROCONTROL?

My goal is to put EUROCONTROL back at the centre of European ATM. We have many strong activities, like the Network Manager, the Central Route Charges Office, our Upper Area Control Centre in Maastricht, and so on. And, of course, we are a major SESAR contributor in both effort and expertise.

Yet for all that, the organisation has lost its way somewhat in the eyes of many stakeholders.

I am a former ANSP CEO, and coming from that environment, I know many core stakeholders have real questions about EUROCONTROL’s role in the European aviation system, with doubts expressed about the organisation’s real added value, in the context of a European ATM environment with a whole host of new actors in recent years, and the expanding role played by the European Commission.

My aim is to reach out to all the Agency’s stakeholders, many of whom the Agency has been guilty of overlooking in past years, and to show them that EUROCONTROL provides remarkable value to the European ATM system and, crucially, can do so much more for them in the future.

I think it is vital for the smooth functioning of the European ATM system to have an organisation like EUROCONTROL. My aim is to ensure that it will be an organisation that is firmly rooted in a philosophy of responding to stakeholder needs and supporting them and their businesses.

Is it easy to get agreement among EUROCONTROL’s Member States concerning strategic direction?

I met with all the Member States before being selected as DG of EUROCONTROL. They all see the value of this organisation, but they also all see the need for us to change, to reach out to other stakeholders and to have them more involved in our work. They are really supportive of the new approach, already see improvements, and are fully behind the changes that I will put in place over the next few years.

EUROCONTROL aims to provide value to the European ATM system.
Are we getting closer to a Single European Sky?

Despite some acknowledged constraints, the Single European Sky concept still represents the only way forward. The original goal of ANSPs consolidating into functional airspace blocks (FABs), as well as increased competition for unbundled services, may not have yet fully materialised. But there is better cooperation, more integration, and enhanced performance – all of which are taking us closer to a Single European Sky.

I see the Network Manager, built on EUROCONTROL’s flow management activities, as a perfect example of how key players – States, ANSPs, airspace users – can come together to enhance capacity and flexibility and to better manage crisis situations. The recent outage we experienced on 3 April 2018 really highlights how critical a piece of infrastructure the Network Manager is to support the whole of the European network.

In the future, I see innovation in technology as the main driver for partnerships that will deliver the Single European Sky. We aim to act as the technical arm of the European Commission, playing our part in implementing the Single European Sky on a wider, pan-European level.

Are you confident you can manage the increasing demand for air travel and even reduce delays in Europe?

The Network Manager is absolutely central to managing the capacity constraints of the future and ensuring a high performing network. Roughly every ten years, traffic doubles. Yet, thanks to the efforts of the Network Manager, the efficiency gains in managing the network centrally in cooperation with all actors have kept delays in check.

The Network Manager does a brilliant job in mitigating delays and maximising network performance – but in the future, we will have our work cut out, because there are huge capacity challenges ahead.

We all know that traffic is increasing – and it will carry on growing. Last year alone, traffic was up 4.4% – meaning that the network handled close on 10.6 million flights in 2017, which will increase to 12.4 million by 2024 according to our latest seven-year forecast. These kinds of growth figures are set to continue, and if they do, there will need to be new approaches at a central level if Europe is to cope with that demand.

There are a number of ways we can address this challenge, which you will be able to read about in an updated Challenges of Growth series of reports, last published in 2013. For example, airports need to see how they can make better use of their existing infrastructure, as opportunities for building new runways are limited. Free route airspace has the potential to increase capacity, while we also aim to improve predictability by linking more airports to the network. We also have to look at building more resilience in the network. For instance, we need to see how to manage better bad weather, as this is becoming more and more of a problem.

What are the challenges in civil-military cooperation?

The philosophy behind civil-military cooperation is simply to provide a balance between economic needs and a nation’s defence requirements, making for a win-win situation. It is essential that new developments in ATM/CNS are managed by both the civil and military sides: adverse impacts have to be avoided and equal benefits have to be gained for both.

We have achieved a lot in this area over the past 20 years and the military has put a great deal of effort into establishing safe and effective processes for the flexible use of airspace. The Network Manager these days has a clear view of when military training areas will be used and so can offer extra routes to civil airspace users.

We have been closely involved in facilitating civil-military cooperation in SESAR from the beginning. Expectations are high for civil-military SESAR cooperation to provide solutions for delivering on airspace capacity, flight efficiency and military mission effectiveness.

All the same, rising civil traffic levels combined with new military requirements for remotely piloted aircraft systems (RPAS), future fighter aircraft and rapid deployment create challenges for civil-military cooperation.

We cannot just wait for SESAR to solve the problems. So, we are working on proposals for our military and civil partners on how to best tackle these high priority issues. We aim to do this through a mixture of enhanced flexible use of airspace arrangements and civil-military collaborative decision-making.

Do we have the right regulatory framework for ATM? What improvements could be made?

The role of States and ANSPs in ATM has evolved tremendously since ATM’s regulatory roots, the 1944 Convention on International Civil Aviation, the Chicago Convention.

These days, we have a mix of international conventions – the EUROCONTROL Convention, national legislation and EU regulations on establishing the Single European Sky – all regulating ATM. This is not a simple regulatory environment, to say the least.

Although I would say that nothing should prevent us from moving into a regulatory environment, which would be better adapted to ATM’s needs, both today and in the future. In my view, the stalled discussions on SES 2+ could begin again and pave the way to a SES 3, focusing on technological innovation, safety and performance, while clearly defining the roles and tasks of ATM’s main players.

Does air navigation do enough to help the aviation industry meet its environmental targets?

A lot of the efforts of air navigation are not visible, even though EUROCONTROL is very active in this regard with its environment work, let alone with more fuel-efficient solutions, such as airspace
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I do not think anyone disagrees with the need to invest properly in ATM infrastructure to ensure the long-term safety of our skies. In fact, this should stay our number one key priority when discussing ATM performance.

Design or key improvements, such as reducing vertical separation in the 2000s, or introducing free route airspace this decade.

In the 2020s, I would like to see us focus on continuous descent operations, which could generate up to 500,000 tonnes of CO\textsubscript{2} savings annually. But there are capacity concerns – perhaps misplaced – that have to be overcome. By providing more efficient airspace and route design, we will help the industry minimise the amount of CO\textsubscript{2} to be offset under ICAO’s Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), which baselines emissions in 2020.

And let us not forget noise, which is still the biggest capacity constraint around airports – understandably so. How can we use performance-based navigation, in particular, to bring maximum respite to the maximum number of people? That requires a lot of engagement with local communities, and ANSPs are becoming increasingly involved with them. We also have to agree strategies beforehand with our industry partners.

So, we do a lot but, as I said, it is largely unseen.

**How do we balance charges with investment in air traffic management infrastructure?**

Establishing charges for air navigation services and facilities is the mechanism underpinning the stable and predictable funding of ATM systems and ATM infrastructure. I do not think anyone disagrees with the need to invest properly in ATM infrastructure to ensure the long-term safety of our skies. In fact, this should stay our number one key priority when discussing ATM performance.

So, I do not see the necessity for a balancing act between charges and ATM infrastructure investment. But there is a real need to ensure that ATM infrastructure investments are made wisely on a number of levels – safety, capacity and environmental performance. They also have to draw on the best technology available, or, in other words, ANSPs will have to make certain that their investments are ‘SESAR compliant’.

