

NEWS AND FEATURES ON CIVIL AVIATION-RELATED TRAINING DEVELOPMENTS - VOL. 8 - NO. 2

# ICAO TRAINING

REPORT

## ENHANCING AVIATION KNOWLEDGE

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TEACHING THE  
FUNDAMENTALS OF  
AIR TRANSPORT

AVIATION  
TRAINING  
AT A CROSSROADS

RE-DESIGNING  
AVIATION  
EDUCATION

ADDRESSING TALENT  
CHALLENGES  
THROUGH  
PARTNERSHIPS



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UNITING AVIATION

A man and a woman in pilot uniforms are standing in front of a modern airport terminal. The man is on the left, wearing a dark blue uniform with gold stripes on the sleeves and a black cap. The woman is on the right, also in a dark blue uniform with gold stripes on the sleeves and a black cap. They are both smiling and looking towards the camera. The background shows the structural elements of the airport terminal, including large glass panels and metal beams.

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# ENHANCING AVIATION KNOWLEDGE

Meshesha Belayneh

Deputy Director, Technical Cooperation Bureau  
and Chief, Global Aviation Training Office  
International Civil Aviation Organization



✈ As commercial air transport has expanded over the last ten years, new airline operators have entered the market. Today, the highest number of aircraft orders ever, are registered. Over the next twenty years, not only will these new aircraft need to be commanded by qualified pilots, maintained by skilled technicians, and managed by competent air traffic controllers, but the global air transportation system will need to be efficiently managed by new, up-to-date and technology-savvy managers.

With many baby-boomers now reaching the age of retirement, demographic attrition is a factor that has to be considered. When replacing one generation of technical professionals with another, on-the-job mentoring plays an important role in the development of overall human performance. ICAO, and our Member States, must ensure these, and other attrition impacts, are thoroughly factored in all human resources planning.


Another important consideration for human resources development, management, and planning, is the rapid increase in the deployment of new technologies across every

major industrial sector, particularly in aviation. This is leading to tremendous competition globally for qualified technical personnel and managers who are able to understand the complexity of this new environment.

The aviation community must be adept and responsive to overcome these types of challenges. There is an ongoing need for increased coordination as States establish the training and educational programmes needs and course offerings that are required globally, regionally and locally. ICAO's TRAINAIR PLUS Programme (TPP), our cooperative network of training and educational organizations, plays an important role in this process. TPP Members and ICAO Member States have access to affordable and cost-effective Standardized Training Packages (STPs) and Partnership Training Packages (PTPs) that can be delivered nationally or regionally, thereby drastically reducing enrollment fees for trainees.

Today, more than 150 STPs have been validated, and 38 ICAO Training Packages have been developed. There are also five PTPs, in partnership with ACI and various aviation universities, that are available. In

addition to our technical and regulatory-based courses, ICAO also offers more generic, knowledge-based programmes for managers of the air transportation system. This portfolio ranges from a single introductory course on aviation that anyone around the world can take at no cost (the Fundamentals of the Air Transport System (FATS), developed in cooperation with the University of Waterloo, that is presented in an eLearning format), to a more comprehensive and multi-year master's programme in Aviation Safety Management (developed and delivered in cooperation with École Nationale de l'Aviation Civile), which is recognized by the Ministry of Education of France as a master's diploma. The TPP portfolio also includes the Management Certificate in Civil Aviation that launched in 2016, in partnership with the John Molson School of Business at Concordia University. In less than two years, 63 students worldwide have obtained this certificate.

Enhancing aviation knowledge at the middle and upper management level is essential to ensuring the global air transportation system can support future demands. By working together, we will make this network even stronger. 

# TEACHING THE FUNDAMENTALS OF AIR TRANSPORT

Interview with Dr. Suzanne Kearns  
Associate Professor,  
University of Waterloo



✈ Recently we sat down with Dr. Suzanne Kearns, an Associate Professor at the University of Waterloo who teaches, researches, and writes about aviation. She is the author of many articles and four aviation books, including the new 'Fundamentals of International Aviation' textbook. She co-developed the University of Waterloo/ICAO online course called 'Fundamentals of the Air Transport System' (FATS) which can be accessed here:

[www.icao.int/fats](http://www.icao.int/fats).

## DR. KEARNS, WHAT IS YOUR BACKGROUND? AND HOW DID YOU GET STARTED IN AVIATION?

From my childhood, aircraft always fascinated me. I grew up in a small town in Canada, my home was under the approach path of the local airport. I would lie in our backyard watching the small general aviation aircraft circle to land – and tell my parents that one day that would be me. Eventually, my parents encouraged me to start flying lessons at the age of 15 and aviation quickly became the center of life. I soloed on my 16<sup>th</sup> birthday and had my private airplane and helicopter pilot licenses on my 17<sup>th</sup> birthday.

Though I went on to complete a helicopter pilot diploma and then my Bachelor's and Master's degrees in aeronautical science and human factors, through those experiences, I was drawn towards the aviation academic world more than operational positions as a pilot. I began

working full-time as a university professor at the age of 24. While working and raising a young family, I had limited time to attend graduate school classes in-person so I chose to complete my PhD online through distance education.

For an academic at that time, the reputation of the institution where you earn your PhD carried a lot of influence. An online programme wasn't regarded as the most prestigious method of earning a PhD. As I knew I would have to justify this choice throughout my career, I decided to focus my PhD studies on education – specifically 'Instructional Design for Online Learning'. If online learning was one of my speciality areas I thought I could turn something that could potentially be a weakness, into a strength.

After earning my PhD, I went on to conduct research and publish articles in aviation education and online learning that included a book titled 'e-Learning in Aviation'.

### YOU RECENTLY WROTE A NEW TEXTBOOK. WHERE DID THE IDEA FOR THE BOOK COME FROM?

About two years ago, after I finished writing another book, I was searching for my next project. I reflected on my volunteer work with ICAO's Next Generation of Aviation Professionals (NGAP) programme. NGAP explores global initiatives to attract, recruit, educate, and retain young people within the aviation sector.

Through this work, I often heard criticisms that professional groups did not believe that other groups understood or valued their profession. In addition, recruitment efforts in aviation are often very specific to a single career. For example, *pilot* recruitment efforts encourage young people to become pilots while maintenance groups seek the next generation of mechanics. A challenge with this approach is that young people who are not successful in their first effort, often leave aviation entirely since they are not aware of the many opportunities in parallel aviation fields. I believed there was enormous potential to shift introductory aviation education away from a profession-specific to a holistic approach.

This concept led me to spend the next two years researching and writing an introductory textbook called '*Fundamentals of International Aviation*'. The goal of the textbook is to provide young adults with a foundation of aviation industry knowledge that represents and highlights all the sectors in the industry. This would allow them to make an informed career choice that would best align with their interests and ambitions. This book was published in March of 2018.

### YOU WENT ON TO CREATE AN E-LEARNING COURSE THAT ALIGNS WITH THIS BOOK, DISTRIBUTED IN PARTNERSHIP WITH ICAO AND THE UNIVERSITY OF WATERLOO. CAN YOU DISCUSS THIS?

As I was finishing the textbook, while continuing to be involved in outreach and education through NGAP, I began wondering how my previous work in e-learning could support distribution of the messages in the book to a broader audience. The textbook is useful for teaching young adults within university/college aviation programmes, yet I wanted to make the information available to adults who are already working in the aviation industry, as well as professionals transitioning into aviation from other sectors.

I met with representatives from ICAO's Global Aviation Training (GAT) office and they were supportive of the concept. After further meetings with the GAT office and senior representatives from the University of Waterloo, a partnership formed to distribute an online course called the '*Fundamentals of the Air Transport System*' (FATS).

The concept was to offer the course at no cost, with the option of paying a fee only to write the exam and earn an ICAO/University of Waterloo certificate of completion. I regard this as a sustainable model, whereby those who take the challenge to earn the certificate (typically for professional purposes) are subsidizing the costs associated with delivery to others, who may not be able to afford the fee.

The online course is available through the ICAO website at [www.icao.int/fats](http://www.icao.int/fats).

### HOW DID YOU MAKE THE COURSE? HOW LONG DID IT TAKE AND WHAT SOFTWARE DID YOU USE?

I created the course with my husband, Michael Kearns, who is also an e-learning developer. He began the courseware development while I was finishing writing the final chapters of the textbook. We continued the development together for about eight months after the book was complete.

The FATS course was built with an e-learning authoring software called Articulate Storyline. Neither my husband nor myself have any formal training in Storyline, we taught ourselves starting about seven years ago. This software is a great tool that anyone can learn to use, with patience and practice.

Courseware development is a very iterative process, meaning that multiple rounds of revisions and additions are required before a final product is produced. It begins with the instructional design objectives, initial content outlines and storyboards, building interactive activities, writing of narratives, and lastly the recording of the voiceover. Each of these stages involves multiple rounds of testing and expert review. The team in ICAO's Global Aviation Training (GAT) group offered continual support on the instructional design, testing, and accuracy of the courseware.

Overall, the course took about a year to build. We are quite proud of the end-product, which includes nine modules of content that introduce a range of careers and key issues within civil aviation.

*“...young people who are not successful in their first effort, often leave aviation entirely since they are not aware of the many opportunities in parallel aviation fields. I believed there was enormous potential to shift introductory aviation education away from a profession-specific to a holistic approach.”*

### WHO WOULD BENEFIT FROM TAKING THIS COURSE?

With any good instructional design process, it's crucial to have a clear image in mind of the intended learners. For the FATS course, we expected the learners to fall into two groups: 1) learners who are new to aviation and/or considering a career in the industry, and 2) existing professionals who know their sector yet seek a broader understanding of international aviation.

To accommodate both groups we made some strategic instructional design choices. The course was designed to be accessible and understandable for novices, without being boring or frustrating for existing professionals. To support this, we chose to unlock all of the navigation in the course. This means learners can skip forwards or backwards, completing each slide in order, or they can jump immediately to the final quiz. The rationale for this is to support learners at different levels of expertise. Novices need the full structure, but those with experience may be seeking a key piece of information (and would become frustrated if required to sit through a complete module).


The courseware is designed based on research-identified, multimedia principles that support online learning. These factors include a conversational audio voiceover that uses a friendly human voice, learner-controlled pacing (allowing time to process and reflect), mixture of media (words, images, videos), and the segregation of training into short units of content.

A unique element of the course is the integration of interactive activities. We tried to create a ratio of about 3:1, for every three minutes a learner spends listening, they spend one minute interacting with the course. This feature is based on the principle that learners need to actively engage with the course to retain the material. It also provides for timely and constructive feedback throughout the learning process.

### IT HAS BEEN ABOUT A YEAR SINCE THE FATS COURSE WAS RELEASED – HOW HAS THE INDUSTRY RESPONDED?

The industry has responded very positively to the course! We have had over one thousand learners complete the course, from all global regions (Africa – 130, Asia/Pacific – 174, Caribbean/South American – 115, Europe/North Atlantic – 146, Middle East – 107, North America – 360, and Others – 28).

We have increasingly seen Civil Aviation Authorities and operators register all newly hired staff to the course, since they regard it as an efficient and cost-effective method of ensuring they have a fundamental understanding of civil aviation.

It is my hope that the industry continues to consider this course to be a resource – both for providing a holistic perspective for the next generation to understand the range of professional positions within aviation, and to support transitioning professionals as they develop a foundational understanding of the diverse yet interconnected nature of international civil aviation industry. 



## MANAGEMENT CERTIFICATE IN CIVIL AVIATION

Offered by Concordia University's John Molson School of Business in partnership with the International Civil Aviation Organization (ICAO), this business program is clearly set on advancing your aviation management skills and career.

### OVERVIEW

The objective of this aviation-centric management programme is to enhance the competencies of qualified personnel in the civil aviation community while promoting best practices with ICAO's TRAINAIR PLUS Programme and global aviation training activities. The programme will be taught at a level equivalent to that of a graduate business programme and will consist of three certificates: Strategic Management, Human Resources Management and Business Planning and Decision-Making. Successful completion of all three certificates will lead to a Management Certificate in Civil Aviation.

### WHO IS THIS PROGRAMME FOR?

Aviation professionals and managers from Civil Aviation Authorities (CAAs), airlines, aerodrome operators, and other service providers.

