

skyway

THE EUROCONTROL MAGAZINE

UKRAINE

MUTUAL COOPERATION TO ENSURE
AIR NAVIGATION SERVICE PROVISION
IN UKRAINE AFTER THE WAR

A STEP CHANGE IN DIGITISATION

MOVING TO THE NEW EUROCONTROL
NETWORK MANAGER OPS CENTRE

NORTHERN NORWAY

A EUROPEAN ROADMAP
TO CLIMATE-NEUTRAL
REGIONAL AIR TRAFFIC

DIVERSITY & INCLUSION

"We are a dynamic, global sector but
we need to start telling the story better"

Dr Rannia Leontaridi

UK Director General for Civil Aviation



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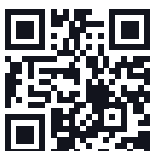
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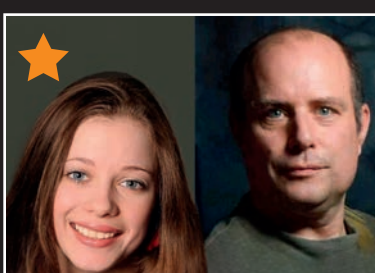
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BY EMBRACING DIVERSITY & ACCELERATING INNOVATIVE TECHNOLOGIES, AVIATION CAN RAISE THE BAR & MEET ITS FUTURE CHALLENGES

EDITORIAL BY RAÚL MEDINA,
DIRECTOR GENERAL OF EUROCONTROL

We need to start telling our story better. That is for me the standout message in this SKYWAY edition, because it is so central to achieving our goal here at EUROCONTROL of raising the bar for European aviation.

Aviation has a great story to tell. Technology is transforming our industry, from the progress being made in digitising the sector, to the new entrants that are being integrated into lower and higher airspace, to the new energy sources that engineers are looking to harness to enable aviation to achieve its challenging net-zero goals by 2050.

All of these are exciting topics, among the most interesting and challenging in any sector. As Rannia Leontaridi says in her interview in this issue, we need to be making that argument so that we can attract the brightest young minds to our sector. Central to that effort will be improving how we address diversity and inclusion, implementing the policies and approaches that will progressively deliver on the goal of making our sector more diverse, and particularly addressing the historical gender gap. Aviation has amazing careers to offer, and some of the most exciting challenges to work on, but we must raise awareness among young people and make them want to join our industry.

This SKYWAY showcases a number of our most interesting and fast-developing areas of work. In the all-important net-zero debate, with climate change the greatest of all challenges facing society, we look at what aviation is doing to make our sector climate-neutral, from electric aircraft and other revolutionary technologies to sustainable aviation fuels, and more efficient air traffic management which includes flying greener routes. We assess how airspace digitisation is accelerating as the EUROCONTROL Network Manager looks to transform the way air traffic is managed across Europe. And we examine how airspace needs are rapidly evolving, from the rapidly expanding drone market which is already reshaping airspace needs and complexity, to brand-new airspace entrants that will need to be accommodated in higher airspace, ranging from slow-moving balloons to ultra-rapid supersonic vehicles and space launches.

All of these are huge challenges, and they come as traffic starts to close in on pre-pandemic levels. I am very proud that close coordination between all aviation actors led by EUROCONTROL has enabled traffic to recover to over 90% of 2019 despite increasingly complex airspace. Today's network however continues to be significantly impacted by war in Ukraine, leading to closed or restricted airspace, heightened military activity, and major negative economic effects triggered by the war and subsequent energy increases. And major changes will be needed: if today's ATM network is already looking stretched with a predicted 10+ million flights this year, imagine the pressures that 16 million annual flights (our forecast for 2050) will place on it.

As ever, the solution will come down to the intersection between technology and people. We need to develop the right technological solutions – and we need the right people to make that happen. Which brings us back to the red thread of this edition: the people we hire now, and the culture we put in place, will be crucial in determining how aviation – and ATM in particular – will meet the challenges over the next three decades.

In conclusion, we are on the right path: we need to have the courage of our convictions, and make those arguments to enable our industry to evolve and thrive. ■





Department
for Transport

DIVERSITY & INCLUSION

WE ARE A DYNAMIC,
GLOBAL SECTOR BUT WE
NEED TO START TELLING
THE STORY BETTER

DR RANNIA LEONTARIDI OBE

Director General for Aviation, Maritime and Security Group at the Department for Transport in the United Kingdom, the UK's Director General for Civil Aviation, Vice-President of the EUROCONTROL Provisional Council and a passionate champion for diversity and inclusion.

DOES AVIATION HAVE A CHALLENGE IN IMPROVING INCLUSION AND DIVERSITY?

Yes. It is a topic that has been openly discussed more and more over the last few years and months, especially as other sectors, which have had equally large problems in terms of diversity and inclusion – such as the technology sector, for example – are getting better at it. There are two issues here. One is the need to make our sector appealing to young people and to explain the amazing opportunities and roles that it holds; and second, the commitment, which all of us – including policy makers, private sector and investment colleagues – will have to make to prioritise and then tackle the issue. And I think that's been quite difficult.

Aviation is a business of people. My vision is of an aviation sector that is above all people-centric and puts customers at the heart of it. We need to understand that those who are employed in the sector represent both passengers and customers.

GIVEN THE ISSUES OF GETTING YOUNG PEOPLE, ESPECIALLY YOUNG WOMEN, INVOLVED IN THE INDUSTRY, HOW DO WE CHANGE THE DYNAMIC TO MAKE IT EASIER, MORE INCLUSIVE AND MORE ATTRACTIVE?

It is not rocket science, but it is more easily said than done. Earlier this month I was in Madrid to participate in the Global Aviation Gender Summit organised by ICAO and hosted by the Spanish Government. We discussed exactly that question. There are three main areas that we need to think about improving.

First, we need to raise ambitions, whether that is advertising for jobs, training people or speaking to colleagues internally about the reforms we need to make.

Second, we need to collaborate, across all parts of the aviation sector, from society, family initiatives, schools and government – bringing all of our initiatives on this issue together. In the UK we took the lead to set up a Global Skills Taskforce, a collaboration between the UK, IATA, ICCAIA, ACI and ICAO to ensure that we can gather the knowledge and expertise we have across the sector so we become bigger than just the sum of our parts. We have invited other nations to join us.

And third, we have to ensure that the sector is practical in everything it does. There are some fundamental things that we need to do across the whole economy, not just aviation, such as improving

the way we interview people, promote STEM work, focusing on diversity and the language we use in our adverts, and importantly, identifying role models.

Somebody asked me: “Do you think we should stop putting all these role models out there because the risk may be that all of that attention on role models is potentially putting on too much pressure and scaring girls?” I said: “No – but we should be clear about how those role models got there, the failures that they faced along the way and the resilience they showed and the people who helped them.”

THERE ARE MANY POSITIVE ROLE MODELS IN AVIATION, BUT THEY TEND TO BE IN THE MORE DYNAMIC AREAS SUCH AS PILOTING AN AIRCRAFT. HOW DO WE ATTRACT NEW ENTRANTS TO THE SAFETY-FOCUSED AREAS SUCH AS AIR TRAFFIC MANAGEMENT AND MAINTENANCE?

In the UK around six per cent of flight crew are women and globally the figure is five per cent. Whenever anybody thinks about the aviation sector all they hear about is pilots. So it is important to showcase what others do. We need to explain all the things that have to happen before an aircraft takes off, but we don't have people who are currently focusing on doing that storytelling. I think that storytelling is as important as everything else. We're not the only sector that employs engineers and safety managers, but I think we're the only sector where much of what we do focuses so much on the more visible and well-known roles and forgetting the various parts of the industry that put an aircraft safely into the sky. So “yes” to role modelling and “yes” to storytelling.

In the UK we have launched our Reach for the Sky Challenge Fund to help get young people from all backgrounds into aviation. Aviation Champions from many parts of the sector have the opportunity to promote and explain what they're doing, reaching out to schools to explaining to pupils the different careers and charities that operate at various levels in different communities. So we are beginning to do some of that storytelling one-to-one with pupils. It is a significant step but a drop in the ocean, but can you imagine the power of a programme like that if it were rolled out across Europe? Across the globe? ■



AVIATION USED TO BE A GLAMOROUS INDUSTRY BUT HAS DROPPED DOWN THE POPULARITY STAKES, ESPECIALLY WITH ITS RECORD AS A CONTRIBUTOR TO GREENHOUSE GAS EMISSIONS. HOW CAN WE IMPROVE THE INDUSTRY'S OVERALL IMAGE FOR YOUNGER PEOPLE?

I disagree. I think aviation is still a dynamic, interesting, global sector but we need to start telling the story of aviation as a sector better. I believe that we must put people and the environment at the heart of all the work we do. The environmental ambitions of many airlines and airports are enormous and there is plenty of excitement around new technologies such as hydrogen, sustainable aviation fuels or flight management transformation and modernisation of our airspace.

I think the image of the sector maybe took a turn for the worse during the pandemic. It is right to focus on the shortcomings of what we did following the pandemic, on how customers felt let down as the delays mounted. Some of these issues are in the sector's hands to solve: the ability to pay people better, to make better policy, for example. But other issues, like bad weather, remain as serious external factors to destabilise performance. So we must manage the consequences well, focusing on passengers and creating an image that attracts diverse talent to the sector.

In terms of managing the image we have to get better at storytelling. Later this year, a Virgin Atlantic aircraft will fly across the Atlantic from the UK powered by 100 per cent sustainable aviation fuel (SAF). That is an incredible achievement, especially when we consider how many scientists, engineers and what kind of safety jobs will have been needed to put that aircraft in the sky to make sure it reaches the other end safely. The aviation sector must promote the work that it does and explain the sector's environmental credentials, the new technology ambition, the commitment to environmentally responsible aviation. It is important for the aviation industry to demonstrate how it is embedding new technologies such as artificial intelligence and autonomy into the industry, exactly the kinds of things that kids are looking for nowadays.

EUROCONTROL has an incredible reach. We must be able to stimulate the minds of children who are interested in STEM subjects to look at careers in airspace modernisation programmes or managing safety.

AND ATM NOW SPANS FROM THE GROUND UP, ALL THE WAY TO SPACE

Exactly.

Autonomy is going to be big. If you look at what's happening across many airports in introducing autonomous airspace management, this is a new global phenomenon; managing the skies, which of course will be shared by drones, autonomous air vehicles, new aircraft technologies and space launches.

HOW DO YOU GET YOUR STORY HEARD WHEN MOST OF THE AVIATION AND ATM HEADLINES SEEM TO FOCUS ON STRIKES AND INDUSTRIAL UNREST?

As with everything nowadays I think that social media can help reach new audiences and young people who are considering their careers. The sector uses social media quite a lot to advertise or to let passengers know if there's a flight delay, for example. But we have a huge number of incredibly young social media-educated people who are interacting through means that maybe policy makers or the sector don't reach into very much.

Reaching out to young people with a positive image of the sector, a series of interesting job opportunities and getting them in turn to tell a positive aviation story in their way, is key. And we see across many other sectors how communication should work, to share information and experiences. So we first need to get our foot in the door through the available media and start attracting apprentices and new diverse recruits



"I think EUROCONTROL is sitting in that space where it can rise above and connect governments, to do some of the story-telling about the vast opportunities in the sector and promote a modern image for aviation, full of diverse career opportunities"

and then encourage them to share their experiences working in the sector and hopefully build a positive image of a diverse and interesting sector.

Maybe we can then dream of breaking the cycle.

ATM IS INCREDIBLY COMPLEX ON ALL LEVELS – TECHNICALLY, INSTITUTIONALLY, OPERATIONALLY. ALSO, NOT ALL AVIATION STAKEHOLDERS ARE ALWAYS KIND TO AIR NAVIGATION SERVICE PROVIDERS. IS THERE ANYTHING THE INDUSTRY COULD DO TO PRESENT A MORE HARMONISED MESSAGE?

During the pandemic, when things were really hard, all sides of the sector came together to find solutions that allowed passengers to travel safely. EUROCONTROL as a major ATM organisation played a significant role in Europe corralling and aligning all parts of the sector, providing data and information on the state of the sector. I think we need to learn from the pandemic times. Collaboration between States is key and a large part of how airspace is managed. EUROCONTROL can play a major role in uniting the sector's message.

BUT ATM IS STILL PRIMARILY A NATIONAL GOVERNMENT-RUN INDUSTRY IN MANY PARTS OF EUROPE, AND GOVERNMENTS ARE NOT ALWAYS THE MOST PROACTIVE OF INSTITUTIONS.

EUROCONTROL is more than the sum of its parts. It represents 41 countries, with a strong voice of its own. It is incredibly well respected – both in terms of its core mission as well as the role it plays in managing the European airspace network, but also in having a voice in decarbonising aviation, providing data, driving innovation and supporting a diverse aviation agenda. This strong voice, expertise and perspective provides an advantage in vocally supporting diversity in the aviation sector as a whole.

I think EUROCONTROL is sitting in that space where it can rise above and connect governments, to do some of the story-telling about the vast opportunities in the sector and promote a modern image for aviation, full of diverse career opportunities. I think the new Director General has a huge opportunity to change the narrative on diversity and contribute significantly to an issue that can infuse the sector with new talent and empower its future. ■

ENAIRe 


"WE WANT TO TURN ENAIRe INTO A GLOBAL AIR NAVIGATION OPERATOR"

ENRIQUE MAURER

CEO of ENAIRe, a global operator of efficient, safe and sustainable air navigation services

Enrique Maurer, the new CEO of Spain's air navigation service provider, ENAIRe, has accepted the challenge of leveraging the company's leadership in its sector to turn it into a global operator by including new services such as drones and space traffic.

ON 10 JUNE, YOU BECAME ENAIRe'S GENERAL MANAGER AFTER LEADING THE AIR NAVIGATION SERVICES DIRECTORATE. HOW WOULD YOU SUMMARISE THE PAST FEW MONTHS?

On the whole they have been very positive and give continuity to ENAIRe's strategic commitments. Our mission is to provide air navigation services with the maximum safety, quality, efficiency and sustainability, without ignoring the company's innovation and internationalisation.

ON 25 AUGUST, THE NEW COLLECTIVE AGREEMENT FOR AIR CONTROLLERS HAS COME INTO FORCE. WHAT DOES THIS AGREEMENT ENTAIL?

This new Agreement has a lot to offer ENAIRe and its 2,100 air traffic controllers. This is the first Agreement signed with controllers in 24 years, since the First Control Agreement. It is a great deal for stability as we seek to make ENAIRe more competitive and improve their careers. The Agreement will allow us to continue strengthening the path to transform and improve our services, while striking a work-life balance.

HOW WAS THE SUMMER SEASON, AND HOW IS THE AIR TRAFFIC FORECAST SET TO EVOLVE?

We have to wait for the September data, but we're going to close out an outstanding summer season. On 22 July, with 7,449 operations, we beat the single-day record set in 2019, which was being used as the reference year. The July and August figures confirm the sector's recovery following the standstill brought on by the pandemic in 2020, as well as ENAIRe's leading role among European air navigation service providers. This year is expected to be one of a series of new highs for aviation. And for 2027, the forecast for Spain points to growth of 15% over the 2019 baseline.

Last year, with traffic equivalent to the record year of 2019 during the high summer season, ENAIRe was congratulated by EUROCONTROL for our contribution to the recovery of air traffic and the quality of our service. This year, Spain will surpass the cumulative traffic figures for 2019 much more so than other European countries, with notable traffic increases in several regions.

WHAT DRIVES ENAIRE'S FIRM COMMITMENT TO INTERNATIONALISATION?

We view internationalisation as a challenge and as an opportunity. We can compete successfully and become a benchmark operator for the provision of new services on a global level, as well as for new players in the sector, such as drones and space traffic. The challenge is to integrate these new actors safely, effectively and sustainably.

HOW IMPORTANT IS SAFETY TO ENAIRE?

Safety is in our DNA. Since 2015, we have held over 128 safety management committee meetings, led by General Management; we have created specific work groups with trade unions and professional associations to promote safety; an observatory with the Official Pilots Association and multiple Just Culture initiatives to promote incident reporting with a focus on improvement and prediction, using big data to analyse causal factors. ENAIRE has received the highest score in Europe on the operational safety key performance indicator for four years in a row. Our level of safety is a measure of our quality as an operator.

WHAT ROLES DO TECHNOLOGY AND INVESTMENT PLAY IN DIGITISATION AT ENAIRE?

I would highlight the changes in the controllers' workstation, with the implementation of important features to assist in air traffic management through digital links, security networks, as well as advanced conflict management and decision-making tools.

HOW IS ENAIRE POSITIONED TO PROVIDE NEW SERVICES?

In terms of efficient and flexible use by civil and military users, the application of new concepts such as Free Route procedures will yield increased environmental sustainability through optimised routes. In the field of drones, the U-space concept is being implemented in Spain, which will enable operational areas to be phased in for this type of unmanned vehicle alongside conventional airspace. ENAIRE is in the process of being certified and designated a provider of common information services (CIS) for all drone service providers (USSP). In the field of space management, we are working hard on various initiatives and working groups, in coordination with various ministries. The challenge is to integrate drones, Urban Air Mobility (air taxis) and aerospace aviation as safely as possible.