What is clear to me is that if you provide reliable and efficient capacity to the network, then you should get paid accordingly.

Basically, infrastructure investments would have to be in line with the objectives I expect in SES 3 – and charges will be the instrument for funding this high-performance Single European Sky. One of the advantages of the current European charges system is that it allows for these investments to be financed without the need for outside funding.

**What are the most important emerging technologies based on your research work?**

Dynamic air traffic flow management springs to mind. This is aimed at creating a collaborative decision-making environment for all phases of flight. It will help airlines, the military, ANSPs and airports to manage congestion and crises, using a common set of information and tools.

There is also STAMS (short-term ATFM measures) for managing temporary peak loads. Airspace will be optimised with A-FUA (advanced flexible use of airspace) and departure slots swapped with UDPP (user defined prioritisation process). We will map the flight management system trajectory with the extended flight plan.

All projects targeting improved airport efficiency and throughput are critical, as big airports are the main bottleneck today. Here, we have wake vortex re-categorisation and time-based separation, both of which help add slots to saturated runways.

CCO (continuous climb operations), CDO (continuous descent operations) and PBN-based SIDs (standard instrument departures) and STARs (standard approaches) allow more efficient and environmentally-friendly approach trajectories to be flown, while still maintaining a high level of capacity and safety.

Total airport management comes with a collaborative decision-making simulation tool to help airports take airside and landside operations into consideration when deciding how to manage congestion and crises.

Another key area is RPAS ATM integration. Each category tends to be specific and needs its own safety case, but there is also a need to integrate RPAS widely into a global European drone framework. EUROCONTROL could play this integrator role.

I could mention lots more key projects, like virtual centres, remote towers, airborne collision avoidance system (ACAS-X), cybersecurity and the new integrated CNS strategy. But without going into detail, let me just stress the need to coordinate and synchronise all these projects in the context of the European ATM Master Plan.

**If you could change one thing about ATM instantly, what would it be and why?**

I would focus on enhancing the ability of the Network Manager to manage the ATM network and capacity for the benefit of all of Europe. That is the only way to deal with the huge capacity challenges that lie ahead.
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Finding common ground

Kevin Shum, Director-General, Civil Aviation Authority of Singapore (CAAS) and Chair, CANSO Asia Pacific CEO Committee, explores how to bring the region closer to seamless ATM through collaboration and innovation.

Passenger traffic in Asia Pacific averaged an increase of 7% per annum in the last decade. Forecasts project that this strong growth will continue over the next 20 years.

In trying to accommodate the growing traffic, air navigation service providers (ANSPs) in the region face several common challenges. Committed to maintaining safety and improving efficiency, the Asia Pacific ANSP community is working together to deliver our collective vision of seamless air traffic management (ATM) operations in the region.

Collaborate and progress

The Asia Pacific region covers a vast expanse of airspace spanning 49 flight information regions (FIRs), managed by more than 30 ANSPs. The ANSPs in the region exhibit a broad range of capabilities. Some are very large, with thousands of controllers, while others are significantly smaller, and employ dozens of controllers.

Nonetheless, we all face a common set of challenges. Increasing air traffic threatens to congest air routes and airports. Air traffic management will become more complex as new markets and airports develop. There is also an urgent need to refresh legacy ATM systems to cope with the increasing traffic.

A very large share of the traffic in the region is international. We will therefore need to work collaboratively to manage this increase in air traffic.

The Asia Pacific region covers a vast expanse of airspace spanning 49 flight information regions. There is already a high degree of collaboration across the region. Many useful bilateral and multilateral forums have been established for information sharing, collaboration and decision-making.

A very large share of traffic in the Asia Pacific region is international, requiring collaborative working to manage the volume increases.
The ICAO Regional Air Navigation Plan commits the region to work towards seamless ATM operations. Safety and efficiency can only be maximised when we work together. Operating unilaterally in aviation is counterproductive.

There is already a high degree of collaboration across the region. Many useful bilateral and multilateral forums have been established for information sharing, collaboration and decision-making, such as through ICAO, CANSO and the Association of Southeast Asian Nations (ASEAN). Good progress has been made in advancing seamless ATM through multiple initiatives.

One good example is air traffic flow management (ATFM) using a distributed multi-nodal network. The concept is an important step for ANSPs in the region to collaboratively enhance demand-capacity balancing in Asia Pacific.

Initially pioneered by AEROTHAI, the Hong Kong Civil Aviation Department and CAAS, 11 ANSPs and more than 36 airports have now joined the effort and work towards more seamless traffic flow across the region. A tiered approach was taken to cater to varying levels of readiness and participation. As a result, many ANSPs were able to come onboard early and witness the potential benefits. Better predictability for stakeholders through well-coordinated flow management will enhance operational efficiency and optimise capacity.

We will not be stopping there. Though multi-nodal benefits flights within the region, ATFM can also look at long-range flights to coordinate speed adjustments to aircraft during the en-route phase so as to minimise time spent in airborne holding on arrival and to better manage arrival times. Airways New Zealand, CAAS and NATS partnered to conduct preliminary trials on long-range ATFM in late 2017 and early 2018. These trials demonstrated the potential to redistribute airborne delays to the more fuel-efficient cruising phase.

**Capacity building**

Data sharing will be critical to strengthen the development of seamless ATM operations. Strong collaboration exists in implementing data sharing on automatic dependent surveillance-broadcast (ADS-B) between Australia and Indonesia; Indonesia and Singapore; Singapore and Vietnam; India and Myanmar; and Singapore and the Philippines for Southeast Asia and the Bay of Bengal.
This has resulted in significant benefits. For instance, ADS-B collaboration involving the Vietnam Air Traffic Management Corporation (VATM) and CAAS has resulted in aircraft separation on some airways in the South China Sea being reduced to 20 nautical miles (NM). This is a significant improvement in airspace capacity compared with the original separation of 50NM to 80NM.

We will see greater collaboration going forward. In 2017, the 10 ASEAN aviation ministers adopted a new ASEAN ATM Master Plan, which will enhance safety, efficiency and capacity in the region and advance the Seamless ASEAN Sky (SAS).

The five-year Master Plan is being implemented, and will cover areas to be harmonised, such as performance-based navigation (PBN) routes, ATFM, air traffic services interfacility data communications (AIDC), aeronautical information management (AIM), and common regional aeronautical virtual private network (CRV).

In 2012 CANSO established Asia Pacific safety and operations workgroups as important platforms for experts to network and collaborate on issues of priority to the region. For example, the Safety Workgroup is looking at issues such as safety culture, threat and error management, human factors and risk analysis tools while the Operations Workgroup is focused on en route PBN harmonisation and AIDC implementation in addition to ADS-B collaboration and the distributed multi-nodal ATFM.

However, there is much more that can be done. ATM is on the cusp of new paradigms and drives towards seamless ATM. For instance, there are ongoing efforts to implement system wide information management (SWIM) and data sharing to reap benefits in safety and efficiency through greater automation of ATM data exchange, harmonised information, greater transparency and a reduction in the duplication of information management.

Performance benchmarking and metrics will drive evidence-based decision making. Modelling and simulation tools will predict future scenarios and empower planners to better meet the future needs. Space-based technologies such as space-based ADS-B and IT technologies such as digital tower applications will transform and even revolutionise our concept of operations. Already, we see that global surveillance and remote augmented service provision are becoming realities.

