ENAC alumni

N°26 - OCTOBER 2019

AERONAUTIC, AI, BIG DATA : THE CHALLENGES OF INNOVATION

Photo credit : Rawpixel/Freepik

SUMMARY

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EDITO

Dear ENAC Alumni,

When we look into the commercial aviation industry, which emerged shortly after the Second World War, we can see how much more modern the industry has become since its advent.

Of course, this modernisation concerns the central item in commercial aviation - the aircraft. Over 70 years, technological progress has enabled aircraft flight to become faster and safer, whilst carrying more passengers, consuming less fuel and generating less and less noise pollution.

Similarly, satellite technologies are gradually replacing conventional technologies in the areas of aircraft navigation and monitoring. Likewise for communications, data link or satellite technologies are gradually replacing radio communication. In general, the aircraft is ever more connected to its outside environment, notably with airline operations.

However, beyond innovations relating to the aircraft, the whole commercial aviation industry has undergone innovations over 70 years. This is notably the case for air traffic control where the use of Internet technologies and satellites is enabling more interoperability and effectiveness for air traffic control systems. Innovation is also one of the pillars of airport modernisation. In collaboration with airlines, airports are massively investing in the "smartisation" of their operations, to enable a seamless passenger flow within them. There are also increasing investments in RFID technologies, big data and artificial intelligence, for better management of the flow of luggage, aircraft and vehicles in airports.

These major innovation areas are presented to you in this magazine dedicated to innovation in commercial aviation. Our industry will definitely need them to face the future challenges of increasing passenger numbers and sustainable development.

I hope you enjoy reading the magazine!

Marc

ASSO NEWS

[DIARY]

8th of October - Toulouse
Evening "Les Elles de l'ENAC"

10th of October - Toulouse
ENAC Alumni new comers party

16th of October - Paris
Nationale Assembly Meeting

19th of October - Toulouse
10 years of IENAC09

15th of November - Toulouse
Gala ENAC

21st of November - Toulouse
Company visit : Airbus Beluga

30th of November - Toulouse
ENAC's open day

7th & 8th of December - Saly (Sénégal)
Saly Air Show

Beginning of December - Toulouse
Company Visit : AKKA

6th of February - Paris
Les Etats de l'Air 2020

Alumni from the Democratic Republic of the Congo are working with the local civil aviation authority for better qualification of aviation staff : the branch is developing, follow their actions !

NEW MEMBRES FOR ENAC ALUMNI

Members of Air Transport University (UTA) training are now part of ENAC alumni. We welcome them!

ENAC ALUMNI'S BOARD OF DIRECTORS MEETS

On July 3rd, the Board of Directors met. The Toulouse participants wanted to make the most of this occasion with a friendly meal before the summer.

OUR ALUMNI AT THE NATIONAL ASSEMBLY

ENAC Alumni organised a debate on July 10 in the National Assembly on environmental issues.

We would like to extend our warm thanks to Jean-Baptiste Djebbari, TSEEAC05 Alumni and Secretary of State for Transports, who enabled us to organise the debate between representatives of the nation and air transport experts.

A delegation of important figures from the air transport sector presented the challenges facing our industry to the MPs. The debate was on the environmental acceptability of the air transport industry and the associated action taken by this industry.

The industry representatives were as follows: Alain Battisti, Chair of FNAM and CEO of Chalair, Florian Guillermet, Executive Director of SESAR, Marc Hamy, Senior Vice-President of Airbus, Marc Houalla, Chair of ENAC Alumni, Joint General Manager of the ADP Group and CEO of Paris-Charles de Gaulle airport and Anne Rigail, CEO of Air France.
Some Alumni members watched this debate and took part in discussions during a friendly cocktail evening.

SPACE THINK TANK

3... 2... 1... TAKE OFF !

Are you a former ENAC student working in the space sector ? ENAC Alumni is launching our space circle ! From satellite communications to manned flights, ENAC has a lot of talent in these areas. For the first time within ENAC Alumni, we are offering to open a business circle dedicated to the space sector. The aim of this business circle, run by Alumni members, will be to organise after-work events and other meetings between Alumni members working in the space sector to discuss our professions and passions. The organised events will appear directly on the ENAC Alumni website and be shared on the social networks.
We hope that many of you will attend this first space circle event, which will take place very soon !
This circle will also enable us to present careers in the space sector to ENAC students, some of whom are unaware of opportunities in this area that are actually compatible with the ENAC Engineer curriculum.

NOMINATIONS

Jean-Michel VERNHES - IENAC71 - L
Becomes President of the oversight council of Strasbourg Airport.