### MODE OF DELIVERY

Courses will be delivered using a hybrid format combining classroom sessions and e-learning, allowing participants to continue to meet their career responsibilities. Classroom sessions will be offered in all regions to accommodate large participation from ICAO Member States and aviation industry, and to keep course fees at reasonable level.

## ADVANCE YOUR AVIATION MANAGEMENT SKILLS AND CAREER

### MORE INFORMATION

[concordia.ca/jmsb/aviation](http://concordia.ca/jmsb/aviation)



# KNOWLEDGE MANAGEMENT AND ACI'S KNOWLEDGE PATHWAYS



✈ As airport executives, one of our key objectives is to provide the right learning and development offerings that provide knowledge to our teams, and contribute to improved performance and competitive advantage. But the true value for airports and aviation as a whole occurs when knowledge is managed via a strategy that supports the organizational strategy, and not the other way around.

Knowledge in the airport business is based on an individual's capacity to understand and apply skills that lead to action that adds value for the airport, such as increasing safety in operations or improving strategic planning. As a professional, the knowledge we gain is derived from thinking, based on a combination of information, experience and insight. To make learning activities successful, we need to provide the right development activity – be it through a course, mentoring, or via on-the-job training or an exchange programme – at the right time – for the right individual – in the right way – in order for them to make an informed decision that allows them to do the right thing.

*“When we want to develop knowledge, we need to start with these performance management questions: what drives business performance at our airport, and how does the team drive it? If knowledge does not add value, it is a waste of time, money and effort.”*

The goal of knowledge management is to direct the airport’s learning and development (knowledge) resources and processes with the objective of creating value that will give competitive advantages to the airport. When we want to develop knowledge, we need to start with these performance management questions: what drives business performance at our airport, and how does the team drive it? If knowledge does not add value, it is a waste of time, money and effort.

#### **ACI’S KNOWLEDGE PATHWAYS**

To better assist members with the development of their knowledge management, ACI began developing airport knowledge pathways with the aim of categorizing our course offerings, and assisting the learning and development professionals when they develop their education plans. We approached this by creating three pathways:

##### **FOUNDATION LEVEL**

#### **“MORE EFFECTIVE AND EFFICIENT”**

This level provides courses that teach best practice knowledge and regulatory elements for each operational domain to ensure that staff will become increasingly effective and efficient at their jobs. This can be delivered through online or short classroom courses that are designed to enhance the above-mentioned understanding, whether they are new to

the industry or necessary for eliminating gaps in understanding and concepts within organizational staff.

##### **ADVANCED**


#### **“HOW TO BEST IMPLEMENT”**

Focus on how to “best apply” all of the key elements at the airport based on industry best practices. This level is not only about understanding there are regulations or best practices, but also how the professional can apply and implement them in their day-to-day environment.

##### **EXPERT**

#### **“THE EXPERIENCED PROFESSIONAL”**

This level develops knowledge-based learning that enables people to create more effective, efficient and better ways of doing things leading to new industry best practices such as developing the airport’s long-term strategic plan.

We are proud to offer the newly imagined knowledge pathways, a set of three educational offerings which provide comprehensive continuing education for any level of airport professional, in any management or technical setting, with the end goal of promoting airport excellence! 

**KEVIN CARON**

Director, Capacity Building Programmes  
ACI World



# THE WHOLE IS GREATER THAN THE SUM OF ITS PARTS



✈️ Aviation is in a perpetual state of evolution and modernization; constant change is an inherent characteristic of the industry. Be it standards, regulation, or even equipment, there is very little that remains unchanged from one year to the next. There are several external factors, security being foremost, for which reliable control measures are predominantly short-lived. This reality raises an ever-present challenge: the skills and knowledge of yesteryear simply won't suffice for those looking to enter the sector or to grow within it.

While this has always been a challenge within the aviation sector, it is further exacerbated by a mismatch of skills across several industries. Although potential employees are both in high demand and low supply, it isn't necessarily easier to find employment or advance one's career. In fact, several markets have seen the average time individuals take to land a job actually increase to levels last seen following the 2008 recession. This highly competitive climate has resulted in an equally trying situation for employers who find it increasingly difficult to find the right person for the right job.

The International Air Transport Association (IATA) both identifies and relates to this problem so we responded by commissioning the *2018 Aviation Human Resources Report*. The aim of the report was to delve deeper to find viable solutions, and we singled out 'labor skills mismatch' as among the most serious challenges faced by the industry today. Almost half of all HR professionals interviewed labelled recruitment as their biggest challenge. Indeed, they cited the availability of applicants with the right skills levels and qualifications among their chief concerns.

### CAREER-FOCUSED TRAINING

The growing need for lifelong education is clear. Attaining job-specific skills and knowledge through initial and recurrent training is crucial for aviation professionals. Given the abundance of available options, it is important to seek out training that both keeps up with the industry and is valued and recognized.

As the wing of the trade association that represents the world's leading airlines, IATA Training regularly receives direct and candid feedback from key stakeholders. Our organization is uniquely qualified to offer professionals the ability to be trained with the skills and know-how that employers are actually looking for. In an effort to produce the best possible outcomes for both students and their employers, there has long been a concerted effort to offer up-to-date industry expertise in conjunction with academic training of the highest quality.

### BEST IN CLASS

Over the years, IATA Training has developed several partnerships with some of the world's prestigious academic institutions. This collaborative effort now

enables professionals with the ability to leverage IATA's industry expertise along with rigorous academic learning. These partnerships have resulted in a diverse array of options for those seeking to equip themselves with the tools required to grow and succeed in their careers.

Whether one wishes to take an e-learning course or pursue a graduate level programme, there is truly something for everyone at IATA Training. Students are able to choose from e-learning courses and virtual programmes, offered in partnership with *Embry-Riddle Aeronautical University*, *McGill University* and *Harvard Business Publishing*, to engaging classroom programmes leading to master's degrees, offered in partnership with institutions including the *École Nationale de l'Aviation Civile (ENAC)* in France, *Nanyang Technological University (NTU)* in Singapore, and the *University of Geneva (UNIGE)* in Switzerland. These partnerships are all focused on getting as much value as possible for both the professionals undertaking the training, and the industry as a whole, which stands to reap great benefits from a better-trained workforce.

### HIPO

IATA's *High Performing Finance Organizations (HIPO)* programme, is an excellent example of how IATA Training offers solutions that have been customized to meet the precise needs of the aviation sector. This new programme was developed based on feedback IATA received from several airlines with finance departments that felt they were not receiving adequate training to help them transition out of their primarily transactional past, to a future where they will be more focused on strategic and value-added functions. Following extensive consultations with several key industry players, IATA successfully launched this initiative into its first phase.

HIPO has two primary objectives, **attracting talent** and **developing talent**.

The former is achieved by offering aspiring young aviation professionals – from ten universities in nine countries across four continents – the ability to undertake exciting internships with IATA member airlines. This provides students from partner universities including, University College Dublin, the Rotterdam School of Management,



and HEC Montreal, with springboard into the industry, while simultaneously supplying the industry with great new talent. The latter objective is realized through the new IATA Finance Academy, a wing of IATA Training, which offers highly customized and targeted training. One of the courses currently offered by the academy is being delivered in partnership with Embry Riddle Aeronautical University. A bright future for this industry increasingly demands extensive partnerships with academia, and IATA Training recognizes this reality.

### MANAGERS AND THE BIG PICTURE

While HIPO is the most recent example of this focus on imparting soft skills along with academic training, the movement towards such value added programmes is nothing new. A need for more well-rounded training for upper management

was identified at the beginning of this decade. General MBAs had been in vogue for many years, but it was becoming clear that such generic training failed to provide managers with the broad understanding of the industry that was required for them to perform to their full potential.

Although theoretical education comes with intrinsic value, combining it with training provided by professionals with significant experience in various key segments of the aviation industry, provides managers with a far better grasp of the big picture. IATA Training has long recognized this fact and has strived to craft programmes where the academic expertise of professors from the world's leading institutions of higher learning is delivered in tandem with industry knowledge that can only be delivered by instructors with years of on-the-job experience.

### ADVANCED STUDIES IN AVIATION MANAGEMENT

Since 2010, IATA Training and the *University of Geneva* have partnered to offer managers the academic excellence of the *Geneva School of Economics and Management* alongside content from IATA that is both practical and timely. The programme is unique in spanning the full scope of aviation business issues and offering a unique opportunity to gain specialized training, as well as full academic credit.

These modules are conducted jointly by IATA faculty and university professors, at the *IATA Executive Headquarters* and the *University of Geneva* respectively. Students can choose to either pursue an Executive Certificate, a Diploma, or an Executive MBA. Through this unique partnership, students are able to have

UNIGE aviation and environment  
Jul 2017 on tour of GVA airport




access not only to a world class faculty, but also senior executives within the industry. The programme has been tailored to enable tomorrow's aspiring aviation leaders to face the challenges of today while planning for growth in the future, all without interrupting their careers.

Giulio Leucci, who served as the Chief Executive Officer of Nieuport Aviation Infrastructure Partners until late last month, is one of the many students who quickly rose the management ladder after having completed the IATA-University of Geneva Executive MBA. He noted that “the combination of IATA's professional environment and the academic leadership of the University of Geneva gives the programme a unique advantage”. He went on to predict that “this course of studies will allow me to reach the highest level of competency in managing the airport business.”

Leucci is one among several students who have been able to gain the IATA advantage in combination with more traditional academic schooling. IATA Training was among the first in the industry to make a push towards such mixed learning in an effort to best equip aviation professionals, and it continues to be on the forefront of imparting knowledge and soft skills that are relevant, practical, and required – the training that employers are actually looking for – to this very day.

### THE NEW WAY FORWARD

IATA expects no less than 7.8 billion passengers to travel in 2036 – just short of doubling the four billion air travellers who flew this past year. The next two decades will see massive growth within the sector, and the already trying job of securing professionals with the technical know-how and academic training required to perform will only get more difficult.

Through partnerships with premier academic institutions that have been developed over several years, IATA Training is able to offer the industry the very best of both in a single package. Industry expertise and academic qualifications are offered in targeted subjects and areas, developed based on direct feedback from the biggest players in the sector. Not only are aviation professionals provided with the training and credentials required to enter, grow, and succeed within aviation, but the industry itself is provided with a workforce that has the skills and know-how to not only keep the industry afloat, but to keep it flying ever higher. 

### IVICA KOVACIC

Head, Global Partnerships and Innovation  
IATA Training

ENAC ARLOPS Graduation Ceremony 2015-2016





ICAO

GLOBAL AVIATION TRAINING

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# AVIATION DATA-DRIVEN DECISION MAKING (AD3M) PROGRAMME

## Better Decisions through Aviation Data Analysis

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this exciting new programme!

The AD3M Programme is ICAO's training package on  
building intelligence and analyzing aviation data.

---

TO CONTACT US: [www.icao.int/training](http://www.icao.int/training)    [AviationTraining@icao.int](mailto:AviationTraining@icao.int)

## COURSE DESCRIPTION:

The AD3M Programme is designed to prepare aviation professionals to generate reports and interpret results to make effective decisions, manage risk and set priorities for different civil aviation activities, operations, or procedures.

The AD3M Programme consists of two parts, a prerequisite online course to explore the fundamental concepts behind data-driven decision making, followed by a classroom course to apply the concepts to practical scenarios and real-life situations.

## TARGET POPULATION:

Aviation professionals and managers from Civil Aviation Authorities (CAAs), airlines, aerodrome operators, and other service providers involved in collecting, managing, reporting or making decisions using aviation data.

## COURSE STRUCTURE:

### Part 1: Online course

Fundamentals of AD3M (prerequisite)

#### **Duration:**

10 to 15 hours

### Part 2: Classroom course

Application of AD3M

#### **Duration:**

4 days



## LEARNING OBJECTIVES:

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Participants who complete the AD3M Programme will be able to apply best practices of data-driven decision making in aviation and define suitable key performance indicators (KPIs) in civil aviation sectors.

Upon completion of the Programme, participants will be able to apply aviation data-driven decision making principles and methods in their professional roles.

