

# NAVIGATING AFRICAN SKIES

Addressing the key challenges facing the region



## VIEWPOINTS

Simon Hocquard, new CANSO DG  
Emanuel Chaves, Chairman and  
CEO, Aeroportos de Moçambique  
Moodie Cheikh, CEO,  
Searidge Technologies

## SPOTLIGHT

Choosing the right supplier  
Moving forward on diversity  
ATM's success stories  
New vision for Europe  
Switching to True North  
The need for primary radar



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# IN THIS ISSUE

## 5 EDITOR'S NOTE

Change is a constant in ATM. Every day brings new procedures, new technologies and new ideas.

## 6 INTERVIEW

CANSO Director General, Simon Hocquard, explains how CANSO is fit for the future of ATM.

## 10 AGM IN PICTURES

All the action from the CANSO Global ATM Summit and 23rd AGM.

## 12 MOZAMBIQUE

Emanuel Chaves, Chairman and CEO of Aeroportos de Moçambique, outlines the need for harmonisation in Africa to manage rising demand and environmental challenges.

## 14 DIVERSITY

Michael Bell, Korn Ferry, explains how global aviation can be taken to new heights through diversity.

## 18 LETTER FROM AFRICA

Hamza Johari, CANSO Africa Chair and Director General, Tanzania Civil Aviation Authority, outlines the key ATM issues and initiatives in Africa.

## 20 ACQUISITION EXCELLENCE

Fiona Thompson, Operations Director, Park Air Systems, outlines the right way to carry out a successful supplier assessment.

## 22 ATM SUCCESS STORIES

The six finalists for the *CANSO Award of Excellence in ATM* each highlight the extraordinary progress being made in air traffic management.

## 26 ASSOCIATE MEMBER

Moodie Cheikh, CEO, Searidge Technologies, explains why flexibility is vital for a sustainable, modernised industry.

## 28 RADAR

Why the rudimentary technology of radar still has an important role to play in maintaining safe skies.

## 30 EUROPE

How a pan-European strategy will help to drive efficiencies and cater for rising demand.

## 32 TRUE NORTH

NAV CANADA is leading industry efforts to move away from magnetic north to true north, improving safety and saving millions of dollars.



6

CANSO



10



14

CANSO



22



28

NATS



30



32

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# Embracing the changing nature of ATM

**Change is a constant in our industry. Every day brings new procedures, new technologies, new ideas and new people.**

CANSO is not immune to these changes and in this issue of *Airspace* we welcome the new Director General, Simon Hocquard, with an in-depth interview (page 6). It's recommended reading because it gives clear indications of the future direction of CANSO – the voice of ATM. The association has a big role to play in how the industry tackles the challenges of today and tomorrow, and Simon sets out his immediate agenda to ensure CANSO remains relevant.

One of Simon's priorities is encouraging diversity (page 14). CANSO has been instrumental in a major industry study, *Soaring Through the Glass Ceiling*. One of the authors of the study, Michael Bell of Korn Ferry, takes us through the key findings.

Another item on the new DG's to-do list is a stronger regional focus. Each region has different needs and different resources. Ahead of the CANSO Africa Conference, we speak to Emanuel Chaves, Chairman and CEO of Aeroportos de Moçambique, who explains Africa's harmonisation efforts and the potential benefits of this work (page 12).

We also hear from Hamza Johari, CANSO Africa Chair and Director General, Tanzania Civil Aviation Authority (page 18). He outlines five issues that Africa must tackle: improving aviation safety; the implementation of infrastructure; a shortage of financial and human resources; improving training; and the need to separate operational responsibility from regulatory oversight.

Europe, meanwhile, has an ever-increasing amount of air traffic to accommodate (page 30). The peak summer season has become synonymous with delays but, following the report of the Wise Persons Group, a way forward has been identified. The ten

recommendations noted in the article may be aimed at relieving European congestion, but they will resonate globally as the demand for air navigation services continues to surge.

Two other aspects of change are worth noting. First, it is not just about the big picture. The day-to-day brushwork of the industry must also be transformed. The latest in our series on Acquisition Excellence (page 20) details the improvements that can be made in procurement while True North (page 32) explores a new direction in navigational calculations. Primary radar, on the other hand, is about constant reinvigoration (page 28). The technology still has something to offer and software advances keep it fresh. All these actions build the foundation for greater development.

Second, change is a collaborative effort. Moodie Cheikh, CEO, Searidge Technologies, makes this and several other salient points (page 26). And we see it most explicitly in the success stories, based on the six finalists for the inaugural CANSO Award of Excellence in ATM (page 22). These are compelling stories that highlight the extraordinary progress being made in ATM. All required input from multiple sources, a sure sign that partnership is fundamental to the future.

Let me leave you with a comment on change from Albert Einstein: "The world as we have created it is a process of our thinking. It cannot be changed without changing our thinking."

I hope you find this issue of *Airspace* thought provoking. Happy reading!

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Front Cover Image: CANSO/Emma King





Credit: CANSO

# Fit for the future of ATM

New CANSO Director General, Simon Hocquard, explains why a member-focused strategy will give CANSO an even stronger voice.

## What will you bring to the role of CANSO Director General?

My background has certainly focused my thinking on what I believe are the priorities for the ATM industry and for CANSO. I worked as a controller (many years ago), and also held a variety of operational and senior management positions in NATS dealing with strategic and aero political issues. There is also my position as Chairman Network Management Board in Europe and as a member of the Wise Persons Group, as well as two years working at CANSO seeing ATM around the world close up.

It is an incredible honour to lead this organisation. Understanding what our members need by listening to them will be at the heart of

everything we do. Alongside the member-centric approach will be a renewed focus on strong industry advocacy and communications as well as an emphasis on regional support.

CANSO today is ready to take the necessary steps to deliver these goals. The organisation is in good shape and there is an excellent foundation for our work going forward. My task is to ensure CANSO is ahead of the curve; that it is, and remains, relevant.

## How can ATM be made more visible to governments and stakeholders?

CANSO is established as the global and regional voice of air traffic management (ATM) but it is important we get governments and other partners in the aviation value chain to really listen to and act on that voice. We have to make sure that when governments or partners have a question about ATM, they know CANSO is the organisation to turn to for an answer. We must ensure CANSO is the first port of call.

That is why I am putting a greater focus on communications than we have in the past. We need a bigger presence to achieve that. We will need to increase our digital presence as well as our physical presence. That means doing more online and getting out to the regions as much as possible.

CANSO must be in a position to influence policy across the globe for the benefit of its members. It has to get across its messages, explain its positions, broadcast its expertise and insight. And that can't come just from me. All CANSO staff must be involved in this communications push, as well as members, our workgroups

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and task forces, and our industry partners. For example, when we make the case for investing in and modernising ATM infrastructure, our industry partners should also convey the same messages to governments. All will consequently benefit.

### What are your regional priorities for CANSO?

Regionally, we have to talk authoritatively about the important issues and there must be a strong member focus in our dialogue. Importantly, we must remember that is not one-size-fits-all but solutions can be tailor-made.

For example, in South America, CANSO is doing a lot of work, especially on performance-based navigation (PBN) and air traffic flow management (ATFM), from which everybody can benefit. To maximise those benefits, I am looking to increase membership as much as possible.

In Africa, the Mombasa Roadmap on implementing ATFM is an excellent initiative for the entire continent that has to be delivered and the Africa ATM Safety Peer Review Initiative is improving safety standards. In Asia Pacific, we are concentrating on a regional training collaboration initiative aimed at further enhancing different aspects of ATM through training and human resource development.

The Middle East is about getting countries to work together, and it will be important to bring operations together in an environment where everybody can learn from each other. Europe, meanwhile, is all about advocacy. The ANSPs in the region don't necessarily need too much technical help but they certainly need CANSO to be involved in, and influencing, policy debates.

Regionally, we have to talk authoritatively about the important issues and there must be a strong member focus in our dialogue. Importantly, we must remember that is not one-size-fits-all but solutions can be tailor-made.

### What technologies will come to the fore?

In terms of technologies, CANSO can provide the all-important strategic overview. Our *Fit for the Future* initiative is exploring technologies that could be adapted for ATM.

People know about the technologies that are already transforming the industry, such as space-based surveillance and digital towers, but we also need to look beyond the horizon and beyond the boundaries of ATM. CANSO can let its members know what is coming. Blockchain has enormous potential, for example, and how it works with system wide information management (SWIM) will be a really interesting development. It should let everybody see the same picture at the same time. Big data will enable levels of analysis that will improve flight efficiency.

I think the industry is in an exciting place right now. These new technologies will bring an entirely new way of thinking. How air traffic moves through airspace is going to change. And the ATM



CANSO takes a regional approach to navigating the future of ATM in Asia Pacific.

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industry needs to be at the forefront of that change because if we don't do it, there is a danger that somebody else will.

### Will drones and space travel have an impact?

Certainly. Anything that travels through the air needs ATM in one form or another. We all know that the emergence of new, diverse airspace users is a challenge but one we are rising to. I think we have been absolutely right to welcome all new airspace users and to seek ways to safely accommodate them.

The key is working with the new users to find solutions. For example, I am delighted that several UAS traffic management (UTM) organisations have joined CANSO as members and we are working with the UTM industry to ensure that UTM is interoperable with existing ATM. We are also leading the ICAO UAS Steering Group to ensure regulation is appropriate and effective.

Regarding space travel, we are also working with ICAO and others to safely integrate operations in and through controlled airspace for space vehicles.

### Will the evolution of ANSP business models be significant to the industry's development?

Different business models are appropriate to different places and countries. Again, there is no one-size-fits-all. It is the output from the business model that is important and not the business model itself. CANSO is happy to support any model that has the right output.

And though we might use the phrase "market-based" that does not have to mean privatisation. That just means that there should be some form of performance contract with customers and suppliers and a focus on output.

### Isn't the level of investment affected by the business model?

The only time the business model comes into play is when it is an obvious obstruction to the right level of investment and the right output.

The industry certainly needs to improve the level of investment in infrastructure but CANSO will provide support for every ANSP member regardless of the business model. It is important to be pragmatic and find the best way forward for each ANSP. That is how you remain relevant.