The planea.enaire.es website allows professional drone operators to submit their aeronautical safety study so their request can be processed by the Operations Management units, towers and air control centres involved in the operation.

ENAIRE Planea is also integrated with other tools from ENAIRE's aeronautical information service, such as ENAIRE Drones (drones.enaire.es) and Insignia (insignia.enaire.es).

HOW IMPORTANT ARE THE GROUPS WITHIN ENAIRE TO THE ORGANISATION'S INITIATIVES?

Our people are our real driver of change. Technological modernisation, our new modes of operation, new services; all these initiatives can only be viewed through the involvement and teamwork of our people. I would also note the devotion of ENAIRE and its entire team to serving our customers: they are our *raison d'être* and are, together with safety, in our DNA.

WHAT DOES ENAIRE'S PARTICIPATION IN THE EXPODRÓNICA AIR SHOW AT THE WORLD SPACE SUMMIT AND IN THE FIRST EDITION OF AIRSPACE INTEGRATION MEAN?

These three events are a very important meeting point for professionals in the global aviation sector and industry. The Airspace Integration Congress is an opportunity to showcase our commitment to sustainability and to present our new catalogue of services. At this forum, ENAIRE is presenting the new features of the iFOCUCS control station, and a novel 360° virtual control experience developed by our controllers that enables real-time interaction and simulation of control training activities (dealing with emergencies, interacting with drones, etc.). ■





MUTUAL COOPERATION TO ENSURE AIR NAVIGATION SERVICES PROVISION IN UKRAINE AFTER THE WAR

24 December 2022 was the thirtieth anniversary of the founding of Ukrainian State Air Traffic Services Enterprise (UkSATSE). Over the past three decades, UkSATSE has provided air navigation services of the highest standards to thousands of flights daily in Ukrainian airspace and in the international High Seas area over the Black Sea, where responsibility for air navigation services provision is delegated to Ukraine under international agreements.

Today, Ukraine is going through the hardest times in its independent history. Therefore, we are more than ever in urgent need of the support and solidarity of the international community – support without which our freedom and common peaceful future are impossible.

We have witnessed horrific missile attacks on civil energy, utility and social infrastructures, as well as on the civilians of Ukraine.

At such a critical moment, UkSATSE, as the national air navigation service provider of Ukraine, has found itself in a challenging situation. It has a clear task of retaining the air navigation system (ANS) of Ukraine – preserving the personnel, as a core value, and equipment. Yet it has no funding for this. There are no sources of financing ANS in Ukraine at the moment as all available State budget resources are directed towards military needs and victory which is a prerequisite for the recovery of civil aviation. Commercial loan financing for UkSATSE is not feasible under such conditions.

Despite all cost containment measures applied by UkSATSE – including, unfortunately, the temporary suspension of employment contracts for all categories of personnel – the company's pre-war reserves are exhausted.

However, UkSATSE continues its work, and such a miracle of resilience is a result of incredible teamwork of our supportive partners including the Ukrainian government, the European Bank for Reconstruction and Development and the European Investment Bank which have collectively agreed on the loan restructuring and the release of funds previously blocked at the Debt Service Reserve Account for further loan repayment.

But the main overriding factor that allows Ukrainian ANS to face the future with confidence is the outstanding solidarity and support by all EUROCONTROL Member States, the Agency and the European Commission as expressed in the establishment of the European ATM Voluntary Solidarity Fund.

Last year's decisions of the EUROCONTROL Member States to establish this Fund and authorise the Agency to use part of the unused 2021 budgetary credits to cover Ukraine's 2022 contributions were more than vital. They enabled UkSATSE not only to preserve its core personnel and equipment, but also, in close collaboration with EUROCONTROL, to start the process of planning and implementing actions aimed at the fastest possible recovery of air navigation services provision in Ukrainian airspace immediately after the end of the war, having no doubts about the final victory of Ukraine.



ANDRII YARMAK

Chief Executive Officer,
 Ukrainian State Air Traffic Services Enterprise



ACTION PLANS

Following the decisions of the Government and the President of Ukraine in Spring 2022, UksATSE started early planning for the safe recovery of ANS in Ukrainian airspace.

At the first stage, as an integral part of the infrastructure project for the recovery of the transport sector and economy of Ukraine, the Action plan of Ukrainian State Air Traffic Services Enterprise for air navigation services recovery in the airspace of Ukraine (or “Recovery Plan”) has been developed by UksATSE and approved by the State Aviation Administration of Ukraine (SAAU) on 30 May 2022.

The 17 blocks of the Recovery Plan cover a full range of interconnected areas including safety and security, infrastructure, personnel, equipment, procedures and other service-related measures for the fastest resumption of UksATSE services during the first recovery period with the minimum possible volumes, configurations and time intervals taken into account.

Jointly with EUROCONTROL, the areas for potential cooperation and support for UksATSE were identified and the relevant implementation measures were included into the Action Plan between UksATSE and EUROCONTROL for air navigation services recovery in the airspace of Ukraine (“Common Action Plan”) signed by both parties in Brussels on 24 November 2022.

Since March 2023, UksATSE experts have been seconded to EUROCONTROL to implement the activities stemming from the Common Action Plan under the coordination of a dedicated

EUROCONTROL/UksATSE Task Force (“Task Force”) established to define and develop strategies for Ukrainian ANS reintegration into the European and global aviation network after the war ends.

The Task Force initiated several processes focused on UksATSE operational personnel training, development of the future concept of operations specifically designed for the service recovery phase and review of the concept for communication, navigation and surveillance (CNS) services to be used during the first recovery period and later.

To adhere to safety standards, the development of a safety case dedicated to the recovery of services in the airspace of Ukraine has been initiated. The safety case will contain structured safety arguments to provide the required evidence of compliance with applicable risk management requirements and compliance



of safety risk management procedures during the recovery of services in Ukrainian airspace.

Coordinating with the EUROCONTROL Network Manager team, UkSATSE and SAAU are seeking acceptable solutions for the performance of flight inspections of the ground CNS facilities that will be required in the ANS recovery phase.

Furthermore, strong partnership between UkSATSE and the US Federal Aviation Administration (FAA) will ensure the arrangement of additional services for ATCO training, flight inspections of the ground CNS equipment and radar coverage improvements, as outlined in the Recovery Plan and the Common Action Plan.

UKSATSE PERSONNEL

Amid all the challenges, the most valuable asset that UkSATSE needs to preserve is its personnel.

Aiming to enhance the capacity of training and competency maintenance of operational personnel, as well as to provide for the possibility of renewing their medical certification and language proficiency endorsements, UkSATSE has launched a programme to create new secure capabilities covering simulator systems, training facilities and medical centre services.

Maintaining the competency of aviation specialists at the proper level and ensuring their readiness for further prompt recovery will also be achieved through online learning and on-site simulator-based training at

the EUROCONTROL Aviation Learning Centre, ENAC's aviation school (France) and the EUROCONTROL Maastricht Upper Area Control Centre.

A number of other activities related to maintaining the competency of UkSATSE critical personnel are under development, including preparation for further training sessions to be provided by well-known aviation organisations and companies.

UkSATSE continues to follow all Ukrainian technical requirements and administrative procedures related to air traffic controllers licensing and certification implemented in accordance with Commission Regulation (EU) 2015/340. This allows, jointly with some EUROCONTROL Member States and EASA, studying European initiatives related to the cross-border utilisation of air traffic controllers in line with competence maintenance and training needed for the first ANS recovery period in Ukraine.

FUNDING

To date, based on the existing realities, the process of further funding of UkSATSE can be divided into two main blocks of tasks.

The first block is focused on finding solutions for financing and preserving core air navigation personnel and maintaining the ANS of Ukraine after 2023 if the war continues. In the present circumstances, Ukraine, having exhausted the alternatives, will be forced to



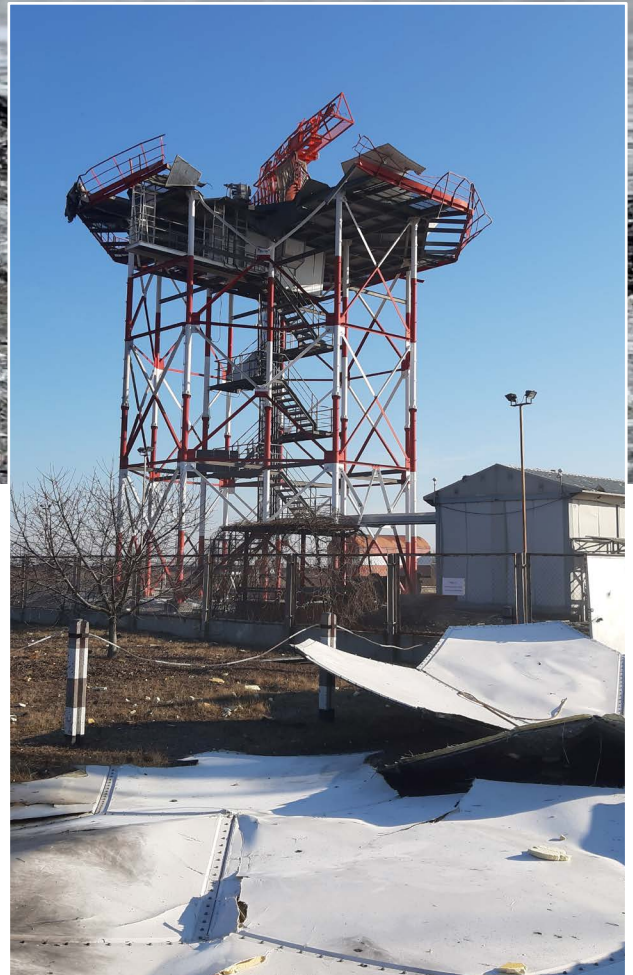
appeal to EUROCONTROL Member States for further prolongation of the functioning and replenishment of the European ATM Voluntary Solidarity Fund for the period after 2023.

The second block is dedicated to the funding of the post-war recovery of the air navigation infrastructure of Ukraine. It includes, among other tasks, the seeking of grants and other kinds of support from potential donors including the European Union, international development organisations, funds and governments, ANS equipment manufacturers and leasing providers.

CONCLUSION

In conclusion, we would like to express our deepest gratitude and appreciation to all EUROCONTROL Member States for their standing with Ukrainian people and the support they are providing through the establishment of the European ATM Voluntary Solidarity Fund.

The heroic resistance of the Ukrainian people and the successful military operations of the Ukrainian army supported by unprecedented assistance from all the civilised world leave no doubt of the final victory of Ukraine. However, if circumstances do not allow Ukrainian civil aviation to resume operations after 2023, we will be forced to turn again to the Member States with the request to stand in solidarity with Ukrainian people and to prolong the functioning of the Fund for the necessary period.



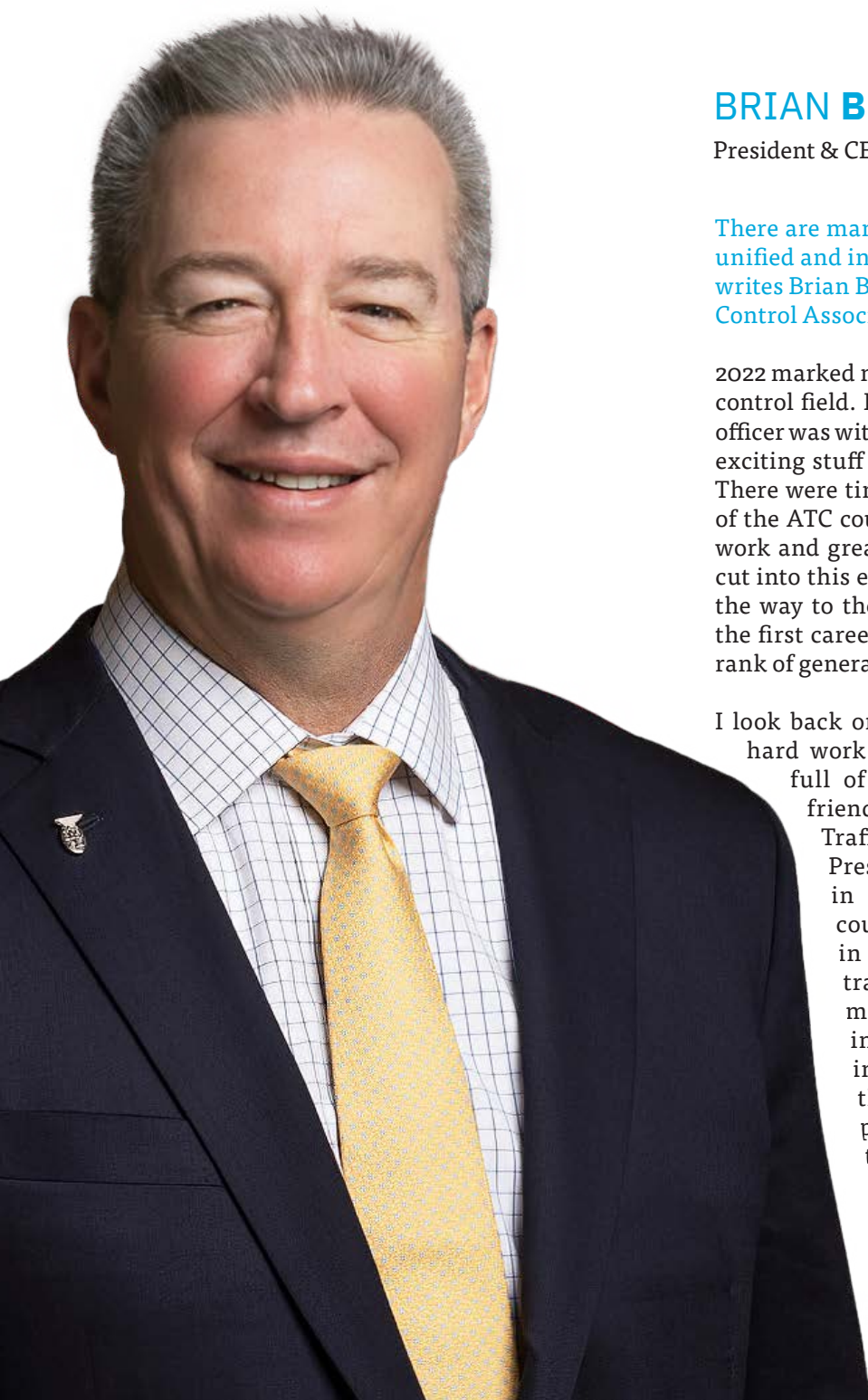
Special gratitude is due to the EUROCONTROL Agency for the consolidated and unconditional support that the Director General and his team continue to provide. We strongly believe that after the war, EUROCONTROL will become a solid platform and coordinator for the recovery of Ukrainian ANS as an integral part of the European air navigation network.

Finally, we would like to express our warmest thanks to the European Commission, EASA, the FAA and all our other friends and partners which are making important efforts to restore Ukrainian ANS and thereby normalising the functioning of the entire European air navigation network.

We fervently hope to warmly welcome our long-awaited guests to Ukraine's peaceful skies at the earliest opportunity after the victory of Ukraine. ■



WE MUST AGREE ON THE DATA ARCHITECTURE



BRIAN BRUCKBAUER

President & CEO Air Traffic Control Association

There are many issues to overcome to realise a more unified and integrated airspace system in the future, writes Brian Bruckbauer, President & CEO Air Traffic Control Association.

2022 marked my 30-year anniversary in the air traffic control field. Initial training as an air traffic control officer was with the United States Air Force, and it was exciting stuff for a newly minted second lieutenant. There were times when the sheer depth and breadth of the ATC coursework was overwhelming, but hard work and great instructors enabled me to make the cut into this extraordinary field. I took my career all the way to the rank of brigadier general, becoming the first career air traffic control officer to reach the rank of general in the US Air Force.

I look back on that time fondly, knowing that the hard work then has led to a rewarding career, full of incredible experiences and lifelong friendships. It also led me to the Air Traffic Control Association (ATCA) as its President and CEO. Much has changed in the field of ATC training over the course of those 30 years, especially in the technologies employed in that training. There are also considerably more educational options available to individuals wanting to pursue a career in air traffic management. All of us in this profession and industry need to play our part in recruiting new talent to take over the current operations being conducted, as well as the new and exciting future that we envision.



That future and the air traffic management industry of today faces many challenges. There are a host of issues to overcome to realise a more unified and integrated airspace system in the future.

First, we must agree on the data architecture we need to seamlessly integrate general aviation, commercial aviation, military aviation, uncrewed systems and space launches. This will inform how things that operate in the airspace connect to one other. It will help to inform how artificial intelligence and machine learning can be used to assist with keeping our skies safe. Trust is another key component of this architecture, so data protections and security protocols will play a vital role in building and maintaining confidence by airspace providers and users, and those along for the ride. There will likely need to be some creativity in how this data architecture is paid for – in the US it could be funded by the United States Government, or potentially the aviation industry could present a business case solution. I've visited air traffic companies and spoken to several professionals in our industry. We have the knowledge and expertise to do this, now it comes down to having the will to do it. If we agree we want a seamless, connected and safe airspace system that integrates all airspace users, the data architecture is the lynchpin that will help us achieve success – and we all need to work together.

