

Future talent for future growth

Innovative training solutions are essential to allow air traffic controllers to meet the evolving needs of the ATM industry – and to secure the future skills pipeline.



Credit: NATS

The growth in air traffic is well documented. Within 20 years, passenger numbers are expected to double. As aircraft movements grow and airports remain stunted by environmental, political and financial constrictions, air traffic management will have to find new ways of dealing with the huge surge in demand.

New technologies – many founded on some degree of automation – will doubtless take some of the strain. But air traffic controllers (ATCOs) will remain at the heart of the industry, and the need to evolve and develop new skills has never been greater.

Fortunately, this need is already being met by innovative CANSO Members. Here, *Airspace* showcases some of the training and development success stories and solutions on offer. ➔

Skills and training stories

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NATS – Confidence and resilience

It is important to support air traffic controllers in what is a highly pressurised working environment. NATS has been using a 'confidence and resilience' programme for a number of years. It provides both trainees and valid controllers with a set of tools and strategies to regain confidence should that be necessary. It also helps them to optimise performance under pressure and to fulfil training and operational potential.

The programme has helped many trainees and valid controllers to overcome human resource issues that have caused problems in achieving validation or maintaining a satisfactory level of performance when valid.

NATS integrates the training of technical and non-technical skills together. When a trainee joins NATS, they receive a series of training modules and one-to-one coaching support to develop confidence and resilience to help them along the end-to-end training journey.

Trainees learn techniques to help them to keep up with the fast pace of learning, to respond to feedback effectively and to maintain focus under sustained pressure. Practical techniques are taught which are taken from sports psychology and these enable trainees to develop purposeful practice, set learning goals effectively and maximise their social support structure.

Through the use of the confidence and resilience programme, NATS has increased validation rates and reduced validation times. NATS



Credit: NATS

has also kept controllers operational who were at risk of losing their licence. While this provides business benefits, it also helps individuals to become and remain effective air traffic controllers.

ENAIRES – An agile solution



Credit: ENAIRES

GammaSim is ENAIRES's sustainable solution to ATCO training challenges.

GammaSim is a simulation platform developed in-house by ENAIRES. Air traffic controllers have worked closely with simulator developers to create a system tailored to their training needs. An internal development team has also ensured the technological autonomy needed to continuously upgrade and enhance the system.

GammaSim started as a small project for a low-cost 3D tower simulator for abnormal and emergency situations (ABES). After few months of development, GammaSim became a state-of-the-art simulator, used in demanding situations such as at the Barcelona, Madrid and Malaga control towers for training more than 350 controllers. It also delivered substantial cost-savings with respect to alternative off-the-shelf simulation solutions. As such, GammaSim is ENAIRES's sustainable solution to upcoming ATCO training challenges.

A GammaSim video is available on YouTube.

GammaSim stands for:

- **General-purpose:** used as an ABES simulator, a conversion-training simulator, for the design of new functions, airspace procedures, incident study and more.
- **Adaptable:** flexible and easy-to-use to optimise training design and delivery
- **Multi-role:** high fidelity 3D-tower simulation, or en-route and approach simulation
- **Multi-position:** from standalone to full-scale multi-position and cross-unit simulation. All units are interconnected
- **Agile:** fast adoption of changing requirements, prototyping and scalability

Czech Air Navigation Institute – Partnering across borders

The BHANSA (Bosnia and Herzegovina Air Navigation Services Agency) New Generation Training Project is a major driving force behind a complete takeover of the provision of air navigation services in the upper airspace of Bosnia and Herzegovina (FL325 – FL660).