Ensuring that UTM is interoperable with existing ATM is a key issue.

Different business models are appropriate to different places and countries. Again, there is no one-size-fits-all. It is the output from the business model that is important and not the business model itself. CANSO is happy to support any model that has the right output.

### Can you tally pragmatism with partnership and harmonisation, which are so important to solving industry issues?

The concepts work perfectly together. The industry definitely needs partnerships and harmonisation because they are about promoting and implementing best practices and the process and procedures that create seamless operations.

They are not, however, about ANSP A and ANSP B necessarily using the same technologies and the same business model.

Partnership and harmonisation work through the sharing of knowledge and data and the best way to ensure you are in a position to share those abilities is by doing what is right for you. Again, it is about the output. How you get there will be different for each ANSP.

### Is CANSO doing enough to encourage gender diversity?

Among CANSO staff, we have more women than men right now. However, across the aviation industry, women are under-represented. CANSO has collaborated in a global study on women in leadership with other industry bodies and Korn Ferry, which has produced a report, *Soaring through the Glass Ceiling* (see page 14).

This initiative will determine how the aviation and aerospace industries can more effectively recruit and advance women into leadership roles. Encouraging greater participation by women in the industry is an important goal for CANSO and its members.

### How can the industry get its environmental message across to the public?

There is no doubt that the environmental debate is heating up again. The industry needs to be constantly vigilant to ensure it is always doing everything it can to address its environmental impact.

All the measures we take to improve efficiency, shorten routes and reduce delays save emissions and we need to ensure we position procedures such as free route airspace, PBN, ATFM and others as environmental measures.

I would like to get to a point where airspace infrastructure and air traffic management is not a factor in the environmental debate. That means being able to fly airspace users from point A to point B using the most efficient path possible with no constraints. To get there will take hard work every day.

It is that kind of effort that will ultimately win the environmental debate. In addition, we will continue to work with ATAG and other industry associations to present a cross-industry approach to tackling the climate change impacts of aviation. ➔



# Delivering our future skies today



The hills are alive with the sound of music, Swiss-style at the Welcome Reception.

A record-breaking 275 delegates from 63 countries and territories attended the CANSO Global ATM Summit and 23rd AGM. CANSO's flagship member event, it was kindly hosted by skyguide in Geneva, Switzerland, with lead sponsor Aireon, on 17-19 June.

The event brought together key industry players for extensive discussions about the importance of cohesive partnerships, driven through shared data, collaborative decision-making and a common sense of purpose.

The CANSO Global ATM Summit also highlighted significant success stories of CANSO Members, who presented a selection of initiatives delivering progress across the ATM industry. The inaugural CANSO Award of Excellence in ATM, voted for by CANSO Members, went to Aireon, NATS and NAV CANADA for their joint project to deploy space-based ADS-B in the North Atlantic (see page 22).



A packed audience for the opening of the CANSO Global ATM Summit at Geneva's Intercontinental Hotel.



Panels of subject matter experts provided intriguing insight and debate on major ATM themes including human performance management.



Domaine de Penthes was the venue for a lively Welcome Reception full of Swiss character, kindly hosted by skyguide.



ATMs hot topics were discussed at every opportunity making the CANSO AGM one of the premier events in the calendar.





Aireon, NATS and NAV CANADA took the inaugural CANSO Award of Excellence in ATM, for their joint project to deploy space-based ADS-B in the North Atlantic.



skyguide hosted a spectacular dinner and drone show at the Bâtiment des Forces Motrices.



Delegates had a great opportunity to network, meeting friends old and new to discuss ATM and forge important business links.



A swathe of exhibitors provided key insights into new technologies.



Collaborative approach: Keynote speakers Alexandre de Junaic, Director General and CEO, IATA and Angela Gittens, Director General, ACI (centre), flanked by David McMillan, Gatwick Airport Non-Executive Director (left) and Jeff Poole, former Director General, CANSO.



# Moving to the same rhythm

Emanuel Chaves, Chairman and CEO of Aeroportos de Moçambique (ADM), explains recovery efforts following a devastating cyclone and the need for harmonisation.



Credit: ADM

## How have the cyclones affected your infrastructure?

The cyclones that occurred in Mozambique earlier this year severely affected aviation infrastructures and systems. The most affected airport was Beira. In terms of infrastructure, the passenger and cargo terminals were badly damaged, and all the buildings lost their roofs, windows and fencing.

The systems were also affected, with the destruction of electric poles, vertical signals, wind direction indicators, runway lights and so forth. Navigational aids such as VHF omni-directional range (VHF), instrument landing system (ILS), automatic dependent surveillance – broadcast (ADS-B), and the aeronautical fixed telecommunication network (AFTN) also stopped operating.

However, after the cyclones, strong efforts were made to re-establish a safe and efficient operational environment and most of the infrastructures and systems resumed operation quickly.

## What are your plans to upgrade infrastructure and systems across the country in the next few years?

The main plans to upgrade infrastructure and systems across the country in the next few years will focus mostly on the rehabilitation of runways at a number of main airports, including Vilankulos, Chimoio, Mocimboa da Praia, Lichinga, Tete and Nampula.

We will also modernise and extend passenger terminals at Beira, Quelimane and Nampula and construct a new tower for Vilankulos airport.

More generally, the company intends to purchase and install new VHF and high frequency communication systems; to modernise the fixed communication systems through the migration from AFTN to the ATS message handling system for fixed message handling; and to acquire new firefighting vehicles and ambulances for airports and aerodromes.



Credit: iStock.com/Shams

Aeroportos de Moçambique – based in Maputo – has made regional harmonisation a core part of its strategy.





Credit: Christian Volpatti

LAM Mozambique's struggles have affected Aeroportos de Moçambique's plans.

### Has LAM Mozambique's struggles affected your strategy?

Definitely. Our communication navigation and surveillance / air traffic management (CNS/ATM) implementation strategy has been affected in the medium and long term since income revenues are not as planned.

But though LAM Mozambique is operating with some financial constraints that impact our company as an ANSP, we will continue operating according to the standards and recommended practices from ICAO and CANSO.

### Are you getting enough funding to make the required upgrades and, in general, what more can be done to persuade governments to invest in ATM?

We have a good relationship with the government, and we are aligned in terms of ensuring appropriate safety levels for operations in our airspace.

### With such a large oceanic airspace to cover, does space-based ADS-B interest you?

Space-based ADS-B certainly interests us. It is a crucial tool for safe and accurate navigation operations, especially in oceanic and remote areas.

### How are you cooperating with neighbouring airspaces and how important is regional harmonisation to more efficient airspace?

There have been various actions taken towards regional harmonisation to ensure more efficient operations in the airspace. The regional ANSPs share the very small aperture terminal (VSAT) network and a number of bilateral or multi-lateral agreements are used to share expertise and experiences among the ANSPs in the region.

We have agreements with TCAA (Tanzania) and ATNS (South Africa) and similar understandings with adjacent flight information regions, including Harare, Antananarivo, Johannesburg, Lilongwe and Lusaka.

### Do you find it easy to recruit controllers and is there more the industry could do to help ANSPs attract new talent?

In our experience, it is easy to recruit controllers. The aviation industry is an attractive proposition in Mozambique. Generally speaking, it is a promising and well-paying career compared with other professions.

### In general, what do you see as the main challenges for ANSPs in the years ahead?

The main challenges for ANSPs in the coming years will be related to the modernisation of the CNS/ATM systems in line with the global and regional plans of ICAO and CANSO.

In Mozambique, we will need to adopt processes and procedures to maintain our operations and provide technical staff with the necessary skills according to the requirements and recommendations of best practice in the aviation industry. This will enable us to cope with the increase in traffic in the Africa region in the years ahead.

### Are technical skills required to lead an ANSP or do you think business ability is more important in the modern environment?

Both elements are important to lead an ANSP. But since the aviation industry is very specific in the technical skills required, this element perhaps has a slightly more important role for the success of ANSP operations in the modern environment.

### If you could change one thing about the industry, what would it be and why?

It would be good to establish a mechanism that allows the ANSPs to move to the same rhythm in terms of access not only to technology but also to staff qualifications and management processes, regardless of their financial and technical capacity.

This would help to build a harmonised environment for ANSPs and also improve service delivery for the airspace users. ➔

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# Diversity by design



Michael Bell, Korn Ferry, explains how global aviation can be taken to new heights through diversity.

Credit: iStock.com/VectorStory

**For several months, the aviation industry has been embarked on a multi-sector, multi-faceted global study of the key enablers and inhibitors of the advancement of women into leadership roles in the industry, with a focus on identifying specific, actionable best practices.**

Why was the study – *Soaring Through the Glass Ceiling* – undertaken? Whereas women have made great strides in many professional fields and industries, there remains a gap in critical leadership roles in aviation and aerospace. Simply put, the industry has not kept pace with other sectors on this vital issue.

For example, women account for only 5% of airline pilots (International Society of Women Airline Pilots), and, according to IATA, only about 3% of CEOs in aviation are women. The numbers look somewhat better in air navigation, with female leadership in the range of 15%–25%, depending on the organization. Pockets of success do exist in airports, with female CEOs representing upwards of 30% across major US airports.

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Whereas women have made great strides in many professional fields and industries, there remains a gap in critical leadership roles in aviation and aerospace. Simply put, the industry has not kept pace with other sectors on this vital issue.

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But the progress has not been sufficiently fast, nor uniform. This critical study is a first in many regards, being the first truly global industry study on gender diversity, the first involving almost all parts of the aviation/aerospace ecosystem and the first focused on identifying a comprehensive, actionable set of best practices for all stakeholders.

A key success factor has been the involvement of several major aviation industry and professional associations – Aerospace Industries Association (AIA), Airlines for America (A4A), Airports Council International – World (ACI), Civil Air Navigation Services Organisation (CANSO), International Air Transport Association (IATA), and the International Aviation Women's Association (IAWA) – all in close collaboration with Korn Ferry.

In this regard, the study has benefitted from the collective experience, expertise, reach, and influence of virtually all elements of the aviation and aerospace value chain.