Antoine ONFRAY - IENAC04
Becomes Chief Operating Officer of group Paref.

Mathieu MUNOS - IENAC01
Becomes General Manager of Air Caraïbes.

THEY LEFT US

Yves RENGADE - English teacher at ENAC

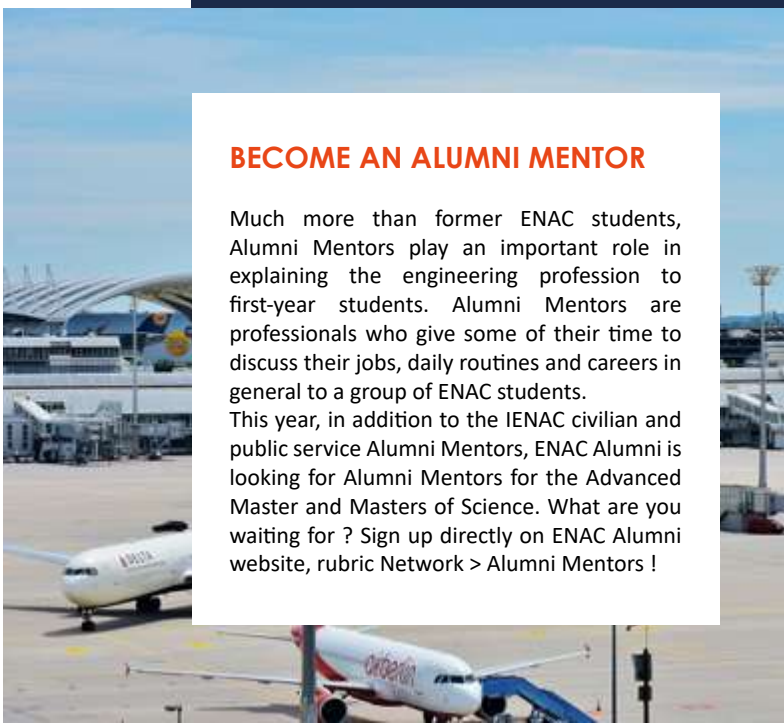
Yves Rengade was a member of ENAC teaching staff and many of you were taught English by him. He was an associate professor of English and the author of several books in English on aviation that are still found in bookshops today.

Yoan GIRY - MCTA17A

A fan of aviation, Yoan joined ENAC in September 2017 as a student air traffic controller. He was well liked by his classmates and teachers. Having also being selected by the Air France Cadets a few months after coming to our school, Yoan left ENAC in July 2018 to achieve his professional dream of becoming an airline pilot.

Jean-Luc VINOT - Teacher-Researcher

A teacher and researcher in the ENAC Interactive IT team, Jean-Luc was hard-working, enthusiastic and very inquisitive. He didn't wait to complete his PhD before getting his teeth into air control systems (ODS character fonts, MAGE screens), producing disruptive innovations (Digistrips) or leading globally-renowned research projects in the area of critical HMIs (Airbus B612 character fonts used by Google and the tangible cockpit project). He had a worldwide influence in aviation and more, and many current products and projects benefited from his great contribution.



BECOME AN ALUMNI MENTOR

Much more than former ENAC students, Alumni Mentors play an important role in explaining the engineering profession to first-year students. Alumni Mentors are professionals who give some of their time to discuss their jobs, daily routines and careers in general to a group of ENAC students.
This year, in addition to the IENAC civilian and public service Alumni Mentors, ENAC Alumni is looking for Alumni Mentors for the Advanced Master and Masters of Science. What are you waiting for ? Sign up directly on ENAC Alumni website, rubric Network > Alumni Mentors !

NEW PARTNERSHIP FOR ENAC ALUMNI

SIGNATURE OF THE PARTNERSHIP CONVENTION WITH AKKA TECHNOLOGIES DURING THE INTERNATIONAL PARIS AIR SHOW

RENEWAL OF PARTNERSHIP WITH FRACS (FRance Aviation Civile Services)

On 17th of July, Farid Zizi (IAC85), Director of FRACS (ex-DSNA Saervices) and Michaël Benhamed (IENAC94), Vice-Chair of ENAC Alumni once again signed a partnership agreement between FRACS and the organisation. We are therefore continuing on the work we began at the start of this collaboration : developing a pool of alumni experts on an international level, developing alumni missions for all FRACS project training and lastly, promoting ENAC Alumni action to FRACS stakeholders.