The second major challenge I see, and we are starting to make progress on this, is that the various aviation sectors need to do a better job of working together on airspace integration solutions. Today there are instances when a win for space launches could be seen as a loss for airlines, or a win for the airlines could be seen as a loss for the military. We need to look at our airspace systems differently, and this will require taking a critical look at our current concept of operations so we can create solutions to do more integrating instead of accommodating. If we can harness the power of multiple sectors and agree on what this digital approach to integrated operations looks like, it has the potential to drive better, faster, and scalable solutions. After only a couple of months on the job as the President and CEO of ATCA, I saw airspace integration as a piece of the puzzle where ATCA could truly make a difference, to move the industry forward in helping each sector to truly be successful.



In the fall of 2021 when I transitioned from my career in military air traffic management and aviation to ATCA, I met numerous industry stakeholders to better understand the entire aviation and airspace landscape. What I learned was that the advanced air mobility, unmanned aircraft system (UAS) traffic management and space traffic management areas were expanding and ATCA needed to evolve. The ATCA team updated the association's strategy to more clearly reflect the changing nature of airspace management. Today, our updated vision includes airspace integration as a top priority: to serve air traffic management users, providers and industry partners by promoting cooperation, development and safety in all aspects of airspace integration, and to further the efforts, needs and success of our members. Our motto also evolved into ATCA – leading the charge on airspace integration.



ATCA Global 2022

But we didn't make changes in name only. We wanted to ensure the conversations on airspace integration took place to allow for the key players to gather and solutions to be discussed. In the fall of 2022 at ATCA's Global Conference and Expo we completely reimagined the event to include robust discussions on ATM (air traffic management), STM (space traffic management), and UTM (unmanned aircraft traffic management). We created dedicated theatres for three days of programming from experts within each sector, along with exhibits and networking, and ATCA Global was able to shift smoothly to become better aligned with all the key operators vying for access to airspace.

As a member-based association largely comprised of individuals who work for corporations within air traffic management we knew many of our corporate member companies were also expanding their offerings to air navigation service providers (ANSPs) beyond ATM, so we needed to provide value to these organisations, thus shifting our focus to airspace integration. This allowed us to have a broader appeal to various business lines within industry and to also appeal to new companies such as those in the drone market.

In 2022 ATCA hosted our final World ATM Congress, and with the ending of that event we brainstormed how we could continue the conversation about airspace integration. We have ATM, UTM, STM, drones and so on, all continuing to rapidly increase operations – but the elephant in the room is how can all of them operate safely and efficiently in the same airspace? Additionally, around the globe each of these sectors are at various stages in their development and the airspace in which they operate has different regulations.

We decided we needed an international event to discuss all facets of airspace integration. We created Airspace Integration Week Madrid. The only event of its kind, showcasing all facets of airspace integration and therefore including ATM, UTM, STM and a transversal area of civil-military cooperation. Taking place in Madrid on 25-28 September 2023, it is the premier event on airspace integration and hosts the most comprehensive agenda on the relevant issues within the global airspace.

A review of the programmes planned for our Airspace Integration Week Madrid reflects the evolving technologies within our industry, and the challenges and opportunities that come in effectively managing them. Seminars include New Satellite Applications for the Aviation Sector; Autonomous Aircraft: Day One vs. Scaled Operations; Estimating Ground Risk in Urban UAS Operations; and Launch, Range and Re-Entry Operations from the Airspace Integration Perspective. Such topics would have seemed so foreign to us 20 years ago that they would have been dismissed as “too futuristic”. Well, the future is here, and it's up to us to cooperate and collaborate with each other to ensure the future works.

Today is an exciting time to be a professional within the ATM, STM and UTM industry. We all face many challenges, but they are not insurmountable, as long as international cooperation and collaboration is fostered. I am proud that ATCA is doing its part to provide the venues where problems can be discussed, solutions brainstormed, and hopefully equitable solutions found in the future that are in the best interests of all involved in airspace operations. ■

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NORTHERN NORWAY

A EUROPEAN ROADMAP TO CLIMATE-NEUTRAL REGIONAL AIR TRAFFIC

**EINAR SORENSEN**

AVIATION ADVISER

Northern Norway is pioneering a series of aviation development programmes which will put it on the fast track to aviation net zero emissions, writes Einar Sorensen, aviation adviser, Oslo, Norway.

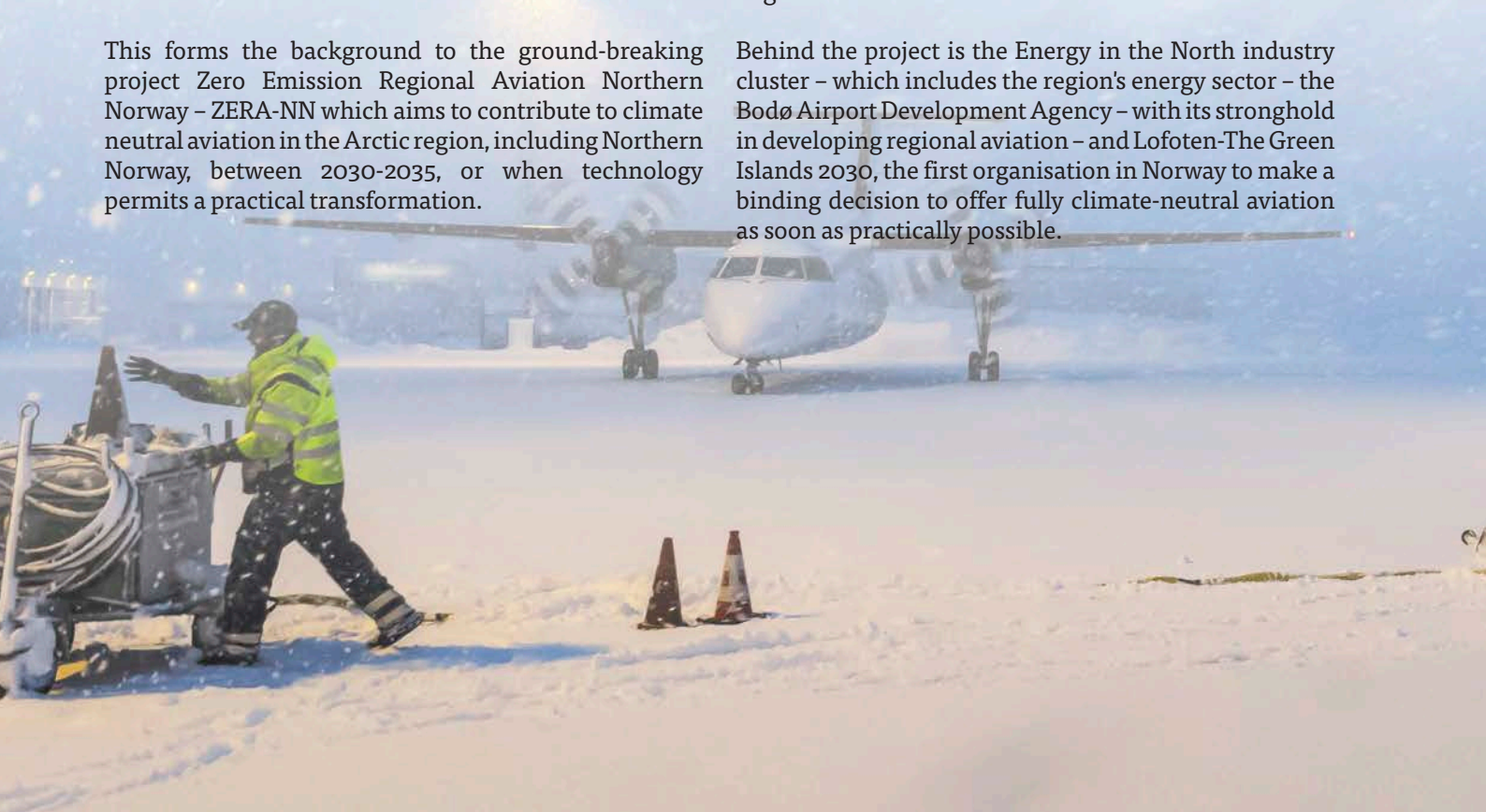
Few other countries are better placed than Norway to head the transition to a climate-neutral future, especially in aviation. The country is on the doorstep to the Arctic and is a leader in Europe for renewable energy, offshore oil and natural gas. This is an excellent starting point for supplying European aviation with climate-neutral energy and fuel – crucial to the future of aviation on our continent.

This forms the background to the ground-breaking project Zero Emission Regional Aviation Northern Norway – ZERA-NN which aims to contribute to climate neutral aviation in the Arctic region, including Northern Norway, between 2030-2035, or when technology permits a practical transformation.

To achieve this, the project has brought together the most important players from regional authorities, the energy sector, business and research and development organisations in a unique national and international collaboration to ensure that Norway will have a full-out climate-neutral aviation offer within 2040, which Avinor has set up as a target year.

The project has entered into agreements with the German and French aircraft industry and is now discussing larger cooperation packages with other European regions, for example, with the Airport Regions Council in Brussels.

Behind the project is the Energy in the North industry cluster – which includes the region's energy sector – the Bodø Airport Development Agency – with its stronghold in developing regional aviation – and Lofoten-The Green Islands 2030, the first organisation in Norway to make a binding decision to offer fully climate-neutral aviation as soon as practically possible.



Aviation is vital to most business and social activities in Lofoten, and in Northern Norway as a whole. That is the driving force behind Avinor's deployment of remotely-operated control towers (ROT) at airports in Northern Norway, with Bodø ATC as the national centre for this innovative development. ROT technology is seen as one of the main enablers to increasingly strong demands for cost-effective operations.

THE NORTH NORWEGIAN PROJECT IS BUILT WITH CLEAR GOALS

First, the region's 26 airports – out of a total of 45 with regular air traffic in Norway – should be launched as a network for testing and approval of new climate-neutral aircraft and the corresponding ground-based infrastructure. Northern Norwegian airports have state-of-the-art ATC and navigation solutions which provide an exceptionally high level of on-time performance and flight safety.

"Northern Norwegian airports have state-of-the-art ATC and navigation solutions which provide an exceptionally high level of on-time performance and flight safety"

Second, the region is to be developed into one of Europe's leading energy producers. Modern high-efficiency facilities producing 100% renewable electricity have been built very close to airports strategically located on the coast where most people live – providing a first-class starting point for the production of sustainable aviation fuels (SAF), hydrogen or clean electric power for powering potentially 100% electrically-powered aircraft.



The Lofoten Region with its short-runway airports will be launched as a pilot area for the practical introduction of climate-neutral aircraft, energy supply to airports and operational procedures adapted to the requirements of the region. This is a critical factor in Lofoten becoming one of Europe's most important destinations for future climate-neutral tourism.



However, ZERA-NN is not just a regional project. From its start in 2022 the aim of the programme has been to serve the rest of Norway and European regions. The project has been designed so that the results can easily be applied elsewhere. The project therefore has an extensive international element, with delegation trips and participation in important exhibitions and conferences.

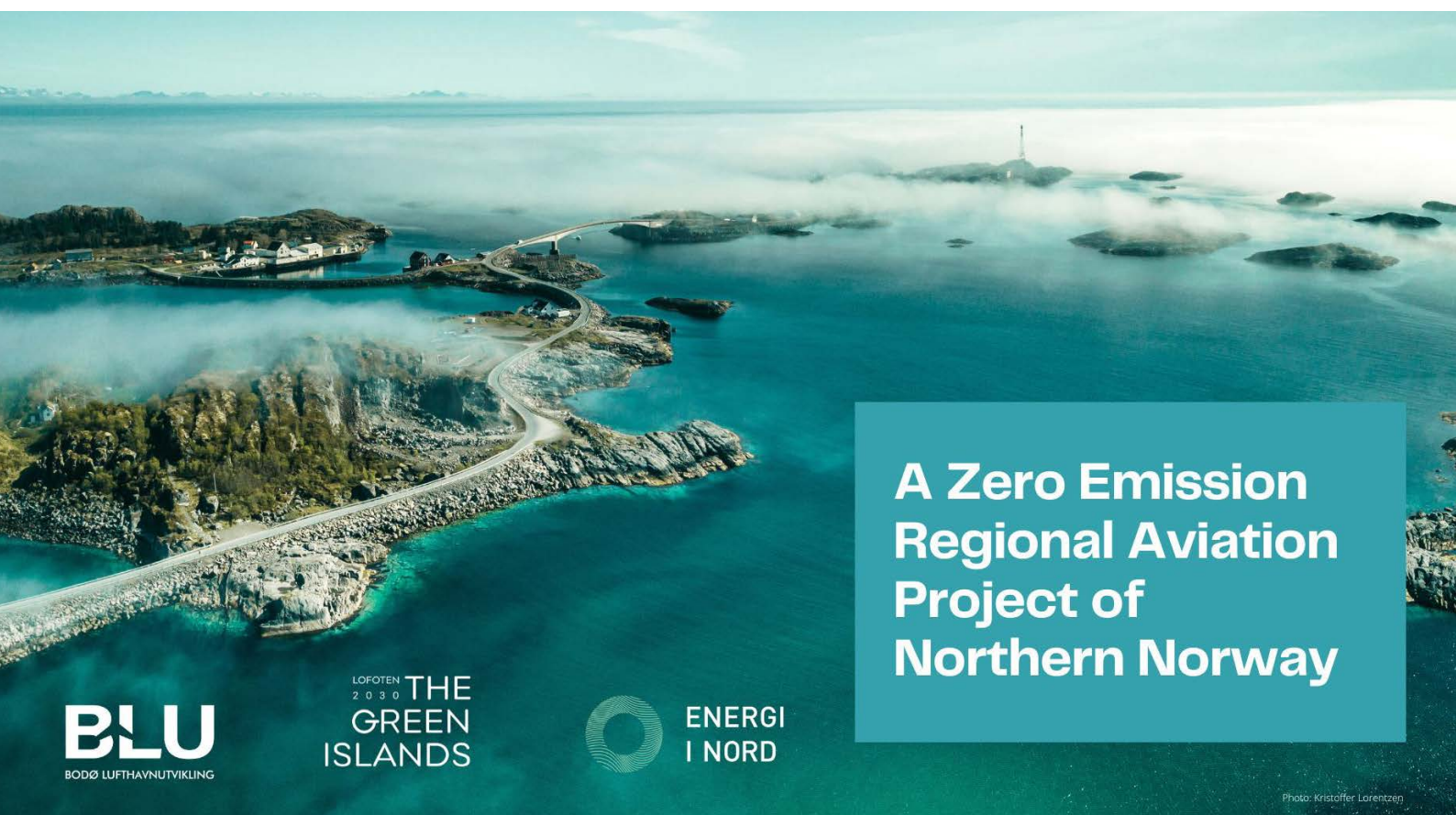
This programme is a clear recognition of the European Commission and European authorities' avowed commitment to a transition to climate-neutral aviation, extending cooperation as never before between all actors with an interest in this area. This covers not just discussions but investments in joint projects and the commercialisation of new technology, which will be so important in transforming the sector.

"The Lofoten Region with its short-runway airports will be launched as a pilot area for the practical introduction of climate-neutral aircraft, energy supply to airports and operational procedures adapted to the requirements"



Northern Norway is an important Arctic region and the gateway to Arctic areas for Europe. Nowhere else is climate change felt as strongly as in the Arctic, where warming is three times as great as the global average. Climate change in the Arctic also has enormous consequences for the rest of the globe. It is therefore important for the whole of Europe that transformation programmes in Northern Norway are successful, because solutions here have a direct influence on the rest of Europe's development.

"By taking a leading role internationally in restructuring aviation through sustainable fuels and electrification, Norway will have a climate effect far beyond the country's borders"



BLU
BODØ LUFTHAVNUTVIKLING

LOFOTEN
2030 THE
GREEN
ISLANDS

 **ENERGI
I NORD**

Photo: Kristoffer Lorentzen

By taking a leading role internationally in restructuring aviation through sustainable fuels and electrification, Norway will have a climate effect far beyond the country's borders.

It will create a major competitive advantage for value creation and industry in Norway in terms of sustainability in fuel, hydrogen and electrification. It will provide a transition to fossil-free aviation, securing jobs both in the aviation industry, exports, the tourism industry and business in general.

Technology development in aviation takes time. A demanding adjustment creates a need for predictability and a long planning horizon; Norwegian industry is a strong participant in the aviation industry, especially

through the SESAR programme and wider ATM development.

Norway performed a similar role when it led the introduction of electric vehicles (EVs) years ago, despite the fact that Norway has no car industry to speak of. EVs today have an 80% market share of new car sales in Norway. Other larger countries are following Norway's example, resulting in an EV market share showing significant global growth, reaching 14% of all new car sales in 2022.

In electric shipping, Norway has used a combination of the carrot and the stick to ensure that in only eight years between 2015 to 2023, 52 of Norway's 228 ferry operations have switched from fossil to electric propulsion.

Northern Norway has 482,000 inhabitants, or approximately 9% of Norway's population. Energy production makes up 16% of Norway's total energy base, with a production of 25 Terawatt-hour (TWh), of which 23 TWh is hydropower driven and 2 TWh wind-power derived. The region also has 21 TWh in multi seasonal storage capacity in the form of hydropower dams. The potential for offshore wind is also vast.