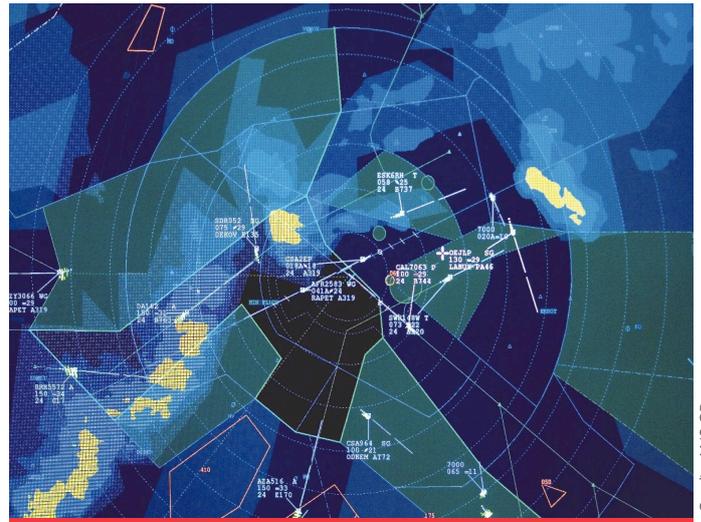
Now entering its third year, the Czech Air Navigation Institute, a division of Air Navigation Services of the Czech Republic (ANS CR), is leading the project on behalf of its client, BHANSA.

The project was conceived to train 59 new ATCOs and re-train 10 licensed ATCOs to achieve all their appropriate ratings.

What sets it apart from other training projects is the inclusion of unit training outside the client's country. Following completion of area control surveillance (ACS) rating training, positions for 45 candidates were secured in area control unit training programmes in four separate countries: Croatia, Finland, Serbia and Slovenia.

Dozens of candidates are being trained in all these countries as part of this project.

The first group of seven successful ACS-licensed ATCOs returned to BHANSA in September 2018. Several more unit training programmes will be completed in 2019, with the final programmes expected to finish during the first half of 2020. All successful candidates in other ratings completed training in 2018.



Cross-border training is a key part of the BHANSA training project.

Credit: ANS CR

Successful ACS candidates not only receive training from the partnering units but also receive full ATCO licences with unit endorsements from each partner's respective civil aviation authority. As such, this project is a true manifestation of the scope and depth of the Commission Regulation (EU) 2015/340, which lays down requirements for licences.

Airways New Zealand – World-class training



Credit: Airways New Zealand

Airways New Zealand's Total Control simulator suite.

Vietnamese air traffic control students are accessing world-class advanced training in a safe, supportive environment as part of a strategic partnership between Airways New Zealand and Vietnam Air Traffic Management Corporation (VATM).

The Vietnamese ANSP, responsible for air traffic services across two flight information regions, including nine international and 13 domestic airports, has partnered with Airways in a shared training model to access qualified, safe and reliable ATC trainees for its operational environment.

The VATM Train Abroad programme offers tower/approach and area training programmes, carried out at Airways' state-of-the-art training facilities in New Zealand. Students benefit from a supportive learning environment with a low instructor to student ratio.

The programme includes both theoretical and applied training, using Airways' own Total Control simulator suite. Total Control offers unparalleled realism with a real-world photographic visual environment, providing students with a fully immersive environment for learning. Students also have access to advanced online learning technologies and have the unique opportunity of being immersed in an English-speaking environment and the New Zealand culture.

On successful completion of the VATM Train Abroad programme, students are eligible to be employed by VATM as an air traffic controller – commencing on-the-job ATC training at one of Vietnam's air traffic control facilities.

To date, 51 students have completed ATC training with Airways through this model over the past three years, and a further 15 students will join the programme in 2019.

Park Air Systems Ltd – Addressing cyber threats

Blended learning techniques, whereby a student uses multiple senses, are the latest tools to be utilised in the training portfolio from Park Air Systems.

Currently consisting of over 20 modules covering product training, cybersecurity and radio frequency principles, courses are designed to empower customers in the confident use and maintenance of solutions supplied by Park Air as well as the infrastructure they employ.

Backed by recent research from Athabasca University, Park Air is using blended learning techniques to ensure touch, visual and auditory senses all receive a work out in training. The company believes that this allows for a more enjoyable and memorable learning experience.

Furthermore, enabling students to vote on multiple choice questions not only adds an additional element of fun, but also allows trainers to monitor student understanding and progress.

Cybersecurity is an increasingly vital topic in ATM, with many products now being deployed in Internet protocol networks, so it is vital that customers understand the importance of network security.



Blended learning techniques engage multiple senses.

Credit: iStock.com/18percentgrey

As topics can be complex, ranging from network security standards to penetration testing, it becomes increasingly important to use multiple techniques and media to convey important messages.