AIRCRAFT

FLIGHT OPERATIONS SUPPORT SERVICES

AKKA optimizes your operational process, manages your documentation, follows your requirements and supports you on any need with expertise and flexibility.

Accurate partner to work with your different stakeholders (regulations, authorities, pilots...)

Flight Operations Support Services are focused on flight & ground activities. AKKA offers airline-experienced teams adapted to each area of activities in order to best support our customers.

OUR ADDED VALUE

Experienced and dedicated Management team

International renown and solid Flight Ops Services company

Global support from audits to implementation and training

Dedicated focus point for operators

Adaptation or advise on operator tools

24/7 services for OCC

CERTIFICATION & REGULATION

SERVICES

- IOSA Support (Implemented & Documented)
- Civil Aviation and related approval request Support (EFB, CATII/III, ETOPS...)
- Aircraft Integration
- Regulation Monitoring (AIR-OPS, AIR-CREW, SERA...)
- Compliance revisions (AIRCREW, AIROPS, ...)
- Support for TCO Agreement

OPERATIONAL MANAGEMENT

SERVICES

- Flight Operations Engineering in situ to support the operator
- Remote Control Center & Flight Operations Department
- Flight Plan Preparation Center, Dispatch
- Routes Studies
- Aircraft Configuration Analysis

DOCUMENTATION MANAGEMENT

SERVICES

- Documentation Conversion (.xml)
- Revision Analysis
- Ops Documentation Revision (Manufacturer & Operator)
- Creation of supplementary manuals (MMEL, AFM ...)

FLIGHT EFFICIENCY

SERVICES

- Flight Data Analysis & Safety Recommandations
- Performing on-site operator support & courses
- Fuel Efficiency
- Ground Handling Support

OPERATIONS CONTROL CENTER

SERVICES

- OFP computerized ATC and DLA filing
- NOTAMs watch
- ATC and Airport slot management
- Live flight watch
- Live flight tracking for flight efficiency
- Traffic right's
- Operational audit

Automotive | **Aerospace** | Railway | Energy | Life Sciences | Telecoms | Space | Services and Informations Systems | Defence | Oil and Gas | Consulting

BACK ON THE INTERNATIONAL PARIS AIR SHOW

4 companies pitched in front of Tsinghua promotion

60 alumni for the traditionnal Bourget drink

1 trusted partner to finance the event : OSAC

More than **100** alumni passed on the stand

15 godmothers mobilized for the "Les Elles de l'ENAC- ELLES BOUGENT"day

1 meeting with the Minister of Transports

1 partnership signature with AKKA Technologies

Aristée Thevenon, IENAC17

Videographer, travel lover, he tells us about his experience in KIWIS' country

Photo Credit : Aristée THEVENON

Hello, my name is Aristée Thevenon. I am a third-year engineering student with a major in AVI, on a joint HMI Master's degree course. I am also a videographer and photographer for restaurants and organisations in the Toulouse region.

You left to complete a work placement in New-Zealand. How did you end up there ?

To validate the ENAC engineering course, you have to have at least 14 weeks of experience abroad. I wanted to take this travel opportunity to discover a country as far as possible from France - mission accomplished - I found myself 19,000 km from home, on the other side of the world. I had already travelled to a few countries as a tourist. It was therefore important for me to discover this new culture via the world of work through a placement.

How did you find your work placement in NZ ? Did you have any difficulties getting there ?

I did my placement in the Augmented Human Lab at the University of Auckland: a research laboratory with the main goal of making technology as human as possible. This placement was recommended to me by the members of the ENAC HMI laboratory. It was an opportunity for me to take my first steps into the research environment.

Going abroad, especially outside the European Union, requires good organisation. The periods for obtaining the various documents required go from a few days to several months. For example, a New Zealand work visa can take up to four months, and then you need to wait another two to three months for a passport. Luckily, I started my placement research quite early and I was able to launch the administrative process in January.

Can you tell us about your first week in NZ ? Did you go with friends ? Who were the first people you met ?

The first week was quite testing : after 30 hours travelling (including 23 hours on a plane), I had a week to learn about my placement and accommodation. In New Zealand, it is best to look for a flat once there to make sure you are not being conned. And there are a fair few con artists! Lots of advertisers want a transfer of several hundred dollars via Western Union to reserve the flat. These vendors even send you photos of their ID - all fakes! The best solution was therefore to stay in a hotel or Airbnb for the first few days and schedule as many viewings as possible there to find the best flat share.

The day after my arrival, I went to the location of my work placement. I met all the colleagues with whom I would explore the country at the weekends. The first days enabled me to talk to them all and identify all the lab's research projects so I could join one of them. For half of my stay, my girlfriend came to discover the country with me and work as a volunteer for the Red Cross.