This provides the basis for a programme of full-scale production of power-to-liquid SAFs, blue hydrogen and ammonia. In the period 2022 to 2028, between EUR 8 billion and EUR 13 billion will be invested in a series of state-of-the-art production sites. This will produce 569,000 tonnes of green ammonia, 3 billion tonnes of blue ammonia, 3 million tonnes of PtL-methanol, 180,000 tonnes of PtL SAF and 29 Gigawatt-hour (GWh)/year of battery production.

This huge production potential has attracted a lot of attention. Norwegian Airlines, one of Europe's leading low-cost airlines, has become a co-owner of the SAF production plant in Mosjøen, located in the south of Nordland county.

Two new large airports are being built in the region, Bodø New Airport and the Polar Circle Airport at Mo i Rana, symbolising the country's confidence in the future. These airports are to be operational by 2028-2030 and will be examples of the new generation of climate-neutral airports in which Europe must invest.

This will also be one of the most important topics for a large international conference in Bodø on 13 June 2024, where the focus will be on Europe's investment in climate-neutral regional aviation. The conference is part of a programme around Bodø's position as Europe's capital of culture in 2024.

"If you can succeed with climate-neutral aviation in a region with such strong climatic and topographical focus as Northern Norway, then you can succeed anywhere in the world"

Leaders from the European Commission, aviation organisations, aircraft manufacturers, airlines and others in transport are expected to participate. The underlying message of the event is that if you can succeed with climate-neutral aviation in a region with such strong climatic and topographical focus as Northern Norway, then you can succeed anywhere in the world. ■

The writer Einar Sorensen

has for over 20 years been working with aviation projects out of Toulouse, the global aviation centre. From 2005 to 2023 he headed ATM Norway, a branch organisation of Norwegian ATM industries and R&D within the SESAR programme.

Later he was responsible for coordination of technological projects between Toulouse Metropole and the Oslo region in Norway. He is now engaged by Bodø Airport Development Agency to coordinate project development with international partners.

PHOTOS:

Article background photo

Northern Norway is one of the world's most demanding regions for air traffic.

Winter weather and a demanding topography require the highest possible competence from airlines, airports and world-leading ATC technology. The picture is from Tromsø Airport, Northern Norway's most important airport. Photo: Gaute Bruvik/Avinor

Map: Lofoten is a region of islands with air traffic vital for all societal activities. Lofoten is planning to lead on the introduction of climate-neutral aviation.

Map made by Lofoten Kraft AS

"Zero Emission Regional Aviation Northern Norway":

A unique collaborative project between actors with a common goal of leading the practical launch of climate-neutral air traffic.



"WE ARE BUILDING THE
ECO SYSTEM DRIVING
THE TRANSITION TO
**A ZERO-EMISSION
AVIATION INDUSTRY**"



SOFIA GRAFLUND

Chief Operating Officer of Heart Aerospace,
a Gothenburg-based company developing a regional airliner driven
by electric motors with battery derived energy.

THE ELECTRIFICATION OF REGIONAL AIR SERVICES IN EUROPE WILL BE AN IMPORTANT MILESTONE IN THE JOURNEY TOWARDS A CARBON ZERO AVIATION INDUSTRY. WHAT ARE THE KEY TECHNICAL AND REGULATORY CHALLENGES THAT WILL NEED TO BE OVERCOME TO REACH THIS MILESTONE?

Heart Aerospace is developing the ES-30 and aims for it to enter service in 2028. The ES-30 is in its preliminary design phase, which means we are in the process of selecting our key partners and suppliers. We are building the eco system around us that will be part of driving the transition to a zero-emission aviation industry. It is about finding the partners, from the industry and outside of the industry, who share our vision and mission and are committed to make this transition happen. And that we need to be successful together. We can really see that the existing aerospace industry is coming along and are starting to see us as a strategic programme that they want to part of. It means they, in some ways, must abandon old ways of working and find new ways of working together with us.

The ES-30 is a regional electric airplane with a standard seating capacity of 30 passengers driven by electric motors with battery derived energy. It will have a fully electric zero emissions range of 200 kilometres, an extended range of 400 kilometres, all including typical airline reserves.

At Heart we've taken the approach in our first programme to limit innovation to where it matters and focused on the electric power train to reduce emissions and costs. Certifying a new aircraft is challenging and that is why we have elected to focus on innovating the power train and keep many other parts of the plane as conventional as possible– the first goal is really to make this airplane take off!

For the next programmes we can allow ourselves to investigate further improvements. However, for this first aircraft we want to rely on the existing supply chain where possible, to mitigate risk and cost. Another important thing to point out is our close collaboration with the certification authorities, with whom we have been engaging since the very start of our programme.

To sum up, our biggest challenge is to make sure all parts necessary to develop, build and deliver an aircraft – from design of the aircraft, recruitment of the right talent to certification processes, supply chain and so on, are progressing in a synchronised manner.



"Our biggest challenge is to make sure all parts necessary to develop, build and deliver an aircraft are progressing in a synchronised manner"

WHEN DO YOU THINK THE FIRST REGIONAL ELECTRIC SERVICES WILL BE INTRODUCED AND WHAT HAS BEEN THE INTEREST OF YOUR CUSTOMERS, THE AIRLINES?

Our aim is to introduce the ES-30 to the market by 2028. It is a challenging timeline, but we have the right team in place to do it. The interest from airlines has been great and Heart Aerospace now has a total of 250 firm orders for the ES-30, with options and purchase rights for an additional 120 aircraft. The company also has letters of intent for a further 91 aircraft.

The Nordic region will likely be a leader in the adoption of electric aviation with several concrete infrastructure projects already underway, including our own collaboration with the government of Åland as an early user case.

"The Nordic region will likely be a leader in the adoption of electric aviation with several concrete infrastructure projects already underway"



COULD YOU SHARE YOUR VIEW OF WHAT A NETWORK OF ELECTRIC REGIONAL AIRLINER SERVICES WILL LOOK LIKE COMPARED TO TODAY'S NETWORKS, IN TERMS OF GROUND INFRASTRUCTURE REQUIREMENTS, AIRCRAFT PERFORMANCE, EMISSIONS AND AIR TRAFFIC CONTROL INTEGRATION?

The return those airlines are looking for is reliable aircraft that can still be commercially attractive and easy to operate while also delivering an ultra-low carbon footprint.

The electric propulsion allows the aircraft to operate with zero emissions and low noise and with a cost efficiency that allows airlines to operate regional routes profitably. This means that airports can become more integrated with our communities and that point-to-point travel, as we can see in Norway already today, will become much more frequent. As opposed to travelling into major hubs and swapping planes to reach your end destination, which is common today.

Many airports already have charging infrastructure in place for ground handling equipment, but for fast charging of the aircraft you would need two megawatts power supply which is usually not available at airports. The target for the ES-30 is for the batteries to charge in 30 minutes or less and this requires the airport to make investments in infrastructure.

"The electric propulsion allows the aircraft to operate with zero emissions and low noise and with a cost efficiency that allows airlines to operate regional routes profitably"

HOW DO YOU SEE SOCIETY'S VIEW OF AVIATION CHANGING? IS THERE REALLY GROWING DEMAND FOR MORE ENVIRONMENTALLY RESPONSIBLE AIR SERVICES AMONG PASSENGERS AND CITIZENS?

Globally, air travel is still in its infancy. Only 20% of the world's population has ever flown on an aircraft, which means that there are over 6 billion people worldwide that have never been airborne. And as they start to be connected to this amazing infrastructure, emissions will increase exponentially.

So we need to break this trend. Airlines are doing a lot of good things, from better route planning to higher load factors, to mixing in biofuels, doing offsets and buying aircraft with more efficient jet engines. But it's not enough. We need new technology, and a new generation of aircraft, that can completely decarbonise air travel.

I believe there is a demand for green options for air travel, but I think that it can't only be put on the passengers. Political initiatives need to increase. We need to see actions that will support this transition just like we saw the support for transitioning to electric cars. Initiatives like zero airport fees for electric aircraft and for electricity used to charge electric aircraft to be exempted from VAT would be very helpful. If zero-emissions air travel is less expensive and offers higher connectivity – why wouldn't everyone want to fly green?

"I believe there is a demand for green options for air travel, but I think that it can't only be put on the passengers. Political initiatives need to increase"

WHAT IS YOUR COMPANY'S CONTRIBUTION TO MAKING EUROPE'S AVIATION INDUSTRY MORE COMPETITIVE, MORE DIVERSE AND INCLUSIVE?

Heart Aerospace's vision is not only to launch an electric airplane – we want to build a whole new industry. We want to question old truths and bring in experience from other industries. We want to challenge the traditional supply chain to become more cost efficient and we want to bring commercial regional air travel back to the old, golden days when the world was more connected than what we see today.

We are a company with an international melting pot of a team, about 200 people from 28 different countries, and we can see every day how a multitude of perspectives lead to better performance and a better company culture. To reinvent air travel, we must reinvent how we work. We are looking to build an aerospace company for the twenty-first century.

And finally, I would love to see more female engineers on our team and make them feel that Heart Aerospace is their time and place to thrive! ■



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DIVERSITY, EQUALITY & INCLUSION IN AVIATION

WHY WE MUST DO BETTER



**MILENA
BOWMAN**

Executive Manager Airspace,
Systems and Procedures
EUROCONTROL's Maastricht
Upper Area Control Centre

Making aviation sustainable needs the three Ps – people, planet and profit. Diversity and inclusion is an important part of the picture, writes Milena Bowman, Executive Manager Airspace, Systems and Procedures at EUROCONTROL's Maastricht Upper Area Control Centre (MUAC).

The three Ps needed for sustainable aviation are enough qualified people to do the work; a green planet, and profitable businesses that thrive in a dynamic and changing economic environment. Working on diversity and inclusion is important to the 3Ps, with some of the negative effects of diversity needing to be considered, along with the current legal framework, and ongoing activities to achieve efficiency in these efforts at the European level.

During the 2023 Global Aviation Gender Summit, ICAO estimated that if women's participation in aviation continued at its current pace of increase, it would take 450 years to achieve gender parity. We clearly do not have this amount of time to waste.

The industry is suffering labour shortages, which projections show will get worse. But efforts to attract, train and retain a diverse range of people must go well beyond gender: migrant waves and an open labour EU market have increased ethnic and cultural diversity in many societies; people with disabilities; neurodiverse people; members of the LGBTQ communities, all should form an essential part of the aviation workforce.

The shortage of qualified labour is plaguing the current labour market, especially in aviation where certification processes take a relatively long time. A more diverse workforce can achieve better results if there are equal opportunities and a culture of inclusion to incorporate the richness of knowledge among employees with different backgrounds. At the same time, a more inclusive sector will be a more attractive sector to the new generation. Therefore, it is strategically important to build a setting where best practices are exchanged, shared learning is tailored to air traffic management (ATM) and the sector is seen as one standing for inclusion, diversity and innovation, and one that does not tolerate discrimination in any form.

Promoting and supporting diversity in the workplace is an important aspect of good people management. It is about valuing everyone in an organisation as an individual, so it is vital to have an inclusive environment where everyone feels able to participate and achieve their potential. While legislation – covering age, disability, race, religion, gender and sexual orientation among others – sets minimum standards, an effective



diversity and inclusion strategy goes beyond legal compliance and seeks to add value to an organisation, contributing to employee well-being and engagement.

The moral case for building fairer and more inclusive labour markets and workplaces is indisputable: regardless of our identity, background or circumstances, we all deserve the opportunity to develop our skills and talents to our full potential, work in a safe, supportive and inclusive environment, be fairly rewarded and recognised for our work and have a meaningful voice on matters that affect us.

In addition to the moral and people management cases, the aviation sector has also safety reasons to work on unbiasing the selection process, and on unconscious bias training, cultural differences and inclusive team management. The Annual Safety Forum, held in Brussels in June 2023, discussed in depth how we select and train the next generations of aviation professionals. It became clear that we need to pay special attention to training people to work in a highly interconnected and very diverse environment so that misunderstandings are avoided, and differences can be discussed and resolved. In addition, the Forum found that managing diversity is important to maintain a healthy safety climate within teams, in times when our societies are galvanised by numerous political and moral topics.

Aviation should care about its diversity and inclusion as many studies have linked the diversity of teams with

the quality of innovation they are able to produce. The aviation sector is going through a considerable digital overhaul, a trend that is likely only to intensify in the years to come. Today, the ATM industry is a system of systems where actors are interconnected in a socio-technical network. I call the ability to work and function in this ultra-connected world “diversability”. The better individual teams and organisations are at being able to extract the value of diversity, the more innovative the sector will be.

Lastly, we must keep in mind that diversity is often referred to in scientific literature as a double-edged sword. On one hand, people with diverse backgrounds bring knowledge from these backgrounds and offer different ways to approach a problem or structure a solution. The richness of the ideas and the number of innovative ideas are often correlated with the diversity of the people in the team. On the other hand, diversity might also form social categorisation within a team leading to “them and us thinking”. In the worst case, this thinking can become “them vs. us” and create fault lines among team members. For teams welcoming new members it would be beneficial to spend time getting to know them. The ability of the team to benefit from the inherent diversity dividend it has depends on the ability of team members individually and the team itself to incorporate different points of view, combining them in a better solution. Plainly put, diversity is good but only if the organisation is ready for it.



For all these reasons, organisations regionally and globally have deployed activities to promote diversity and inclusion. Such work links directly with EC Directives, many state laws, UN Global Sustainable Development Goals (SDGs) and Environment, Society and Governance (ESG) standards in general. There are a number of ongoing initiatives such as IATA 25 by 2025, ICAO NGAP, DG-MOVE platform for Change, EU Ambassadors for Diversity in Transport, EUROCAE WG125 and the ongoing initiative facilitated by EUROCONTROL and EASA to create a network among ATM diversity and inclusion leaders. ICAO and EUROCONTROL announced their intentions for collaboration at the ICAO Global Aviation Gender Summit in Madrid, July 7, 2023.



Salvatore Sciacchitano, President of the ICAO Council and Milena Bowman, EUROCONTROL

The EC Platform for Change was established in 2017, to make sure that women and men are given equal opportunities to participate in the transport sector. The platform members also realised that by concentrating only on the gender aspect of diversity, a lot of under represented groups in aviation are left behind. Hence the European Commission funded the Ambassadors for Diversity In Transport initiative that seeks to promote diversity, equality and inclusion within the EU transport sector. This is done by raising awareness and sharing information on and developing and implementing initiatives to promote diversity in the EU transport sector, from the perspective of transport workers and transport users. EUROCONTROL proudly hosted its first meeting in March 2023 at its Headquarters.

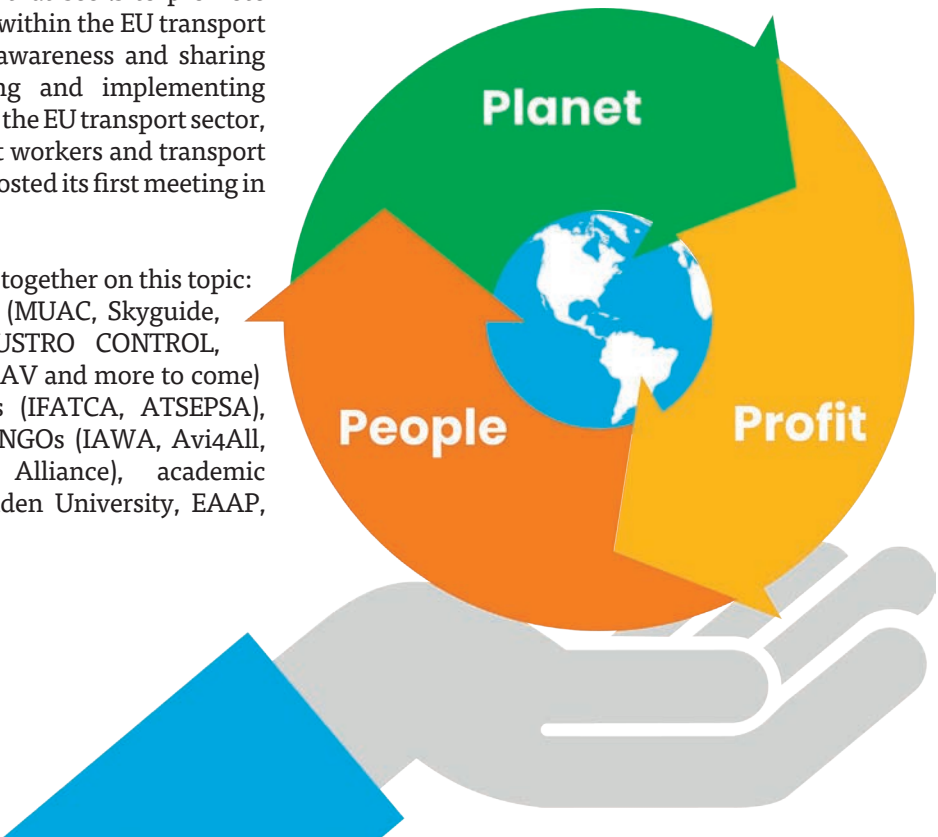
Many organisations are working together on this topic: ECAC, EUROCAE, many ANSPs (MUAC, Skyguide, LVNL, BULATSA, PANSAT, AUSTRO CONTROL, NATS, IATCA, DSNA, skeyes, ENAV and more to come) professional staff organisations (IFATCA, ATSEPSA), social partners (ETF, ATCEUC), NGOs (IAWA, Avi4All, EPAN, Ellas-Vuelan-Alto, T-C Alliance), academic institutions and consulting (Leiden University, EAAP, NLR, CAOP, FoxATM).