## Activity streams

The methodology for the study has comprised four streams of activity: (i) a global survey of four key stakeholder groups – women, business leaders, human resources leaders, and education leaders; (ii) global interviews of representatives of the same four key stakeholder groups; (iii) case studies of best practice organizations and leaders; and (iv) insights from Korn Ferry's Diversity and Inclusion Practice.

Judging from the response rate, the industry is hungry to both discuss and make real progress on this important topic. Over 2,400



individuals responded to the survey – a 27% response rate. Over 60 business leaders, including many CEOs, readily agreed to share their time for interviews.

Various ANSP leaders have been active participants in the interviews, including but not limited to those from Airways New Zealand, Air Navigation Services of the Czech Republic, Civil Aviation Authority of Singapore, Dutch Caribbean Air Navigation Service Provider, Indra Navia, NATS, and NAV CANADA. Several original equipment manufacturers and service providers to the ANSP industry have also been active participants.

## Primary inhibitors

The first goal of the study was to secure an understanding of the actual inhibitors to the advancement of women into leadership roles in the industry. Through a variety of means, the study has identified five primary inhibitors:

1. A lack of opportunity for advancement or upward mobility
2. A lack of female executives or board directors
3. An unclear understanding of potential career paths
4. A male-dominated industry
5. The challenges associated with navigating the double bind - be warm/be tough.

This was born out through the survey results with 49% of female respondents citing the lack of opportunity for advancement as a critical inhibitor. Moreover, only 60% of female respondents feel that their voice is heard and only 34% feel that they are treated similarly to men.

Shifting to potential solutions, our study revealed that the two most important enablers for the advancement of women in aviation and aerospace are the representation of women in leadership and women serving as role models and clear and unequivocal communication that gender diversity is a strategic priority on the part of business leaders.

The more women ascend to leadership and governance roles, the easier it is for others to follow. As such, those organizations that have taken the bold, ground-breaking steps to advance women are accelerating progress for all others. This has been readily demonstrated by Teri Bristol, Chief Operating Officer of the Air Traffic Organization of the Federal Aviation Administration.

As Bristol shares, "Since I was promoted into the COO role, I have made sure that our leadership team is diverse. Although only 18% of the FAA Air Traffic Organization is gender diverse, three of my eight vice presidents are now women. That has set the example for my organization going forward."

Regarding communication, leadership behaviors count, both substantively and symbolically. When the industry sees leaders both articulate and then act on the value of diversity and inclusion, people take note and act accordingly.

As former CANSO Director General Jeff Poole said, "When I look at the air traffic management industry and at organisations that have been successful relative to diversity, I see that the change is driven from the top – from the CEO and the board. Under their leadership, they have put in place structured programmes to deliver on objectives, with elements across the entire employment life cycle."

## Key findings

The key findings emerging to date from our study can be organized into four broad themes:

Diversity and inclusion is a driver of economic value.

Gender diversity and inclusion become a source of value creation when embedded as the way of doing business.

Diversity and inclusion is informed by analytics.

Organizations need evidence-based D&I strategies, key metrics to measure progress, and stakeholder accountability. The study's survey has helped to set the data foundation and identify key enablers and inhibitors of progress.

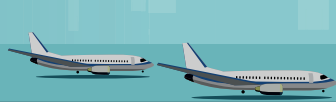
Diversity and inclusion is a shared responsibility.

This includes the need for change and action on the part of all stakeholders – industry associations, business leaders, human resources leaders, women, men, mentors, sponsors, and activists. As an example, business leaders are responsible for removing systemic barriers to women's advancement and eliminating biases in decision-making. Women are responsible for continuing to tenaciously drive their own development and performance. Men are responsible for understanding the unique challenges women face in the workplace and developing their inclusion skills.

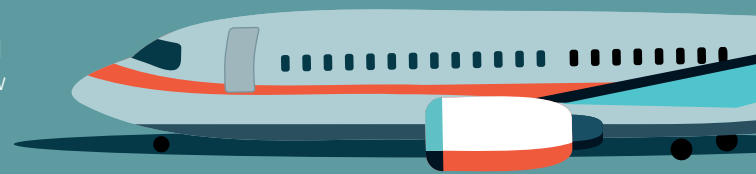
The industry must embrace collective learning and action.

Industry stakeholders will benefit from deeper knowledge and success stories from peers to help each other and the industry make greater progress on gender diversity.

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# THINK METRON

Metron Aviation is helping the Air Traffic Flow Management industry minimize delays, reduce fuel costs and balance demand with capacity. Metron supports customers with a variety of ATFM tools and services that include decision management, post operational reporting and analysis, weather translation, environmental impact, assessment services, and advanced interactive ATFM simulation training.

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Credit: Airways New Zealand

Inherent in improving the intake of women into ATM is changing the perception of careers in the sector.

## Structure and behavior

Practically speaking, what can, and should, organizations and leaders, at various levels, do to make real progress? Our study has determined that real change in diversity and inclusion (D&I) occurs when actions are taken on a combination of both structural and behavioral dimensions.

Structural means inclusive and equitable structures, processes and practices while behavioral incorporates an inclusive mindset, decisions and actions – both individual and collective.

Our study, to be released in Q3 2019, will highlight specific and actionable potential solutions that are both structural and behavioral in nature across each stakeholder group. Though business leaders are but one of those stakeholder groups, their actions can get the ball rolling.

In terms of behavioral actions, leaders must unambiguously and repeatedly communicate gender diversity as an organizational priority. As Harris Corporation CEO Bill Brown has pointed out, “Every CEO says that diversity is important and most companies have good programs in support of it. But, when I say it, it’s personal. I have two daughters and three sisters, and I believe that every woman should have an opportunity to be as successful as I was. When you make it personal, and speak with true passion about it, people hear it.”

Similarly, the leadership at Spain’s ENAIRE has taken specific action to address the representation of women. María López

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Real change in D&I occurs when actions are taken on a combination of both structural and behavioral dimensions. Structural means inclusive and equitable structures, processes and practices while behavioral incorporates an inclusive mindset, decisions and actions – both individual and collective.

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Fernández-Pacheco (Responsible for Corporate Social Responsibility at DG Cabinet Office, ENAIRE) noted, “We now have four women among the 10 members of our management team when just four years ago, we had only one. That should help us attract and select more women going forward. We are also working to establish a network of women to help each other, but also need men to actively help women break through the barriers.”

Structurally, gender D&I programs should be integrated into the business, not as standalone/parallel or human resources efforts. “It’s also about what you do every day and how you run your business; it’s not a fad or something you provide a report to the board on once a year,” added Brown.

In addition, D&I must be embedded in all human capital decisions including composition and performance of teams while gender diversity performance should be incorporated into leadership evaluation.

Specific objectives for female representation at all levels is desirable with performance measured against those objectives. Martin Rolfe, NATS CEO said, “Attracting women into the front-line roles has been a historical challenge. We are working hard to get more women involved in STEM (science, technical, engineering, mathematics) roles. This has included signing up for the Women in Aviation Charter, a joint initiative of industry and government in the UK with 48 signatories including NATS. Through that, we have set 5-6 major commitments relative to diversity and now report on our progress on a regular basis.”

Inherent in improving the intake of women into the ATM sector is changing the perception of careers in the sector. “We are working to get around the issue of the nerdiness or macho factor of a career in air traffic control,” Rolfe continued.

“We are making it known that you don’t have to be a plane-spotter to enjoy the business, that you can be an archaeologist and still be an air traffic controller. Part of the solution is getting over the issue of shift work, which can be a real issue for some women.”

The full results of the study will provide a robust and striking set of potential actions for all stakeholders to draw on to have a meaningful impact. Taken collectively, these actions should finally give women the wings to soar through the glass ceiling. ➤

# Key challenges in African ATM

Hamza Johari, CANSO Africa Chair and Director General, Tanzania Civil Aviation Authority, outlines key ATM issues and initiatives in Africa.



Hamza Johari outlining how the Mombasa ATFM Roadmap can address key challenges in Africa.

**Aviation provides connectivity, access to markets and contributes to significant economic and social benefits. The latest (2018) economic report by the Air Transport Action Group (ATAG) calculates that air transport supports over six million jobs in Africa and contributes around US\$ 65 billion in GDP, some 2.6% of GDP across all Africa countries.**

Air transport in Africa is a comparatively young industry with only 2% share of the global aviation market (98 million passengers), but it also has huge potential for growth as it services a large and rapidly growing population. With traffic forecast to grow at around 5% a year, the task of ATM is to manage this growth, safely, efficiently and cost effectively so Africa can reap the full economic and social benefits of aviation.

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However, this is far from easy! In the annual report of the CANSO Africa Region to the CANSO AGM this year, we identified five key challenges that we need to address: improving aviation safety by tackling the continuing absence of safety management systems (SMS) in some ANSPs; the lack of proper implementation of infrastructure; a shortage of financial and human resources; improving the training and development of operational staff; and the continuing need to encourage separation between the provision of air navigation services and responsibility for regulatory oversight.

I wanted to use this *Letter from Africa* to expand on these challenges and offer some thoughts on addressing them. Hopefully it might generate some thinking and discussion in advance of the CANSO Africa Conference in September, which I and Tanzania CAA are proud to host in Dar es Salaam.

## Enhancing safety

Safety is the industry's number one priority and CANSO Members are leveraging regional partnerships to meet global safety goals. In some Africa ANSPs there is lack of proper infrastructure and maintenance, inadequate training and development of the operational staff and a lack of standardised policies and procedures or means to evolve and implement best practice in safety management.

The CANSO Africa ATM Safety Peer Review Initiative was established in 2015 to address these issues, bringing to the forefront the need



for a standardised, measurable, sustainable approach to improving safety and other operational issues across the region.

Created for ANSPs by ANSPs, the initiative works by encouraging African ANSPs to assess each other's safety management systems (SMS) and other operational requirements, share experiences and learn about measures for making improvements in safety and operational performance.

This unified approach to implementing best practice helps to harmonise safety standards, enhance data analysis and safety risk management, and improve safety performance measurement across the region. Fifteen reviews have been successfully conducted thus far.