Saudi Air Navigation Services – A 360-degree assessment

Saudi Air Navigation Services (SANS) has been empowering its employees to gain new skills and grow professionally by focusing on learning and development programmes.

The company adopted a new approach in 2018 to ensure efficient and appropriate training and development for ATCOs. It thought that creating a new competency framework would help in providing a comprehensive training. The human resource (HR) team worked in partnership with external field-experienced consultants to review ATCO job descriptions and meet the

internal subject matter experts. A final competency framework was established that included the required level for each competency in every ATC job.

In addition, SANS has conducted a 360-degree assessment for all ATCOs to define any training and development gaps.

All assessments were reviewed and analysed by the HR team and revealed full individual development plans (IDP) for all ATCOs in SANS. In 2019, SANS will begin to implement the IDPs.

NLR – Versatile and responsive

Human performance is vital to safe and efficient air traffic management. But ATCO duties are changing, caused by disruptive technologies, new ATM concepts, increased automation and decision support tools. Especially in complex situations, disturbances and unpredictable events, ATCO performance is key.

Developing and ensuring versatile and responsive ATCO performance forces new requirements and challenges on ATM solutions. It is essential to create synergy by connecting all aspects of human effectiveness in an integrated way, to ensure that ATCOs are fit to operate now and in the future.



The Netherlands Aerospace Centre NLR has developed comprehensive and innovative solutions comprising the whole span of human effectiveness; from determining optimum human-machine interfaces, developing and validating new operational concepts, automation and decision support tools, and assessing operator fatigue and ATCO performance.

The aim is not only to unlock the full potential of an ATCO but decrease costs and increase the effectiveness of training. The principles of ‘train-as-you-operate’ and ‘train-for-the-unexpected’ underpin the philosophy. And evidence based and personalised training has been developed to meets actual needs.

Simulation and new technology are also vital tools. Simulation offers a realistic, safe, controllable, and relatively inexpensive environment and can seamlessly be integrated into modern training. New technology like augmented and virtual reality and artificial intelligence provide innovative and cost-effective solutions for training.

Credit: NLR

FTEJerez – Catering for growing demand

Flight Training Europe (FTEJerez) made significant improvements in 2018 to cater for the current and predicted demand for airline pilots and air traffic controllers.

FTEJerez’s ATC training division expanded its practical training facilities, which has brought its simulator total to 10 radar and three tower devices. After training nearly 100 ATC students in 2018, the present year will be equally busy.

To maintain FTEJerez’s ‘all training and accommodation in one location’ approach, and meet growing demand for cadets, the academy plans to increase its accommodation capacity nearly 50%. It will be completed in spring 2019, offering accommodation, classrooms and catering as well as sports and leisure facilities.

Regarding the campus extension, Miguel Caparrós, ATC Head of Training at FTEJerez, noted that: “A fundamental part of our vision of ATC training is a focus on creating long-term relationships between pilots and air traffic controllers, bringing both teams to a level of communication with no barriers.

“At the FTEJerez campus, all pilot cadets and ATC students share accommodation, facilities and time-off, creating an environment in which students exchange their knowledge and perspectives of the same industry. This allows us to use the pilot training division’s

facilities to provide our ATC students with the experience of back-seating in real flights and multi-crew cooperation lessons in the B737-800 simulator plus visits to real-life operations at the Jerez Airport tower, among other activities.”



FTEJerez’s vision is to create barrier-free ATM relationships.

Credit: FTEJerez

HungaroControl – Creating a simulation HUB

HungaroControl recently launched Europe’s largest commercial radar simulator for validation activities. With 34 controller and 27 pilot working positions, the aim is to validate new operational concepts with the contribution of ATCOs proficient in the measured airspace.

In one project, SESAR was looking for ways to optimise airspace and manage traffic in a more seamless and efficient way. Rather than being assigned airspace, controllers are assigned aircraft to manage. This allows a greater flexibility and pooling controllers where the traffic is heaviest eliminates the need to restrict or delay flights.

The Simulation HUB provides a wide range of training, real-time and fast-time simulation projects, and consultancy services for airports, ANSPs, functional airspace blocks and other interested parties.