In our work we found that sharing our experiences, collating best practices and sharing available material creates a strong network.

The benefits of such a network are multiple. First, sharing knowledge makes the organisations' journey in diversity and inclusion more efficient. The group members share not only beneficial and successful activities, but also the negative ones, thus signposting to organisations difficulties and barriers that could be avoided. Second, working together on the same objectives is something that our industry has done on multiple technological projects. Deploying these industry organisational skills to work also on diversity and inclusion brings efficiency and economies of scale for deploying training programmes and communication campaigns. Lastly, working on diversity and inclusion sometimes takes an emotional toll on the people involved, as the conversations are often psychologically tense. A network of people who are busy in the area provides psychological support for those involved in putting humans back at the centre of our work.

If aviation wants to have a sustainable future it must make sure there are enough qualified people to deliver services. We do not have 450 years to wait for culture to change naturally. We have to work together on making our ranks more inclusive, to welcome and retain the diverse new generations of aviation professionals. Aviation simply cannot afford to not work on diversity and inclusion.

Milena Bowman is an Executive Manager at MUAC Operations, EUROCONTROL, founder of a Diversity and Inclusion Think-Tank and a PhD candidate with Leiden University researching the topic of Team Diversity and Safety Climate.





AirTalk 5000 headset

Imtradex

SIMULATION AND OPERATIONS

Hand in hand

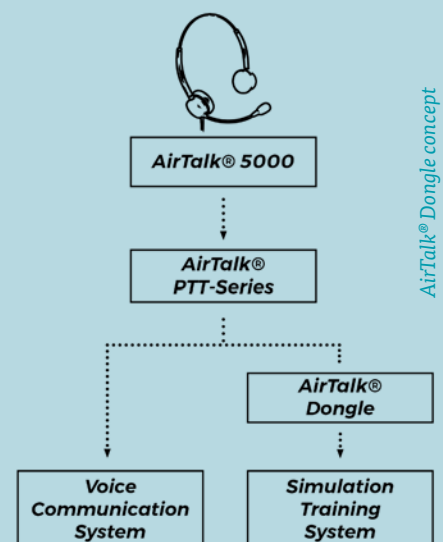
Training and simulation constitute crucial elements of Air Traffic Control. ATCOs must undergo training to acclimate to new sites and systems. Moreover, they need to grasp emerging technologies and progressive concepts like Remote Digital Towers, Remote Towers, or Virtual Towers. The simulation provider covers these domains and more to offer the finest experience to air navigation service providers and their training institutions. To ensure this exceptional experience, seamless integration with existing or new operational systems is imperative. This aligns with the military adage of "train as you fight."

Addressing the capacity to operate and train cohesively, it's evident that communication equipment, such as handsets, headsets, and microphones, plays a pivotal role. While aligning equipment for operations and simulations might pose challenges, numerous factors must be considered, particularly in terms of equipment availability for each domain. The novel IMTRADEX concept facilitates uninterrupted communication between simulation and operational arenas. The AirTalk® Dongle offers a digital avenue to link your operational devices with the simulation area. This adaptable device can be seamlessly integrated into various systems, and the IMTRADEX USB technology might already be

familiar to your simulation setup. The Dongle concept synergizes seamlessly with the IMTRADEX AirTalk® series, presenting immediate connectivity options.

Furthermore, IMTRADEX delivers comprehensive communication equipment for ANSPs, yielding substantial returns on investment and drawing from over 30 years of collaborating with global ANSPs and the biggest VCS manufacturer. The products boast durable components, ensuring longevity, and are constructed with robustness in mind, but still light-weight. With over 80,000 ATC headsets distributed across 70+ countries, these lightweight yet durable headsets guarantee comfort and endurance. The ergonomically designed Push-To-Talk buttons align perfectly with ATCOs' hands, whether opting for PTT-19, PTT-13, or the latest PTT-19 Dual tailored for remote tower applications. Coupled with the headset choices within the AirTalk® 5000 series, the communication lineup offers a comprehensive product spectrum for ATCOs. This, in conjunction with IMTRADEX's complete product range, furnishes ANSPs with advantageous and dependable solutions. The array of products encompasses additional devices designed for utilization within the ATM setting. Various kinds of handsets are on offer, alongside a diverse selection of microphones catering to

different use cases. Additionally, customized communication solutions are provided to meet the distinct requirements of each customer. The product lineup is accessible in both analog and USB variants, ensuring comprehensive coverage across all domains. ■



AirTalk® Dongle concept

True operational excellence necessitates the finest training and simulation equipment.

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FREQUENTIS
FOR A SAFER WORLD

ACCELERATED DRONE MANAGEMENT



Drone markets are reshaping airspace, increasing its complexity. Thomas Pils, Frequentis Vice President New Market Solutions, explains why new technologies should be adopted to ensure safety, situational awareness, and compliance.

The ability to manage crewed and uncrewed traffic in shared airspace is becoming increasingly complex thanks to the rapid growth in drone use cases.

The primary concern is safe integration. Important is the seamless information exchange

between all stakeholders and procedures to ensure safe separation between drones and manned aircraft. For this, organisations must enhance their technological capabilities so that they can introduce drones both safely and efficiently. This has required the development of new technologies, which I want to talk a little about.

THE TECHNOLOGY

Both the aviation industry and drone users must adopt innovative technologies to ensure safe and fair access to the skies. To successfully operate drones, an organisation will need systems for voice and data communications, and uncrewed traffic management (UTM).

Frequentis has created a UTM suite of systems that support secure data exchange and access to UTM services. It facilitates a common information services

(CIS) environment for all uncrewed aviation stakeholders.

The Frequentis UTM suite is available as a user-friendly and interactive mobile app and web portal, consisting of the UTM Operation Manager and the UTM Airspace Manager applications. The UTM Operation Manager caters to both business and private drone operators, providing a comprehensive suite of features designed to enhance airspace safety, and efficiency. The UTM Airspace Manager is an application used by Air Traffic Controllers (ATCO) to manage drones traffic within their area of responsibility.

With a secure open protocol, seamless data exchange between all relevant stakeholders, including government authorities, entrepreneurs, ATCOs, and drone operators can be ensured. A standout feature of the system is the drone map, which provides valuable insights into permanent and temporary flight restriction zones, permitted flight altitudes, flight registrations, airspace monitoring, and the ability to request flight plan approvals and take-off clearance. The interactive tools, accessible through the website and mobile app, ensure that drone operators have a comprehensive understanding of their operating environment, further enhancing safety and situational awareness.

WHO IS TAKING THE LEAP?

In Norway, rescue helicopters were finding it increasingly challenging to safeguard against drones before departing for an



Frequentis accelerated drone management has the ability to manage crewed and uncrewed traffic in a shared airspace



© Norwegian Air Ambulance Foundation

Norwegian Air Ambulance (NLA) operations from their Evenes base in Northern Norway

emergency due to a lack of real-time information. To solve this, we were able to implement a UTM system permitting data sharing between the drone pilot system and the helicopter emergency medical services to ensure both parties could see the other and be alerted of potential collisions. The drone warning system was first put into operation for testing in June, 2022, and was tested among selected users. In March 2023 the project was awarded the Overall Excellence ATM Award at Airspace World in Geneva. This has had a positive impact on public safety and the overall efficiency of these critical services, improving airspace visualisation for emergency helicopters as well as potentially police. It has enabled them to respond more quickly to emergencies and other high-priority tasks, without the added workload required to look for drones.

In Austria, the national railway operator, OBB, is researching the use of drones to inspect railway track, making the task more efficient as well as safer. Since November 2022 we have been researching the operational feasibility of hangar-based automated drone flights for automated track maintenance checks. This use case could benefit many other industries, like construction and agriculture, sending drones from the hanger to a certain point and back once checks have been completed. Over an initial period of one year, use cases such as incidents, checking route availability, forecasting and the effects of natural

hazards, inspection activities, and shunting operations will be practised. This is a great step forward for drone use in railways, aiming to make manual tasks more efficient, while enhancing safety.

In Estonia, our UTM suite has been recently implemented for Estonian Air Navigation Services (EANS). Users now have access to up-to-date drone flight information, can register themselves as operators and securely exchange data, monitor airspace conditions, file flight plans and even apply for take-off clearance. This solution marks a significant milestone in the development of uncrewed aviation services in Estonia and will transform the drone flying experience. Important is also the system's ability to support police and military drone operations.

THE FUTURE DRONE ECOSYSTEM

The predicted surge in drone usage has spurred on the need for innovative solutions that ensure safety, situational awareness, and compliance. As the boundaries between crewed and uncrewed traffic blur, it becomes paramount for both the aviation industry and drone users to embrace new technologies that enable harmonious coexistence in the skies.

By implementing an open, intuitive, and simple solution, ANSPs can safely and efficiently integrate drones into shared airspace while fostering

innovation and economic growth. Seamless integration and real-time data sharing is key, as well as an increasing level of automation to satisfy the steadily growing number of UAVs in a shared airspace. The convergence of ATM and UTM is a logical next step.

Prior to launching an operational drone system, organisations across all industry sectors can work with Frequentis to test and validate their use cases. Our long experience of working with ATM organisations gives us confidence that we can help other industries deploy drones without negative impacts on other air traffic. Solutions are available as on-premises and cloud-hosted deployments, as best suits the requirements of each customer.

ABOUT THOMAS PILSL

With a master's in computer sciences and economics, Thomas has over two decades of experience in the IT services industry, holding various operational and management positions. He joined Frequentis in 2016, in various roles before being appointed Vice President New Market Solutions in January 2023 to further grow the Frequentis UTM suite and other innovative solutions.

ABOUT FREQUENTIS

With over 75 years of cross-industry experience, Frequentis ATM ensures the safety of 95% of the world's passengers and aircraft, helping ANSPs worldwide efficiently deliver safer and more secure capacity for airspace users. Frequentis has been working with Nordic and Baltic stakeholders on the SESAR Gulf of Finland (GOF) U-space and GOF 2 projects, exploring the safe integration of drones, trialling and validating use cases in line with the U-space regulatory framework. ■



MOVING TO THE NEW NETWORK MANAGER OPS CENTRE IS A STEP CHANGE IN EUROPEAN AIRSPACE DIGITISATION



AN INTERVIEW WITH
STEVEN MOORE
HEAD OF ATM NETWORK OPERATIONS,
EUROCONTROL

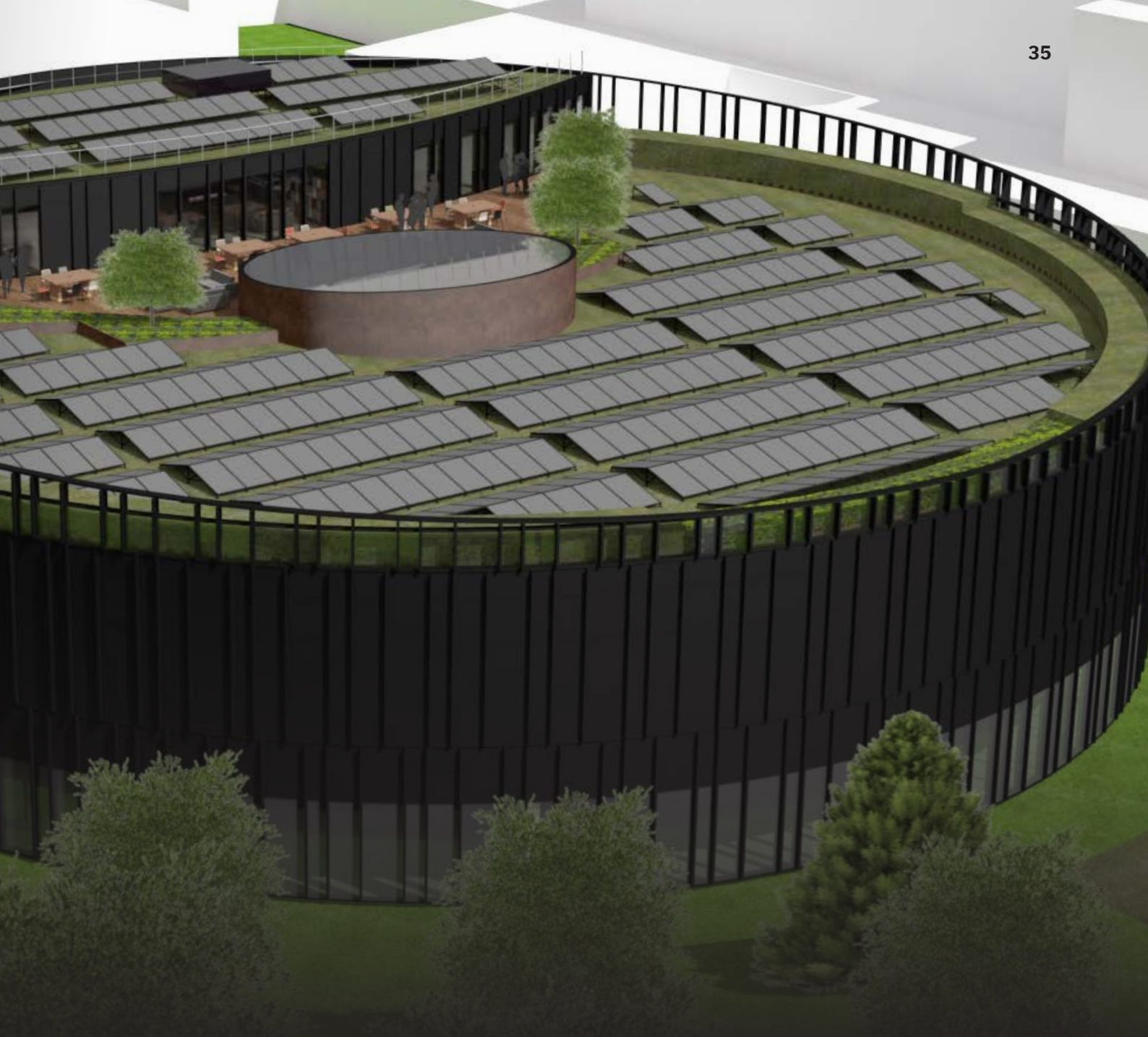
This year marks the sixtieth anniversary of EUROCONTROL as we celebrate the entry into force on 1 March 1963 of the Organisation's International Convention. Over the last 60 years EUROCONTROL has become a key player in the European aviation community, developing wider and deeper partnerships with all the relevant actors to make aviation safer, more efficient, more cost-effective and with a minimal environmental impact. This year marks another important milestone in the Agency's history with the inauguration of EUROCONTROL's new, state-of-the-art Network Manager Operations Centre. The new Centre is designed to ensure that EUROCONTROL, as the manager of the European aviation network, continues to meet the needs of operational stakeholders, digitising and modernising the way air traffic is managed over Europe.

The change-over from the legacy Network Manager Operations Centre (NMOC) to the new operating centre –

“O-Date,” scheduled for the end of October 2023 – marks the next major step in the evolution of the Network Manager to a fully digital service (see: “Network manager starts on a digital transformation path.”)

“This is really the first deliverable of the integrated NM (iNM) programme,” said Steven Moore, Head of ATM Network Operations at EUROCONTROL. “It is the enabler for the first roll-out of the digital platform and a very visible investment not just in the building but in the time and effort that has gone cross-divisional and cross-directorate into making the programme a success. EUROCONTROL's Member States have made a major investment in the programme and it is important to show how we are driving to the delivery of the targets.”

The new centre is far larger and more complex than the NMOC it replaces, reflecting the more complex role the iNM will play in optimising European airspace operations over the coming years.



There are five major operations rooms, the largest of which is the new NMOC. Then there is a technical engineering operations room where the technical support sits; a training centre (which could also be used as an operational area when overnight essential maintenance in the main ops area takes place); a pre-validation area where changes to airspace design, sectorisation and other associated procedures are trialled before they go live; and, finally, a space for user acceptance testing, where the new iNM software will be tested against the performance of the existing systems to benchmark and ensure usability and no degradation in performance before going live.

When the staff transfer to the new centre they will, to begin with, use the same systems they have been working with for years. But behind the screens there are some major changes.

"The new ops room is a virtualised concept, which means that we will connect on 'O-Date' remotely to the existing servers that we have on site," said Steven Moore. "When we introduce our new systems in iNM in the coming years we will simply connect to those remotely. We will then continue to work in the new ops centre on the same front-end hardware that we have today but the systems then will be entirely different."

There are many benefits to this virtualisation. Clutter, heat, and noise radiation can all be reduced in the ops centre with the lack of hardware required at each of the positions, and it paves the way for the roll-out of the first waves of the new iNM system, planned for 2024 and beyond, all hosted in the cloud. This effectively future-proofs the New Network Manager Operations Centre against any costly additional requirements for new capabilities and technology add-ons.