There is still a long way to go and I am pleased that ICAO is putting pressure on States, whether they are CANSO members or not, to take part in the initiative. ICAO is mandating all ANSPs in the region to implement the Peer Review recommendations by 2022. Hopefully, this will ensure that over the next two years all ANSPs will have safety management systems in place and will have embarked on the process to improve their SMSs.

## Modernising operations

The ICAO Aviation System Block Upgrades (ASBUs) represent the best opportunity for States to modernise ATM infrastructure. CANSO members in Africa have identified six priority areas in implementing the ASBUs in Africa: performance-based navigation (PBN), continuous descent operations (CDO), continuous climb operations (CCO), implementing safety management systems (SMS), improving runway safety, and implementing airport collaborative decision making (A-CDM).

Implementing the ASBUs has been a challenge for some States and ANSPs. Many international aerodromes do not have a PBN approach and some only have visual approach procedures.

To progress the implementation of the ASBUs, CANSO has organised a number of workshops over the years. The latest, in April 2019 looked at progress in implementing ASBU Block 0, assessed the challenges for the participants, helped establish clear understanding on the components of the ASBU framework, assisted participating organisations in completing the Air Navigation Reporting Forms (ANRF), and assisted CAAs and ANSPs in determining the way forward in the implementation and prioritisation of the ASBUs in their national plans.

CANSO's recommendations to States in Africa to ensure the ASBUs are implemented include measures to address the issue of missing flight plans (over 80% of missing flight plans globally are attributable to Africa) and collecting and sharing all data related to them with ICAO. CANSO has made it clear that the interoperability of ATM systems is vital to the safe implementation of the ASBU modules.

Modernising ATM infrastructure is helped by new technologies coming on stream such as automation, space-based ADS-B and remote and digital tower technology. These enable ANSPs in Africa to leapfrog to the latest systems without the expense of building ground-based infrastructure. Aireon's space-based surveillance system is now live and it has already signed data service agreements (DSAs) with ANSPs in Africa covering 19 States.

The Mombasa ATFM Roadmap will also make a difference. Signed at the CANSO Africa Conference last year, the roadmap commits African ANSPs to create and support a CANSO air traffic flow management (ATFM) and collaborative decision-making (CDM)

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CANSO is working with States and regulators to raise awareness of the important role of ATM in increasing connectivity, enhancing capacity, improving efficiency of airspace, and ultimately delivering economic benefits worldwide.

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initiative to help to further improve the safety, efficiency and effectiveness of African airspace.

## Securing skills

Lack of financial resources is a key issue for some African States when developing their air navigation services. It is the role of States to ensure adequate finance is available to invest in modern, efficient ATM infrastructure that can manage increasing demand. Efficient and effective ATM requires long-term planning and stability but necessary investments in ATM are often underfunded by governments, which are faced with competing budget priorities from, for example, education, healthcare and security. In addition, procurement processes for purchasing new systems and equipment are often lengthy, bureaucratic and costly.

To tackle this issue and encourage States to invest in ATM infrastructure, CANSO is working with States and regulators to raise awareness of the important role of ATM in increasing connectivity, enhancing capacity, improving efficiency of airspace, and ultimately delivering economic benefits worldwide. We are urging States to develop more robust ATM implementation plans to guide funding priorities; and also encouraging States to adopt a more holistic view of ATM, recognising the importance of ATFM and regional airspace initiatives, rather than just operating within national boundaries.

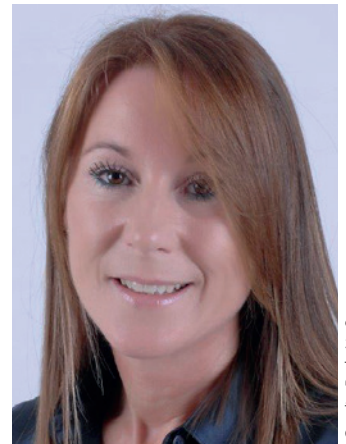
People are our most important asset. To handle the growth of air traffic safely and efficiently, Africa needs to ensure it has well-trained ATCOs. By the mid-2030s, the aviation sector globally is forecast to need a further 620,000 pilots and 125,000 air traffic controllers. CANSO works closely with the ICAO Next Generation of Aviation Professionals (NGAP) programme, promoting initiatives to inspire the next generation of science, technology, engineering and mathematics (STEM) professionals. But we still need to do more work on training and retaining other ATM staff to address the high turnover of maintenance personnel and improve training to ensure ATM equipment is maintained properly.

New technologies such as digitisation and artificial intelligence are not only transforming ATM performance but also changing the role of air traffic control staff and the skills they require now and in the future. CANSO recently launched the *CANSO Standard of Excellence in Human Performance Management* to help ANSPs to manage these changes and to improve human performance.

There is one final area where we are asking States to act to improve efficiency. One organisation having responsibility for both regulation and service provision acts as a constraint. Most ANSPs in Africa are owned and operated by the government bodies that regulate them, which can create conflicts of interest and hinder the implementation of performance-driven air navigation services. Separation unlocks value, enabling ANSPs to concentrate on the delivery of efficient, cost-effective and customer-oriented air navigation services. ➤

# Assessing potential suppliers

In the third of a series of articles for *Airspace* on best practice in procurement, Fiona Thompson, Operations Director, Park Air Systems, outlines the right way to carry out a successful supplier assessment.



Credit: Park Air Systems

**Stakeholders involved in supplier selection will undoubtedly ask: how do I ensure that the supplier I choose will fulfil my organisation's needs?**

Supplier selection is a business process undertaken to evaluate suppliers. By following a few key steps, you can reduce the risk of choosing the wrong supplier.

## External data

Assessing suppliers is an information gathering exercise that should involve a myriad of stakeholders within the organisation and also the evaluation of independent external data.

An assessment is comprised of both formal and informal processes. The informal part of an assessment will usually be done prior to the release of any formal process, such as a request for information or a request for proposals, but it can also run in parallel.

The informal part of an assessment should first include discussions with any internal stakeholders who have previously used this supplier. Their feedback will be invaluable as they will have real life experience with the capabilities and shortcomings on delivering within the organisation.

Experiences of other companies can also be extremely valuable. Reaching out to other companies as to their experience with a particular supplier can provide you with a different perspective than those of your internal stakeholders.

Researching the financial viability of a supplier should also be part of your review. A financial assessment system can easily be accessed to ensure that the supplier has a sound financial footing.

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## Formal criteria

The formal part of an assessment should contain an evaluation of the following key areas.

**Capability:** Does the supplier have the technical capability to produce the product or perform the service you need? This assessment can be done by questioning specifically how the supplier plans to deliver the goods or services and demanding a detailed account of key steps. Requesting evidence of previous implementations within the marketplace is also recommended.

**Capacity:** Does the supplier have the resources required – in people and equipment – to satisfy their current order backlog, their future forecast and to fulfil your requirements? This assessment can be more difficult. Requesting the supplier to identify the number of personnel or hours tied to key steps in your evaluation can help. Key personnel clauses in your terms and conditions can also ensure that the initial 'A Team' that is usually presented during an evaluation process is kept on for the life of a project.

**On-time delivery:** Does the supplier have an acceptable on-time delivery record, and does its lead-times meet the requirements of your organisation? This is where your informal investigations can prove useful but within the formal process you can include penalty clauses or liquidated damages for late delivery. Negotiations and discussions with the supplier around these obligations will be telling in how comfortable they are with the timelines.

**Quality:** Does the supplier have an adequate management system – such as ISO 90001 – or other controls and standards to demonstrate that it can adequately manage its quality?

**Pricing:** Does the pricing of the products or services reflect the value of the product?

**Business continuity plans/disaster recovery:** Does the business have a robust, well-documented business continuity plan in the event of a disruption?

**Cybersecurity:** Does the supplier have sufficient protection from a cyberattack that would disrupt its everyday business continuity?

**Information security:** Does the company understand its obligation regarding the control of personal data?

**Terms and Conditions:** Does the company have acceptable terms and conditions, including payment terms, that can be agreed by both parties?



**Safety and ethics:** Does the supplier demonstrate both a safe and ethical working environment? This evaluation can include whether the supplier has a code of conduct that has become a best practice within an organisation.

**Social Responsibility:** Does the business show social/corporate responsibilities when conducting its business, including such areas as the environment and health and safety?

Once the above areas have been assessed, risks can be analysed. Having all this data, as well as the data on the product/service in a weighted format will allow you to make an informed decision on which is the most suitable supplier for your business and for the requirement you have.

### Other considerations

Sometimes suppliers will be selected out of convenience or necessity due to the speed with which the product or service is required. As long as the risks to the business are low and the product or service being procured is not overly complex, this can be acceptable. However, to ensure that costs are as competitive as possible, this is not recommended as a best practice.

There may also be instances of stakeholders requesting the use of a particular supplier. This should not stop the business from following their normal selection process. If the vendors are found to be unsatisfactory, then this should be discussed with the customer and a solution sought.

### Performing the assessment

A supplier assessment is usually performed by the supply chain/procurement functions in conjunction with internal stakeholders, such as engineering or operations. You may wish to also include quality assurance or related teams. The advice of legal counsel, insurance and tax personnel can also be sought to evaluate the global risk.

A supplier assessment is usually performed by the supply chain/procurement functions in conjunction with internal stakeholders, such as engineering or operations. The advice of legal counsel, insurance and tax personnel can also be sought to evaluate the global risk. Should urgent business requirements mean the selection process needs to be expedited, the risk to the business should be assessed and mitigation plans produced to ensure all risk is kept to a minimum.

Should urgent business requirements mean the selection process needs to be expedited, the risk to the business should be assessed and mitigation plans produced to ensure all risk is kept to a minimum. The advantages of approving the supplier rapidly must outweigh the risk of not following the process.

Once approved, the supplier's performance against the above criteria should be monitored by the relevant parties quarterly, and their records updated accordingly. Relevant parties usually include members from the purchasing, quality, engineering and technical departments although others may be applicable depending on the product or service. ➔

*The next article in this series will examine best practice in working collaboratively.*



## CANSO Acquisition Excellence

The *CANSO Acquisition Excellence Manual*, breaks down the walls to often complex and time-consuming procurement processes and procedures, and provides insight and guidance on acquisition best practice.