Fast-time simulation (FTS) is a cost-effective way to examine the impact of new operational aspects and helps stakeholders to make informed decisions. The event logs are post-processed through tailored algorithms developed by the fast-time simulation experts. FTS can be used stand-alone or with real-time simulation (RTS).

To create realistic scenarios, Simulation HUB also offers the opportunity to use the HMI (Human-Machine Interface) of ATCOs ‘home’ ATM system reproduced by HungaroControl’s simulation developers. Furthermore, HungaroControl offers basic ATCO training, refresher training and emergency simulations.

Simulation HUB offers a unique service in the region. Besides the SESAR validation in January, ATCOs from ISAVIA and IAC have attended training at HungaroControl.



HungaroControl’s HUB focuses on making ATM more efficient and safer, delivering benefits in real world operations.

Credit: HungaroControl

Micro Nav – Narrowing the skills gap

Micro Nav has provided its single solution BEST (beginning to end simulation and training) simulator to the UK's Royal Navy; and delivered a military air systems control simulator (MASCS) and a synthetic air traffic management training facility.

The simulators are making a critical contribution to the Royal Navy's Air Traffic Control, Air Battle Management and Aircraft Control Training Mission.

The MASCS implementation integrated the functionality of the Royal Navy School of Fighter Control's legacy Fighter Aircraft Control Training System and the Royal Navy School of Aircraft Control's Helicopter Control Trainer to create an enhanced training capability on a shared architecture and platform. The simulated environment included emulation of the Royal Navy's Combat Management System to provide the highest levels of simulation fidelity and realism.

The Simulated Air Traffic Management Training Facility is an on-board training system, which provides a high-resolution 3D-rendered view from the *HMS Queen Elizabeth* aircraft carrier flying control island, in addition to a simulated total ship and maritime airspace environment. This unique simulation environment provides an end-to-end training capability from aptitude testing to continuation training. At sea, deployed air traffic control officers can conduct certification and continuation training, as well as train in new scenarios derived from operational experiences.

With the advent of their new aircraft carrier group and sea-borne fixed wing assets, the Royal Navy identified a key gap in the skills set of their ATCOs. The Simulated Air Traffic Management Training Facility has been instrumental in providing the tools to allow the Royal Navy ATCOs to narrow that gap, particularly during the run up to the F35B operational flight deck trials that were carried out during September 2018. ATCOs were able to practice aircraft sequencing, new arrival procedures, and visual circuit operations on the simulator many months in advance of the arrival of the new aircraft.



Flight deck operations on board *HMS Queen Elizabeth*.

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ESSP – Enhancing understanding of GNSS

Global Navigation Satellite Systems (GNSS) is the key enabler for performance-based navigation (PBN).

The European Satellite Services Provider (ESSP-SAS), the only worldwide satellite-based augmentation system (SBAS) ANSP certified by the European Aviation Safety Agency (EASA), has in-depth knowledge of GNSS and the provision of navigation services.

ESSP delivers consultancy services, including capacity building, to develop GNSS and PBN skills in ANSPs, civil aviation authorities (CAA) and airport operators. This enhances their response to the highly demanding operational and regulatory challenges in aviation.

The BEYOND project is an example of this. From 2015 to 2017, the ESSP led a consortium of more than 15 countries in the European Western Balkans and Euro-Med area. Thanks to this project the participating ANSPs have acquired the necessary capabilities to tackle their first implementations of PBN approach procedures. Following this, the CAAs are ready to build a country-wide PBN strategy based on GNSS.

The ESSP regularly provides customised PBN and GNSS training courses worldwide. IDAC (Dominican Republic ANSP), ASEANA and JPO (Joint Programme Office for African adoption and development of Satellite-Based Augmentation Systems) are recent participants.

ST Engineering – Researching new capabilities

A key initiative at ST Engineering involves the rotation of project management, engineering and support staff on projects for such key customers as the Civil Aviation Authority of Singapore and Changi Airport Group.

Team members are given opportunities to develop and enhance their understanding of ATM and airport operations, optimising their skills and expanding their capabilities to better support our customers.