The new building is BREEAM rated – the Building Research Establishment Environmental Assessment Methodology (BREEAM) suite of schemes enables consistent and comparable assessment and verification across the entire built environment lifecycle – at the second highest level, as the highest level would have required a significantly larger level of financial investment against very little additional environmental benefit, according to the project planners.

“It’s cleverly designed, the bees love it,” said Steven Moore. “There’s even grass on the access corridor roofs to aid cooling, or warmth, depending on the season.”

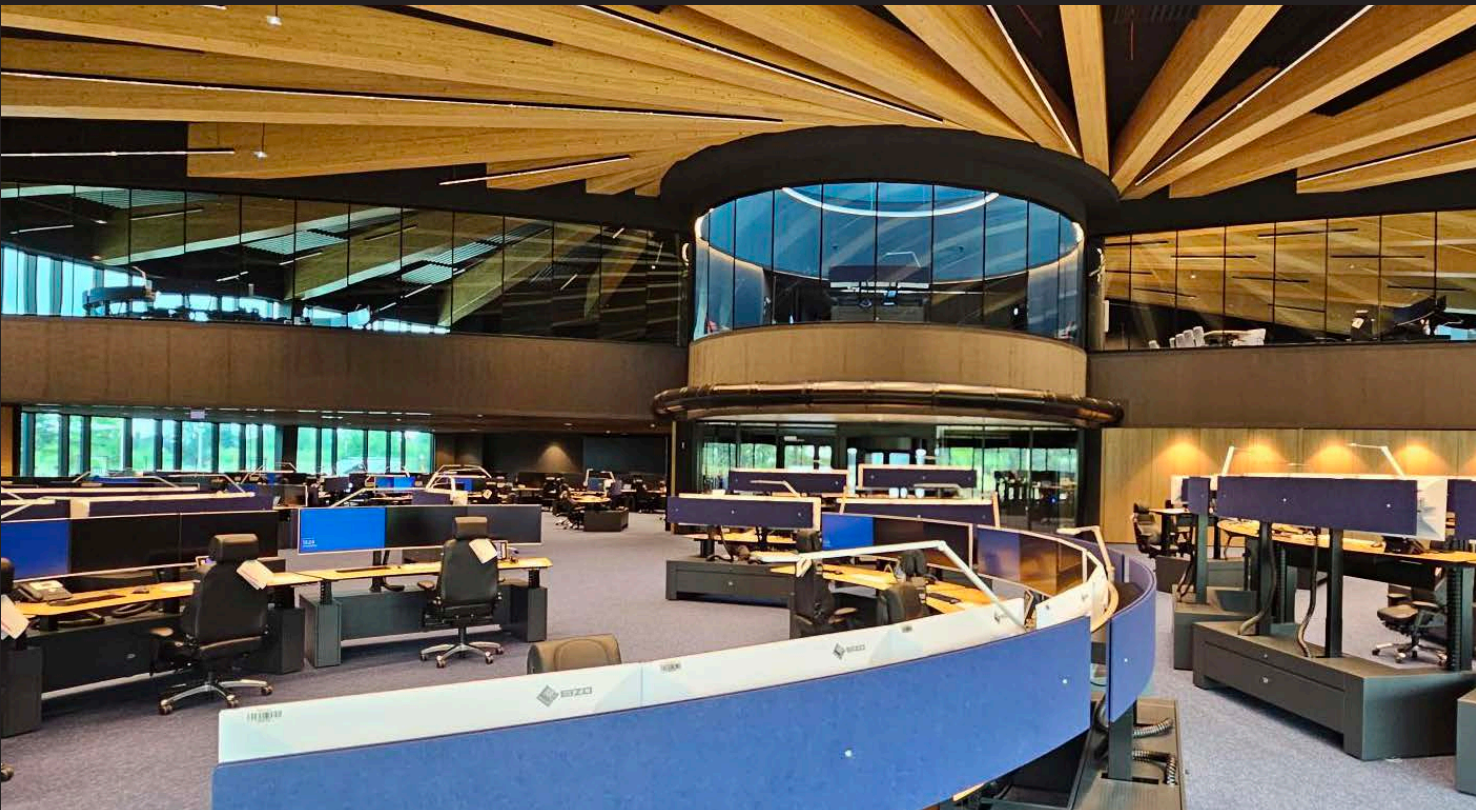
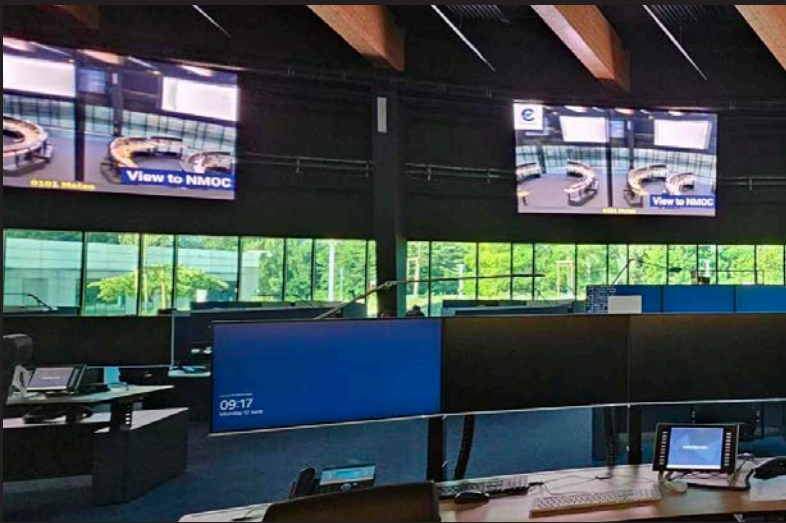
It is fully self-powered by solar panels and recycles rainwater via its own storage and pump areas (with appropriate connectivity to the existing buildings for all power and water needs as part of redundancy). It is also self-regulating, so the senior technical and ops managers can decide whether they want the building warmer or cooler; the building automates this change by varying the amount of solar energy allowed through the windows. This means the new centre is relatively affordable to run and cool. It has been designed as a circular building as this is the most energy-efficient layout.

“This move to the new ops centre is a huge achievement for EUROCONTROL and all of its stakeholders, but most significantly it is a people-change transition,” said Steven Moore. “The simple art of walking right rather than left, of working in a different lighting, temperature and acoustic scenario represents a significant piece of change for our operational colleagues. The old centre was developed in the

1990s and has been added on and built over without any of today’s ISO norms of standards and space. In designing the new centre we had to take account of hundreds of different views and opinions and it was a real challenge to incorporate them all. I’m really happy with where we are. The road was bumpy, but we listened and we have been able to create an amazing new space.

And from a technical point of view, when the new iNM system is introduced (see also “Network Manager starts on a digital transformation path”) we will already be in the new ops room, which make the learning required, and move to adding new virtual capabilities, far easier.”

Over 200 people will work in the new centre and the transition has been carefully planned.



"We're going live on 30 October into the morning of 31." said Steven Moore. The plan (at the time of writing) is that the night shift will turn up for work on 30 October in the new building and, after a complete handover, the afternoon shift will turn the lights off in the original ops room on their way home. We have planned a one-night cutover because we will be testing to the point of absolute confidence that it will work.

"We have planned it by taking that transition date and working back from there, starting with operating one or two positions live in the new ops room, shadowed by staff in the old centre, testing each of the positions one after the other."

Starting with the transition date allowed the planners to look at all the problems that might occur which could stop the transition and not just operational equipment issues – no power, no lighting, no water, no coffee for the coffee machines...

"At this time in July, we have a list of over 400 topic areas that we need to ensure we pick up before we go live, from staffing levels at transition, to properly provisioned rest areas and toilets," said Steven Moore. *"We have a steering group which originally started meeting every month and, getting closer to 'O-Date', met much more regularly to make sure we get the updated reports on the human and technical issues, for both the essentials and the smaller things that we could forget."*

The old centre will remain in a contingency mode for three months after the transition. Over the past two years, since the "Spade in the Ground Ceremony" in August 2021, a major team effort has been undertaken which, although at times difficult, has moved the project from a patch of grass and some shrubs, to a fully functioning and state-of-the-art Operations Centre, fit for the future of the Aviation Network for another 30 years at least.

"I would like to extend my personal thanks to everyone who has been involved in this project, external contractors of course, but especially those EUROCONTROL colleagues who have made everything possible and, without whom, we would not be able to envisage going live on time. Thank you, each and every one of you," said Steven Moore.





THE EUROCONTROL NETWORK MANAGER STARTS ON A DIGITAL TRANSFORMATION PATH

The EUROCONTROL Network Manager (NM)'s ten-year integrated Network Management (iNM) programme comprises a series of incremental renewals of all the NM's main operational systems by 2030. NM's legacy operational systems have been operational for over 25 years but are now reaching their technical limits in terms of performance and agility.

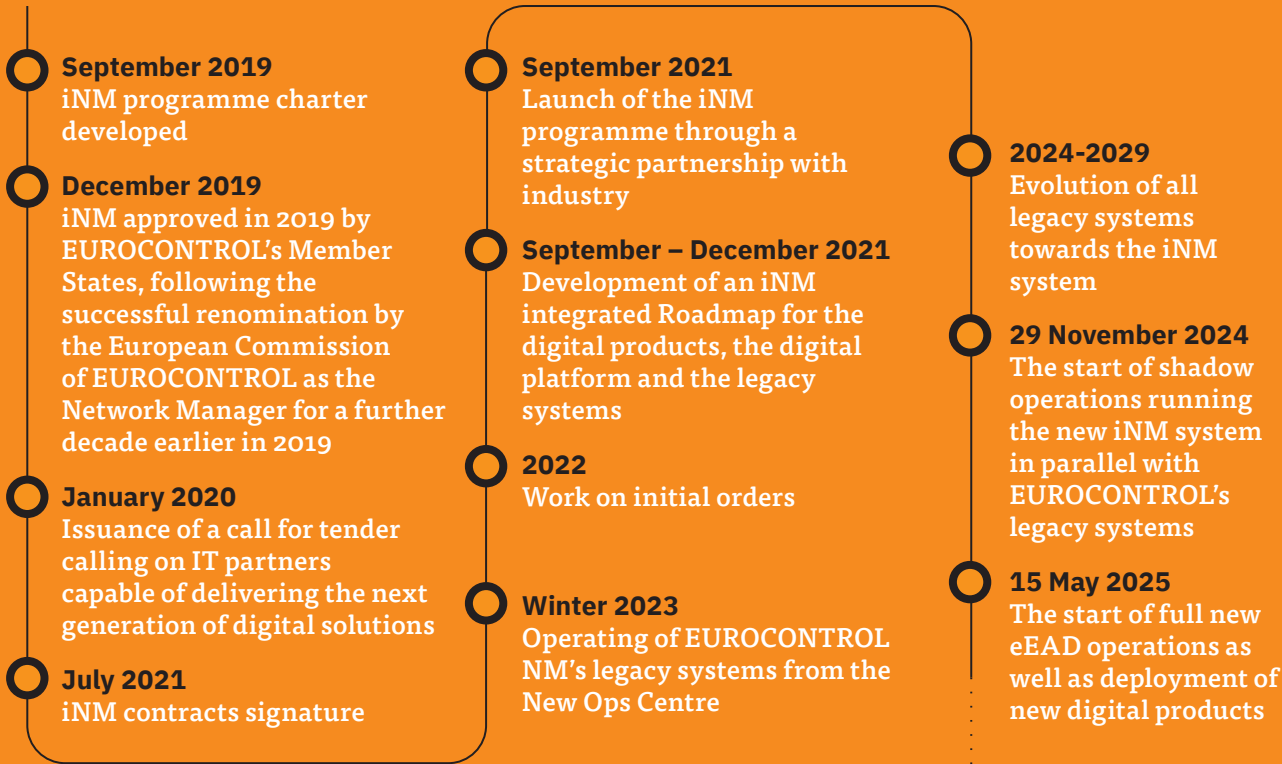
EUROCONTROL has entered into a strategic partnership with technology companies Indra and Atos-Cronos to work with other EUROCONTROL partners Cegeka and Sopra Steria to deliver the iNM programme. iNM will result in a scalable solution that meets NM's performance requirements for decades to come.

At the heart of iNM will be advanced capabilities and new services that support the evolution of operational concepts over the next decade and beyond, encompassing:

- Enterprise architecture;
- Agile development;
- Artificial intelligence and machine learning;
- Big data and data analytics;
- Probability modelling;
- Predictive analysis;
- Cloud solutions;
- Scalable systems;
- Cyber resilience.

iNM will enable NM to transform its business services, resulting in three key deliverables: a single flight manager system that seamlessly manages both flight and flow domains; a unique dynamic airspace system that eliminates overlaps and inconsistencies between legacy systems and databases; and one API for internal and external human machine interfaces.

Timeline



MAJOR DEVELOPMENTS TOWARDS IMPLEMENTATION OF THE **GLOBAL AIRCRAFT- IN-DISTRESS SERVICE**



IAN KNOWLES

TECHNICAL OFFICER,
OPERATIONAL SAFETY
SECTION, ICAO



**ANASTASIIA
SOBCHENKO**

COMMON SERVICES EXPERT,
NETWORK MANAGEMENT
DIRECTORATE, EUROCONTROL

In 2024 the International Civil Aviation Organization (ICAO) and EUROCONTROL will together launch the full operational version of the Location of an Aircraft in Distress Repository (LADR), as part of a global initiative to track aircraft in distress at all times.

On June 15 this year, EUROCONTROL began testing the initial stage of the Location of an Aircraft in Distress Repository (LADR) system, one of the core elements of ICAO's work to ensure that key aviation stakeholders, including search and rescue operators, have up-to-date information related to the last known position of an aircraft. An initial operational version will be available at the end of 2023, with further development in early 2024.



The LADR system (see “EUROCONTROL’s role in enabling GADSS via LADR and OPS CTRL” on p. 41) is being developed within the agency’s Network Management Directorate and the beta version “allows contributors to connect to the system, to provide data about the last known position,” says Anastasiia Sobchenko, Common Services Expert in the Network Manager Directorate. “In this first step we are working with contributors to ensure they can connect to the system, and we receive data from them.”

The ICAO Global Aeronautical Distress and Safety System (GADSS) has four core elements: aircraft tracking, distress location, post-flight localisation and data recovery.

“The aircraft tracking requirements became applicable in 2018,” says Ian Knowles, Technical Officer at the Operational Safety Section of the Air Navigation Bureau of ICAO. “Broadly speaking, this requires a 15-minute position report from an aircraft when it’s in oceanic airspace. If an aircraft is operating in airspace controlled by an air navigation service provider (ANSP) then we can use that automated report.”

To assist in the implementation of these standards, the Normal Aircraft Tracking Implementation Initiative (NATII) was established, and group members decided there needed to be a better means of communication between aircraft operators and ANSPs, which led to the establishment of the OPS Control Directory. “If an aircraft operator has a reason to doubt the safety of an aircraft it needs to know who to get in touch with,” says Ian Knowles. “So the OPS Control Directory was established in direct response to that initial first standard.” EUROCONTROL will host the Ops Control Directory as part of the LADR system, where the usage of OPS Control will be extended to all users of LADR.

The deadline for fitting new aircraft – produced from 1 January 2024 onwards – with distress

equipment tracking requirements will be 1 January 2025, following a delay to the initial planned implementation date as a result of the COVID pandemic.

“One of our EUROCONTROL colleagues, Henk Hof, was leading the development of the GADSS concept and in 2021 we contacted ICAO to propose our support for the LADR development and hosting,” says Anastasiia Sobchenko. “Many European passengers lost their lives in the Air France 447 and Malaysia Airlines 370 disasters, so our response was based on our commitment to undertake additional work to increase passenger safety, supported by all relevant stakeholders including the Network Directors of Technology (NDTECH).”

The LADR project sits within the Network Manager Directorate Infrastructure Division and is being developed together with the Technology Division. “We are developing LADR using agile methodology,” says Anastasiia Sobchenko. “We have broken down the project into smaller phases, emphasising collaboration and continuous improvement, developing LADR in an evolutionary way. This year we will develop the repository and next year scale it up to bring additional functionality to the users.”

The development timelines are ambitious. “But we also try to be very pragmatic, to see what we can do today, what we can improve tomorrow, not to focus on the full scope with many add-ons from the outset,” says Anastasiia Sobchenko. “We focus on the core requirements of the performance specifications document – Functional Specifications for the Location of an Aircraft in Distress Repository (LADR) (Doc 10150) – and with ICAO identified priorities for the LADR services, what needed to be done at the beginning, at the second stage and then identified the essentials that LADR cannot work without.”

A key requirement has been to engage all stakeholders on a regular basis. To understand better how users will be using the system, the EUROCONTROL LADR team involved more than 30 stakeholders including airlines, ANSPs, search and rescue units and States authorities, with representation from all parts of the world to collect their ideas and feedback.