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FOR MORE INFORMATION & REGISTRATION,  
PLEASE VISIT [www.icao.int/training](http://www.icao.int/training) OR EMAIL US AT [aviationtraining@icao.int](mailto:aviationtraining@icao.int)





# ADDRESSING THE TALENT CHALLENGES IN AVIATION THROUGH IMPROVED EDUCATION PARTNERSHIPS

✈ It is no secret that the aviation and aerospace industry is in the midst of a talent drought. An estimated 790,000 new pilots will be needed by 2037. There will be 600,000 new commercial airline technicians required around the world by 2036, and to support this growing industry, there will be 60,000 additional managers needed. This is just the tip of the iceberg. One of the biggest challenges aviation and aerospace organizations will face will be recruiting, engaging and retaining the talent they need to sustain and grow their operations. For management, it is estimated that the gap between the number of managers needed, and the actual number of graduates from aviation management programmes (2010–2030), will include more than 54,000 people.

This situation presents an opportunity for aerospace and aviation organizations, as well as regulatory bodies, to collaborate more intensely with universities in order to develop industry-driven learning programmes that offer next-generation learning solutions to assist in minimizing the skill gap that looms over the industry.

## THE UNDERLYING PROBLEM:

Simply stated, the factors that contribute to the demand for aviation management professionals will exceed supply and include:

- ◆ widespread retirements in the current generation of aviation professionals;
- ◆ competition with other industries for skilled employees; and
- ◆ insufficient training capacity to meet the demands

## THE QUESTION IS: WHAT CAN BE DONE TO FILL THE GROWING VOID?

When companies and universities work in tandem to push the frontiers of knowledge, they become a powerful engine for innovation and economic growth. Concordia University<sup>1</sup>, located in the thriving aviation hub of Montreal, has been a long-standing partner of the aerospace industry and has taken an interdisciplinary approach to training for this quickly evolving sector.

Recognizing the importance of the aviation/aerospace industry in Montreal,

<sup>1</sup>Concordia University in Montreal Aerospace Strategic Hub discusses in more detail some of the cutting-edge programmes being delivered at the University: <https://www.concordia.ca/about/strategic-directions/hubs/aerospace.html>

Concordia University inaugurated the Concordia Institute of Aerospace Design and Innovation (CIADI) in 2001. CIADI's original purpose was to pair students with a keen interest in aerospace with workplace internships on actual research projects. Over the past 17 years, the programme has assisted many Concordia students in moving on to promising careers in the aerospace industry. Since 2015, CIADI has not only provided leading edge know-how among students engaged in aerospace, but has also supported the development and management of multi-partner aerospace research projects.

It is a particular point of pride that, through CIADI, Concordia University has been able to initiate the Montreal Aerospace Institutes (MAI), a strategic organization with a mandate to unite aerospace students in engineering or science from several Montreal institutions and enhance their training through industry-driven courses, projects and university exchanges.

The Gina Cody School of Engineering and Computer Science at Concordia has also developed significant aerospace-related curricula. A new bachelor programme in Aerospace Engineering

was launched in 2016, hosted by the Department of Mechanical, Industrial and Aerospace Engineering. In addition, the School of Engineering, in partnership with several other universities, offers a Master's in Aerospace Engineering, and the Department of Electrical and Computer Engineering is taking a leadership role by offering new course options in avionics and flight control as part of its Bachelor's in Electrical Engineering programme.

Strong research ties between the faculty and aerospace industry actually date back over a decade, with the faculty being a founding member of the Consortium for Research and Innovation in Aerospace in Québec (CRIAQ). Christian Moreau, Director of Research at CIADI and Professor, Mechanical, Industrial and Aerospace Engineering, believes that this industry-driven research is forging the path toward Concordia University becoming Canada's pre-eminent centre for aerospace education and research.

Despite a broad range of undergraduate, masters and PhD programmes being offered, this industry is taking off so fast that a skill gap outpaces the rate in

which entrants can be trained. This is where leveraging the impact of executive education programmes is critical.

Dr. Claude Martel, Director of the Institute of Co-operative Education at Concordia University, believes that universities play an important role in addressing this growing need. The Institute has partnered with the aerospace and aviation industry for the last three decades. Every year, over 500 students become interns in aerospace and aviation organizations. The Institute of Co-operative Education is where most organizations in the field recruit the top talent they seek. Dr. Martel has played a pivotal role in the creation of several aviation specific management and professional programmes with the specific goal of improvement key skills in the aviation industry.

In fact, for more than a decade, Concordia University has partnered with industry, including ICAO, IATA and ACI, to offer specific internship, training and education programmes designed to hone the management acumen of existing industry staff via: the offering of real-world management practices; recent policy innovations; and evidence-based approaches to policy formation and impact analysis. Through these partnerships, executive education can have a direct impact on real world decision makers, not sometime in the future, but now.

It is important to note too, that by creating a collaboration with universities, organizations are able to free up much needed internal resources while still providing the mandatory upper-level training that is required for its employees. By investing in executive education programmes, organizations in the aviation industry would not only be preparing current industry employees for the management-level positions they will likely be required to assume in the coming years, but they will also be equipped with relevant information pertaining to the newest technology, research, and innovative practices available.



### WIN-WIN SOLUTIONS


For universities, the opportunity to interact with actual practitioners can lead to valuable insights for the academics involved in the delivery of the programmes. There is nothing like stress testing an idea with the people who are actually involved in the day-to-day implementation and formation of policy to identify a mismatch between academic theory and practitioner experience. For customized programmes in particular, educators must learn a great deal about the clients' particular situations in order to deliver an effective programme. This presents a rich opportunity, not only to evaluate existing models, but also to gain insight into processes which may not be reflected in current conceptual models. This sharing of experiences can lead to direct research opportunities on topics of interest to the client and academic.

Universities have a plethora of learning strategies that can positively influence

industry-driven learning outcomes developed by the instructional designer, based upon the learning objects and the instructional designer's expertise. These strategies call on the university to collaborate closely with industry partners to incorporate elements of the adult education paradigm, learning style theory, cooperative and collaborative learning techniques, and personal computer-based aviation training devices to span the long-term retention and application gap that can occur between the classroom and the flight line.

### AVOIDING THE ROADBLOCKS

As with any collaboration, creating a successful relationship between an industry organization and a university can come with certain challenges. Namely, communication and culture within the two organizations will likely be contrasting, and will require careful mitigation in order to make it work.

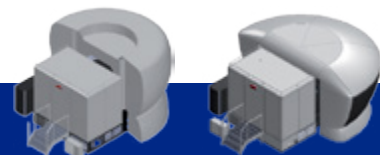
Initially, both sides require a steering committee of key stakeholders and management-level employees who can not only oversee the relationship, but can also manage and control the scope of the collaboration and the project in question. Both organizations need to be deeply involved in the negotiation of responsibilities and expectations, the assessment of strengths either party has to offer and the direct responsibilities of each. In order to truly reap the benefits of a company-university collaboration, however, flexibility and continued communication is key. 

**SANDRA NICHOL**

Executive Director  
John Molson School of Business  
Concordia University



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# AVIATION TRAINING AT A CROSSROADS

✈ As a technologically advanced field, aviation has relied on highly qualified professionals for its continuous development. Tremendous progress in aviation was made possible through the skills of millions of people who brought their contributions to the global aviation system. Aircraft engineers, pilots, aircraft dispatchers, air traffic controllers - there are many categories of such professionals who have been trained around the world.

Today, aviation education is at a crossroads. The exponential growth of global air transport, its technological evolution, combined with demographic declines, massive retirement of older generations, and perhaps less attractiveness of the aviation sector when compared with other industries, has made it more and more difficult for aviation operators to recruit their necessary manpower, both in terms of quantity and quality. This scissor effect could jeopardize the expected

growth of aviation if nothing is done to mitigate its impact.

ICAO and other global stakeholders have long anticipated this situation. ICAO rang the bell by introducing new collaborative programmes like TRAINAIR PLUS, the Next Generation Aviation Professionals (NGAP) and by entering into cooperative agreements with selected aviation universities, including École Nationale de l'Aviation Civile (ENAC).

With the perspective of critical personnel shortages looming here and there, the reinforcement of the aviation education system becomes even more urging. And, with constantly evolving standards, ICAO cooperation with educational institutions is more relevant than ever. Stimulating new ways of cooperative networking between aviation universities will undoubtedly be one of the key drivers for enhancing the future aviation education system on a global scale.

## THE COMMITMENT OF UNIVERSITIES FOR AVIATION EDUCATION: THE EUROPEAN SHOWCASE

Europe paved its way. On 12 October 2018, the PEGASUS<sup>1</sup> network celebrated its 20th anniversary on the magnificent premises of the oldest university in the world: the University of Bologna in Italy.

In 1998 ENAC worked with other French aerospace engineering schools to create a cooperative network of aerospace universities in Europe. We recognized the challenges that the European aerospace industry was facing in:

- ♦ Providing the industry with sufficient workforce in the relevant technological areas;
- ♦ Promoting aviation careers against the emerging “dotcom” industry;

<sup>1</sup>PEGASUS stands for “Partnership of a European Group of Aeronautics and Space Universities”  
<https://www.pegasus-europe.org/>



- ♦ Improving the employability and mobility of the aviation workforce throughout Europe, for taking advantage of the unified economic zone in the EU; and
- ♦ Enhancing cooperation with industry and other aviation stakeholders for identifying future technological bottlenecks and developing the corresponding research activities.

Twenty years later, the PEGASUS adventure has been a success. Our members have continuously provided the European industry with highly qualified aerospace engineers and doctors (nearly 3,000 graduates each year), and we have successfully adapted our learning programmes to meet industry needs. Among the 27 PEGASUS members, student and faculty exchanges were multiplied by a factor of over five times, providing the economic sector with a talented, multicultural engineering and research workforce. In the meantime, the attractiveness of the aerospace industry was not significantly affected by other sectors, and aerospace higher education institutions continue to attract the best European students in their teaching programmes. Moreover, the European teaching offer has also considerably opened up to students coming from the rest of the world, particularly from China and India.

### EXTENDING ACADEMIC COOPERATION THROUGHOUT THE WORLD

The PEGASUS network strives to continuously improve aviation and space education. The general assembly in Bologna extended our activities to incorporate a wider circle of academic partners and to reinforce interaction with industrial companies and research centers. A cooperation agreement was signed in 2017 with a Chinese counterpart, the ARCAS network. PEGASUS members are eager to participate in the upcoming world network of aviation and aerospace universities – it is now time to reach out to the global aviation community.

Joining forces will allow this community to better anticipate future technological challenges in the critical areas that have already been identified by ICAO: safety, security, sustainable development, remotely piloted aircraft systems (RPAS), integration of space, transportation in the current civil aviation system, etc. It should also help to develop educational and training programmes for the next generation of aviation professionals. Permanently improving programme quality has always been, and will remain an objective of the PEGASUS network. Sharing best practices and developing quality educational offerings for the entire world is another challenge that can only be tackled by introducing new pedagogical methods based on digital means.

### DIGITAL CAMPUSES: ENHANCING AVIATION EDUCATION FOR REMOTE PLACES

“Digitalization” remains one of the most promising technologies for enhancing aviation education, particularly in areas that do not have easy access to higher quality education. ICAO has been promoting digital technologies and offering online courses for some time, though as with many other international organizations, the online offering is generally limited to short courses. The greater challenge for aviation universities will be to offer longer courses that lead to official qualifications and diplomas. Such initiatives have already proved their value:

#### IN ITALY

Politecnico di Milano introduced the first distance learning courses in 1997 when they opened several teaching sites across the entire Lombardia region, to reduce the pressure on the main campus in Milano. These early experiments included broadcasts via a dedicated channel of the lectures held on one campus, to other classrooms located remotely. The professors would hold lectures on a rotating basis in each connected classroom, so that all students would also have a direct contact with the teacher periodically.

Though this scheme was later abandoned, Politecnico is currently investing in a series of new pedagogical methods that aren't restricted to enrolled students. Polimi Open Knowledge (POK), which was inaugurated in June 2014 by Politecnico di Milano, is a massive open online course (MOOC) portal that provides online courses that are free and open to everybody. The main objective of the portal is to support all students, not only those from Politecnico di Milano, in crucial stages of their educational and professional careers: from high school to university, from bachelor's to master's degrees, from university to the workplace.

Courses are open to those who register through the portal to access videos, content, activities and self-assessment tests. At the end of the course, if a minimum score is met, a participation certificate is issued (not tied to university credits or entrance test to Politecnico). In bachelor's and master's courses, flipped classrooms, blended classrooms and project-based learning are introduced to allow for each student to be exposed to all methodologies throughout their studies.