Find out more about how your organisation can save time, money and resources and become a better industry partner.



[canso.org/publications](https://canso.org/publications)

# The meaning of success

The six finalists for the inaugural *CANSO Award of Excellence in ATM* each have a compelling story and highlight the extraordinary progress being made in air traffic management.



Credit: CANSO

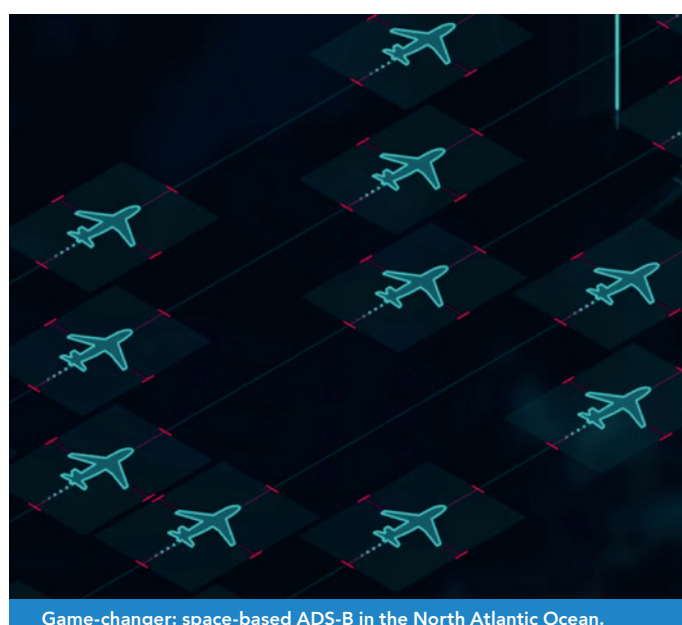
## WINNER: Aireon, NATS and NAV CANADA – Space-based ADS-B in the North Atlantic

Aireon and two of its partners, NAV CANADA and NATS, have made a game-changing use of space-based surveillance in the North Atlantic.

Comprised of 66 payloads on the Iridium Communications satellite constellation, Aireon provides real-time air traffic surveillance for all automatic dependent surveillance – broadcast (ADS-B)-equipped aircraft.

With operations commencing in the North Atlantic Ocean, Gander Domestic and Edmonton Flight Information Regions (FIRs), more than one-third of the world's oceanic traffic is now under positive control by NAV CANADA and NATS air traffic controllers (ATCOs). The deployment of space-based ADS-B in the North Atlantic Ocean makes flying safer, more efficient and more predictable.

Don Thoma, CEO, Aireon, said: "This nomination represents the enormous work required to launch the first ever global air traffic surveillance system. It would not have been possible without partner collaboration during the deployment over the North Atlantic (NAT). It's incredible that this started as an idea and is now an operational service, providing valuable benefits to users."



Game-changer: space-based ADS-B in the North Atlantic Ocean.

Credit: NATS



## NAV CANADA – Implementing the new ICAO separation standard 'RNP-AR' at Calgary International Airport

In November 2018, NAV CANADA was first to implement the new ICAO separation standard Established on RNP-AR (EoR) at Calgary International Airport.

EoR safely enables simultaneous arrivals on parallel runways without a separation minimum of 1,000 feet vertically or three nautical miles laterally – shortening downwind legs, optimising profile descents, increasing efficiency and reducing operational workload.

In the first month, the approach was used 3,000 times; 30,000 track miles were saved and low-level flights over-populated areas were reduced by over 140 hours. EoR is a leap forward in managing air

traffic volume, addressing future capacity demands and providing value to customers and stakeholders.

Neil Wilson, President and CEO NAV CANADA, said: "Our successful implementation of the new ICAO standard, Established on RNP-AR, is a testament to the outstanding close collaboration of our people at NAV CANADA and the many partners in Canada and internationally who supported this initiative.

"Use of this leading-edge standard has already demonstrated significant safety, efficiency and environmental impacts; offering potential for other major airports worldwide."



Credit: iStock.com/wwing

Calgary International Airport – EoR is a leap forward in managing air traffic volume and addressing future capacity demands.

## DSNA and skyguide – Flexible and dynamic provision of air navigation services across the Swiss / French border

The European regulation, and the ICAO framework, allows for flexible interfaces between air navigation service providers (ANSPs). When well used, this flexibility brings efficiency gains: ANSPs can dynamically manage their interface to optimise capacity depending on traffic, shifting between them the service provision in an airspace sector.

DSNA and skyguide have implemented such a system for optimising a departure procedure from Geneva Airport, close to the French border. Departures from runway 04 engage the shift of the volume from skyguide's air traffic control centre (ACC) to DSNA's ACC, enhancing capacity and safety of departures. When Geneva operates runway 22, overflights are privileged, the airspace sector management reverts back to skyguide.

Maurice Georges, CEO of DSNA said: "The exemplary cooperation on which this system relies was fed by mutual trust. This innovative, shared dynamic zone of responsibility is now regularly activated and benefits all our customers.

"The complementarity of our organizations was key to the successful outcome of this complex project, undoubtedly aligned with the spirit of the Single European Sky (SES)."

Alex Bristol, skyguide CEO, said: "The long-lasting partnership between skyguide and our colleagues in DSNA allows innovative dynamic airspace management, increasing safety and offering more airspace capacity to our customers in the densest airspace of Europe."

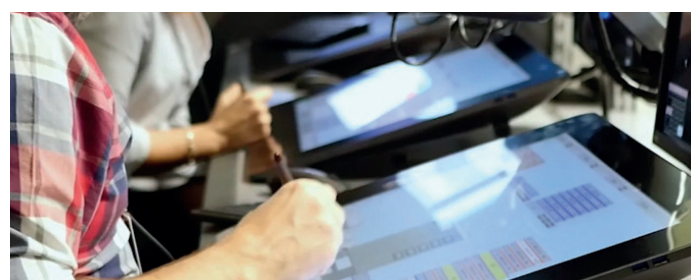
## NATS and NAV CANADA – Replacing traditional paper strips with an electronic computer display system (ExCDS) into London Terminal Control

In 2018, a transformational programme replaced traditional paper strips with NAV CANADA's electronic computer display system, ExCDS, at NATS' London Terminal Control, which manages the traffic for London's five international airports.

ExCDS is part of a ten-year £1bn transformation programme by NATS to update many of the core systems used to manage air traffic to meet forecast growth, improve efficiency, and reduce its impact on the environment while maintaining and improving safety.

Martin Rolfe, NATS CEO, said: "Delivering a project on this scale in an environment that functions 24 hours a day, seven days a week managing Europe's busiest airspace, presents huge challenges. It involved hard work and dedication from many people across NATS,

and at our partners at NAV CANADA, to successfully deliver one of our biggest-ever transformations."



Credit: NATS

ExCDS supports increased safety and efficiency.

# Unlocking winning partnerships for over 25 years



ATNS prides itself on a dedicated and passionate team of over 1000 employees – continuously striving to provide safe, orderly, expeditious and efficient management of air traffic for over 25 years.

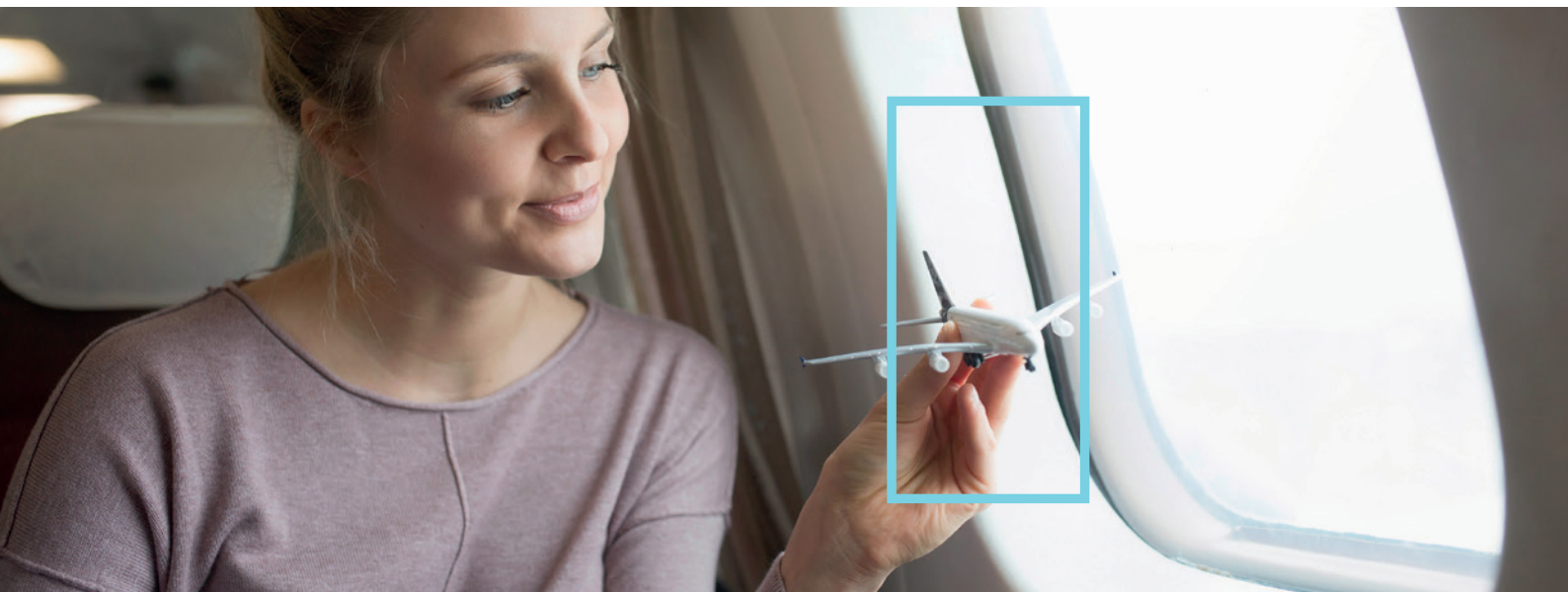
Our services include:

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- Air Traffic Services • Billing and Collection Services
- WGS-84 Surveys • Obstacle evaluation (Annex 14)
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- Central Aeronautical Database (CAD)
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## Creating skies together

In ATM we connect  
people, places and skies,  
making everything work.  
We partner with our  
clients building the future  
together.