> New-Zealanders – called Kiwis here – have a rich, protected culture.

What did your lab placement entail ? Can you explain your duties and goal ? Is ENAC known in NZ ?

Over the course of the three months, I worked on two projects. The first was to develop software for a watch designed for deaf people. It has microphones and vibrators to help the hard-of-hearing perceive their environment in a new way (alert if their phone rings, or a car is approaching, transcription of surrounding dialogues, etc.). I was in charge of developing the software for the user interface: it was an opportunity to apply dozens of hours of onboard programming lessons from the AVI course.

The second project was the provision of a server and the development of an online application to display graphic data to customers. Using a camera filming the eye's reflection, users must be able to ascertain all data relative to their stress and activity levels via this application.

We often say that travelling to far-flung places, discovering a new culture and adapting to new customs transforms people. How would you say this experience changed you?

New Zealanders, called Kiwis here, have a rich, protected culture: the Maori culture. The indigenous populations now make up a significant part of the country and their heritage and customs are passed on down the generations. This culture has an international influence, notably thanks to the reputation of the All Blacks - all of their players are Maoris! For fans of Disney films, Moana (Vaiana in France) was greatly inspired by the history of these Polynesian explorers. Throughout my trip, this culture gave me real-life lessons on the importance of culture within a

community. Maoris are among the few peoples able to fully integrate modern society and send a real message of hope to all communities currently fighting for their rights.
As well as travelling, I have been working in a lab that has a real mixture of cultures: many students from all over the world come to work here for a few months or a few years. This was an opportunity to learn a lot about cultural differences, notably in the workplace. Meals with the group also gave the opportunity to discuss our different ideas on topics such as marriage or politics.

Aristée, we know that as well as being a student, you are a photography fan. Were the NZ landscapes a source of inspiration to you ?

The advantage of diving into so many unusual landscapes and a culture brimming with history was that it quickly unleashed my creativity. You try and capture as many moments as possible, then sometimes you just put the camera away and watch a sunset or a moment that will only exist in your memory.
Over the course of two months travelling, my hard drive carried the weight of 100GB of videos of all kinds: mountain biking, swimming in hot springs, Maori dances and songs, etc. Selecting the best moments to describe this trip is going to be hard !

You are the ENAC videographer for the student societies, ENAC and ENAC Alumni. Can you tell us about this passion ? How did it come about ?

When I finished sixth-form college, I left my village in the Auvergne for the city of Lyon with high ambitions. I had been a musician and dancer for around ten years and wanted to combine both of my passions in a project that brought together various Lyon-based artists. I was able to persuade six dancers and six artists to work on a unique concept combining art, music and dance. DANCE X ARTS. As I didn't have the resources to hire a videographer, I had to learn to film with my GoPro for this project. After nine months of work, I published my project, which was quickly republished by the Lyon Facebook page (that already had a million followers at the time), which enabled me to become a digital ambassador for the city.
This project aroused my interest in video-making and two years and several projects later, I decided to take my work to a professional level. I therefore very quickly gained projects : photos and videos for gourmet restaurants, a video montage for the double world boxing champion, video reporting for two Virgin Radio concerts and, of course, various projects for ENAC and ENAC Alumni.

Do you want to move abroad in the future ?

I went to New Zealand knowing that I intend to work in France. I really love my country and would like to stay close to my family. For me, the rest of the world is for travelling and discovery. Despite this, I wouldn't say no to working abroad for a few months in my future employment.

What plans do you have from September 2019 ?

I return from New Zealand on 31 August, and I will be starting the HMI Master's degree offered by ENAC alongside my ENAC engineering qualification from 2 September. As the same time, I intend to keep working as a videographer and be part of two ENAC student societies.

To conclude, do you have any advice for students who have the travel bug and would like to combine study and travel ?

KIA ORA : This word from the Maori culture is often heard in New Zealand. It can be used in many contexts, especially to offer a welcome. New Zealand is one of many countries where you really feel welcomed by the people, who are happy to show the country and its customs. Study and work are some of the best ways to travel and really become immersed in a culture: so for anyone who loves to travel, I just have one thing to say to you: go for it and seize all opportunities!

To take contact with Aristée Thevenon // http://atprod.fr// or by mail at // aristee.thevenon@alumni.enac.fr //

Photo Credit : Aristée THEVENON

Aeronautic, AI, Big Data : the challenges of Innovation

INTRODUCTION

by Rodolphe Rochette, AE01

Innovation – the key to future success !