#### IN THE NETHERLANDS

At the Delft University of Technology (TU Delft)<sup>2</sup>, the use of digitized learning material began many years ago, with many different methods still in use. One simple method records lectures through a system called “Collegerama”, with a series of lectures recorded once every three years or earlier if there are changes to the course. The use of these recordings proves to be useful, not only for students who are not able to attend lectures, but also for those who need to review before exams. With the recordings, students can watch the full lecture series or the specific parts that they did not fully understand.

“Blended Learning” has also been extensively used at TU Delft. With

<sup>2</sup> TU Delft is also one of the founding members of PEGASUS

extensive course material available on the internet, developing new material is not always necessary. Dedicated searches for online course materials that fit the needs of a specific course can save time. This method of blended learning requires a change in the attitude of the students as well, since they are required to prepare themselves before coming to class. When they are joining face-to-face lectures, it is expected that they have studied the course material that is available online.

The next phase that was introduced a few years ago included the TU Delft Extension School, which concentrated all of the

online activities. Many MOOCs have been made available on a range of different topics, the TU Delft Extension school is connected to the EdEx platform that guarantees worldwide access to these MOOCs. Within the TU Delft offerings of MOOCs there is an increasing number of aerospace courses. These courses are available for free and the participation in these courses is huge. While this literally involves thousands, to hundreds of thousands of students, the percentage of students who make it to the end of the course and receive the course certificate, is low, with an even lower percentage receiving the course certificate.

Eventually, there became a need for professional education. Thanks to online courses, professionals who are working in concentrated fields can get access to dedicated course material on specific topics. Though the professionals who take these courses may or may not have university degrees, online professional courses have fees and usually attract a small number of participants. But contrary to those participating in the MOOCs, the percentage of those who complete the course is much higher.

These online courses have become part of the regular educational programme as well. Though initially they were considered additional reference material for the campus students, they are now part of the regular programme. If a lecturer develops an online course the face-to-face course on campus is no longer given. For on-campus students extra face-to-face sessions are organized but the lecturing no longer takes place. This saves the lecturers valuable time and makes the in-class time much more focused, and much more rewarding.

## IN FRANCE

Nearly 10 years ago, ENAC launched its E-Campus platform (Figure 1). The platform is dedicated to a range of learning oriented services, from hosting training material to the operation of E-Training modules, and the follow-up of student progression. Widely used by professors and students alike, the platform is particularly useful for advanced master's programmes that are taught by ENAC in various countries, from Asia to South-East Asia and the Middle East.

For integrated air transport pilot license (ATPL) courses (Figure 2), a digital-based programme is delivered in blended learning, and will be proposed in a full distance-learning format in the future, with dedicated tools to provide control and monitoring of the trainees' progress.

FIGURE 1

E-Campus, the ENAC digital platform for distance learning

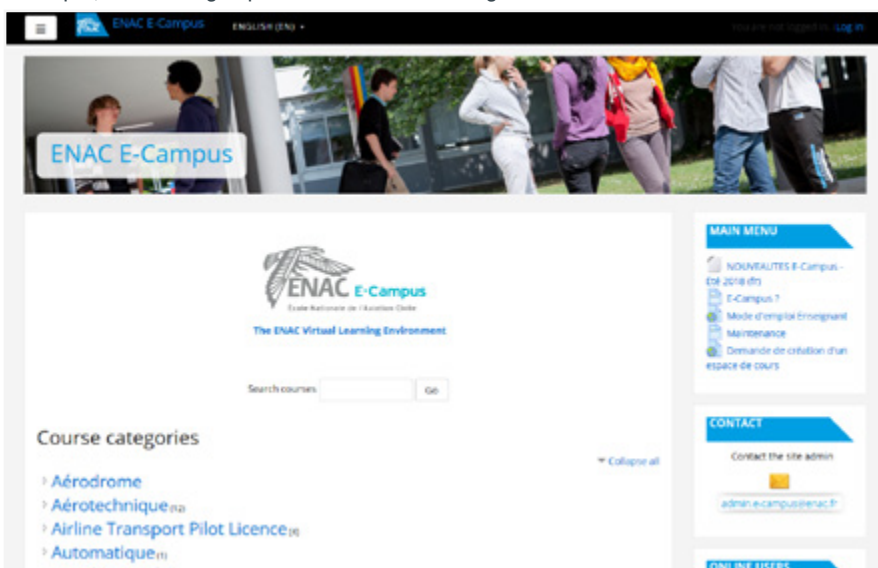


FIGURE 2

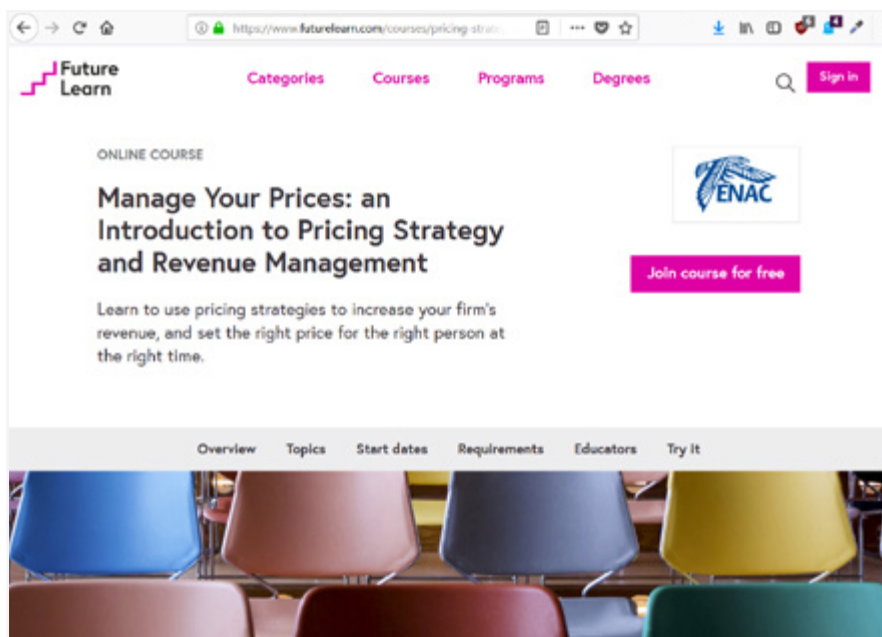
Online Theoretical ATPL Course



*“Stimulating new ways of cooperative networking between aviation universities will undoubtedly be one of the key drivers for enhancing the future aviation education system on a global scale.”*

FIGURE 3

#### MOOC Airline Revenue Management



Several MOOCs (Figure 3) are also provided (Airlines Revenue Management; Which Aircraft For Which Mission, etc.) on various platforms, as well as more interactive serious games for the operational and economical optimization of an airport or the practicing and learning of basic practical skills for ATCOs, in a simplified simulated environment.

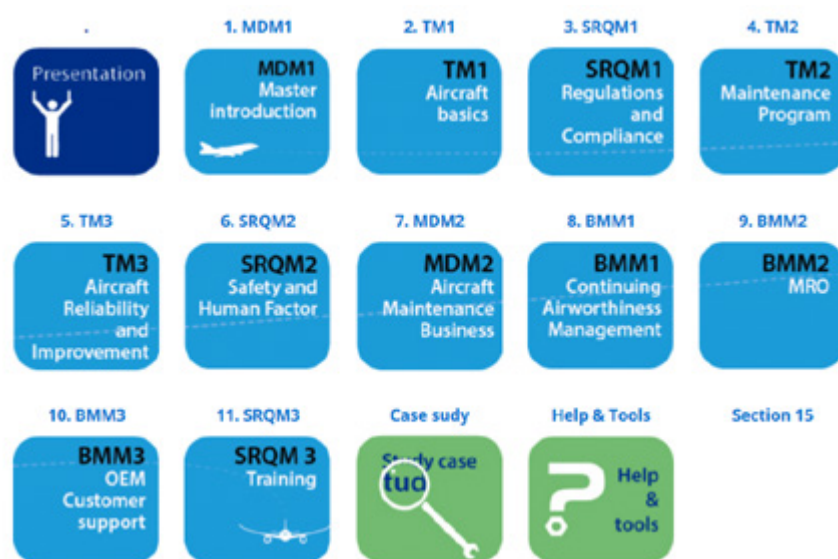
On a more advanced and ambitious scale, a full master's programme in *Aircraft Life and Maintenance Management* (Figure 4) should be delivered in blended learning in the near future. Further developments will also take advantage of ENAC's full-scale, interoperable aircraft and ATC simulators.

#### CONCLUSION

All of these demonstrate the tremendous potential universities have for enhancing the future of aviation and aerospace education on a global scale. Cooperation through more integrated networking, better sharing of information between academia and aviation stakeholders, as well as more ambitious digital means will surely contribute substantially to that goal and will help the aviation community continue to develop safer, more secure and sustainable aviation in the years to come. <sup>[1]</sup>

FIGURE 4

#### Structure of Master programme in Aircraft Life and Maintenance Management



**PASCAL REVEL**

Professor  
ENAC Toulouse (France)

**Prof. FRANCO BERNELLI**

Professor  
Politecnico di Milano (Italy)

**Prof. JORIS MELKERT**

Chairman of the PEGASUS network,  
Technical University Delft (Netherlands)



# ENHANCING AVIATION EDUCATION

✈ The extraordinary growth in the aviation industry is now upon us, a trend that is forecast to continue until at least 2037. While this growth will provide exceptional opportunities, it will also bring challenges for the industry and the education and training organizations that are tied to it. Though the challenge to the industry is the inability to meet the staffing needs of the industry, the opportunities are directly linked as aviation education and training institutions gear up for the influx of students who will meet these needs.

Challenges to the aviation education system are directly linked to the rapid expansion of the numbers of students, the numbers of programmes offered, and the quality of these programmes. It is essential that the quality of the graduates from universities are at the highest possible level.

Though many papers have looked at how universities develop and the role they play in aviation education and training, it is useful to review the steps universities must take to ensure that graduates are ready to take on roles within the industry. By providing a base level for graduate skills in the aviation industry, a sensible approach for enhancing the outputs from the aviation education system can then be introduced.

Universities are governed very differently in many different nations. For example, in Australia each university is established by its own Act of State Parliament and is a stand-alone, self-accrediting organization. They are allowed to operate as a university by the federal government using federal government funding, and managed by the Tertiary Education Quality and Standards Agency. This is a complicated mix of reporting lines and financial lineage.

It is not unusual in the education sector for States to have their own rules and regulations that universities must comply with in order to operate. This system has grown organically, with the education systems of most nations developed to provide for the citizens of that particular State. The concept of large-scale international education is rather new. Even though the United Nations Educational, Scientific and Cultural Organization (UNESCO) endeavours to bring systems closer together, a unified approach is many years away (if ever). There are currently very limited (if any) universal qualifications that are automatically accepted everywhere in the world in any sphere of education, with teaching, dentistry and medicine, as just a few examples of where no consensus exists.

With the exceptionally diverse nature of education in mind, it is obvious that it is not feasible to impose an international

accreditation system on universities. Such a system may well contravene or contradict the very requirements, history and experiences that the State, under which the university is established, dictates.

It is essential that we do not try to follow a path of accreditation where universities must meet a set of input criteria. It would be pointless to look at the length of a degree, the types of academic courses that are required for students to graduate, and the qualifications of the staff. To try to enforce such requirements would be disruptive, creating international friction and unsettling the existing industry/provider relationships, without ultimately achieving anything for the industry. A better approach would be to establish dialogue about what the outputs from our education institutions should be, and then allow each institution to deliver those outputs in ways that are appropriate for them.

The aviation education system must ensure the quality of its graduates. To this end, and in the interests of space and time, we will look at the essential outputs for a degree for pilots as an example (the same logic can be applied to other areas of the industry).

There is no doubt that a graduate with a pilot degree must be a professional pilot who holds a commercial or multi-crew pilot license (CPL/MPL) that allows him/her to receive compensation for operating an aircraft. Most pilot degrees are aimed at providing “airline” pilots, so pilots graduating from a university would have to have the skills, attitudes and knowledge required to be an airline pilot. The airline will be seeking graduates who can, as rapidly as possible, be further trained as a first or second officer in a multi-crew aircraft, and who have the potential for command in the (potentially not too distant) future. Thus the “output” from an institution that ensures that these skills, attitudes and knowledge are taught, demonstrated, practiced and assessed at a level that airlines are expecting,

would be recognized as providing an appropriate degree, without the need for assessing what the inputs were to achieve that level of expertise.