## Altitude Angel and Frequentis – Integrating drones into ATM operations

Operation Zenith was a joint project by Altitude Angel and Frequentis and provided a comprehensive demonstration of how drone operations can be safely integrated into everyday air traffic management (ATM) operations.

Altitude Angel's GuardianUTM provided all parties with a real-time moving map of all aerial activity, which the UTM (UAS traffic management) system also used to send advance warning to nearby highly automated drones or to the pilots in charge of them to help them safely operate in proximity.

All the while, the UTM system was fully integrated into the air traffic control tower at Manchester Airport, providing air traffic controllers with a detailed view of all approved and unapproved activity.

Richard Parker, Altitude Angel, CEO and founder said: "With our partners Frequentis, alongside NATS, Manchester Airport and over 20 delivery partners, we delivered a series of world-first live demonstrations proving the successful integration of ATM and UTM in real-life situations at a major UK airport.



Operation Zenith took place in a fully operational airspace.

"What made Operation Zenith even more impressive was the fact it took place in a fully operational airspace, side-by-side with regular traffic movements."

## CADENA and EANA – Air Traffic Flow Management in Latin America and Caribbean

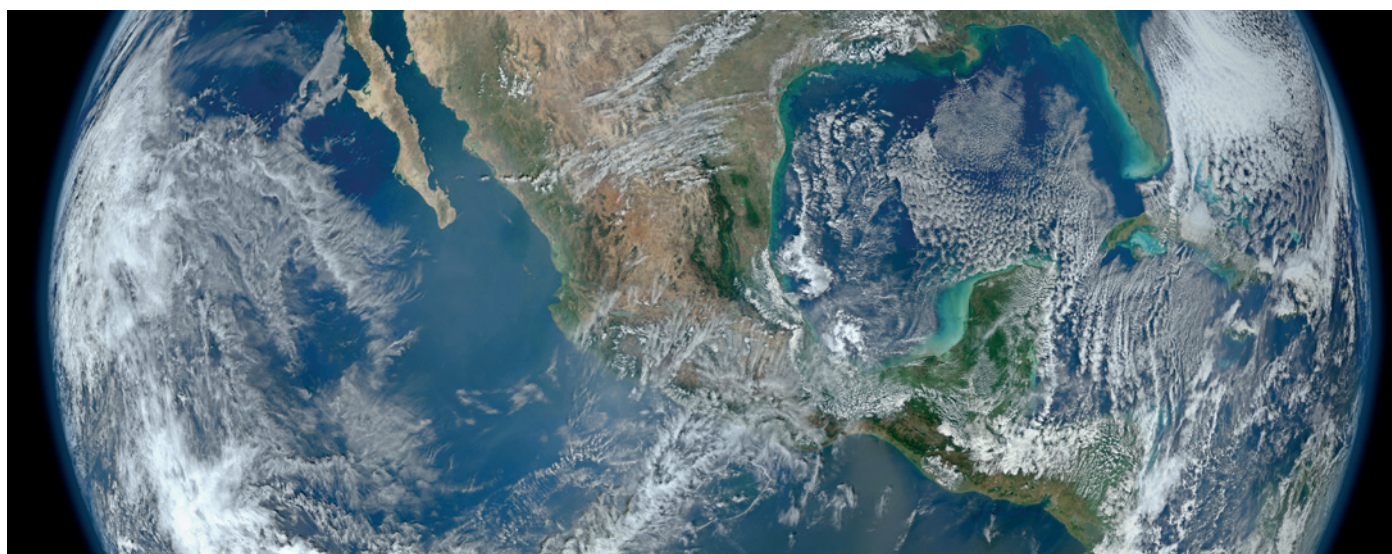
CADENA (CANSO Air traffic flow management Data Exchange Network for the Americas) is a collaborative venture of 10 air navigation service providers and a further 14 other aviation industry partners in Latin America and Caribbean.

It promotes and facilitates the safe and efficient movement of air traffic in the Latin America and Caribbean region through effective implementation of air traffic flow management (ATFM) and collaborative decision-making (CDM). These processes and procedures simplify data sharing and common situational awareness that is vital to the safe, efficient, and harmonised flow of air traffic.

CADENA discusses and shares among ANSPs, airlines and airports, weather, staffing, combined sectors, equipment outages, traffic management measures (TMM), and airport configuration.

The Operational Information System (OIS) webpage includes information on expected demand, planned traffic management measures, constraints, volcanic ash plumes, special events, and runway closures.

Gabriel Giannotti, President and CEO of EANA and CADENA Vice Chair said: "CADENA members provide strategic leadership in the implementation, and harmonisation, of ATFM and CDM in the Latin America and Caribbean region. Common situational awareness keeps on improving through communication. I am delighted CADENA is guiding regional ANSPs on developing and implementing their flow management units. CADENA is a proven initiative uniting regional ANSPs, airlines and stakeholders. As CADENA Vice chair, I am pleased to know that CADENA is the communications platform for the region."



CADENA promotes and facilitates the safe and efficient movement of air traffic in the Latin America and Caribbean region.

*There were 27 entries for the CANSO Award of Excellence, which were evaluated by a jury of CANSO Executive Committee Members. The jury chose six entries to go forward to be voted on by CANSO Members at the CANSO Global ATM Summit on 18 June 2019. Each of the six shortlisted nominations made a presentation at the Summit.*

# An appetite for innovation

Moodie Cheikh, CEO, Searidge Technologies, tells Graham Newton that flexibility is vital for a sustainable, modernised industry.

**Air traffic management has adopted numerous new technologies and process in recent years as the industry seeks to meet user demand for its services in a safe, consistent and cost-effective manner.**

Nevertheless, it is generally accepted by all that the pace of implementation is not fast enough, the regulated nature of the business and the key importance of safety slowing uptake.

"Also, air traffic control doesn't have any time off, it is a 24/7/365 industry that makes it that much more challenging to implement new technology," says Moodie Cheikh, CEO, Searidge Technologies. "That said, we have had a lot of success with certain early-adopter customers implementing new technologies, and the rate of adoption of new technology is increasing quicker than in previous years."

## Flexible approach

If the pace of change is to keep accelerating, ATM needs to improve the level of investment – historically low for the "invisible highways".

For Cheikh, that means greater partnership in the value chain. "ATM is a global business, with multiple stakeholders," he says. "Alignment of these stakeholders is required to ensure an understanding of the need for investment so that capacity demands continue to be met.

"More specifically, the ATM technology business is largely based on a model of sustainable growth through large capital expenditure programmes. A more flexible approach to procurement, based on longer-term partnerships would drive innovation and co-creation and create greater value.

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The ATM technology business is largely based on a model of sustainable growth through large capital expenditure programmes. A more flexible approach to procurement, based on longer-term partnerships would drive innovation and co-creation and create greater value.

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Credit: Searidge Technologies

"I would like to see a greater appetite for innovation and more flexible ways of implementing new technology," he continues. "This could be achieved by opening up our industry through more open standards and transparent practices, enabling new entrants to both challenge incumbents and drive new ideas."

Unfortunately, proprietary technologies still dominate the industry, making collaboration difficult, much to the frustration of airports and ANSPs that wish to unlock their data and corresponding efficiencies. Cheikh believes consolidation has occurred within the industry in recent years but the opportunities to offer integrated solutions have not yet been fully realised.

"We expect to see further consolidation around converged technology offerings," he suggests. "ANSPs and airports possess more power than they use and are well positioned to drive the industry towards better technology collaboration."

## Digital towers

Equally vital to agility and harmonisation is a need to look beyond the industry for solutions. Searidge, for example, sees itself as an innovative software development company that just happens to work in ATM. How the wider technology sector is evolving is therefore of prime importance.

"We like to think that we challenge ourselves and our customers to adopt innovation," Cheikh notes. "We have many 'first-of' type systems and technologies that have been deployed. This is a core objective for Searidge."

The company is particularly involved in the digital tower market, working with a number of ANSPs and international airports to



implement this cutting-edge solution and bring cost-effective service to smaller aerodromes.

"The digital tower market is at a point where most major ANSPs have a digital tower programme and we envisage Searidge continuing to be a leader in that market," reveals the Searidge CEO. "As artificial intelligence (AI) technology matures and airports and ATC focus on connecting their data, the digital tower market will continue to grow."

Not that Cheikh believes humans will disappear from the picture any time soon. He advises that in the short to medium term, humans will continue to be involved at a core level of decision making.

"We see automation developing with the provision of AI-supported tools and systems, which will increasingly automate ATM functions but with humans maintaining responsibility for final decisions and with the ability to intervene when necessary," he explains. "The human role will evolve from an active to a more passive role."

### Attracting talent

Searidge isn't being passive with its own humans, however, and is evolving how it works with its customers. Given the global customer base, the decision has been taken to locate senior Searidge employees in key regions to better support its customer programmes and sales activities.

The company is also heavily involved in attracting new talent to work on ATM technologies. Each year, it has grown the number of

"The digital tower market is at a point where most major ANSPs have a digital tower programme and we envisage Searidge continuing to be a leader in that market ... as artificial intelligence technology matures and airports and ATC focus on connecting their data, the digital tower market will continue to grow."

cooperative/intern staff it takes on and many of them go to work with Searidge full time on completion of their studies.

While ATM is not always at the top of career options to begin with, once Searidge educates potential employees on how they would contribute to such an important and challenging industry, their interest becomes clear. The team is augmented with experienced hires in areas such as ATM, sales, data science, AI and project management.

"Working at Searidge offers the opportunity to actively contribute towards the development of emerging ATM technologies and this challenge is attractive to ensure we are able to grow the team," concludes Cheikh. ➔



Credit: NATS

Searidge is working with a number of ANSPs and international airports to implement cost effective cutting-edge solutions.