Innovation is at the heart of any company's strategy. In a constantly-changing environment, it is essential to understand this, so as to adapt to issues and plan ahead. Entrepreneurs, employees, intrapreneurs and students alike - innovation affects us all! As individuals, we are both beneficiaries and drivers of technical progress.

What changes can we expect ? What will be the consequences and benefits of the digital transformation? Let's take the time to analyse what may be best for us in this article.

Planning for change

Society is going through one of the most interesting times in its transformation. Digitisation is fast approaching, the transformation is taking place quickly. The structure of our organisations is being challenged. New technologies are making conventional companies have to question their working methods and business models. Products and services are no longer based on creating, selling and moving on to something new, but require continuous improvement throughout their life cycles. Innovation must be as disruptive as it is incremental. Being innovative requires planning for change, whilst reinforcing, to remain on top of the situation.

Although innovation helps us to think outside the box and find ideas for improvement, the key to success is to create and harness value.

Decisions guided by data - enhanced commercial value

Data analysis, due to its analytical and holistic approach, enables faster and more extensive progress. Skywise by Airbus and Analytx by Boeing are connecting the companies to the reality of the market by creating new business opportunities.

Agile methods are resulting in shorter development loops, focused on business via regular customer feedback. Innovation is synonymous with enhanced business value, transparency and team autonomy.

Artificial Intelligence, although far from mature, is already a vital strategic technology.

Changing skills

Innovation is primarily transforming three skills categories:

- "Core digital expertise" and its clearly-established fundamental digital capacities. The creation of new professions and their new working methods: agile, developers and specialists in AI, data and cybersecurity,
- "Traditional professions". Industry (4.0), research and development, and marketing and support roles such as human resources and finance are undergoing a real change,
- "Skills management". In the digital age, managerial added value is changing. We are witnessing the disappearance of know-how transfers and a reduction in management levels. Artificial intelligence and digital technology are helping employees in real time. People no longer expect their managers to show them how to do something, but to guide them via coaching.

Trailblazing mindset and human aspect

Making ideas a reality and boosting projects involves transforming your skills to take an active part in a digital future. What works for a company will not work in the same way for each of you. Everything depends on the context and the ability to produce added value.

"Preparing for the future is simply creating the present". (Antoine de Saint-Exupéry). Now, 2/3 of employees feel responsible for their developments. "Jobs are changing, and so must I".

Let's build the future by receiving then in turn giving to others in reverse mentoring mode. We should promote the human aspect of innovation and digital transformation, by sharing best practices between communities.

Intergenerational hackathons, MOOCs, business incubators, and so on, the main thing is to find the best path to take and adopt the trailblazing mindset so dear to our community.

Join the Digitale Innovation Think Tank of ENAC Alumni : https://www.alumni.enac.fr/en/groupe/cercle-innovation-digitale-1083

THE CONTROL TOWER OF THE FUTURE

When we talk of airports, the images that come to mind are obviously full of aircraft and control towers. These buildings, with their unusual architecture, are generally the icons of each airport. However, in the digital age, with increasingly fast network connections and high-definition imagery, this poster image is changing. Airport air traffic control is undergoing a digital transformation. Here is an overview on the new technologies already available in the airport air traffic management area.

BACKGROUND

Airport air traffic control helps guarantee a safe, even flow of air traffic at and around airports. This includes preventing collisions and jams when taxiing on the ground on the taxiways and on the takeoff and landing strips. For this, air traffic controllers must always have the most accurate possible mental image of the situation. To build this mental image, air traffic controllers use tools and HMIs (human-machine interfaces), but the basic principle for now is to "see" and understand the situation. The pioneers of aviation followed this logic by constructing taller and taller control towers to cover the increasingly-large fields of vision at airports. At the start of the 2000s, two major technological innovations started to shift the architectural paradigm of the control tower : the improvement and wide-spread availability of high-definition screens and the continuous improvement of speeds for data transfer networks such as the internet. So in 2005, the Swedish firm Saab restarted work commenced and abandoned by Japanese soldiers in the 80s: the digital and remote control tower.

FROM "PROOF OF CONCEPT" TO CONCEPT

The first years of this work were dedicated to developing a technical solution that would eventually enable the creation of a fully-digital air traffic control position. Cameras placed on a pole constantly sending a display of the air traffic situation at and around airports to control screens - at the end of the 2000s, this was the technical solution chosen as proof of concept that would become a major revolution in the air traffic management (ATM) industry. Obviously, this solution was to enable air navigation services to be provided from anywhere to any airport, provided there was a connection allowing the transfer of video data with high enough quality and resiliency. Then, and this is the main benefit of the digital signal, it was rapidly possible to enrich raw video data by adding relevant information for air traffic controllers.
After a dozen years of research and development, the first airport controlled remotely from a digital position was certified in 2015 in Sweden. In ten years, high-definition and fibre optic screen technologies enabled a mature, operational solution to be achieved. The digital tower era had just begun.