“We used performance-based standards for this system,” says Ian Knowles. “We set the requirements of the system and left people to come up with different ways of meeting those requirements. The key objective is for the system to be triggered when a

From left: Nicholas Rallo, Regional Director of the ICAO European and North American Office, Juan Carlos Salazar, Secretary General of ICAO, Raúl Medina, Director General of EUROCONTROL, Anastasiia Sobchenko, LADR Focal Point at EUROCONTROL



EUROCONTROL'S ROLE IN ENABLING GADSS VIA LADR AND OPS CTRL

In May 2023 ICAO Secretary General Juan Carlos Salazar and EUROCONTROL Director General Raúl Medina signed an agreement for the development and hosting of a Location of an Aircraft in Distress Repository (LADR) and an Operational Control Directory (OPS CTRL), key parts of the ICAO Global Aeronautical Distress and Safety System (GADSS) that covers autonomous distress tracking equipment on aircraft and improved systems and procedures to collect and share last known aircraft location information.

LADR and the OPS CTRL elements will facilitate the exchange of information between air operators, air navigation service providers and rescue coordination centres.

"Implementation of LADR will allow search and rescue services to better employ their resources in a timely manner to the most effective locations, thereby assisting in their mission to save lives," said ICAO Secretary General Juan Carlos Salazar at the agreement signing ceremony.

The GADSS concept was launched following two high-profile incidents involving airliners that went missing, triggering complex and highly costly search efforts: the crash of Air France Flight 447 on 1 June 2009 and the disappearance of Malaysia Airlines flight 370 on 8 March 2014.

LADR will allow data submissions from accredited contributors to ensure all information related to the location of an aircraft in distress from suitably equipped aircraft is stored and made available to users. In case of an "aircraft in distress" anywhere, anytime around the globe, LADR will provide a single point of access to the required information and notify the appropriate stakeholders, including aircraft operators, air navigation service providers and search and rescue, of a potential event. An initial version of LADR with core-functionality is expected to be delivered by the end of 2023, and an enhanced and scaled-up version that conforms with existing requirements is expected to be delivered by November 2024.

GADSS contains three main elements: aircraft tracking; location of an aircraft in distress (achieved through autonomous distress tracking (ADT) of aircraft in flight), and post-flight localisation and recovery (PFLR). All aircraft of a maximum certificated take-off mass of over 27 000 kg for which the individual certificate of airworthiness is first issued on or after 1 January 2023 must autonomously transmit information from which a position can be determined by the operator at least once every minute, when in distress, in accordance with Appendix 9. 6.18.2. ■

flight is in a distress condition, which is defined by EUROCAE document ED-237. The system will then transmit position information every minute. There are a number of different ways of doing that and at least three manufacturers that can meet all of the requirements."

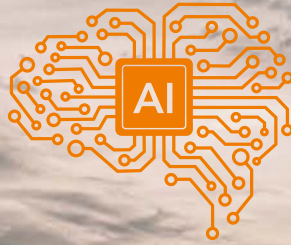
"It's a technology-agnostic approach," says Anastasiia Sobchenko. *"Jointly with ICAO and potential contributors to LADR, we have developed a LADR FIXM schema which will allow LADR contributors to provide data in a standard format, LADR to compile it and provide it to stakeholders in a clear way."*

In terms of the data, LADR is collecting both mandatory and optional elements. For the mandatory data there is a unique aircraft identifier – the three-letter designator from the State plus an aircraft registration, the aircraft's 24-bit address or flight callsign, among others. Other core elements are latitude and longitude and time-at-the-reported-position.

"We also want to know who is sending us the information, so not just the aircraft but the manufacturer of the system," says Ian Knowles. *"That can be very useful information in finding out what's happening if the system stops transmitting or we miss a signal. Ground speed and the heading are also important because that will direct the search and rescue services to the most likely destination or final impact point."*

"Once we receive the data through the LADR system we validate it," says Anastasiia Sobchenko. *"We then immediately make it available to operational stakeholders, so they all receive this information in the same format, in the same way and at the same time. The LADR system identifies to which FIRs this data belongs, to which airline and search and rescue unit it belongs – so they don't have to sit 24/7, watching LADR. They receive a notification and then react."*

"In an ideal world we are building a system which would have no notifications because these will only be triggered if an aircraft is in distress," says Ian Knowles. *"It would be great if we never have to use it."* ■



ISOBAR

RESEARCH IS BUILDING CONTROLLER CONFIDENCE IN AI SYSTEMS

Gilles Gawinowski, Camille Anoraud and Ramon Dalmau Codina, from the EUROCONTROL Innovation Hub and **Stéphane Pierre**, from the EUROCONTROL Network Manager Directorate talk about ISOBAR, winner of the SESAR Exploratory Research Award.

In March 2023 EUROCONTROL's Innovation Hub ISOBAR programme was one of two Agency research projects to take home a SESAR 3 Joint Undertaking Digital European Sky Award, winning the Exploratory Research category.

Some research programmes have outcomes that are far more important than the basic project aims. The ISOBAR research work has been strategically important to EUROCONTROL for three main reasons: it gives controllers an important new tool in calculating the impact of severe weather incidents on capacity; it has moved from exploratory research to operational use at an unusually fast pace; and it is building confidence among operational staff that artificial intelligence (AI) tools can be usefully integrated into current systems and procedures.

ISOBAR – or “Artificial Intelligence Solutions to Meteorological Demand/Capacity Balancing (DCB) Imbalances for Network Operations Planning” – research has centred on the use of machine-learning to predict the severity and probability of convective weather events and their impact on en-route capacity.

“When convective weather began crossing Europe, we knew it would affect air traffic management capacity in Europe and that each sector would be impacted in different ways,” said Gilles Gawinowski, one of the ISOBAR research leaders based at EUROCONTROL's Innovation Hub. “The simple idea was to use AI to predict the capacity reduction and detect how each area would be affected. In that way we could prevent chaos.”

It quickly became clear that if the system could predict expected traffic and required resource levels for convective weather, it could also be used for other capacity-impacting incidents. A series of research objectives were defined (see ISOBAR: project aims, conclusions and members box) and ISOBAR work was launched in May 2020 as part of a Horizon 2020-funded SESAR JU research initiative. The budget for the programme was EUR 2 million. Essentially, the aim was to develop a system incorporating innovative AI-based components to predict convective weather up to 36 hours in advance and then forecast the impact of traffic demand on capacity while providing automated solutions.

May 2020, during one of the first peaks of the COVID pandemic, was hardly optimal timing for such a wide-ranging, complex, collaborative innovation programme, involving a network of stakeholders including engineers, data scientists and operational experts.

“We had to work remotely, via Teams, but, surprisingly, the process worked out very well,” said Stéphane Pierre, from EUROCONTROL's Network Manager Directorate, who worked with Innovation Hub colleagues on the project. “We had the validation at the end, in Bretigny, but all the rest was done remotely.”

Integrating AI tools within an operational air traffic management infrastructure had to be carefully planned, to understand how humans and machine-learning systems could interact in an optimal way –

which was one of the most important challenges of the programme.

"The goal was to translate all the data into something meaningful for air traffic controllers because engineers speak a different language, which is fairly normal," said Stephane Pierre. "So the researchers had to develop a new interface and design it in a way which would process the data and deliver different scenarios."

"Operational staff currently calculate capacity reductions in their heads, based on their experience in the job," said Camille Anoraud, the EUROCONTROL Innovation Hub researcher who piloted the solution. "And what we provided were real numbers. So during the validation exercise we wanted to see if our capacity reduction propositions matched their own views and experience. It was interesting to see whether the algorithm proposed to them aligned with their own forecasts."

"The goal really was to provide them with realistic solutions, so they could also picture themselves using it in the short or medium term."

"When you are designing a system which shows predicted capacity, you cannot do this in a too futuristic way because operational staff will neither accept nor understand it," said EUROCONTROL Innovation Hub researcher Ramon Dalmau-Codina, who developed the solution. "We had to find a way not to transition from the proven technology to something entirely new. So we had to develop new algorithms which took a step-by-step approach in moving from legacy systems to this new technology."

Currently, calculating demand and capacity balancing is done by humans in different ways in different countries.

"So for me the most difficult part of the challenge was to merge the current system of human calculations with a high number of cherry-picking measures which are completely automated by the machine and not determined by humans," said Ramon Dalmau-Codina.

Forecasting an accurate capacity figure as a result of weather incidents and presenting this to controllers in an optimal format was just one of the interesting

challenges the team faced. Other issues included looking through the different timelines for the predictions to arrive at the most stable prediction through a defined time slot and, inevitably, ensuring that the weather forecasts were as accurate as possible.

"In all the work we did we had to rely on weather data," said Ramon Dalmau-Codina. "So, even if we built a very good model that could map weather to capacity reductions, if the weather forecast was not good then the predictions were not going to be good, either. So the project underlined the fact that good weather forecasts are vital for ATM and we need to work very closely with the meteo agencies."

"We had some pleasant surprises in the validation exercise," said Stephane Pierre. "The weather predictions were fairly stable. In terms of capacity reduction calculations we had no idea whether they would correspond to reality, because it was so innovative. In fact, the figures that we got from the system were considered as fairly reliable and perfectly in line with what the controllers were expecting. So this has reinforced our confidence in these types of tools, which I think is very important."

The simulations and final validation exercise took place with operational partners at the Innovation Hub and proved the technical feasibility and operational acceptability of ISOBAR's new collaborative framework for a network of stakeholders which included the EUROCONTROL Network Manager, area control centres and airspace users.

"The research has finished but some of the elements of the project are being implemented now in our systems and this summer we have been testing some of the elements of the capacity-reduction AI tool," said Stephane Pierre. "We have already started to implement the interface and we will be able to check all these tools against the reality for this summer. What we haven't done yet is all the coordination aspects with the flow management positions (FMPs) and so on but that will come later. The outcome of the project is that the Network Manager is already starting to work with this capacity reduction calculation tool – very soon after the results of the first research outcome."



ISOBAR

PROJECT AIMS, CONCLUSIONS AND MEMBERS

The ISOBAR research programme, which ran from May 2020 to December 2020, aimed to develop a new AI-based service to support the Network Operations Plan by integrating enhanced convective weather forecasts for predicting imbalances between capacity and demand. The programme exploited artificial intelligence (AI) to select mitigation measures at local and network level in a collaborative Air Traffic Flow and Capacity Management (ATFCM) operations paradigm. To achieve this vision, four objectives were set:

- Reinforce collaborative ATFCM processes at pre-tactical and tactical levels into the LTM (local) and Network Management (network) roles integrating dynamic weather cells.
- Characterisation of demand and capacity imbalances at pre-tactical level depending on the input of probabilistic weather cells by using applied AI methods and ATM and weather data integration.
- User-driven mitigation plan considering airspace user priorities (and fluctuations in demand based on weather forecasts) and predicted effectiveness of ATFCM regulations, considering flow constraints and network effects.
- Develop an operational and technical roadmap for the integration of ancillary services (providing AI-based hotspot detection and adaptive mitigation measures) into the NM platform, by defining interfaces, functional and performance requirements.

The ISOBAR project integrated accurate and probabilistic convective weather forecasts in the ATFCM process. These weather forecasts are an input to demand and capacity prediction, so that imbalances between capacity and demand can be better anticipated and more adequate mitigation measures can be prescribed to ensure safety and maximise efficiency and capacity. The overall outcome was an adaptive network plan, prescribing alternative solutions depending on the evolution of

demand, capacity and weather. The main building blocks around which the work in ISOBAR has been articulated were:

- An enhanced ATFCM process targeting weather-based imbalances;
- A meteo engine providing probabilistic forecasts of convective storms;
- Data integration from diverse ATM and meteo sources;
- Precise and granular characterisation of demand and capacity imbalances, including capacity decay prediction and the characterisation of potential airspace user demand responses to disruptions;
- Automated DCB mitigation solutions boosting human operator capabilities;
- Demonstration of the feasibility and usability of the ISOBAR Solution, addressing both an operational and a performance evaluation.

“The very promising ISOBAR concept should be pushed towards a higher maturity level and further improvements in performance/maturity of the AI-based components and DCB workflow” according to the conclusions.

Research consortium members comprised:

- Centro de Referencia de Investigación, Desarrollo e Innovación ATM, A.I.E. (CRIDA)
- Universidad Carlos III de Madrid
- Cranfield University
- Ecole Nationale de l'Aviation Civile
- Direction Générale de l'Aviation Civile/Direction des Services de la Navigation Aérienne
- Météo-France
- Agencia Estatal de Meteorología
- Sopra Steria Group
- Earth Networks
- Swiss International Air Lines AG
- EUROCONTROL

For more information

<https://isobar-project.eu/2023/03/06/the-outcomes-of-the-isobar-project/>

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DIVERSITY OF THOUGHT

SURVIVING AND THRIVING IN A CHANGING WORLD



DR STEVEN SHORROCK

Senior Team Leader Human Factors in the EUROCONTROL Network Manager Safety Unit. Steven is a Chartered Psychologist and Chartered Ergonomist and Human Factors Specialist and is Editor-in-Chief of EUROCONTROL's HindSight magazine.

In a rapidly evolving world, organisations must adapt to survive and thrive. However, the key lies not only in technological innovation, but in the diversity of thought within an organisation. EUROCONTROL's Steven Shorrock sheds light on the crucial role diversity of thought plays in navigating the complexities of our changing world.

There are three truths by which many organisations either survive or fail. The first is that everything is changing: technology, industries, regulations, economies, markets, societies, and the climate. Some changes are generated by organisations, while others happen to organisations. Some changes happen slowly or are otherwise foreseeable, while others are fast and surprise us. The second truth is that organisations must adapt to their environment if they are to survive and thrive. To be more specific, people must adapt, and create the capacity for resilient operations. Even in the most technologically advanced sectors, only people can do this. The third truth is that everything has limits, including technology and people. Some limits are fixed, but our adaptive capacity is malleable.

Aviation is changing in so many ways that it is hard to envision how things might look in a few decades' time. But in an increasingly complex world, everything is becoming more interconnected and interdependent.

Changes in one part of the aviation system, society or the world affect parts that were not thought to be connected. Perturbations ripple through the industry under the surface, with changes emerging in ways that surprise us. Even small changes in one part can result in big changes in another.

Solutions are also interconnected and can also be hard to see. One feature of complexity that is often unappreciated is diversity. Complex systems require diversity to cope with changing conditions. This is why just as a bee colony has different kinds of bees for different roles, organisations have different kinds of people for different jobs. But we don't just need diverse jobs. We need diverse ways of thinking. Diversity of thinking is needed to cope with the diversity of challenges and opportunities ahead concerning sustainability, safety, security, business continuity, capacity, and efficiency. So, how can we expand and enrich the diversity of thinking in organisations necessary to meet the demands of a complex and rapidly changing world, and how can we create the conditions for this to be expressed?

Research in a variety of disciplines, from psychology to complexity science, suggests several ways to encourage diversity of thought in yourself, your team and your organisation.

"Diversity of thinking is needed to cope with the diversity of challenges and opportunities ahead concerning sustainability, safety, security, business continuity, capacity, and efficiency"

EMBRACE UNCERTAINTY

Recently, with the pandemic, the Russian invasion of Ukraine, and climate change, we have experienced ever more uncertainty about the state of the world and the future. In a rapidly changing world, it is necessary to accept and be comfortable with uncertainty. Whether we are trying to understand a situation or intentionally bringing about change, it is important to accept that we probably do not and cannot fully understand a complex situation or system. Surprises that result from interventions are an example of this. Once we accept uncertainty, the need for diverse perspectives and diversity of thought becomes clearer. But we need to allow this diversity to be expressed.

PRACTISE TAKING MULTIPLE PERSPECTIVES

The ability to see situations from multiple perspectives is part of what makes us human. Shifting between different perspectives may involve seeing things from different roles or backgrounds, or with different goals or information, for instance. This illuminates perceptions and understandings, and helps us to see and understand problems and opportunities. Perspective-shifting is critical to managing in the face of complexity as different aspects of systems and situations come to light. Skill is required to harvest these different views. Perspective shifting is taught on programmes from systems thinking and complexity science to art and psychotherapy, and it can require deliberate practice to become agile enough to see things differently.

EMBRACE OPENNESS TO EXPERIENCE

In psychology, 'openness to experience' is one of the 'big five' personality traits. It is associated with curiosity, creativity, and imagination. People who score highly on this trait are better able to see things differently and from different perspectives, and

they are better able to tolerate uncertainty. We can all increase our openness to experience to adapt and thrive in the face of change. Research shows that openness to experience can be enhanced by cultural activities, reading different books, learning an instrument, taking up a new hobby, and even developing a more active lifestyle and paying more attention to the natural and built environment. But we must be willing to change, believe that we can change, and persist with behavioural changes until they become habitual.

LEARN HOW TO LISTEN

We all know how to listen, but we don't all know how to do it well. How often do you find yourself 'listening' while also using your mobile phone, thinking of something else, or otherwise not really giving full attention? To benefit from diverse ways of thinking, we need to really attend and listen to those expressing them. We probably all know someone who listens well. It pays to observe how they do this. Again, formal courses are available to help (for example, counselling skills), and may be the most useful training you can do, both professionally and personally.