# Back to the future

The rudimentary technology of radar still has an important role to play in maintaining safe skies.

**Far from being a redundant technology, radar will continue to be an integral pillar of ATM services for the foreseeable future.**

Modern systems, such as automatic dependent surveillance – broadcast (ADS-B), are based on communication protocols. All commercial and most private aircraft are equipped with transponders that transmit information about the aircraft's position and other relevant information for air traffic controllers.

"Newer technologies may indeed take the need away for ANSPs to keep primary radars for en-route surveillance purposes," says Jan van Gent, Chief Operating Officer at Intersoft Electronics.

"However, on airports you want to be 100% certain that there is nothing in the way of incoming or departing airplanes. We do not see a decrease in primary radars for airport surveillance."

If that on-board transponder fails or is deliberately switched off – as has happened – there is no knowing where an aircraft is in the sky unless primary radar is deployed.

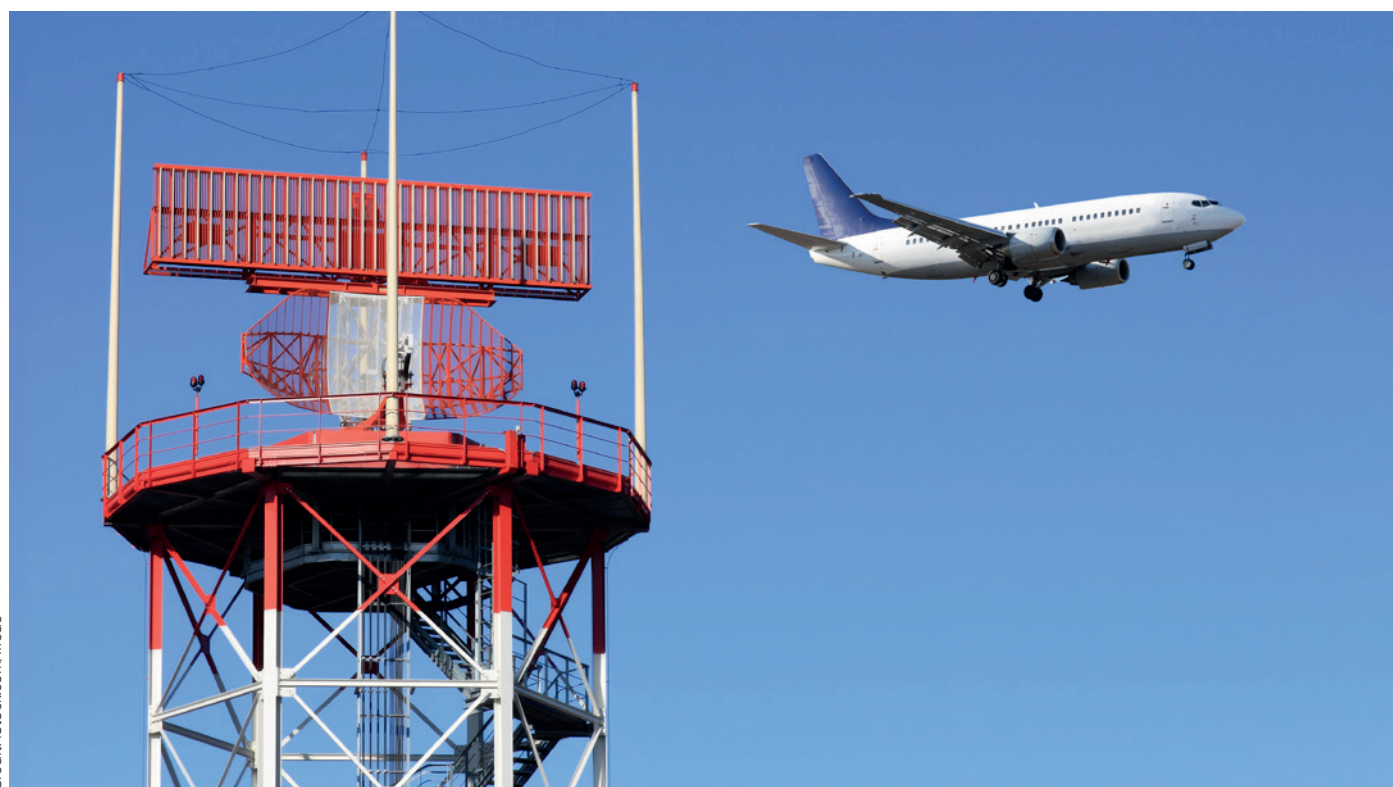
Primary radar works by sending out electromagnetic energy that reflects off any metal object and allows the user to see every flying object in the sky.

As van Gent succinctly explains: "Primary radar is the only technology that detects objects in the air that don't want to be detected."

This might be particularly important given the increasing use of drones. Drones are not equipped with transponders and drone operators who ignore or are unaware of the pertinent rules could manoeuvre their drones close to an airport, putting passenger aircraft at risk. Primary radar can detect these drones, after which the necessary search and counter-measure equipment can be deployed.

"Unlike electro-optic sensors, such as infrared and laser, primary radar is capable of operating at all times of the day and in all weather conditions," says van Gent. "Primary radars also provide information on the environment such as adverse weather conditions."

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Primary radar is the only technology that detects objects in the air that don't want to be detected.





Credit: iStock.com/Erika Mitchell

Wind turbines are being sited ever closer to airports and their radars.

## Wind turbines

But there are challenges to overcome. Radar is an old technology and many in service date from before the cell phone age. Interference problems from radio frequency (RF) pollution is therefore rife, not only from the growth in mobile devices but also from the cell towers that are needed for operating 4G / 5G equipment. Basically, the signal data processing element of radar systems is the first to age, much like any computer.

Less obvious is the issue of wind turbines. Due to the increase in demand for clean energy, wind turbines – both onshore and offshore – are increasing in number in many parts of the world. This demand has resulted in wind turbine heights increasing and wind farms creeping closer than ever before to airports and their radars.

"The towers and nacelles of modern wind turbines produce large reflections, many times larger than the reflections from aircraft," van Gent informs. "These appear as large stationary objects which can degrade the detection and tracking of aircraft in the vicinity of the turbines and wind farms. This increases the workload of the air traffic controller."



Credit: iStock.com/Rainer Puster

Drone detection is a key advantage of radar.

The towers and nacelles of modern wind turbines produce large reflections, many times larger than the reflections from aircraft. These appear as large stationary objects which can degrade the detection and tracking of aircraft in the vicinity of the turbines and wind farms. This increases the workload of the air traffic controller.

Moreover, the rotating turbine blades can appear as targets moving with a wide range of velocities simultaneously, rendering many of the current radar cancellation techniques ineffective.

## Building blocks

Fortunately, solutions are at hand to give older radar technology a new lease of life. Evolving radio frequency environments, for example, are benefitting from advanced RF filtering technology that effectively cancels out the effect of RF pollution for primary radars.

Intersoft Electronics – which has been supplying radar test and analysis equipment for almost three decades – provides new processing technology to filter out the effects of wind turbines without deteriorating the detection capabilities of the radar system. "We have demonstrated our ability to effectively mitigate the effects of 225m high wind turbines as close as 5km from an airport radar," says van Gent.

The company's next generation signal processing (NGSP) platform is also the basis for a solution to anomalous propagation, where radar waves are deflected due to an unusual distribution in temperature and humidity in the atmosphere.

"The building blocks are there to make it easy to fine-tune radar systems," van Gent sums up. "Because the fact is that primary RADAR will remain a critical component in ATM for the foreseeable future." ➤



# A network approach

As air traffic in Europe continues to grow, the industry is moving to adopt a pan-European strategy.

**The Wise Persons Group established by the European Commission's DG MOVE has published its recommendations for European ATM to deliver an improved performance and service while considering the continuous growth of air traffic.**

The report on the *Future of the Single European Sky* puts forward ten recommendations (see panel) which it believes "would enable additional ATM capacity in Europe to be provided in a flexible and scalable manner at a reasonable cost, delivering a more resilient ATM system, while most importantly continuing to ensure safety and security and meet environmental concerns".

## Top priority

The recommendations need to be seen in the context of the deliberations by the Wise Persons Group. Safety and security were understandably given top priority.

The Group noted the increasing importance of data and that ensuring cybersecurity and cyber resilience as the modernisation of the ATM system progresses is vital. Cyber functions should be addressed through a security-by-design approach,

with cybersecurity embedded in new technological solutions.

Environmental sustainability continues to be a major issue. Enabling airspace users to operate their preferred trajectories will directly contribute towards the environmental performance of the system. The Group believes "it is of the utmost importance that environmental considerations are given a high priority in considering the future SES framework".

One of the more complex discussion points was the scalability of the European ATM system. Capacity must meet demand, but the current system is inflexible, which limits the ability to change capacity at short notice.

Controllers need to be trained on specific sectors, for example, but the training can take too long. Airlines, meanwhile, can switch plans at short notice, giving the system an inherent unpredictability.

"If the capacity provided is too low, this results in delays. If capacity is too high, this results in higher costs," notes the report. Greater flexibility in capacity management is therefore essential. But greater predictability in demand would be a significant enabler in this respect and the report calls for a "strong

and clear commitment from the airlines to provide ANSPs better and more accurate information about the flights and routes they will operate".

New technologies will also help scalability. In its discussions, the Group supported the recommendations of the Airspace Architecture Study (AAS) carried out by the SESAR Joint Undertaking to accelerate the uptake of new technologies.

## Market approach

Simplification was another over-arching principle of the Group's deliberations. In regulatory terms, this means economic regulations should only be put in place where market incentives are insufficient to drive performance to acceptable service levels. The report notes that there have been promising results in such areas as digital towers, where services have been opened to competition.

Coupled with this, it is envisaged that the industry's digital transformation will inevitably lead to a more service-oriented and standardised approach.

In terms of institutions, the Group is advocating a clear distinction between the



delivery arm and the regulatory arm of the Single European Sky. Whatever institutional arrangements are set up, the report makes it clear that these should be permanent rather than temporary to ensure that sufficient resources and expertise are available.