In addition, in-house programmes such as 'Sparkathon' – an innovation programme – enable iterative engineering and an open approach to accelerate product ideas to market. Supporting external partnerships, engineers work in a dedicated space equipped with multi-disciplinary hardware and software tools

to co-create, collaborate, build and validate new capabilities to manage and maintain safe and seamless airspace.

Furthermore, in partnership with leading institutions such as the Singapore University of Technology and Design (SUTD), ST Engineering offers aviation students internship opportunities to research and develop state-of-the-art technologies and capabilities supporting aviation industry transformation.

Collaborating on research initiatives with Air Traffic Management Research Institute (ATMRI) – a joint research centre by Nanyang Technology University and CAAS – our operational staff, data scientists and team members are embedded in the research programmes to further develop their skills.

LVNL – Tailor-made development

The development of a visual flight rules (VFR) airport to an instrument flight rules (IFR) airport requires a flexible, can-do attitude.

With the future opening of a new IFR airport in The Netherlands, LVNL is challenged to form a new unit to deliver ATC services.

Because it is not yet a controlled airport, an important element of the regular training process of new air traffic controllers – on the job training – cannot take place. LVNL found a solution in recruiting personnel with prior experience.

A supporting factor was that the team culture should fit with both the culture of the new airport and the culture of LVNL.

Because the future team already had working experience, LVNL specifically put more emphasis on team culture during the training process.

To form the new ATC unit, a diverse group was selected with both civil and military backgrounds and from different countries. Interpersonal skills and intercultural co-operation were critical.

This broad background required an individual approach to training, so every team member received a tailor-made development programme, based on the high safety requirements in the aviation industry. Three of them followed an intensive course to master the Dutch language.

With this approach, LVNL deviated from its regular training and development programme.

Though the airport is not yet open for IFR traffic and the development programme is ongoing, LVNL believes this tailor-made training programme may offer important insights for future development policies.

A4F – A seminar for SWIM

A4F focuses on helping the aviation industry manage the implementation of the Aviation System Block Upgrades (ASBU).

By focusing on the ASBUs – ICAO’s framework for the future of the aviation system – A4F ensures it addresses the most important issues in ATM; supporting the aviation industry of tomorrow using the experience gained from solving the real challenges of today.

A key area within the ASBUs is system-wide information management (SWIM) – a particular specialty for A4F. A4F has designed a new highly-targeted SWIM seminar to share knowledge about SWIM, how it touches different organisations and how it can become a tool for the common good of aviation.

The seminar is a way to learn and an opportunity to share stories with others about experiences with SWIM.



Highly-targeted seminar highlights SWIM experiences.

Credit: A4F

MITRE – Addressing needs in ATFM

New technologies and methods are driving an evolution in air traffic management (ATM). Two major domains of ATM include air traffic control (ATC) and air traffic flow management (ATFM). The skill, knowledge and training required to be a proficient air traffic controller will no longer be adequate to operate effectively in the training and proficiency of the air traffic flow manager.

ATFM expands on ATC knowledge in strategic decision-making, traffic modelling and analysis, information exchange, and collaborative processes.

ATC behavioural competencies include active radio communication, separation management, tactical control and decision-making and near-term memory.

In comparison, ATFM behavioural competencies include traffic modelling, strategic event analysis, collaborative decision-making, long-term memory, and continual strategic planning. Given the differences in these competencies, few people would excel and possess the aptitudes needed for both domains without specialised training in each type of ability.

Recent MITRE research has identified gaps, and in many cases non-existent training, for ATFM competency. To fill this gap, MITRE developed a college level curriculum targeted at air traffic flow management skills.

The course introduces traffic flow management theory, NextGen philosophies, operational concepts, system integration, crew resource management, decision-making analysis and models.

A medium-fidelity simulator supports the learning objectives of the course through laboratory exercises and hands-on experience.

The course was offered in an experimental state at two universities that specialise in air traffic controller education; Community College of Beaver County (CCBC) and Embry-Riddle Aeronautical University (ERAU). ERAU, Daytona Beach campus, integrated the ATFM course into its undergraduate ATM curriculum.

MITRE continues to explore training efficiencies in both air traffic control and air traffic flow management domains to ensure integrated solutions for the future workforce.