REFLECT ON DIFFERENCE

When I think back to the conferences I have attended, a small number of sessions stick out. Why? They were different. One involved an interactive theatre play that we organised at a EUROCONTROL just culture conference for pilots, controllers, safety specialists, prosecutors and judges. Another involved jazz musicians at a conference on resilience. Other sessions have involved discussions where different perspectives could emerge. Most other 'presentations' become part of a homogenous soup. If you think back to something that really stood out in a positive way, and perhaps helped change the way you think about something, it tends to be a discontinuity and a break from the norm. It tends to involve diversity of thought and action. This should be elevated and celebrated.



RECRUIT OUTSIDE OF THE USUAL DISCIPLINES

In aviation, we tend to value certain disciplines for certain organisational activities. For engineering projects, we mostly recruit those with a background in science, technology, engineering and mathematics. This can result in groups of people who think and act in the same sort of way and see the same sort of problems and opportunities. They may be unwilling to share unconventional views or ideas. In a changing world, the ability of monocultural teams to respond appropriately is rapidly saturated. What is often missing is an understanding of humanities. Problems may involve relationships, communication, culture, complexity, ethics, and jurisprudence. A humanities-based perspective can help even (or especially) the most technologically-advanced engineering work, which is still trying to address social issues in a social context. Some major software organisations are now recruiting not only software engineers but resilience engineers to help organisations improve their capability to respond, monitor, learn, and anticipate. We are going to need to cross and combine disciplinary boundaries to create a holistic approach.

"In a changing world, the ability of monocultural teams to respond appropriately is rapidly saturated. What is often missing is understanding of humanities"

CREATE BUMPING SPACES

We can benefit from diversity by physically designing the environment to create the opportunity for people to come into contact with others in serendipitous encounters. These 'bumping spaces' allow people to meet one another and exchange ideas and perspectives. They include informal areas where people bump into others, including those they don't routinely work with. They provide the physical space to generate and explore new ideas and ways of thinking and strengthen relationships so that these can be exchanged. Many breakthrough ideas are formed and developed away from the desk.

CREATE TIME TO GET TOGETHER (WITH PEOPLE UNLIKE YOURSELF)

We often think we lack time to get together, especially for unstructured and informal activities. But it is such activities that allow divergent thinking to fertilise. This happens partly because new ideas are generated through interactions and the expertise that emerges when we get together. But it is partly because of something else: when we get together socially with people of different backgrounds, professions, networks, and ways of thinking, a special sort of 'social capital' is developed. This is called bridging social capital. Like new synaptic connections in the brain, new relationships are forged. Trust is developed that gives permission for new ideas to be expressed.

LEVEL THE PLAYING FIELD

Some degree of power distance or hierarchy is necessary in organisations. For instance, power distance can be useful for the implementation of ideas and is expected and valued in some cultures. But more inequality in power makes it more difficult for new ideas and new ways of thinking to be generated and expressed. In organisations with a steep hierarchy, innovation is flattened.

Given there are several ways to benefit from diversity of thought at work, the next question is where to start. I don't think it matters too much. Each of these suggestions can be a good starting point. But do make a start. Every organisation needs people with different perspectives and ways of thinking. In a changing world where we need to adapt to survive and thrive, one of the biggest limits to our adaptability is homogeneity. The diversity of thought needed in an organisation reflects the diversity of problems and opportunities that we face. If we are to be ready to adapt to the changes that are to come, the path to survival and success lies in embracing the diversity of thought that reflects the diversity of the world we inhabit. ■

"The diversity of thought needed in an organisation reflects the diversity of problems and opportunities that we face"



Istanbul Airport 

iGA Istanbul Airport is the rising star of the aviation scene with its unique architecture, strong substructure, impressive sustainability and accessibility credentials and premium travelling experience offering. Celebrating its fifth anniversary in 2023 and bridging the gap between Europe, Asia and Africa, iGA Istanbul Airport has welcomed more than 170 million passengers and offers direct access to over 300 destinations, across five continents.

iGA ISTANBUL AIRPORT

Aviation's rising star

As one of the largest aviation projects in Türkiye, sustainability is an important part of iGA's journey. The commitment to environmental responsibility shines through as iGA embarks on a journey to attain carbon neutrality by 2050. Aligned with the United Nations Sustainable Development Goals, iGA Istanbul has made a public pledge to protect the planet and hold itself accountable to showing future generations what steps they can take to prioritise the planet.

'FOCUS ON THE PLANET, TARGET FOR THE FUTURE'

iGA's 2022 sustainability report marks its advanced efforts on their sustainability journey, through defining impacts, setting future goals and working on a sustainability management system. The iGA's sustainability motto, 'Focus on the Planet, Target for the Future' underpins iGA's mission and commitments for the years to come.

WORKING FOR THE FUTURE OF SUSTAINABLE MOBILITY

iGA has removed barriers to create an accessible hub for all travellers, going above and beyond typical standards. Recognising everyone's fundamental right to travel, the airport delivers exceptional accessibility services through its iGA Cares programme, incorporating industry-leading practices. In 2022, iGA incorporated further features into digital applications and call centres to enhance accessibility for passengers with disabilities.

RESPECTING PLANETARY BOUNDARIES

To provide a cleaner world for future generations, the airport adheres to strict guidelines and qualifications, aiming every day to limit and reduce their impact on the environment in the hope of becoming completely net zero by 2050. iGA was the first airport in Turkey to receive the Net Zero Certificate in 2022 from the Ministry of Environment, Urbanisation and Climate Change and has set out ambitious goals for the next seven years, such as reducing Scope 1 & 2 (**Scope 1 emissions** are direct emissions from company-owned and controlled resources and **Scope 2 emissions** are indirect emissions from the generation of purchased energy, from a utility provider) emissions by 45% and providing all stakeholders with 100% renewable energy.

CONTRIBUTING POSITIVELY FOR THE SOCIETY

As well as exhibiting a sustainable model for environmental sustainability, iGA is committed to bringing positive value to all guests, employees and society, including the local community. The development of employees is integral to success, and through the introduction of the iGA Cultural Ambassador programme, the team has made its systems people-oriented and engaging. ■

For more information please see here <https://www.igairport.aero/en/>



AIRLINES BACK MUAC'S NEW GREENER ROUTE PLAN



AN INTERVIEW WITH

JOHN SANTURBANO

DIRECTOR, MAASTRICHT UPPER AREA
CONTROL CENTRE, EUROCONTROL

Airline support is growing for a new service which proposes more environmentally responsible routes through EUROCONTROL Maastricht Upper Area Control Centre (MUAC) managed airspace.

Six months into the start of EUROCONTROL MUAC's new ECO Service, over 100 airlines are already accessing modified routes proposed by MUAC to reduce flight emissions. The service is a new addition to the Pre-Flight Check (PFC) process deployed three years ago, to improve punctuality and flight efficiency.

The ECO Service targets all greenhouse gas emissions while also taking into account reserved airspace for military activities, network constraints and flight schedules. The environmental data is estimated by the Advanced Emissions Model (AEM) developed and maintained by EUROCONTROL's Aviation Sustainability Unit in the EUROCONTROL Innovation Hub (Brétigny/France). Through advanced algorithms, AEM processes flight trajectories on a flight-by-flight basis to estimate the amount of fuel burn and related exhaust emissions including carbon dioxide, carbon monoxide, water vapour, the oxides of nitrogen and sulphur, unburnt hydrocarbons and

particulate matters. This identifies the routes with a smaller environmental impact, enabling MUAC to propose these to participating airlines on a daily basis, taking care to exclude those that conflict with other network priorities.

Integrating environmental data into MUAC's operational processes is the result of many months of detailed analysis. The environmental measurements had to be interpreted in an operational context and to be actionable by operational staff. *"We needed to be able to estimate flight emissions before we could think about improving them,"* says John Santurbano, Director of EUROCONTROL MUAC. *"We achieved that at the end of 2022 and ran a live trial to test the reaction of the airlines. As we hoped, they welcomed the initiative and uptake is currently around 25% of the opportunities we propose."* Reduced flight emissions are frequently associated with a shorter flight duration and lower costs which also helps to promote the concept.

Still in the trial phase and yet to achieve full coverage and resourcing, the MUAC ECO Service has already delivered more than 2,640 eco proposals, each generating flight emissions savings.



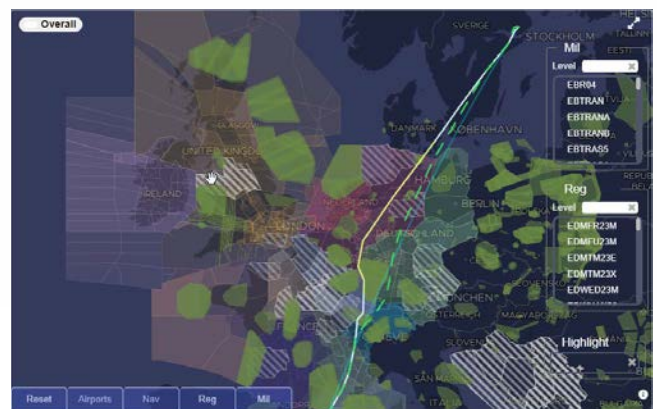
ENHANCED COLLABORATION

A key enabler for the collaborative process behind the ECO Service is the MUAC ATM-Portal (ATM-P). The platform gives all users the ability to share data and, when combined with efficiency algorithms, to act on a range of cost savings as well as – since the start of 2023 – environmental opportunities. Algorithms detect and automatically display potential problems such as long delays, airport curfew times, tight airline schedules, change of status or parameters in the flight plan. Airlines can assign priority status to their flights using the ATM-P and can access re-routing proposals issued by air traffic control. The collaborative tool ensures the interests of all stakeholders are represented and provides an interface between automated flight planning and operational flight phases.

Flight emissions are a new feature in airline flight planning, where cost, punctuality and efficiency drive the planning process. Aircraft operators have further complex trade-offs to consider: selecting a route with the lowest environmental impact needs to be weighed against other flight criteria and costs including flight duration, flight connections and the potential increase in route charges incurred if the flight enters a different flight information region.

Similarly, the key performance indicators set by the European Commission to assess air navigation service providers (ANSPs)' productivity measure output in terms of safety, capacity, cost efficiency and, for the environment, horizontal flight efficiency. Since the environmental topic is more than just horizontal flight efficiency, MUAC is a pioneer in this area and is unique in offering its ECO Service. It is also supporting its roll out at other air navigation service providers as part of a wider ambition to be proactive in making the switch to tackling flight emissions.

MUAC works closely with the EUROCONTROL Network Manager and neighbouring air navigation service providers. Routes proposed as part of the Pre-Flight Check that impact adjacent airspace are first agreed with neighbouring air navigation service providers before their release to the airlines' operations centres. Leveraging decades of close cooperation between MUAC and neighbouring partners, John Santurbano anticipates that more facilities could be ready to operate an ECO Service within the next 12 months.



Horizontal view of the current and proposed routing

	Original	Proposed
Kao Route	N0440F360 NOSLR6 NOSLI NRS0 ABAMA DCT MAXEL DCT BASUM DCT ABAMI DCT NVO DCT LINGO/NAS39350 DCT SUJAL UNRS2 GILR DCT GVA DCT INCUS DCT BALS UNRS2 VERSO DCT LUNK DCT POS DCT LULAK UL 129 M JV B31 OSGAL OSGAL3M	EOBT valid until: 13.05 N0442F360 NOSLR6 NOSLI NRS0 ABAMA DCT MAXEL DCT OTYMON DCT BOMIR DCT GIGET DCT ABAMA DCT ARH DCT NATOR DCT LUTIX DCT BENDT DCT NEMOS DCT GVA DCT INCUS DCT BALS UNRS2 VERSO UL 129 LUNK LUNK2P
SPO/LVL	N0440F360	N0442F360
3D	NOSLR6 (41)	NOSLR6 (44)
STAR	OSGAL3M (47)	LUNK2P (44)
REGOLA	-	-
CTOT	-	-
File Length	1454	1393
Est. Enroute Gain	-	85
Duration	206	201
Temp. Status	NOT_SUSPENDED	NOT_SUSPENDED
Fuel Ind.	8185	7815
File Change Ind.	2157	2206
GHG	2344 / 4956	1901 / 3813
Regulation List		

Comparison between the current and proposed routing, including the improvement in flight emissions (GHG values)



"Our data set is different to that of the airlines," explains John Santurbano. "There may be a more efficient route the airline has missed, or the automated Computerised Flight Plan Service Provider process has not identified a particular opportunity. This is where the manual top layer adds value." The goal is to expand participation in the ECO Service from today's 100+ airlines to serve all aircraft operators and share route opportunities with each of them.

Adding more data is another objective, for example working with Computerised Flight Plan Service Providers and airlines to expand aircraft performance information. In addition to aircraft type, MUAC is looking to include aircraft mass, speed, way points and other predictions going forward. *"We have started working on the integration of more frequent weather updates from our German weather partner," adds Santurbano. "We include wind predictions and expect to add more precise weather data."*

TACTICAL OPPORTUNITIES

On top of more eco-friendly flight planning, enhanced data will help MUAC's ambitions to enable air traffic controllers to offer more environmentally friendly trajectories during tactical flight phases. As it is important to know the arrival runway and the likelihood of that changing, a model to predict runway usage has been developed and, if this information is known six hours in advance, MUAC can propose a more optimal route. Air traffic controllers can then plan more efficient smooth descent paths in place of stepped operations for example, to reduce emissions. MUAC became the first air navigation service provider in Europe to display aircraft intent information – downlinked automatically from the aircraft's flight management system information via ATS B2 Automatic Dependent Surveillance – Contract (ADS-C) via the aeronautical telecommunications network (ATN) – in May 2022, making available data such as optimum top of descent and descent profile for controllers to take advantage of the more precise aircraft information.

Meanwhile MUAC is already identifying environmental opportunities not yet available to other stakeholders as a result of the existing collaborative network. Integration of civil and military operations at MUAC supports efficient cross-border civil-military services in the upper airspace of Germany and the Netherlands. *"Contact with the military zones in our airspace is direct, either to the operations room or central supervisor," says John Santurbano. "Thanks to the Dutch Flexible Use of Airspace Cell based at MUAC and the direct link with the military authorities in Belgium and Germany, we immediately know when an area becomes available and can directly coordinate delivery of routes through these deactivated areas with the aircraft operators (both tactically and in the pre-flight phase). The direct contact enables adjustment of their flight plan according to the latest situation which results in cost and environmental benefits."*

Expanding the ECO Service is part of a wider MUAC project called the Greenhouse gases and Aviation footprint reduction in ATC operations (GAIA) project, launched in early 2023. GAIA aims to bring MUAC's environmental initiatives together under one umbrella to provide airspace users with a series of economic indicators that will collectively contribute to reduced emissions. MUAC is also reviewing its entire environmental footprint to identify how the organisation can eventually become climate neutral, perhaps even climate positive, in the near future.

MUAC engages directly with the airlines to receive feedback and comments on environmental topics including the ECO Service. Specific topics are discussed during "BlueSky" workshops involving a small number of airlines which are especially motivated to identify opportunities to raise environmental performance. *"We hear about our shortcomings and we try to address those with a systemic solution. We think we are on the right path, but we need all the stakeholders to make significant steps forward," says John Santurbano. "We are proud of the start we have made but it is just the beginning."* ■

ENAIRE, global operator of efficient, safe and sustainable air navigation services





7-8 November 2023
EUROCONTROL's Brussels HQ

Sustainable Skies Conference: Contrails in Focus

The global push for climate neutrality and sustainability has put the spotlight on the aviation industry's impact on non-CO₂ emissions, with contrails and associated cirrus clouds coming under scrutiny.

To explore this key environmental issue, we are pleased to announce the **Sustainable Skies Conference: Contrails in Focus**, which will take place at EUROCONTROL's Brussels headquarters on 7-8 November 2023.

The overall goal of the event, held jointly with **CANSO**, is to bring together scientists, researchers, the aviation industry, policy makers and other stakeholders to improve the understanding of the formation and characteristics of contrails and contrail-induced cirrus clouds, together with their impact on climate – and to explore potential mitigation measures to minimise their occurrence.

Over the course of the two days, world-leading experts will:

- take stock of the current state of knowledge on the topic;
- explore the state-of-the-art methods for detecting and monitoring contrails and cirrus clouds;
- look at current methods and technologies for predicting the formation of contrails and cirrus clouds and estimating their impact on the climate (and the interdependencies with CO₂); and
- discuss possible ways of minimising contrail formation and the challenges of operationalising mitigation measures at scale.

Join us to take part in the discussions on the latest scientific insights on contrails and to learn more about the ongoing research and innovative solutions that the industry is working on to tackle contrails.



MORE INFO





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EPISODE 04 WITH RACHEL BURBIDGE

How is climate change affecting aviation operations, and what is being done to reduce these impacts?



EPISODE 03 WITH PATRICK MANA

What are the latest cyber-threats facing aviation actors – and how is EUROCONTROL's EATM-CERT team helping to build aviation cyber-resilience?



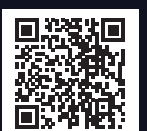
EPISODE 02 WITH MARYLIN BASTIN

Is aviation on track to meet its challenging sustainability goals – and how will EUROCONTROL's 'Flying Green' platform help?



EPISODE 01 WITH STEVEN MOORE

Is the network prepared for summer 23 traffic?



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