NOW

For nearly five years now, digital and remote tower projects have been spreading. Starting with the Swedish pioneers, now three airports are controlled from the Remote Tower Centre (RTC) in Sundsvall. A new RTC is being built in Arlanda (Stockholm airport). This RTC will, in the long term, be able to control up to 24 airports remotely. Lastly, in the north at the border between Sweden and Norway, a brand new airport is being built (Scandinavian mountain airport) to serve the winter sports stations. This airport is the first to be designed and built without a conventional control tower, but directly with a remote, virtual control tower. It is scheduled to open in late 2019.

OTHER PROJECTS ARE CROPPING UP EVERYWHERE!

The most advanced and impressive is the HungaroControl project at Budapest airport. This airport, with traffic comparable to Lyon St Exupéry, launched the virtual tower project in 2015. The virtual platform is now operational and used as a contingency plan if there is a major problem with the conventional control tower, and HungaroControl plans to switch the virtual tower to main operational mode within a year.
The Germans at DFS also have an ambitious RTC project in Leipzig. This control centre, now operational at the airport of Saarbrucken should eventually control Erfurt and Dresden airports.
In England, the main project is at London City airport. This airport should eventually be controlled from the Swanwick control centre.
This is just a short summary of various projects developing throughout the world.

EXPECTED BENEFITS AND LIMITATIONS TO BE SURPASSED

The Remote and Digital tower concept has got past the technological adventure stage. The technology is no longer the main issue of this concept as it has now been mastered. This invention is now reaching the




stage where it must provide operational, economic and social proof. In terms of operations, it is clear that there are many safety benefits thanks to enhanced video. This enables controllers to see and monitor aircraft even in poor weather conditions or at night. You can also connect support tools to detect and prevent potential collision situations at or around airports. However, these technological advances are not cheap. In particular, to guarantee a resiliency level at least comparable to a physical control tower, the doubling-up of data transmission channels (video flow, radio, etc.) using optical fibre is quite expensive. Similarly, system redundancy, guaranteeing continuous nominal operation for controllers, comes at a cost. However, these costs are necessary to guarantee a high enough level of safety and resiliency to be accepted by the monitoring authorities, under the auspices of the EASA. To counterbalance these costs, technology promoters are highlighting future savings in terms of human resources and air traffic controllers in particular. Studies conducted to improve service tower scheduling within the Sundsvall RTC show that eventually it will be possible to double the profitability of air traffic controller officers (ATCOs) at medium sized airports and triple the profitability of aerodrome flight information service officers (AFISOs) at small airports. It will therefore be possible to decide between reducing constant-service human costs or increasing and improving services at an equivalent cost. However, this will only be possible at an RTC using the multiple mode. In this mode, an ATCO or AFISO will have to manage two to three airports simultaneously. Studies are being conducted on this topic to remove various stumbling blocks such as officer mental load, fatigue in the short, mid and long term, effectively managing the radio frequency at several airports simultaneously, etc. These economic and operational challenges are also social challenges. The work on officers accepting this technology is already difficult due to the significant changes it will address. Therefore, ergonomic and human factors that are not year clear will also have to be covered. The challenge for digital and remote towers is therefore no longer only technological but involves managing the economic and human change.

IN THE FUTURE

As you can see in a recent economic report, estimations place the digital tower market at nearly 400 million dollars by 2025. This is mainly for the contingency operating mode, offering emergency solutions for major incidents at conventional towers.

Even if single modes (one officer for each airport) and multiple modes (one officer for several airports) still need to prove financial profitability for the former and operational viability for the latter, it is highly likely that the operational and technological stumbling blocks will be removed over the next few years.

For now, three major industrialists share the market and have an advance both in terms of experience and technology. These are the Swedish company Saab, the Austrian company Frequentis and the Canadian company Searidge. The market is mainly concentrated in Europe, but the other continents will clearly have higher growth in this segment.