The ATM environment is demanding and fluid. Through collaboration, unique opportunities emerge for the ANSP community to move service provision to a higher level. What we require is the resolve to find common ground and work together and to innovate. In this way, we can all reap the many economic and social benefits of enabling opportunities through aviation.

For more information about CANSO’s work in the Asia Pacific region and the CANSO Asia Pacific Conference 2018 visit canso.org

There are ongoing efforts to implement system wide information management (SWIM) and data sharing to reap benefits in safety and efficiency through greater automation of ATM data exchange, harmonised information, greater transparency and a reduction in the duplication of information management.
Civil-military cooperation in air traffic management has become a pressing issue as skies become increasingly congested. More commercial traffic and new airspace entrants – most notably drones – make efficient use of the skies essential.

Progress is being made. ICAO has long supported the flexible use of airspace (FUA) concept. In basic terms, this views airspace as a shared resource in which civil and military requirements have to be accommodated to the maximum extent possible. The military usually makes its airspace available to civil use when possible and, consequently, any necessary segregation of airspace is only of a temporary nature.

In some regions, there is a legal underpinning to FUA, for example through Single European Sky legislation in Europe, which establishes three layers in civil-military coordination: strategic, pre-tactical and tactical.

Steps are now being taken to implement advanced FUA, which introduces the idea of area modularity in airspace design. It also provides enriched data sharing between civil and military partners and performance measurement in the pre-tactical phase.

CANSO, meanwhile, is championing airport collaborative decision making (A-CDM). This is about shared processes and information so all partners have the same situational awareness in and around the airport.

By involving all stakeholders from the start, goals can be agreed from a combined perspective rather than the perspective of an individual company. It allows each partner to understand how they affect overall system performance.

In December 2017, CANSO took part in ICAO’s Second Global Air Navigation Industry Symposium (GANIS/2) and First Safety and Air Navigation Implementation Symposium (SANIS/1) in Montreal.

During a session on civil-military cooperation, CANSO highlighted the need to coordinate, collaborate, and cooperate in sharing equipment, technology, and flexible airspace, utilising A-CDM processes. Indeed, the new ICAO Manual 10088, Civil-Military Cooperation, in which CANSO was a significant contributor, details the importance of fostering a greater understanding of each other’s requirements.

One system

There have been some specific achievements at the national and regional level. Organisational willingness is very apparent in Australia, where the OneSKY project will combine civil and military operations and put 11% of world airspace under one system. There are projects in Latin America and in Europe too.

The Maastricht Upper Area Control Centre (MUAC) is providing air traffic control services to both civil and military customers in the Netherlands’ airspace above 24,500 feet.
“This arrangement concerning military air traffic service for the upper airspace, a tangible result of the National Airspace Vision, is a significant step for civil-military cooperation in the Netherlands,” says Lieutenant-General Dennis Luyt, Commander of the Royal Netherlands Air Force. “The arrangement ensures the continuity of operations as well as access to upper airspace for the military. In this way, our military mission effectiveness will remain at least at the same level as is currently the case.

“In the UK, the Airspace Management Cell is a joint civil-military organisation that enables the transit of hundreds of civil aircraft every day through airspace that would otherwise be denied to them, reducing delays, mileage, fuel burn and emissions.

There are 146 areas designated as special use airspace (SUA) in the UK. In 2016, 422,000 flights used conditional routes (CDR) through SUAs, an increase of 9% on the previous year. The UK uses the EUROCONTROL airspace management tool – local and subRegional ASM (LARA) – to support the process. LARA is now being extended to the Ministry of Defence (MOD) and will be used by it in the planning and tactical phases.

Forthcoming trials and initiatives expect to increase the efficiency of airspace management 40% through common and integrated tools.

Secure skies

There are, of course, limits to what can be achieved. NATO requirements for civil-military cooperation are very specific and aimed at ensuring a global secure environment. Rapid air mobility measures cannot be compromised.

“Military are no longer considered a source of restriction,” says Giorgio Cioni, Director Armament and Aerospace Capabilities, Defence Investment, NATO International Staff and Chairman of the NATO Aviation Committee. “Performance indicators show that military are making an effort to release airspace. On the other hand, military identifies that civil users do not use the released airspace in an efficient manner and that efforts being developed in that respect must be supported.

He suggests that civil-military cooperation should continue at local, regional and network levels to find a trade-off between civil predictability and military flexibility. “Arising concepts such as advanced flexible use of airspace should appropriately address the challenges regarding the transfer of authority and national sovereignty,” he says.

According to Cioni, greater cooperation is required in all domains. He cites two major hurdles that must be overcome for that to be achieved. “Increasing reliance on inter-connected ATM systems, new services and increased use of digital technologies, makes ATM a cyber risk environment,” he says.

There is an obvious need to share data, but that data must be secured. For the military, some operations are necessarily discreet. Transparency can be advantageous for military too, as it can act as a deterrent to show how quickly military can respond.

The work on cybersecurity civil-military cooperation extends to operating in a degrading or denied environment. Resilience is the key and redundancy that uses traditional navigational aids must be built in to any partnership.

Aside from cybersecurity, he also notes that new technology means new investments and there is no positive cost benefit analysis for military investments to improve the overall efficiency of the air traffic management system.

“For this reason, one of the solutions for the military is to demonstrate the performance of their systems is equivalent to those of the civil organisations. Performance equivalence can be a solution when the acquisition of new equipment is not possible. This concept is designed to support an alternative certification process in cases where compliance is not possible.”

Making decisions

But cooperation is not just a matter of equipping assets, but a need to be involved from the outset in the decision-making process. This can only be achieved if all actors are willing to involve the military at all levels, from strategic decisions – which may involve significant institutional changes – to technical discussions regarding standards.

“NATO, with the implementation of its Total System Approach to Aviation (TSAA), wants to ensure holistic consideration of all technical, organisational, procedural and human factors which contribute to the effectiveness of NATO missions and to the mitigation of hazards and risks to the safety and security of air activities conducted by manned and remotely piloted aircraft systems (RPAS),” says Cioni.

He insists that defence assets, such as military RPAS, should not be constrained in their operations and their integration will be carried out in a stepped approach. Additional cooperation will be required with regard to the proliferation of small drones in urban areas, he adds. “As technology evolves and new airspace users emerge, it is difficult to find a solution that fits all,” Cioni concludes. “Again, civil-military cooperation is essential from research to operational implementation to fit all airspace users’ needs.”
Traffic volatility might seem like nothing new. Since aviation began, the industry has been a rollercoaster ride of booms and busts. In fact, up until 2007 traffic forecasts were generally correct and traffic flows well established. The global financial crisis tore this predictability asunder and has been followed by geopolitical turbulence.

Traffic variations are becoming more pronounced even as the industry at large enjoys a reasonably smooth ride.

Figures from Functional Airspace Block Europe Central (FABEC) demonstrate that the devil is in the detail. Monthly figures from 2017 show traffic varied from -3.5% to +12.8% on a monthly basis compared with expected traffic. That +12.8% was in September and hides even deeper daily volatility – going from -8.5% to +19%.