Finally, a network-centric approach is crucial to meeting future demand. Only a fully integrated European network can improve the operational and environmental performance of European ATM for the benefit of all stakeholders, in particular the travelling public.

## Common vision

For its part, CANSO welcomes the themes identified in the report of the Wise Persons Group and agrees there are issues to be tackled in each theme to drive progress in modernising Europe's ATM system.

Nevertheless, on a number of the proposals, before CANSO can provide its view, further information and discussion is required to better understand the potential consequences. In particular, concerns exist on the need to preserve the role of the industry for the successful delivery of the Single European Sky.

CANSO is in full alignment with the network-centric idea. The CEOs of CANSO's 35 ANSP Members in Europe have unanimously

## SESAR Update

SESAR Deployment Manager (SESAR DM) will save 552,000 tonnes of CO<sub>2</sub> emissions by 2030, the equivalent of planting one million trees.

SESAR DM's first 112 completed ATM projects across Europe will also save 12 million flight minutes by 2030, equating to €484 million in savings, and generating over €10 billion in performance benefits by 2030.

How SESAR DM develops is now being deliberated by the European Commission in light of the recommendations set out in the report of the Wise Person's Group.

agreed a common vision for ATM in Europe – *CANSO Europe 2035*.

CANSO Director Europe Affairs, Tanja Grobotek, said: "The approach of ANSPs is evolving to become more customer-focused, operating successfully in a market-based environment, changing from a charging to a pricing regime, and to focus on the network rather than as individual network players. But we also need enabling policies from European policy makers to fully unleash the potential of an open system architecture, which is vital for the future of ATM."

A pan-European network must take precedence over the requirements or preferences of individual ANSPs or airspace users. The regulatory framework therefore needs to reflect the need to encourage a network-centric approach.

Speaking at the European Commission's first roundtable meeting on the future of the Single European Sky, Jan Klas, Chair of CANSO Europe said: "ANSPs need to be supported by a regulatory framework that provides the necessary autonomy and flexibility for ANSPs to take full advantage of this competitive environment and successfully deliver value to their customers."

"This new environment may also support technical and operational consolidation, where a positive business case exists. Equally, this needs to happen without preventing States from maintaining sovereignty over their own airspace." ➔

Read *CANSO Europe 2035 Vision: A forward-looking vision to improve airspace management* at [canso.org](https://canso.org)

## THE 10 RECOMMENDATIONS OF THE WISE PERSONS GROUP

- 1 Confirm and strengthen EUROCONTROL's Network Manager role by providing it with the necessary executive powers to manage the ATM network.
- 2 Fully integrate airports into the network on the basis of linking the Network Operations Plan and Airport Operation Plans, using extensive Collaborative Decision Making.
- 3 Implement a Digital European Sky based on an agreed roadmap building on the recommendations described in the Airspace Architecture Study, managed by the Infrastructure Manager, ensuring resilience of the system.
- 4 Create a new market for ATM data service providers as recommended by the Airspace Architecture Study.
- 5 Use the performance and charging scheme to support the digitisation of air traffic services, and public funding to support deployment only where necessary from a network perspective.
- 6 Facilitate the transition towards the Digital European Sky by reviewing current licensing and training requirements for ATCOs, with full involvement of staff representatives.
- 7 Simplify and strengthen economic regulation, while relying on a market-driven approach wherever possible.
- 8 Establish a strong, independent and technically competent economic regulator at European level.
- 9 Establish a Seamless European (Upper) Airspace System including a common route charge.
- 10 Encourage airports to procure tower services through competitive tender or contract, where operationally feasible and positively impacting users.

# True stories

NAV CANADA is leading industry efforts to move away from magnetic north to true north, improving safety and saving millions of dollars annually.



Credit: iStock.com/Rifrazione

**Magnetic variation has always posed a problem for the design and operation of instrument procedures from the enroute through to terminal and approach phases of flight.**

Not only that but a working paper presented by Canada at the 13th ICAO Air Navigation Conference noted that "air carriers, air navigation service providers (ANSPs) and avionics original equipment manufacturers (OEMs) spend millions annually managing magnetic variation."

The problem has continued into the digital age even though aviation doesn't need the original magnetic reference anymore.

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Air carriers, air navigation service providers and avionics original equipment manufacturers spend millions annually managing magnetic variation. The problem has continued into the digital age even though aviation doesn't need the original magnetic reference anymore.

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Alaska's Anchorage International Airport highlights the issue. In 2012, the Federal Aviation Administration (FAA) updated the magnetic variation of the airport. Because aircraft operators couldn't all follow suit immediately, there was a mismatch between the magnetic variation used in various aircraft systems and the navigation database in the flight management system.

The result was unacceptable lateral guidance when conducting CAT II and CAT III approaches to Anchorage. The incorrect magnetic variation was reissued until the aircraft operators could update their inertial reference system magnetic variation tables.

Indeed, getting airlines to update their systems regularly is known to be a challenge. A Canadian study estimated some were 10-15 years out of date. Already, the National Oceanic and Atmospheric Administration (NOAA) has recommended a mid-cycle update to the World Magnetic Model 2015 as the forecast is deemed no longer valid out to 2020.

As Anthony MacKay, Assistant Vice President, ATS Service Delivery, NAV CANADA, explains, issues with magnetic variation persist largely because "that's the way we have always done it".

## The background

The use of magnetic north dates back to the earliest days of flight. As soon as aircraft were developed, a heading reference system



was required. And the fragile nature of the early aircraft meant that the system needed to be small, lightweight and simple. “Nothing is more simple than a magnetic compass,” says MacKay. “It doesn’t need any power and it always works.”

As navigation systems developed, a heading instrument or directional gyro was used to account for small errors in the magnetic compass caused by dips in the Earth’s magnetic field. Periodically, the pilot would reset the heading instrument to align with the magnetic compass.

In the jet age, the heading instrument was tied to a magnetic sense system eliminating that one step of the pilot reading the magnetic compass and then setting the heading instrument.

“Unless you were flying north or south of 70 degrees latitude, the difference between the moving magnetic poles and the true north and south poles that form the anchors between the latitude and longitude lines around earth were easily handled,” MacKay explains. “Small directional errors in an analogue system were not that critical and the analogue human in the middle could easily adjust and compensate.”

But as aircraft systems became more tightly integrated and digital systems developed, those small errors have become more than a mere distraction, driving a mismatch between the various navigation systems as the Anchorage case illustrates. As MacKay puts it: “If a computer is expecting to see a one and instead it is given a zero, it doesn’t like it very much.”

Today, all modern aircraft with Inertial Reference Systems or Attitude Reference Systems that use cost-effective Inertial technology actually function in true north (TRUE).

“All the systems, all the math under the hood is done in TRUE,” says MacKay. “Then the aircraft systems convert it to magnetic north to show it to the pilot. Today, instrument procedures are built in TRUE and then converted to magnetic prior to publication. Our surveillance systems use latitude and longitude in TRUE and then adjust to magnetic prior to showing the tracks/targets to controllers.”

## Advantages

There are many advantages in moving to TRUE, including simplifying technical processes.

Because Magnetic North is always moving, all the procedures and systems built upon magnetic north need to be constantly updated and amended. Switching to TRUE will therefore remove the cost involved for airlines in updating magnetic variation in Inertial Reference Units (usually two or three per aircraft), flight management systems and, if installed, Synthetic Vision Systems.

“Basically, while using magnetic north, every computer system on the aircraft requires updates to maintain the current magnetic value,” he says. “And they all have to match – which sometimes they don’t, depending on the model and the implementation.”

Similarly, for ANSPs, switching to TRUE removes the time devoted to updating IFR approach and enroute procedures with the latest magnetic values. The system would be frozen on TRUE.

Airports, meanwhile, would never need to change runway numbering again. Given the documentation involved in that process, it would be a significant gain. “Essentially, switching to TRUE removes a large and costly time and money burden for all segments of modern aviation,” MacKay insists.



In 2012, a magnetic variation mismatch between aircraft and airport systems data affected CAT II and CAT III approaches at Anchorage International.

Credit: iStock.com/Chilkoot

## Select the switch

Perhaps the biggest advantage to TRUE is that it can be implemented by simply stopping a process – the conversion to magnetic north. As noted, Inertial Reference Systems on modern aircraft already function in TRUE. Most aircraft have a Mag/True switch that would just need to be selected.

Of course, this solution works for the larger aircraft used in scheduled commercial aviation. General aviation planes that still only have and can only have a magnetic compass or sense system on board would need to either manually do a small plus/minus conversion on what was read off of the magnetic compass prior to setting the directional gyro or use a device that would convert from magnetic to TRUE for them. But these systems for light aircraft are much cheaper than those required to go from TRUE to magnetic on a large aircraft fleet.

Most importantly, however, there needs to be a desire to change. The next step, therefore, is working with ICAO to accept the change and help the industry move towards TRUE. Those meetings have started. There will be objections from small aircraft operators, but NAV CANADA anticipates a lead time to enact the change of 10 or more years.

"It would be more than manageable," concludes MacKay. "There are millions of dollars lying on the table for the aviation industry to save." ➔

## TRUE in performance-based navigation

Canada's working paper to ICAO suggests that a true north heading reference in a performance-based navigation (PBN) operation would simplify charting and aircraft operation and reduce costs going forward.

In Canada alone, it costs roughly \$500,000 per year to manage magnetic variation in various publications. Another \$300,000 per year is spent rotating VORs and flight checking modified instrument procedures for magnetic variation changes.

Other magnetic variation costs stated by the working paper include:

- Airport signage and runway renumbering
- RADAR alignments
- Aircraft magnetic variation table updates for Inertial Reference Units (IRU) and flight management systems. If an older IRU cannot accept a new magnetic variation table, an IRU upgrade and replacement is necessary
- Industry standards meetings and certification efforts to deal with the current magnetic variation issues affecting the worldwide fleet, including database inconsistencies, loss of CAT II and CAT III certification, RNP issues).



Switching to TRUE will remove the cost involved for airlines in updating magnetic variation in Inertial Reference Units and flight management systems.



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