Non-technical skills development is a key output area that universities need to develop in their students. The non-technical skills for a pilot that are described in ICAO’s Manual of Evidence-based Training include communication, leadership and teamwork, problem solving and decision making, situation awareness, and workload management. These are all high level executive functions that are mostly operationalized through the pre-frontal cortex of the human brain.

*“The brain creates pathways and links between neurons to cement these executive functions and it prunes neurons that are not used.”*

Interestingly, this area of the brain is the last area to develop, with final development occurring between 18-25 years of age. While competencies may be affected by genetic components and family experiences, they are also affected by individual experiences, community, friends and the general environment that the individual occupies and engages with. The brain creates pathways and links between neurons to cement these executive functions and it prunes neurons that are not used.

To some extent, like muscle memory, practicing executive functions and

being exposed to well-planned positive reinforcement of these core non-technical skills, creates and strengthens neuronal pathways in the pre-frontal cortex that govern the non-technical skills. Concomitantly, by reducing the level of negative experiences and poor behaviour/attitudes/skills, these “negative” skills will be pruned and removed as pathways. This, in effect, hard-wires the individual to perform at a higher level and produce better results with respect to the non-technical skills required to perform as an airline pilot.

This age range (18-25 years) is the time when young adults are attending university and taking up their first jobs. It is essential then that universities and industry work together to ensure that students and new employees are exposed to positive influences, positive experiences, and that they practice executive level functions in appropriate contexts. Skills must be taught, demonstrated, practiced and assessed regularly. This requires that aviation industry employers and universities work closely together to provide the type of professional development and mentoring that young adults require to become, and remain, successful in their careers.

By introducing these kinds of development programmes both within the curriculum, and as extracurricular activities, the pool of capable young people graduating from university programmes will increase, as will the overall quality of the graduates and new employees. Improved satisfaction from the academic faculty and industry mentors would rise as their satisfaction with student performance, the effort of new employees, and the general positive impact that overall improved performance naturally brings.

The “academic” component of the degree is vitally important and addresses the knowledge requirements for the industry, and the physical skills required to operate the aircraft. This is akin to the




way dentists and surgeons are educated and trained. The academic components of the degrees may differ widely across the world, but the attitudes expected of employees and the non-technical skills may, or may not, be present in a university scenario. The presence or absence of a formal or informal process that manages the professional development of people in this age group at university is essential for their future careers, and indeed plays a role in resilience and overall happiness. It may also have an effect on mental health.

Close relationships with industry, and specifically the organizations most likely to employ a particular university's graduate, are essential to enhancing the industry through university education. This way employers play a role in the design and offering of the programme and ensure that it is relevant for the context in which graduates will be initially employed. However, it is also

important that the international context is understood and addressed. This remains important as the strong potential exists where future employment may well be at an international locale.

While the academic components of the degree may vary in different parts of the globe, the area that is agreed upon in the international context includes ICAO pilot competencies (and the non-technical skills). This reiterates that these skills must make up an essential component of a degree that results in graduating pilots. Young people are attending university at a critical time in their physiological development. Well-designed programmes ensure that their physiological and psychological development is understood, and that programme designs make the most of the ability to help students develop the skills that will hold them in good stead in the industry, and in life in general.

The way to ensure effective and quality aviation education programmes at university is through strong industry relationships and the development of a professional development/mentoring scheme which is either intra-, co- or extra-curricular in design but which teaches, demonstrates, practices and assesses the non-technical skills required to work in the aviation industry. 

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#### PAUL BATES

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University of Southern Queensland  
Australia

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# LOOKING TO THE SKY, MAKING IT A WAY OF LIFE

✈ I was born in Brazzaville, Congo in the mid 1980's, to a Chadian father and a Congolese mother. Both originated from former French colonies situated in Central Africa. The skies were very different from what they are today – but it played a big role in building my curiosity for aircraft.

We lived in Brazzaville, the capital of Congo, until I was 10 years old. I had two childhood friends whose fathers worked in aviation. One worked for the Agency for the Safety of Air Navigation in Africa and Madagascar (ASECNA), the organization responsible for air navigation safety (control towers management and personnel, airports facilities and firefighting, etc.). He brought home documents with drawings that looked like clouds with arrows that raised my curiosity, but they made no sense to me. The other father served as cabin crew for Air Afrique, the flag carrier of many former French African colonies that collapsed in the early 2000s. He brought plenty of cool things back from his travels – thanks to him I played my first Nintendo game!

Though I must admit, as a kid, I was a little envious of the benefits their families were getting from their father's jobs, with accommodations and travel and things, it was actually what was happening in the skies that ignited my aviation flame. One good thing about living in the late 80's and early 90's era in Congo, was that not one week would pass without planes flying in formation or a helicopter throwing some flyers. I would run to watch them and wonder what made them fly.

I started making different shaped paper airplanes and became the best kite manufacturer on the block. My father was an engineer so not only did I have his tools to work with, but he was very encouraging. He bought me a magazine that taught me how to make a high performance kite. That actually came in handy, since it helped me understand the formula and principle of lift generation faster than my friends, through simple logic:

**Lift** =  $\frac{1}{2} \rho \cdot C_x \cdot S \cdot V^2$  =  $\frac{1}{2} \rho \cdot C_x \cdot$   
( **Surface** of my kite X **(how fast I run)**<sup>2</sup> )

In 1993, there was a civil war in the Republic of Congo. Aircraft were flying again, but not in formation and not dropping flyers. It was still a sight to be seen for a kid, I was amazed by the versatility and the mechanics that could make a machine travel so high and so fast. There might have been a war going on, but the children living in it can still have dreams.

During the 1993 civil war the families of my friends left Brazzaville. In 1997 the second civil war broke and my family moved to N'djamena, Chad, my father's homeland. It was the first time I travelled in a plane, and to this day I still feel like that flight was too short and too fast.

I was just starting high school, my interest for aviation had faded. Teenagers weren't interested in paper planes and kites and truth be told, I was more focused on getting good grades at school and hanging out with my friends. In my environment, aviation training didn't exist, so I had to wonder what else was out

there. ASECNA was providing training to airport, weather, fire and control tower personnel. The existing aviation professionals had been trained through scholarships from the government or Air Afrique (that had gone bankrupt).

I was in my first year of university, studying mathematics, physics and computer science when the flame rekindled. It was 2004/2005 when the Chadian government planned to establish a national carrier. Because the fall of Air Afrique had left the country with very few personnel and many close to retirement, they decided to grant scholarships to students who they would train as licensed pilot and aircraft maintenance engineers at Ethiopian Airlines Aviation Academy (EAA).

EAA, which is based in Addis Ababa, Ethiopia, was known to be one of the best aviation international standards training centers in the sub-Saharan region. I successfully passed the selection process and was chosen to go to Ethiopia to pursue my dreams to become a licensed Aircraft Maintenance Engineer (AME).

Where I come from, it is very common to travel abroad to continue studies after high school. My own parents and most of my friends' parents had all gone away. But in their days scholarships abounded. Not only have they become scarce, but the number of applicants drastically increased. The only option most people have today is to be self-sponsored. This is particularly difficult when the training or studies you wish to pursue are not available in your country.

Aviation training centers are rare in Africa, so without scholarships, training is out of reach for most of us. I was so grateful to have been given this opportunity and I hope I will be able to pay it back by contributing to the development of aviation in Africa.

When we arrived in Addis Ababa, Ethiopia, we spoke exclusively in French or our respective native languages, so we had to

take a four-month English course before beginning the training. Though we had taken English classes in high school, we were never very serious about it.

I learned the new language quickly. I had a bit of an advantage because my dad was a computer geek, so we had video games in English on the computer and I watched movies with English subtitles. Video games and movies aren't brainless activities if the time allocated to them is well balanced - and on that my dad was very strict. Another advantage, perhaps even the biggest one, is that I am easy going. If you want to learn a language you have to immerse yourself, as my father would say: "don't stand on the shore waiting for the sea to come teach you how to swim".

Learning English is unavoidable in aviation today. It is the common means of communication for everyone in the industry, whether they are personnel from manufacturers, airports, airlines or regulatory bodies. It is easier to adapt to that reality when your basic training is executed in English, as was my case, but one can always adapt, and speaking more than one language is an asset.

Through my training at EAA, I was on par with professionals from around the world. But I would like to be honest about something very personal. I don't think I would have done well at university, not because I wasn't smart enough, but because it did not suit my personality. I learn better in a consistent and stable environment. The difference in the French education system is that you are either in a university or a school. In a university you might only have five hours of classes a day. In an engineering school you are more than likely to have eight hours of class a day for five days a week.

Aircraft maintenance training at EAA follows the school model and though I was very comfortable in that environment, some of my classmates who had had three or four years of university were struggling.



Lere Wapi T. Diamoneka

The three years I spent in Addis Ababa was rich in other experiences. I was able to learn about new cultures and I developed friendships with people with so many nationalities. There are many things aviation does well, but one of the best aspects is how it brings people from all horizons together.

I graduated in May 2008 after 4,248 hours of ICAO Type II training, with a license in Airframe & Powerplant (B1) and an avionics license (B2) on a Boeing 737-200.

Following that I went to Chad, where my entrance was quite harsh in the professional world. The national carrier had collapsed before our graduation, so we were left on our own. I ended up getting a job at the handling agency of N'djamena Hassan Djamous International Airport. I was a marshaller there, since the technical department only had a maintenance agreement with Air France and no other airlines coming to N'djamena. Only our manager, who was formerly Air Afrique personnel, and the only AME in the department with the ratings and EASA part 66 B1 License, was allowed to perform maintenance and release Air France aircraft.

It was that manager who advised me to resign and find a job with an airline. He also encouraged me to do my best to get an EASA part 66 B1 and/or B2 license,

since holding those licenses would be an asset to a carrier. He was not wrong. I resigned after three months and went looking for a job in Brazzaville, Congo, where I had first seen an airplane.

It did not go well, I didn't have a job for nearly six months. No one wanted to hire an AME fresh out of school, with no relevant rating. This happens in Africa in general, and in Central Africa in particular, where AMEs and pilots are generally trained by airlines, so their recruitment is guaranteed.

But the day came when I was recruited by the maintenance manager of Société Nouvelle Air Congo (SN Air Congo). He was a very experienced AME who represented the interests of the South African partner of SN Air Congo.

When I started working for SN Air Congo in early 2009, the Airline was, if I was to be very honest, just one level above a "bush airline". We were operating in precarious conditions. Operations were rendered possible because of the BAe 146, with its high wings that kept the engine high above the ground, clear from foreign object damage on the ground, and it was able to land on short runways.

SN Air Congo owned two or three turboprop aircrafts (MA 60) that we could never fly more than two of at a time. The South African partner brought three Avro RJ BAe 146 and there was a CEO of Finance and a maintenance manager supervising its aircraft.

I was assigned on the BAe 146 fleet and obtained the rating on that aircraft, earning the Congolese license equivalent to my Ethiopian licenses. We were only three AMEs so we had a lot to do. Within a short period of time I had worked on all aircraft systems and was quite comfortable. We had crews from South Africa, Europe and America, many of whom I am still in touch with.

Things were going well, but what I didn't know was that under the surface, disagreements were growing among the partners. In March-April of 2010 the partnership ended. Those of us who worked on the BAe 146 didn't have jobs and were not welcome.

Around the same time, an airline named Asky Airlines (Asky for African Sky), which was based in Togo, began operating. Their motivation was to become a Panafrican Airline that would allow African States to become shareholders, and by doing so they would fill the gap left by Air Afrique. Ethiopian Airlines was a strategic partner and the main shareholder. Asky Airlines was using two Boeing 737 NG and one Bombardier Q400 at the time.

It was in late 2009 or early 2010, before Asky had taken its first flight, when I sent my CV, training documents and motivation letter to apply for a job. In September 2010 they contacted me and I left SN Air Congo and joined Asky Airlines.

Asky Airlines offered me the experience of working in an environment where abiding the rules and meeting international standards wasn't just mandatory, it was the only path to success and durability.