ANSPs may plan for 5% growth per annum but that does not help when some days are 19% up. Variations in sector traffic can be even greater with a doubling of traffic compared to expected levels on some days. Worse, these record levels of oscillation have no discernible pattern. Saturday traffic can be strong, showing a 10% increase or it may not be noteworthy, registering perhaps a 2% increase.

Reasons for volatility

A confluence of factors has moved traffic volatility high up the agenda of ANSPs. Chief among them is capacity. Variations happened before but in Europe, and on key routes worldwide, airspace is becoming congested, particularly at peak times. In such circumstances, handling the expected traffic is difficult enough and resources are stretched.

There is no spare capacity to accommodate fluctuations. Perversely, when predictions go wrong the natural inclination is to reduce stated capacity to protect against volatility. This necessarily makes congestion – and potential traffic variations – far worse.

Other elements in increasing volatility include fundamental changes in the airline industry. Competition is fierce, and the rise of low cost carriers shows no sign of abating. Typically, these carriers have short-term planning windows and schedules can change quickly and dramatically. The predictability of summer and winter schedules has largely been consigned to the history books.
On key routes worldwide, airspace is becoming congested, particularly at peak times. In such circumstances, handling the expected traffic is difficult enough and resources are stretched. There is no spare capacity to accommodate fluctuations. Perversely, when predictions go wrong the natural inclination is to reduce stated capacity to protect against volatility. This necessarily makes congestion – and potential traffic variations – far worse.

Meanwhile, external events continue to unduly influence the industry despite concerted efforts in recent years to “shockproof” aviation.

Weather is an obvious culprit. Climate change is forcing shifts in weather patterns that meteorologists are still studying. Storms in some areas, for example, seem to be increasing in frequency and intensity. And then there are always one-off events, such as volcanic eruptions that can affect flights to varying degrees for various amounts of time.

Geopolitical tensions play their part too. Consider flights over Poland – part of the Baltic Functional Airspace Block (Baltic FAB) – in summer 2014. Tensions between Russia and Ukraine were growing and MH17 had been downed in eastern Ukraine.

Very quickly, some 150 long-haul flights a day – a crucial source of income – moved to the south and out of Polish responsibility. Meanwhile, the contested areas in the Ukraine meant a sizeable increase in short-haul flights using the south-east of Poland; growth was close to 20% in quick order when the forecast anticipated a yearly increase of just 3%. Within weeks, revenue had dropped but the workload had increased. And because of the increased military activity in the area, some flights, such as the Copenhagen-Warsaw route, were taking convoluted and inefficient paths.

The Danube FAB experienced similar shifts in traffic because of these events, compounded by the closure of Syrian and Iraqi airspace. “In 2014, Danube FAB had to cope without warning with a traffic increase of more than 20% due to the closure of Ukraine airspace,” says Veselin Stoyanov of Danube FAB / BULATSA. “To solve the situation a wide range of tactical, short- and mid-term measures had to be implemented – ranging from changes in rosters, airspace design up to new technical equipment.”

Malta, part of the BLUE MED FAB, had problems of its own. Libyan airspace shutting down cut north-south flows. Much like in the Baltic

The impact of sanctions against Qatar on Malta FIR.

Source: blumed.aero


ATC capacity attributed en-route ATFM delay at the most constraining ACCs (2017).

Weather attributed en-route ATFM delay at the most constraining ACCs (2017).
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**World ATM Congress 2019**

12-14 March 2019
Madrid, Spain
IFEMA, Feria de Madrid
www.worldatmcongress.org
Coping strategy

Given increasing volatility and the likelihood of crisis situations occurring, ANSPs need to have a strategy for dealing with such events as best as they possibly can. Short term solutions – those that can be implemented within a few days – include changing staff rostering and increasing shift duration where possible. Complexity may need to be temporarily curtailed by denying optimum profiles, for example, and using simpler – but longer – routes. This affects airlines, passengers and the environment and so should be a restricted option. Meanwhile, existing ATM systems can be explored to see how they can best handle the traffic fluctuations being experienced.

In the medium term, defined in this instance as 4-6 weeks, airspace design comes into the equation, technology can be adapted and ATCOs can be retrained on different sectors.

Longer term, up to a year out, new sectors and sector configuration can be implemented. ENAIRE has a new sector in Barcelona that borders with France, for example, and new sectors around Palma de Mallorca. There is also the opportunity to upgrade training facilities, operations rooms and critical flight information region interfaces. Most importantly, staff numbers can be increased.

High-end forecasts

But all the upgrades cost money at a time when volatility in air traffic could mean substantial revenue loss with an accompanying reduction in budget.

One way round this is to take higher-end forecasts as the planning guide. In short, make sure there is more than enough airspace capacity and more than enough ATCOs. Of course, this fails to win over other aviation stakeholders such as airlines and governments when austerity is the order of the day and efficiency the buzzword.

“How do you increase staff and invest at a time when cost cutting is still paramount and everybody talks of efficiency?” asks Ruiz. “That is a delicate balance to achieve.”

Collaboration will be vital. First, ANSPs should work together to smooth out volatility as much as possible. Smoothing out volatility necessitates a network-wide effort. Some industry experts have suggested a financial buffer would help in this regard. It would allow ANSPs that have coped well or are less affected to ‘take a hit’ in delays if they need to help the overall system.

Equally crucial is engaging with the airlines. Perhaps one flight may take a little longer, but then the ANSP can save on the next two flights by giving them optimised routes. Airlines’ flight plans are an area of concern in this regard. Not only are they routinely revised en-route due to weather or other restrictions but also they can be sub-optimal to begin with. There are various reasons for this including scheduling, a lack of investment and potential military activity.

Airlines need to part of an ongoing process rather than complaining at plans made using a high growth scenario one year and then believing that not enough capacity was planned the next.

Ideal world

The most important ingredient of all for dealing with volatility is flexibility. The good news is that this is becoming easier to achieve with modern systems that are often designed with scalability and short-term fluctuations in mind.

Finally, it must be remembered that ANSPs cannot stop a Russia-Ukraine conflict or the downing of MH17. “It may need everybody to accept that is not a perfect world and we will not be able to achieve the perfect balance,” says DSNA’s Deputy Director of Operations, Geoffroy Ville.

“Nevertheless, we can improve the overall system and that is what we must strive to do. Otherwise, volatility will continue to increase and become a key barrier to harmonised growth.”
Coalition of the willing?

Partnerships continue to transform air traffic management even as they undergo their own changes to adapt to a dynamic market.

There are many different types of partnership and collaboration in ATM – from full-blown alliances to ad-hoc expertise sharing.

Most can broadly be described as having either cost-efficiency, improved customer service or capacity building as the goal.

The major driver behind COOPANS, for example, was cost-efficiency. COOPANS consists of five ANSPs covering seven air traffic control centres, all running the same Thales-provided software. Speaking on a partnership panel at World ATM Congress, Thomas Hoffmann, Chairman of the COOPANS Alliance, said it had saved 30% on procurement and there are also savings from the joint development, testing and deployment of new systems and initiatives.

Hoffmann continued: “The COOPANS air navigation service providers (ANSPs) are quite diverse and nothing forced us into this cooperation. The idea was to save cost for small to medium-sized ANSPs. When COOPANS was formed, the European Performance Scheme was not in place. But we are able to meet the current cost-efficiency targets while moving towards greater standardisation.”