For now, France is relatively inactive as regards this topic. No national industrialists seem to have started working on the technology and there are very few operational projects. However, as highlighted in the report on the airport network by the CGET in 2017, the density of this network makes the use of digital and remote towers very interesting. Regional aerodromes and airports are important tools for promoting the local economy. The digital and remote tower technology would help lower the costs of management and improve the quality of services at these platforms. ENAC is building an R&D platform on the concept. Although entering the area a little late, ENAC has decided to focus on issues based on ergonomics and human factors. With the quality of various national industrialists, the R&D at ENAC and the good airport network, France is clearly a great place for this technology. Now we just need the desire to achieve the ambition of becoming a leader in this booming market.

Printed version : find this article online with a complete presentation by Xavier Pretat.
Online version : to go further click on the link !

THE AUTHOR

Xavier Pretat is an air navigation control engineer with an Air Traffic Control and Management Master's degree working in the ENAC ATM department and co-organiser of the international Remote Tower seminar that took place at ENAC in October 2018.

START UP INCUBATED AT ENAC

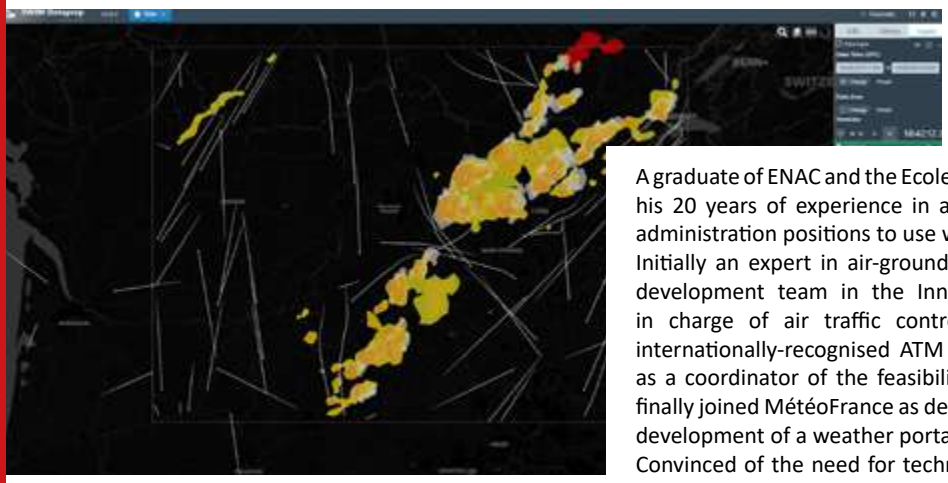
ANYWAVES TAKES CENTRE STAGE

A graduate of ENAC and Doctor of Electronics from ONERA, Nicolas Capet very quickly joined the CNES Antennas department. In charge of innovation, he has taken part in a lot of R&D work and is interested in the emerging Nanosatellite market. Initially developed for university purposes, these small satellites have earnt their place on space programmes for scientific and commercial missions. The market is becoming professional and CNES would like to structure a French industrial sector. Nicolas Capet created ANYWAVES in April 2017, in the context of a CNES spin-off and based on the promotion of CNES patents, today incubated at ENAC by ENACcélérateur since May 2018.

ANYWAVES designs and manufactures mini high-performance antennas for SmallSats. ANYWAVES is the first pure player in European Antennas for the Newspace.

With an expert team and patented revolutionary technology, ANYWAVES quickly developed a catalogue of innovative antenna products. Structuring the area by 3D printing high-resistance materials, ANYWAVES is optimising the performance and cost of its mini off-the-shelf antennas. Additive manufacturing is used to reproduce periodic layers of small cells (identical or variable), the shape of which provides a big dielectric permittivity to the material for the propagation of electromagnetic waves. Its flexible process also enables the development of custom antennas for constellations of small satellites.

ANYWAVES would like to become the leader in mini antennas for critical systems. ANYWAVES won the i-Lab 2019 competition this year, the biggest deep-tech innovation competition in France and a real growth driver for innovative companies.



METSAFE SERVING AERONAUTIC

A graduate of ENAC and the Ecole Nationale des Ponts et Chaussées, Kamel Rebaï, is putting his 20 years of experience in aviation and meteorology working in high-responsibility administration positions to use with MetSafe.
Initially an expert in air-ground data links and a project manager, he led the Datalink development team in the Innovation Technique Department of the DSNA [agency in charge of air traffic control, communication and information for France]. His internationally-recognised ATM expertise resulted in him joining the 4-FLIGHT project as a coordinator of the feasibility survey and industrial negotiation. Then, in 2011, he finally joined MétéoFrance as development manager, where he coordinated the European development of a weather portal for air traffic control for SESAR.
Convinced of the need for technological innovation opportunities and the unharnessed potential of meteorology in aviation, Kamel Rebaï created MetSafe in October 2017. The company joined the ENACcélérateur in May 2018.
MetSafe offers a B2B platform of meteorological web services for the aviation industry. Thanks to a partnership with Météo-France and Météorage, this platform, operated in the cloud, is supplied in real time with products from digital forecasting and observation (convection, icing, turbulence and lightning detection) on a global scale. This service platform is operated with a high level of availability and performance.
MetSafe delivers tailored services to its customers via an API (Application Programming Interface) that meets the latest international standards. Customers can therefore integrate meteorology into their own solutions, quickly and safely.
Some of the first users of MetSafe include the DSNA, Frequentis and SafetyLine.