Today I am still working for Asky Airlines, where I have welcomed these positive changes:

- ◆ Asky is a non-government owned airline with the longest longevity in the sub region. It operates six B737 NG and two Bombardier Q400, and it is now IOSA certified.
- ◆ I am now rated on B737 NG and I am senior maintenance staff, and a flight engineer. Being part of the IOSA team within the company, I am on track to become an IOSA Internal Auditor.


I never forgot my Chad Handling supervisor's advice. Though a scholarship was not an option, through my personal effort and investment I obtained my EASA part 66 B1 license in 2015.

I believe what has taken me so far is consistency, discipline and love for what I am doing. Without it I would have chosen another path and I wouldn't have achieved this much.

Today I have a broad knowledge of both aircraft as machines and how airlines operate. Through Asky Airlines I have witnessed that the airline industry is not only a tool for developing a sub-region, but it is a job provider that crosses borders to unite people for the same goal. And yet, I know airlines are fragile.

My experiences and everything I went through to follow my passion has led me to consider whether I should join a regulatory body. I believe my experience and will to bring greater good can help to develop the African skies to ensure passengers board safely maintained aircraft, and airlines won't cease operations every few years, causing tragedy in personal and family lives. There is a need for encouraging and assisting governments to develop sufficient and affordable programmes so that kids will discover all that this industry has to offer. No one is more dedicated and reliable than those who love what they are doing.

In aviation, whatever the area one chooses, he or she has to know training will never end, because technology and regulations will continue to evolve. Aviation personnel must be open to change and must always seek improvement and safety, not just for themselves, but for all those who need and use aviation.

My journey to aviation might have ended when I joined Ethiopian Aviation Academy, but my journey through aviation is far from over. 

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**LERE WAPI T. DIAMONEKA**

Senior Maintenance Staff  
and Flight Engineer, Asky Airlines

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#### NORTH AMERICA CENTRAL AMERICA THE CARIBBEAN (13)

- BARBADOS  
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- CANADA  
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- CUBA  
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- EL SALVADOR  
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- JAMAICA  
Civil Aviation Authority Training Institute (CAATI) ●
- MEXICO  
Centro Internacional de Instrucción de Aeropuertos y Servicios Auxiliares. Ingeniero Roberto Kobeh González ●
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Trinidad and Tobago Civil Aviation Authority Civil Aviation Training Centre ●
- UNITED STATES  
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- Delex Systems, Inc. ●
- Federal Aviation Administration (FAA) Academy ●
- The Washington Consulting Group (WCG), Inc. ●
- The Technical Training Group ●

#### SOUTH AMERICA (12)

- ARGENTINA  
Centro de Instrucción, Perfeccionamiento y Experimentación (CIPE) ●
- BOLIVIA  
Instituto Nacional de Aviación Civil (INAC) ●
- BRAZIL  
Centro de Treinamento da Agencia Nacional de Aviação Civil (ANAC) ●
- CHILE  
Escuela Técnica Aeronáutica ●
- COLOMBIA  
Centro de Estudios de Ciencias Aeronáuticas - CEA ●★
- Corporación Educativa Indoamericana (CEI) ●

- ECUADOR  
Escuela Técnica de Aviación Civil (ETAC) ●
- PARAGUAY  
Instituto Nacional de Aeronáutica Civil (INAC) ●
- PERU  
Centro de Instrucción de Aviación Civil (CIAC) de CORPAC ●
- SURINAME  
Polytechnic College Suriname ●
- URUGUAY  
Instituto de Adiestramiento Aeronáutico - DINACIA ●
- VENEZUELA  
Instituto Universitario de Aeronáutica Civil (IUAC) ●
- EUROPE (17)**
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Centre Français de Formation des  
Pompiers d'Aéroport (C2FPA) ●

Ecole Nationale de l'Aviation Civile  
(ENAC) ●

GERMANY  
Star Wings Aviation Training  
Centre GmbH ●

ITALY  
ENAV Academy ●

IDS Ingegneria Dei Sistemi S.p.A. ●

KAZAKHSTAN  
Professional Training Center RSE  
"Kazaeronavigatsia" ●

LUXEMBOURG  
EUROCONTROL Institute of  
Air Navigation Services ●

NETHERLANDS  
Joint Aviation Authorities Training  
Organisation  
(JAA TO) ●

RUSSIAN FEDERATION  
Institute of Air Navigation (IAN) ●

Domodedovo Training LLC ●

SPAIN  
Servicios y Estudios para la  
Navegación Aérea y la Seguridad  
Aeronáutica (SENASA) ●

SWEDEN  
Entry Point North AB Nordic  
ATS Academy ●

TURKEY  
Turkish Aviation Academy ●

UNITED KINGDOM  
International Fire Training Centre  
(IFTC) Serco ●

NATS Training Services ●

### AFRICA (22)

ALGERIA  
Établissement National de la  
Navigation Aérienne (CQRENA) ●

ANGOLA  
Enana-EP/ Centro Aeronáutico de  
Instrução ●

BOTSWANA  
IAS Aviation Academy ●

CAMEROON  
Ecole Régionale de Sécurité  
Incendie (ERSI) ●

EGYPT  
Egyptair Training Academy ● ★

Egyptian Aviation Academy (EAA) ●

United for Aviation Technology  
Services (United ATS) ●

ETHIOPIA  
Ethiopian Aviation Academy  
(EAA) ●

Ethiopian Civil Aviation Training  
Centre (ECATC) ●

GHANA  
Ghana Civil Aviation Training  
Academy (GATA) ●

KENYA  
East African School of Aviation  
(EASA) ●

MAURITIUS  
Airports of Mauritius Co Ltd.  
Aviation Training Centre ● ★

MOROCCO  
Académie Internationale  
Mohamed VI de l'Aviation Civile  
(AIAC) ●

Loumed Cabin Crew Training  
Center (LCCTC) ●

NIGER  
Ecole Africaine de la Météorologie  
et de l'Aviation Civile (EAMAC) ●

NIGERIA  
Flying School and Air Traffic  
Services & Communications  
School of the Nigerian College of  
Aviation Technology (NCAT) ●

SENEGAL  
Ecole Régionale de la Navigation  
Aérienne et Management  
(ERNAM) ●

SOUTH AFRICA  
Air Traffic and Navigation  
Services (ATNS) –  
Aviation Training Academy ●

SUDAN  
Sudan Academy for Aviation  
Sciences and Technology  
(SUDAFAST) ●

TANZANIA  
Civil Aviation Training Centre  
(CATC) ●

TUNISIA  
Académie Tuniso-Française de  
Formation en Sécurité de l'Aviation  
Civile (AFSAC) ●

ZAMBIA  
Zambia Air Services Training  
Institute (ZASTI) ●

### MIDDLE EAST (11)

IRAN (ISLAMIC REPUBLIC OF)  
Civil Aviation Technology College  
(CATC) ●

JORDAN  
Queen Noor Civil Aviation  
Technical College (QNCATC) ●

KUWAIT  
Australian College of Kuwait (ACK) ●

LEBANON  
Middle East Airlines Training  
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OMAN  
Arabian Development and Training  
Institute ● ★

International College of  
Engineering & Management ● ★

Oman Aircraft Control College ●

Oman Airports Learning &  
Development Center ●

QATAR  
Qatar Aeronautical College  
(QAC) ●

SAUDI ARABIA  
Saudi Academy of Civil Aviation  
(SACA) ●

UNITED ARAB EMIRATES  
GALANS Training Centre ●

Gulf Center for Aviation  
Studies (GCAS) ●

### ASIA/PACIFIC (25)

AUSTRALIA  
ASSET Aviation Institute ●

BANGLADESH  
Civil Aviation Training Centre  
(CATC) ●

CHINA  
Capital Airports  
Management Academy ●

Civil Aviation University of China  
(CAUC) ●

Hong Kong International Aviation  
Academy (HKIAA) ● ★

INDIA  
Airports Authority Rescue and  
Fire Fighting Services Training  
Centre ●

Civil Aviation Training College Allahabad  
●

Fire Service Training Center  
(FSTC) ●

GMR Aviation Academy ●

Indian Aviation Academy (IAA) ●

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Civil Aviation Human  
Resource Development Centre ●

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Sekolah Tinggi Penerbangan  
Indonesia ●

JAPAN  
Aeronautical Safety College  
(ASC) ●

MALAYSIA  
Malaysia Aviation Academy (MAVA) ●

MONGOLIA  
Training Centre of the Mongolia  
Civil Aviation Authority  
(TCMCAA) ●

NEPAL  
Civil Aviation Academy of  
Nepal (CAAN) ●

NEW ZEALAND  
Airways New Zealand  
Training Centre ●

PAKISTAN  
Civil Aviation Training  
Institute (CATI) ●

PHILIPPINES  
Civil Aviation Training Center  
Civil Aviation Authority ●

REPUBLIC OF KOREA  
Civil Aviation Training Centre of  
Korea Airports Corporation (KAC) ●

Incheon Airport Aviation  
Academy (IAAA) ●

SINGAPORE  
Singapore Aviation Academy (SAA) ●

SRI LANKA  
Civil Aviation Training Centre  
(CATC) ●

Sri Lankan Aviation College ●

THAILAND  
Civil Aviation Training Centre  
(CATC) ●

# RE-DESIGNING AVIATION EDUCATION

## A COLLECTIVE EFFORT

✈️ Air transport, like many other leading industries, is facing massive challenges. And while we are busy working on solutions to today's problems, we must not forget our responsibility to prepare for the future of aviation.

### TRIPARTITE COOPERATION

ICAO, global trade associations, aerospace enterprises, and educational institutions have all been contributing to address the challenges, as evidenced by the substantial number of conferences, publications, and training programmes. ICAO continues to open dialogue with the industry and academia on safety and security issues that are largely concentrated on technical matters and the harmonization of related standards. Global coordination with primary stakeholders plays an important role in tackling these concerns.

Research performed at the Said Business School of Oxford University on scenario planning, relate to the TUNA conditions of the future, that are characterized by Turbulence, Uncertainty, Novelty and Ambiguity (Ramirez R. & Wilkinson, A, "Strategic Reframing", Oxford University Press, 2016). In view of this, stakeholders should sensibly, closely, jointly examine how best to prepare upcoming generations for the unprecedented challenges they will face.

### NEEDED:

#### MORE FOCUS ON MANAGEMENT

As an industry we are probably not sufficiently addressing the managerial

aspects of the air transport system. Technical matters no doubt need continuous attention to allay the risk of suffering major adverse consequences. However, there seems to be an imbalance in our collective approach. The fact is, no matter what the financial scope of investments in infrastructure, technology, systems, and other assets, wise decisions about the system must be guided by expert professional management. The business of aviation management is complex. Whether the issues at hand are related to the regulatory system, the airlines, the airports, the air navigation system providers or the manufacturers, special knowledge and expertise are required. Management capabilities that are needed in the broadest sense include foresight, governance, leadership, and administrative know-how.

### NEEDED NOW:

#### COMPETENCIES OF THE FUTURE

The anticipated future, albeit ambiguous, will require rethinking the existing competencies, as well as identifying and developing new ones. J. Canton in "Future Smart" (Da Capo Press, 2015) noted that "...we must educate for tomorrow to meet the challenges of the future". He devoted a chapter to the evolution of education and emphasized the critical importance of concentrating on "...authentic learning; critical thinking, reasoning, collaboration, problem-solving and logic". He further opined that "...curriculum taught today is out of sync with social issues and real-world scenarios". Some leading academic institutions might disagree with that

blanket assessment, yet it should be seen as a call for better, enhanced dialogue among the industry stakeholders that are involved in educating for the future and creating more impactful learning designs and systems.

This would mean that we must consider how we develop and train human capital by using real-world simulations and gaming, among other techniques. The power of problem-based learning (PBL), over traditional methods, has been fully demonstrated in the last 20 years. PBL integration with coaching environments is known to have a multiplier effect; it is highly impactful on the retention level of learners as well as on professional practice in the field. Educational research has also demonstrated that when online learning is deployed correctly with a PBL approach, when combined with group work by multi-disciplinary/multi-cultural teams, it is at least as efficient as face-to-face training in many respects.