The Borealis Alliance, meanwhile, has free route airspace (FRA) as its main raison d’être. Borealis has nine ANSPs and there will be FRA across these nine States by 2022. Martin Rolfe, speaking in his role as Chair of the Borealis Alliance, noted that there are 11,000 flights daily through Borealis territory, meaning FRA will save the mileage equivalent of 25 trips to the moon, cut one million minutes of flight time and reduce CO₂ emissions by 150,000 tonnes every year.

Rolfe said partnerships succeed if “the vision for the partnership is shared and every partner stands to gain from participating. This ultimately translates into an improved service and a better travel experience for the end-user.”

Political constructs

While these examples of operationally-driven partnerships are clearly successful, other forms of collaboration are more open to question. European functional airspace blocks (FABs) are often viewed with furrowed brows – and not just by the airlines.

Three functional airspace blocks are covered by Borealis, a layer of cooperation that Rolfe was unsure adds value to the work being done. Though FABs were conceived to promote innovation and
harmonisation, they are a political construct and, as such, not an operational partnership.

“NATS has cooperated with the Irish Aviation Authority for many decades and I have no doubt that we would be working with them even if we were not in a FAB together,” said Rolfe. “The FAB necessarily introduces bureaucracy because it is a legal framework and there are procedures to go through and boxes to be ticked. The aim was to de-fragment the work, but the FAB concept has made things more cumbersome.”

This is not about sovereignty, however. According to Rolfe, it is rarely the root cause of any issues. Usually, partnership problems are more mundane and often business related. Where the money is coming from and where it is going are two oft-heard questions that derail collaborative ideas. “Sovereignty is often used just to disguise this,” said Rolfe.

Florian Guillermet, Executive Director, SESAR Joint Undertaking accepted that SESAR – the technological arm of the Single European Sky initiative – was a forced partnership too, in the sense that it was set by regulation. “But there were common objectives and that is what matters,” he said.

Forced partnerships are not necessarily enshrined in regulation either. Some have come about because there are few other options on the table. Norbert Haslacher, Frequentis Executive Board Member called such coming together a “coalition for survival rather than a coalition of the willing”.

Such cooperation inevitably exists in a hazy atmosphere, fogged by doubt on all sides, he suggested.

**Right reasons**

As the industry develops, such prescriptive partnerships will likely fade away owing to their questionable value. Partnerships must flourish for the right reasons and new trends will come to influence how collaborative efforts are formed.

Guillermet agreed that the nature of partnership must change. “The move from physical to digital assets will provide fluidity in how services are provided and what partnerships make sense,” he said. “It will be possible to deliver air traffic services from anywhere in the world to anywhere in the world. That brings exciting new opportunities to the table.”

Digitisation implies a level of automation and beyond that, artificial intelligence. So, one speculative idea is that partnerships will eventually be about algorithms. The suggestion for collaborative partners may even be made by the machine.

Digitisation also makes partnership in cybersecurity efforts more important. Guillermet noted the open nature of current communication, navigation and surveillance (CNS) technology. “People can look at aircraft positions on the Internet,” he said. “But that means it is also possible to create false information. We need to secure that information and decide who is going to pay for it. This is not just an ANSP problem though, it is an aviation problem.”

At the moment, every country has different systems and standards, which makes the sharing of knowledge and expertise difficult. But it will be vital for ANSPs to work together to build resilience in the case of an attack. It is unlikely that an attack will only affect one ANSP and even if it does that still has a knock-on effect across the network. Planning collaboratively for what happens if the cyber defence gets breached is critical.

Other factors will similarly lend themselves to greater cooperation. Many expect traffic flows to be a basis for future partnership. Popular city pairs may be a crucial platform as the skies and airports at either end become increasingly congested.

The blurring of traditional boundaries will also affect partnerships. ANSPs are moving towards being transport integrators, necessitating working with those involved in u-space, space travel, hyperloops and more.

ANSPs will consequently morph into new business models and new ways of working. COOPANS, for example, is examining how to develop the alliance to best address future needs. Options include a move to a legal entity or deepening the relationship with Thales.

Either way, Hoffman is confident that the number of partners will grow to deliver improved economies of scale as well as benefits from greater interoperability. There could be an increase in scope too with COOPANS offering services to other ANSPs.

Rolfe made two final assertions. “Partnerships will need to be seen holistically and not in isolation,” he said. “You cannot lose the focus of the organisation and partnerships must be viewed within the framework of company resources and strategy.” All partnerships therefore will need to be rooted in a core philosophy – such as providing better customer service.

“You must also retain flexibility,” concluded Rolfe. “I am not aware that NATS has ever signed up for something saying, ‘we will do this forever’. Partnerships work as long as they retain value and, in future, that value will be increasingly dynamic.”

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**Civil-Military**

One of the key partnerships for ANSPs is with the military (see article P18). In Latin America, ANSPs have traditionally been linked with the military. That has made partnerships difficult to achieve and limited in scope.

Agustín Rodríguez Grellet, President and CEO of Argentine ANSP, EANA, said that the newly formed ANSP – independent of the military – is a breath of fresh air for the region. Immediately, EANA started a dialogue with its neighbour, Brazil, to improve cross-border work and learn from an organisation that had successfully handled large increases in traffic during an Olympics and soccer World Cup.

“We are now working with Paraguay and Uruguay too,” said Rodríguez. “When there is trust, anything is possible.”

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Partnerships succeed if the vision for the partnership is shared and every partner stands to gain from participating. This ultimately translates into an improved service and a better travel experience for the end-user.
SESAR (Single European Sky ATM Research) is the technological arm of aviation’s drive towards a single European sky.

Two different bodies come under the SESAR umbrella; SESAR Joint Undertaking (SJU), which is responsible for research and development and SESAR Deployment Manager (SDM), which is responsible for coordinating and synchronising the implementation of validated network-wide technologies.

In other words, SDM is managing the deployment of those technologies which require coordinated and synchronised implementation by most, if not all, European partners – including ANSPs, airports, airlines, military, Network Manager and meteorological service providers – to be fully effective.

“Datalink services are an obvious example,” explains Nicolas Warinsko, General Manager, SDM. “The remote tower concept, meanwhile, is not within the scope of SDM as remote towers do not need network-wide coordination and synchronisation to be successful. Their viability depends purely on the local business case.”

Finance platform

SDM has a remit until end 2020, so discussion is inevitably turning towards the future. This deadline is not driven by deployment status at that time but rather the finance behind deployment. If SDM is to continue, therefore, a European Commission agreement to provide further finance is the key.

“There is a willingness to continue from all parties and it has already been stated by the members of the SESAR Deployment Alliance, the international not-for-profit association entrusted with the SDM function, that they all stand ready to continue to act as the SESAR Deployment Manager into the next decade,” says Warinsko.

“The SDM function is clearly necessary as the natural consequence following from the research and development work being done by the SESAR Joint Undertaking.”

Should there be a serious debate about SDM’s future, the work to date provides a good argument for continuing. About 70% of the Pilot Common Projects has been implemented or is being implemented. Admittedly, this covers the shorter-term projects and the remaining 30% will be tougher. But that 70% equates to some
SESAR

300 projects in 34 States involving 85 partners. €2.5 billion has been invested, including €1.1 billion in grants provided largely to ANSPs.

Cultural change

Warinsko has already overseen a cultural change at SDM that he will further enhance should the organisation continue. “Historically, ATM has been seen as the business of ANSPs,” he says. “But we have to move away from that and see ATM as a system created by partnership.

“Ownership rests not only with ANSPs but also with airlines and airports. Airlines cannot just be observers looking in from the outside and complaining when the system does not function properly.”

In fact, Air France, British Airways, Lufthansa and easyJet are part of the governance of SDM. They will soon be joined by Ryanair. These five airlines comprise the major part of Europe’s traffic. Airlines are fundamental to the governance of SDM and therefore part of the decision-making process.

“Consequently, the culture at SDM is not confrontational anymore,” Warinsko notes. “Rather, it is inclusive and collaborative with the aim to be constructive at all times. There is day-to-day interaction of expertise.”

Circulating knowledge

Thirteen ANSPs are also part of the governance of the SESAR Deployment Alliance. The aim, however, is to engage with all 28 ANSPs covered by the scope of SDM. Opinions are sought, and support earned. “We are not isolated or some opaque Brussels body,” stresses Warinsko. “We are part of the industry, working hard and circulating knowledge to support the industry.”

If SDM does get the go-ahead to carry on, Warinsko is keen to make that circulation of knowledge more effective. De-fragmenting implementation would be a key objective.

The 68 projects completed to date sounds impressive but Warinsko admits combining them into just 20 projects would have made SDM’s life easier. “Everybody taking their own little step does make things unnecessarily complex,” he adds.

The SDM General Manager would also be keen to improve the alignment between SDM and SJU. Large-scale demonstration could be the bridge between the two organisations – seeing what works and the practical implications – but Warinsko insists the time between the end of a successful demonstration and implementation can be reduced. “We can and will accelerate the SESAR lifecycle process,” he concludes.

Credit: iStock/Meinzahn

Hamburg is one of many European airports benefitting from SDM’s work.
A panel on harmonising aircraft avionics and ANSP capabilities at the CANSO Global ATM Operations Conference 2018 in Madrid in March highlighted the need for global collaboration among all stakeholders.

Conventional wisdom has avionics ahead of ANSP capabilities, which is not surprising given the ease of implementation and lack of expense compared with ATM ground infrastructure.

The worry is that this gap between the flight deck and the control tower will widen. Many aircraft have a GPS landing system (GLS) to replace the instrument landing system (ILS), for example. It provides shorter approaches, is less vulnerable to weather interruptions in the signal and has several other safety and efficiency advantages.

Chip Meserole, Director, Advanced Air Traffic Management, Boeing, also noted that the manufacturer is looking to transition to an internet protocol suite (IPS) in the cockpit. It gives greater bandwidth and readies aircraft for future data communications. IPS will allow aviation to move away from industry-specific protocols and take advantage of ubiquitous technology that has proved itself in the commercial sphere. This will greatly simplify avionics and make multi-stack architectures obsolete.

Coordinating ground infrastructure to take advantage of these upgrades is extremely difficult though. The user – the airline – has to see an operational benefit in its investments in cutting-edge technology. But that can only come about once there is critical mass in the ground capabilities.
IPS will allow aviation to move away from industry-specific protocols and take advantage of ubiquitous technology that has proved itself in the commercial sphere. This will greatly simplify avionics and make multi-stack architectures obsolete.

But every ANSP has a unique set of circumstances that necessarily affects investment decisions and resource availability. The flexibility built into such concepts as the ICAO Aviation System Block Upgrades is not readily apparent. Rather, forward momentum becomes a delicate balance between user and provider.

System-wide information management (SWIM) becomes crucial in this regard. Aircraft will ultimately be able to plug in to SWIM which essentially allows ANSPs to share accurate data in real-time. The benefits will be clear to all parties, making SWIM the fulcrum required to balance user and provider needs.

Ground to space

The Operations Conference panel argued, however, that the call for ANSPs to continually upgrade systems to match aircraft technology may be missing the point.

Stephen Angus, Executive General Manager, Air Navigation Services, Airservices Australia said that aircraft technology is actually driving ATM into space.

Airservices has two of the top 10 busiest routes in the world, Sydney-Melbourne and Sydney-Brisbane. Every day, there is pressure to deliver short-haul efficiency while incorporating the long-haul flights that hit the east coast every morning from all parts of the globe.

Nevertheless, Angus noted that Airservices will have limited radar in its network within 10 years. It has decommissioned 250 navaids and will halve the number again in the next five years. “Ground-based automatic surveillance dependent – broadcast is already becoming a legacy system,” said Angus. “We want to futureproof the system for satellite and space-based technology.”

The ground-breaking idea – in more ways than one – is to move away from infrastructure ownership. Angus revealed that Airservices’ future lies in buying a signal and not owning the equipment that supplies that signal. Once the Australian ANSP has defined its digital aerodrome service, it does not intend to build new towers or refurbish old ones.

“That is where Airservices is heading,” he admitted. “If we buy the signal then we can be agile. We are interested in service, not infrastructure. We do not say ‘user’ anymore, we say ‘customer’. That is a fundamental shift.”

Johan Glantz, Technical Affairs Director, European Cockpit Association summed up the situation from the pilot point of view. Regardless of the technologies at play and the business model, he called for ANSPs, airframe manufacturers and technology suppliers to “keep it standard, keep it simple, and keep it safe.”

IPS will allow aviation to move away from industry-specific protocols and take advantage of ubiquitous technology that has proved itself in the commercial sphere. This will greatly simplify avionics and make multi-stack architectures obsolete.

Space-based surveillance

Vinny Capezzuto, Chief Technology Officer at Aireon, which has developed a space-based global air traffic surveillance system, says the company is not driving any changes in the cockpit.

Rather, changes are being driven by ADS-B mandates across the world. “The Aireon system can process all three standards DO-260, 260A and 260B,” he says. “And if there is new standard, we can upload the information to our software. Ultimately, pilots now have surveillance where they did not have it before.”

Capezzuto notes that the Aireon system has ‘seen’ 47,000 unique ICAO codes in the sky so far so the technology of the future is working well.
If you believe the market forecasts, no matter where you are in the world the skies will soon be covered with drones. The picture these forecasts paint is of a global drone market poised like a greyhound waiting to run.

According to Goldman Sachs, $100 billion will be spent on drones between now and 2020 – and that is before it is certain that any commercial beyond-visual-line-of-sight (BVLOS) flights will be allowed by any regulator. The US Federal Aviation Administration (FAA) is predicting US drone numbers will rise 400% over the next five years.

Drones will not just be more numerous; they will be bigger. According to the US Aerospace Industries Association (AIA), spending on large unmanned aircraft systems (UAS) – weighing more than 55lb – is expected to rise from the low hundreds of millions today to $30 billion annually by 2036, driven by demand for long-haul cargo aircraft.

Mastering technology

For many ANSPs around the world, UAS traffic management (UTM) is more of a threat than an opportunity. They find themselves having to devise a UTM programme with no clear budget or timeline.

Politicians and industry leaders want to fast-track drone delivery services because of the huge economic and technological benefits they will bring. Regulators on the other hand have seen nothing like this before. Their concern is with the growing prospect of a drone colliding with an aircraft or falling out of the sky on to a bus queue, with fatal consequences.