### COMPETENCY BUILDING MASTER PLAN – A LEARNING ORGANIZATION TRADEMARK

Tripartite cooperation in the field of education for the air transport industry should be focused on three competency building activities:

1. Development of competency profiles
2. Assessment of competency gaps
3. Development of pragmatic strategies to close these gaps

This approach may best be implemented through the development of Competency

Building Master Plans (CBMPs) that are formulated at the global, State, aviation sub-sector, and enterprise levels. There is much to be gained from structured, active sharing of research, information, and best practices among industry stakeholders on the subject of competencies. Validated instruments should also be developed as tools for assessing the competencies of aviation personnel. Such tools should be jointly developed by subject-matter experts and industrial psychologists, and should go beyond measuring knowledge into measuring abilities in context to inform competency building strategies.

Gaps that are identified through organizational audits, not surprisingly, pertain largely to human capital issues and often relate to managerial competency concerns. One emerging best practice that constitutes an improvement over traditional, often poorly rationalized training plans is the CBMP. A key divergence of the CBMP is that training activities relate directly to organizational performance targets de facto highlighting returns on investment (ROI). It constitutes a fundamental element of an entrepreneurial culture that leading organizations are currently adopting.

A CBMP should display the following characteristics:

- ◆ Focus on achieving organizational performance with reference to contextually meaningful and recognized best practices.
- ◆ Address all levels of an organization, namely, front-line, middle, and executive management, in an interrelated manner.
- ◆ Incorporate a structured plan for both internal and external training activities that provide access to relevant managerial best practices, whether from the aviation sector or from other pertinent areas of excellence.
- ◆ Feature a “coaching” dimension in all key functional areas to ensure that concepts and tools get implemented to the fullest possible extent.
- ◆ Link formally and transparently to succession planning programmes.
- ◆ Clearly identify anticipated ROI for each competency-building activity that is included in the plan with a realistic, meaningful approach to measuring of their success.
- ◆ Promote systems thinking and the eradication of functional-silo perspectives.
- ◆ Feature a competency assessment system (CAS) that integrates a

battery of work-related situational simulations and psychometric tests that aim to identify the development requirements of learners, determine their progression, and support the mapping of their career paths within the enterprise.

### **COLLABORATION FOR A COMPETENCY BUILDING APPROACH - POTENTIAL ROLES FOR ICAO, INDUSTRY AND ACADEMIA**

In the context of a CBMP approach, some potential roles for the partners could be:

#### **FOR ICAO:**

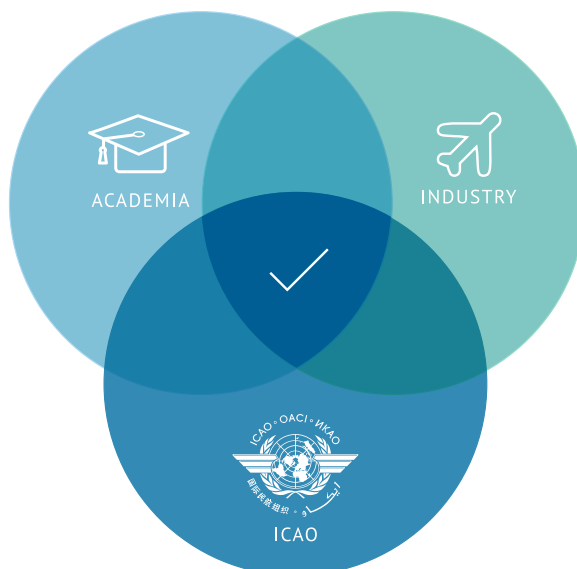
- ◆ Coordinate a structured, global competency-building initiative, much like for the development of Standards and Recommended Practices (SARPs).
- ◆ Assemble a compilation of universally applicable aviation sector competencies.
- ◆ Provide leadership on identifying the universally applicable technical competencies.
- ◆ Further develop the guidance and assistance to TRAINAIR Plus Members for the design of competency assessment tools and development programmes focused on addressing systematically validated performance gaps and the delivery of applicable best practices.

#### **FOR INDUSTRY:**

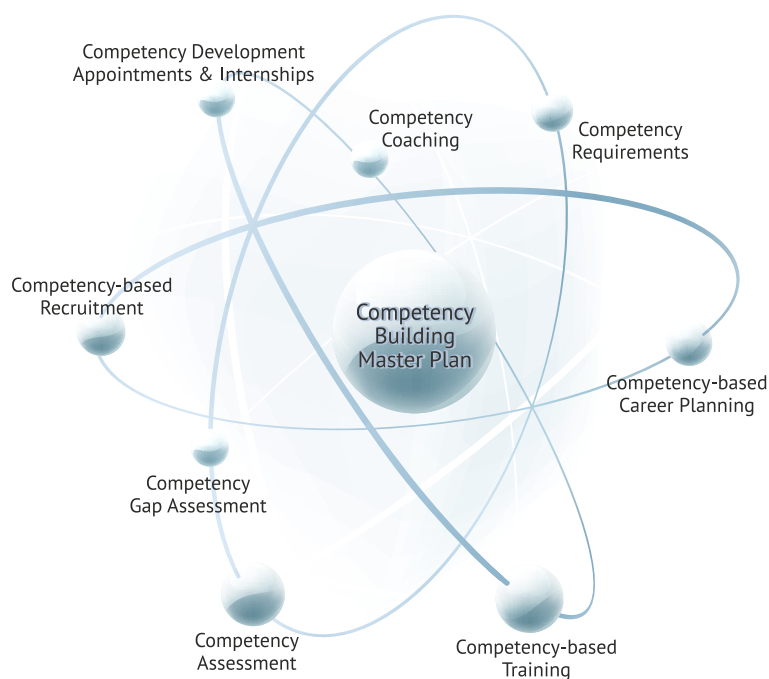
- ◆ Provide leadership on identifying the universally applicable managerial competencies and gaps expressed by operational sub-sectors, i.e. airlines, airports, ANSPs and suppliers (key role to be played by trade associations such as: ACI, CANSO, IATA and TIACA).
- ◆ Systematically define the shifts in competency requirements associated with the advent/adoption of new business models and technologies.
- ◆ Share competency profiles among sectorial enterprises.
- ◆ Offer feedback to academia on user requirements for competency building programmes and the impact/relevance of programmes being delivered.
- ◆ Offer feedback to ICAO and academia on implementation issues regarding technical competencies.

## **TRIPARTITE COOPERATION**

Developing the Next Generation of Aviation Professionals



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#### FOR ACADEMIA:

- Conduct research in support of ICAO, States, trade associations and aviation enterprises on competency targets and their evolution in the context of future requirements.
- Adapt academic programmes to meet the needs identified in CBMPs.
- Consider “crediting” structured, quality-professional training programmes to encourage the learning path synergies in aviation (i.e., the recognition of the Global ACI-ICAO Airport Management Professional Accreditation Programme against the Toulouse Business School Aviation MBA and the Southern Cross University MBA).

Of note: at their level, States also have a crucial role and responsibility, to assess the future human resources development requirements relevant to their jurisdictions. They would be well advised to develop “national” CBMPs for their own aviation sectors and reap the resulting benefits associated with more efficient human capital policy making and strategic planning.

#### RECOMMENDATIONS FOR FUTURE-RELEVANT COMPETENCIES TO BE ADDRESSED THROUGH TRIPARTITE COLLABORATION

Going forward, some emerging competency areas that are critical, and seem particularly relevant to the air transport industry, include:

##### Passenger Experience Management

“In recent years, the aviation industry has often been severely criticized for disregarding the passengers’ perspective, imposing unreasonable fees in spite of deteriorating service levels, and taking advantage of monopolistic or quasi-monopolistic situations... are we truly paying attention to our level of customer service? How serious are we about treating passengers as true customers? Can we take more leadership in fixing this?” (Coutu. P., “Let Us Advocate For A More Meaningful, Customer-centric Approach”, Editorial, Issue no.1, Winter 2012-13, Journal of Airport Management, Henry Stewart Publications)

##### Data Analytics and Decision Support Systems

Ernst & Young defines data analytics as “... the practice of capturing, managing and

analyzing data to drive business strategy and performance by turning raw data into information” (“Analytics: Creating Actionable Insight Trough Data”, EYGM Limited, 2015). With the rapid progression of artificial intelligence, data analytics will likely become a very powerful tool in the development of meaningful decision support systems.

#### Foresight and Scenario Planning

Industry leaders generally concede that the rapidly evolving global aviation industry business environment will have significant impact, yet many observers seem to think we are stuck in a form of short-term planning framework that does not bode well for the future because it is confining the industry to high risk.

R. Kreibich, Director of the Institute for Future Studies and Technology Assessment (Berlin) said “Although megatrends and the core problems of global change are even now deeply affecting all areas of life, and although we already have a great deal of knowledge about the future, very little is being done. There is a huge gap between the challenges - even crises - that we know lie ahead and the practical responses offered on the global, national, and regional levels” (“All Tomorrow’s Crises”, IP, Spring 2007).

#### IN CONCLUSION

As the future of the aviation industry evolves and becomes more complex, there is a clear need for improving tripartite cooperation among ICAO, industry organizations, and academia to deliver education programmes for the next generation of aviation professionals. This would best be achieved through a coordinated, harmonized focus on competency requirements and the adoption of Competency Building Master Planning frameworks. <sup>[TR]</sup>

**PIERRE COUTU**

AMPAP Programme Executive  
Global ACI-ICAO Airport Management  
Professional Accreditation Programme

# HIGHER EDUCATION AVIATION TRAINING: A SOUTH AFRICAN PERSPECTIVE

✈ The Republic of South Africa sits geographically at the very southern tip of a continent that has perhaps not been adequately recognized for its actual size. The African continent, having a surface area of over 30 million square kilometres, is bigger than China, the United States of America and the whole of western Europe combined. It is well over twice the size of the Russian Federation, and the distance in nautical miles from Cape Town to Cairo is almost twice the distance from New York to Los Angeles.

This vast area brings some unique challenges, which when coupled with environmental, surface transportation and political forces, necessitates a unique approach to the aviation industry and the ways Human Capital Development (HCD) must be tailored to effectively maintain and grow the aviation sectors role on the continent.

This is where universities, not only in South Africa, but across Africa, have a vital role to play in developing the appropriate talent and skills to service the aviation industry, and in doing so, support the growth and developmental needs of the continent as a whole.

## SOUTH AFRICA'S AVIATION HISTORY

South Africa, in comparison to its neighbouring States, has a very long commercial aviation history, a history that is again perhaps not sufficiently

well known internationally. For instance, the precursor to South African Airways the national carrier, Union Airways, was founded in 1929 (just fifteen years after the formation of the first commercial airline in the United States of America) and the world's first commercial jet flight flew from London to Johannesburg (the commercial hub of South Africa) in 1952.

South Africa has a world class aerospace design, development, manufacturing and services industry that traces its roots back to the start of the previous century. South Africa has designed, manufactured and maintained its own aerospace systems; has developed long standing partnerships with the likes of Boeing and Airbus amongst many others; and has sold aviation products and system globally for many decades.

It is within this historical framework that universities in South Africa have developed mechanisms to support the airline operators, aerospace companies and the abovementioned associated engineering industry, for which access to appropriate talent is a constant need.

## THE NEED FOR A TALENT PIPELINE

This need led to the creation of a talent pipeline through the National Aerospace Centre (NAC), which was founded in 2006, that starts at the secondary school level and ends at the

post graduate level within the tertiary (university) education environment.

NAC was created by the South African government to specifically enhance aviation education within academia and to ensure the growth of the sector through human capital development support.

This human capital development journey starts in grades ten, eleven and twelve (late secondary school) when youth are introduced to science, engineering and mathematics, via experiential and outreach events, industrial visits, competitions and attendance at science expositions. This process is tailored specifically to allow them to make informed career choices before they enter into either the aviation job market directly, or the university and college education system first, and then the aviation sector after graduation.

It is this formal entry into the tertiary education system at the undergraduate level that has necessitated the development of specific support mechanisms within academia in South Africa that ensure the skills and technologies developed, will always remain relevant to the needs of the sector itself.

## THE ROLE UNIVERSITIES CAN PLAY

South African universities have, for almost two decades now, been divided into three broad groupings – traditional

universities that have a more fundamental research and teaching focus; universities of technology that have a more practical teaching focus; and finally comprehensive universities which offer both the fundamental and practical teaching streams in one institution.