And trying to understand how some of the fundamental technology building blocks of a future UTM system will fit together – 5G mobile phone networks for surveillance and communications, blockchain for tracking and registration, artificial intelligence algorithms for collision avoidance – requires a mastery of concepts and systems.

The roadmaps provided by the SESAR JU and the FAA provide a blueprint for the evolution of UTM services over the next 20 years but they do not say how to involve all stakeholders – including local authorities, regulators, lawyers, drone operators, standards agencies, insurance companies, environmental protection agencies, emergency services, security and law enforcement organisations – in developing a UTM management system that will take account of all the legitimate, and sometimes contradictory, viewpoints.

Making drones pay

Until recently, ANSPs have been caught in the middle of this conundrum, having to develop a UTM concept of operations and business case without even a clear legal mandate for drone safety at very low-level airspace.
One way to overcome the stakeholder involvement challenge has been to set up national drone councils involving all interested parties, with links to local, national and international research bodies and initiatives.

But in the last few months the fog has started to lift. Next year will see some pioneering ANSPs provide the first paid-for UTM services for commercial drone flights. According to the European SESAR JU U-Space roadmap, UTM foundation services (e-registration, e-identification and geo-fencing) are due to be delivered by SESAR JU by the end of 2019 and flight approval for BVLOS drone operations from 2022.

But some European ANSPs – notably those in Poland, Switzerland and the UK – are racing ahead of this schedule and are on track to provide automated authorisation of BVLOS flights around 2020 or shortly thereafter.

Popping up all over the world are UTM centres of excellence where ANSPs have forged partnerships with regulators, operators and others to give a clear insight into how the technical, institutional and financial building blocks of UTM will need to be organised if increasingly complex commercial drone operations are to be safely managed in low level and controlled airspace.

One way to overcome the stakeholder involvement challenge has been to set up national drone councils involving all interested parties, with links to local, national and international research bodies and initiatives. France has been a pioneer of the concept and the Direction Générale de l’Aviation Civile (DGAC) is hoping to authorise its first long-range drone operations by the end of the year.

In Japan, a similar public-private council has been set up to realise Prime Minister Shinzo Abe’s vision for UAS, with a strategic vision for UTM to be delivered via the ‘Roadmap for the Aerial Industrial Revolution’. The aim is to make parcel deliveries by drones a reality by 2020.

Following on from the success of the Low Altitude Authorization and Notification Capability (LAANC) programme, the US Department of Transportation announced the first 10 participants in its drone integration pilot programme in May 2018. Meanwhile, Dubai’s Civil Aviation Authority and the Civil Aviation Authority of Singapore are researching UTM concepts to support autonomous air taxi operations, with Christchurch in New Zealand not far behind.

Business plan

Some of the business case uncertainties are starting to become clearer too. ANSPs have developed a range of partnerships with flight planning software suppliers to ensure drones stay out of sensitive areas and that operators have access to airspace authorisation tools and the latest aeronautical data.

This is predominantly a free service. Most ANSPs recognise that UTM services will have to be paid for by commercial operators and there will be no government support available. They will also not be able to charge for services they provide freely today, so income from drone operations will only start with the introduction of BVLOS flights by commercial operators.

At World ATM Congress 2018 in March, Italy’s air navigation service provider, ENAV, became the world’s first ANSP to produce a public version of its UTM business plan – subject to regulatory approval – with proposed charging scales for UTM services for both recreational and professional drone operators.

Key elements from the business plan suggest investment and running costs sustainable in the mid-term with a return on investment of between the third and fifth year of operations, requiring a potential €50-60 million of operational costs to 2028 for revenues of €70-75 million.

Globally, UTM service income will be worth $517 million between 2018 and 2022, according to a study published by Unmanned Airspace, with income levels rising rapidly after that as drone flights become longer and cross more classes of airspace.

But all UTM models are vulnerable to the advance of technology. UTM is not ATM and technology providers will soon be able to provide their own autonomous, self-organising UTM systems.

Terra Drone Co. Ltd., a Japanese commercial drone service company, has already launched a fully commercialised UTM system in South Korea along with mobile phone company LG U+ to support disaster monitoring and commercial BVLOS operations.

Operators can connect to the UTM system via various portable devices, such as PC, tablet and mobile phone, and plan drone flights just by entering the destination; the drone autonomously stops flying when it recognises other drones, aircraft and birds. In an emergency, the drone deploys a parachute designed to allow it to land in a safe area.

Meanwhile, a NATS tool to allow drone operators automatic authorisation (or refusal) to controlled airspace is now used for similar requests by general aviation pilots; in the NATS concept of operations UTM means ‘unified traffic management’, rather than UAS traffic management. Within a single system of air traffic management for low level and high-level airspace, it is more than likely that many systems developed for autonomous low-level operations will soon migrate to higher levels.
Unmanned aircraft systems (UAS) are already flying more than double the number of flights that manned aircraft are flying on a daily basis.

“We have never before seen flights at the scale of UAS flights today, and we are just getting started,” says Ben Marcus, Chairman and Co-founder of AirMap, a company that is exploring UAS traffic management (UTM) on a global basis.

For Marcus, that means speed is of the essence when it comes to establishing UTM. “I would like to see faster progress,” he admits. “We hear a lot of plans set for 2022 or 2025 that utilise technologies that are available today. I would like to see full-scale UTM happen in 2018!”

Marcus believes a good UTM framework should enable safe and efficient UAS operations in low-altitude airspace. “UTM helps deconflict drone flights from one another and from manned aircraft operations, but perhaps equally important, UTM serves to reduce risk to people on the ground,” he says.

Safety, security, and nuisance risks can all be mitigated through a UTM system that provides interfaces to multiple stakeholders, according to Marcus. Civil aviation authorities, ANSPs, police, local governments and, of course, UAS operators should all be involved.

Foundational UTM services, meanwhile, should include the registration of pilots and UAS, the publication of static and dynamic rulesets, automated airspace authorisation for strategic deconfliction and saturation management, communication channels between UAS operators and relevant authorities and traffic conflict alerting.

Local or global?

A key area of UTM debate is whether rules need to be harmonised globally given the plethora of regulatory frameworks that are beginning to pop up across the world.

“There is a role for harmonisation at international and national levels, but there is also a role for local rules,” says Marcus. “It is important that international standards be set for UAS interfaces, as UAS are sold and operated around the globe.

“However, it is impossible for dynamic local rules to be determined at an international level – events such as parades on Main Street or football matches at the local stadium can only be fed into the UTM system at the local level.”

UTM will utilise an array of new technologies, such as the Internet-of-things, cloud computing, mobile networks – long term evolution (LTE) and 5G – vehicle-to-vehicle communication (including automatic dependent surveillance – broadcast, but also non-aviation standards), artificial intelligence and machine learning, to name a few.

Nevertheless, UTM cannot progress on technology alone. Marcus insists that UAS protagonists and technology giants such as Amazon, Facebook and Google will need to collaborate with ANSPs to provide the UTM framework necessary to handle this burgeoning sector.

“Modern technological approaches learned from developing large-scale distributed Internet applications can help address the opportunity, but ANSPs have deep expertise in how to manage the airspace. Accordingly, ANSPs and technology companies need to be prepared to partner together to deliver UTM services,” Marcus concludes.

ASSOCIATE MEMBER SPOTLIGHT

Be prepared to partner

Ben Marcus, Chairman and Co-founder of AirMap, believes that managing drones requires both cutting-edge technologies and effective airspace management expertise.