These academic groupings all work complimentary to each other and serve two distinct needs within the industrial development value chain. Universities of technology provide technological career development that is focused on the immediate or short term industrial needs and associated skills requirements, whilst traditional universities consider the more medium- to long-term requirements of the industry they serve, especially when considering the research and development content they can create on behalf of the industry.

This research and development (R&D) content within the traditional university space will invariably lead to the creation of intellectual property that, if it is exploited correctly within the domestic and regional sectors, will have a long term benefit for the industry in terms of growth, sustainability and the depth of human capital or talent.

### THE IMPACT OF AN INDUSTRY SUPPORT CENTRE HOUSED WITHIN ACADEMIA

A merger of the HCD and the R&D paths within universities must be driven by the needs of the aviation industry itself. In other words, an aviation support centre that is housed within academia, such as NAC, must not exist to support academic research or teaching content that has no relevance to the aviation industry. It must be fully focused on the needs of the sector it serves.

In order to ensure that this relevance is maintained, cognisance needs to be taken of the specific areas of expertise and specialization that each individual academic institution has. Additionally, networks of academic research groups and clusters need to be developed nation-wide to exploit this expertise, and maintained and managed to

ensure delivery to industry. There must be continuous road-mapping of academic capabilities to ensure that global trends and new technologies are always considered.

Likewise, similar industrial relationships (and networks) need to be developed, maintained and managed to take up the technologies that are developed, and to employ the talent that graduates from academic institutions in a meaningful way.

The multi-year role that NAC has played within the South African academic sector has led to the creation of three levels of education-based relationships with industry and government:

- ◆ **Strategic partners:** Government departments and national and international regulatory bodies that are responsible for national and regional strategies, as well as compliance, certification and qualification processes within the aviation sector
- ◆ **Developmental partners:** Specialist institutions, and mechanisms within the regulatory bodies and industry that provide funding for HCD, training, course development, R&D projects and services for the aviation sector
- ◆ **Project partners:** Joint investigative projects with government departments and national and international regulatory bodies that serve to support the above strategic and developmental programmes.

Within the South African context these existing relationships have led to the development of the following range of thematic areas within academia:

- ◆ Aerospace manufacturing process and materials
- ◆ Maintenance, repair and overhaul technologies
- ◆ Air traffic management
- ◆ Aeronautical design
- ◆ Aeronautical dynamics and control
- ◆ Firm level competitiveness and supply chain optimization
- ◆ Space engineering and propulsion
- ◆ Aerospace electronics

A thematic area therefore serves as a single point of entry for government

and industry to gain access to academic talent and research content in any relevant academic institutions. It is incumbent upon a mechanism such as the NAC, to ensure that all universities get adequate opportunities to play a role in their specific area of specialization.


### A WAY FORWARD

The model as described above has worked extremely well for the South African education system and the domestic aviation sector that it serves.

It has supported significant numbers of university students, within a wide range of universities, jointly sponsored multi-year research and development projects that have resulted in tangible increases in the sectors competitiveness both regionally and internationally, it has generated significant intellectual property (IP), and it prompted a drive to promote the model beyond the borders of South Africa.

The way forward is driven by the opening comments regarding the vastness, size and complexity of the African continent.

The need for remote education processes, online course content, distributed academic support models, continuing adult education, and bilateral and multilateral relationships between universities all the way from the Cape to Cairo, is all the more important in today's world. A world that is embracing artificial intelligence, virtual reality, automation and remote sensing, and that considers concepts such as Industry 4.0 as both a natural and normal building block of the world of tomorrow.

The notion of developing a training needs framework for all of Africa is more prescient and vital than ever before, but this cannot be achieved without the active participation of universities and educators across the continent. 

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**PHILIP HAUPT**

Director

National Aerospace Center (NAC)  
University of the Witwatersrand

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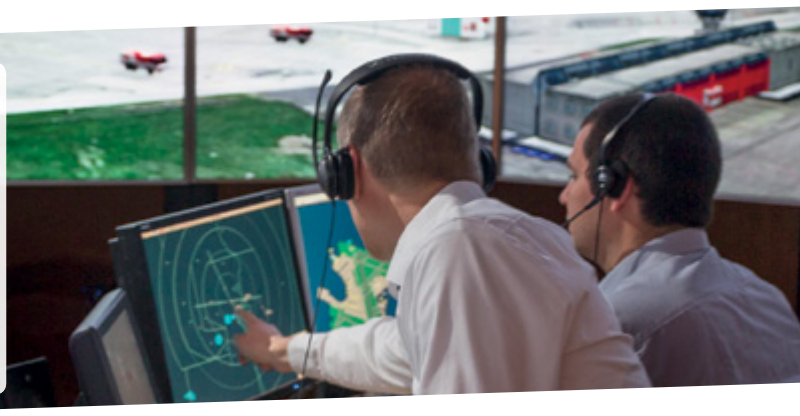
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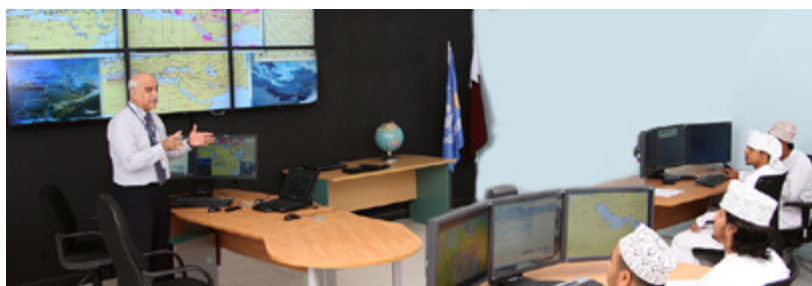
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## 22% AND COUNTING!

### ACCELERATING GENDER EQUALITY IN A HIGHLY SPECIALIZED SECTOR



**SABRINA DEPICKER**  
Head of HR Services  
EUROCONTROL

Organizations need to be in tune with changes in society in order to thrive and succeed. Today, we are aware of the social and business benefits that better gender balance and diversity bring to the workplace. With the workforce in the transport sector comprised of only 22% females, we know we still have a long way to go.

The need for change is recognized, it has prompted public administrations to send out a number of strong signals. In our field, these took the form of the launching by the European Commission of the *Women in Transport - EU Platform for change* initiative in November 2017. The initiative led a number of European organizations,

including EUROCONTROL, to sign the '[Declaration to ensure equal opportunities for women and men in the transport sector](#)'. The platform also enables stakeholders to make their individual endeavours more widely known and to share their good practices.

*"I do not believe in hiding behind the excuse of low representation of women in aviation, engineering and technological fields across Europe",* says Eamonn Brennan, EUROCONTROL Director General. *"Rather, I am convinced that by working with ICAO and partners from across the aviation field, learning from other sectors, we will be able to make real change."*

#### WITH THIS IN MIND, EUROCONTROL IS WORKING ON A NUMBER OF INITIATIVES TO ADDRESS THE VARIOUS DIMENSIONS THIS CHANGE REQUIRES:

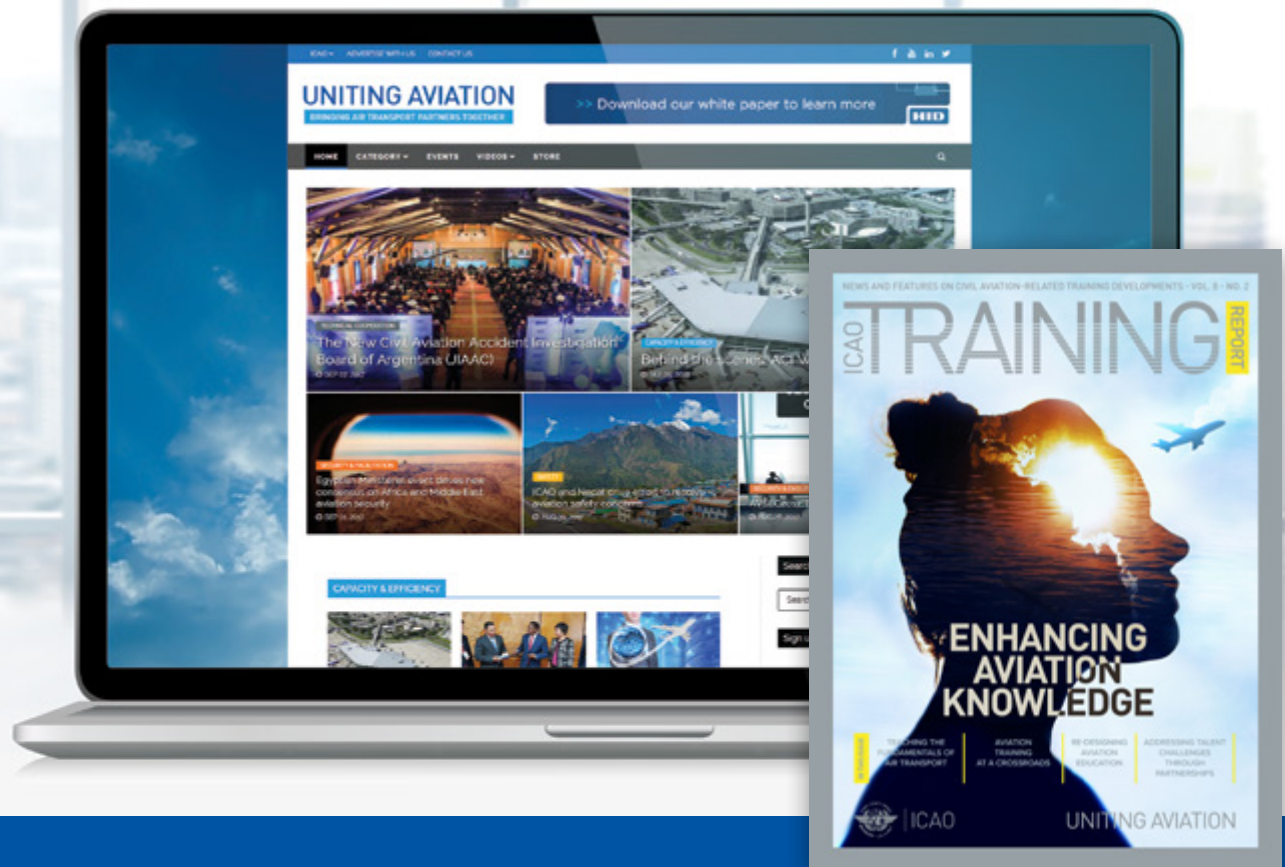
- ◆ **We are improving awareness about our jobs and making them as attractive as possible to female candidates.** To address any unconscious gender bias from the recruitment stage, we have increased the level of participation of female staff in our recruitment and selection boards with the aim of achieving gender parity on boards. Various initiatives are being taken in parallel to increase the number of female applicants.
- ◆ **We are adapting the structures of our internal committees** to ensure a balanced representation of men and women.
- ◆ **We are developing training and awareness** to help managers and staff become sensitive to diversity in general; to be aware of the role that unconscious bias plays; and to appreciate the benefits that an inclusive workplace can bring to an organization.
- ◆ **We are benchmarking** to share experience with comparable organizations. Discovering what others are doing, learning from best practices and seeing how we can collaborate is important.
- ◆ We are in contact with various organizations on this matter and are willing to offer our support.
- ◆ **We are implementing cultural change** to organize regular internal communication on gender diversity matters. Panel discussions with external guest speakers, appointing internal local ambassadors for gender and diversity, and gender mainstreaming are among the actions we are taking on this important "journey of change".
- ◆ **We are delighted to be working with a staff-led initiative, euroDIVERSITY** to explore improvements together. This internal bottom-up initiative was launched by staff and is composed of women and men keen to take the Agency forward.
- ◆ **We are collecting data** to ensure that actions are evidence-based using the gender/diversity data, at our disposal and we will be reporting on progress.

While my EUROCONTROL HR team is taking the lead in addressing diversity, I also strongly believe that improving attitudes is not an exclusive HR task. This is why we are delighted to draw on the inputs of the euroDIVERSITY initiative, as well as our enthusiastic Gender Focal Points around the Agency. A deeper shift in practice

and culture is needed. I am convinced that the approach we have put in place will help us play our part in addressing the lack of diversity in the air transport sector, while at the same time building an engaged and strong workforce.

**If you are interested in working with us on these matters and sharing ideas,  
do not hesitate to contact our Diversity Project Team at [diversity@eurocontrol.int](mailto:diversity@eurocontrol.int).**

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