A key area of UTM debate is whether rules need to be harmonised globally given the plethora of regulatory frameworks that are beginning to pop up across the world.
GLOBAL ATM GATHERING IN MADRID BREAKS RECORDS

More participants than ever took part in World ATM Congress and CANSO ATM Week this year. Registration for World ATM Congress 2018 grew by 10% with a record-breaking 8,542 registrants and 237 exhibitors from 136 countries and territories.

Attendance at the CANSO ATM Week events – CANSO CEO Strategy Summit, CANSO ATM Gala Dinner and CANSO Global ATM Operations Conference – also grew, with wide representation from organisations across the ATM industry.

More information can be found at canso.org and worldatmcongress.org

DRONES EMPLOYED FOR REGULAR MAINTENANCE TO DELIVER ENVIRONMENTAL AND ECONOMIC BENEFITS

Skyguide is using drones for the maintenance of automatic landing systems at Zurich and Geneva airport, providing potential to reduce costs and operational disturbance, as well as CO2 and noise emissions.

UFA DELIVER RANGE OF ATC TRAINING SYSTEMS

UFA Inc. has successfully delivered its ATTower Simulator to Kaufbeuren ATM Training (KAT), the University of Massachusetts – Amherst, and the Royal Jordanian Air Force (RJAF).

Leidos Innovations Corporation has also selected the tower simulator to support the development of the FAA Terminal Flight Data Manager (TDFM) system.

In addition, Leidos has selected UFA Inc.’s ATCoach Global Edition Radar Simulator to serve as the test simulator for ACNZ Automation Modernization Program.

CAAS AND SEARIDGE TECHNOLOGIES COLLABORATE TO EXPLORE AI

CAAS and Searidge Technologies have signed an MoU to conduct research and development into the application of artificial intelligence (AI) in control tower operations. The collaboration will bring together the technical expertise of Searidge Technologies in smart digital airport solutions and the operational expertise of CAAS in ATM.

It will adopt an agile development approach, with feedback from operational and technical users regularly incorporated into the design of the solution.

SESAR 2020: SECOND SUCCESSFUL MULTIPLE REMOTE TOWER VALIDATION FOR THREE AIRPORTS

The SESAR 2020 project to bring the concept of multiple remotely controlled airports to the next maturity level has progressed following a successful Oro Navigacija (ON), DLR and Frequentis AG validation exercise at DLR in Braunschweig, Germany.

In the test setting, one air traffic controller provided air traffic services to three Lithuanian airports simultaneously. In a real-time simulation at the DLR Air Traffic Validation Center, six Lithuanian controllers managed extensive traffic in a mixed VFR/IFR environment, using a newly developed flight strip planning system from Frequentis AG.

JOTRON SUPPORTS AUSTRALIA’S ONESKY

Jotron AS has signed a contract with Thales Australia to supply an ATM recording system to Australia’s OneSKY programme.

Jotron’s Ricochet recorders are modular and allow an unlimited number of channels to be...
recorded simultaneously. The Ricochet recorders supplied to the OneSKY airspace integration program will cover an area of 53 million square kilometres, 11% of global airspace. The contract includes recording of audio, surveillance data and screens.

UKRAINE PREPARES FOR HARMONISATION

An Egis team, led by consultancy Helios from its Aviation Business Unit, has been chosen to support the Ukrainian State Air Traffic Services Enterprise (UkSATSE) with planning the upgrade of its communication, navigation and surveillance systems infrastructure for air traffic management.

The nine-month contract will also deliver an action plan for critical infrastructure renewal and outline technical requirements for subsequent procurement activities.

Oleksandr Dotsenko, Acting Director of UkSATSE said: “A key aim of the work is to harmonise UkSATSE ANS systems with both the ICAO Global Air Navigation Plan and the European ATM Master Plan.”

THE AEFMP INITIATIVE TO HARMONISE AIR NAVIGATION SERVICES MOVES FORWARD WITH THE INCORPORATION OF TUNISIA

ANSPs from Algeria, France, Morocco, Portugal and Spain have renewed their commitment to continue working together, now with Tunisia, to facilitate the optimum use of airspace, in line with the latest requirements and initiatives, such as the Single European Sky project.

COLOMBIAN AERO CIVIL SELECTS FREQUENTIS COMSOFT’S ADVANCED SURVEILLANCE SOLUTION TO KEEP UP WITH AIRSPACE CAPACITY DEMANDS

Frequentis Comsoft is to provide state-of-the-art ADS-B for Colombia to enhance the region’s aviation services. This is one of a number of worldwide ADS-B projects being carried out by the solution expert, but marks the first Quadrant ADS-B for South America.

SUCCEEDFUL FIFTH LAUNCH BRINGS AIREON GLOBAL AIR TRAFFIC SURVEILLANCE SYSTEM CLOSER TO FULL DEPLOYMENT

Aireon has completed the fifth successful launch and deployment of its space-based Automatic Dependent Surveillance-Broadcast (ADS-B) payloads, hosted by the Iridium® NEXT satellite constellation. The successful deployment brings the total number of Aireon payloads in orbit to 50.

DIGITAL TOWER RESEARCH LAB FOR NATS AND SEARIDGE

NATS and Searidge are to launch a UK-based digital tower research and development programme to improve efficiency, weather resilience and contingency operations at the world’s busiest airports.

The programme will centre on a brand-new state-of-the-art digital tower research laboratory located at Heathrow Airport control tower.

COOPANS ALLIANCE TO GROW FURTHER AS NAV PORTUGAL IS SET TO BECOME SIXTH MEMBER

NAV Portugal is on track to become the sixth member of the COOPANS Alliance.

COOPANS (Cooperation between Air Navigation Service Providers) is an international partnership between Austro Control, Croatia Control, Naviair, Irish Aviation Authority and LFV, created with the purpose of operating and developing a common air traffic management system.

NAV Portugal will assume the role of ‘ATM Member Candidate’ for a period of six months, after which the formal membership process will be completed.

NEW IAA AIR TRAFFIC CONTROL TOWER AT DUBLIN

The Irish Aviation Authority (IAA) has started construction of a new 86.9 metre-high air traffic control tower at Dublin Airport. This will facilitate parallel runway operations by 2021.

The new facility will be ready for single runway operation during the first half of 2020 and will be ready to facilitate parallel runway operations by 2021 when the Northern parallel runway is introduced at Dublin Airport. Dublin Air Traffic Control handled 223,195 total terminal movements and close to 30 million passengers in 2017.

ENA V ADOPTS DATALINK COMMUNICATIONS

ENA V has adopted a datalink ground-air-ground communications system across the entire Italian airspace above 8,700 metres.

The solution represents an important innovation. Every year pilots flying in Italian airspace and Italian air traffic controllers exchange approximately 30 million verbal communications, a significant proportion of which will, from now on, be delivered electronically.

In 2017, ENAV handled 1,860,000 flights in Italy.
Comprehensive and Integrated Training

Aviation System Block Upgrade (ASBU)

Methodology and Best Practices for ASBU Implementation

More Information and Registrations
http://mai.mitrecaasd.org
Aireon will harness next-generation aviation surveillance technologies that are currently ground-based and, for the first time ever, extend their reach globally to provide safety benefits to all stakeholders.

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