www.metsafeatm.com
contact@metsafeatm.com
@MetSafe_ATM
@MetSafe_Tech

FOCUS ON THE ENACCÉLÉRATEUR

Philippe Joachim, Deputy Director General of ENAC, answers five questions on the ENACcélérateur for ENAC Alumni.

Why is there a business incubator at ENAC ?

There are two main reasons. 1. The classification of prestigious French engineering schools often takes account of students setting up companies at the end of their courses or the existence of a business incubator in the establishment. 2. This kind of structure actively contributes to our entrepreneurship acculturation process.
ENAC wanted to create our own business incubator, linked to our ecosystem. We want to start successful collaborations with other business incubators in Toulouse and the surrounding region and join the movement to support the creation of start-ups. This project is being developed and coordinated in the context of a partnership with ENAC Alumni.

Who is the ENACcélérateur for ?

It is primarily for the ENAC community: students working on a project or third year IENAC students as part of their course, school staff, notably researchers and former ENAC students - our Alumni.
In the incubator, several ENAC alumni are currently developing their projects. We are also open to innovative projects from outside ENAC, if they grab our attention.

What services are offered by the incubator ?

It is already a place dedicated to support, with offices, meeting rooms and networking spaces that will be developed over the next few years. As well as the physical reception and offices we provide, we want to increase our support for start-ups during the various stages of their incubation.
It is possible to work with other ENAC departments, and research in particular comes to mind. Every time a project owner is interested in collaborating with our researchers, the project will be subject to an agreement.
Obviously, project owners benefit from the school's national and international renown. To find partnerships and foster development, start-ups can directly promote the value of incubation in the leading European air transport school, the DGAC [French Directorate General for Civil Aviation] school, which is a great asset !

How does incubation take place ?

We offer project support based on the level of maturity. From this point of view, there are three main steps.
1. Pre-incubation, when the project owner(s) has(have) an idea that is not yet set in stone. 2. Incubation, for people further ahead in their projects at the time of setting up the company. 3. Acceleration, which is the final step: the company has already been set up and is looking to develop, grow and take off.
We accommodate start-ups in each of these phases, based on the progress of the project presented, for a one-year period (can potentially be extended).

How can I apply ?

Today, we consider all applications. We will soon launch a new call for projects to join the incubator, so keep an eye out! To apply, you will be able to go to the ENACcélérateur site, where you will find a registration form with some fields to complete based on the progress of your project. Pending the launch of this new site, you can send your proposals to me at the following email address : philippe.joachim@enac.fr.

BIG BLANK

THE AIR FRANCE-KLM STARTUP STUDIO... CREATING TRAVEL OF THE FUTURE

Do you know Hubert Riondel? We interviewed him a few weeks ago just for you!

With his pilot qualification in the bag in 2004, Hubert joined Air France as a co-pilot for medium-haul flights then a pilot for long-haul flights. Inquisitive and passionate about innovation, Hubert decided to return to his studies and embark on an MBA at ESCP to supplement his training and focus on innovation, new technology and strategy management. As Hubert was drawn to innovative projects, Air France offered him the opportunity to invest in major company transformation plans, notably taking part in the creation of an internal social network. A few years later, Air France-KLM Group invited him to reflect on innovation within the company. After months of strategic work, Hubert suggested creating a structure to accommodate startups in the travel industry and Big Blank was created!

Big Blank is the startup studio of Air France-KLM in charge of finding new ideas to reinvent mobility and travel.

The startup studio is not a business incubator or an accelerator, nor is it a third place or an investment fund - it is all of these structures combined! This is an innovative cocktail for a near-unique concept! Startup studios, which are trail-blazers in France, exist in small numbers abroad and in France. Their concept? To provide a team of experienced entrepreneurs able to provide help and support for a project, to have financing capability, to own some of the capital and to provide resources.

Thanks to Big Blank, Air France-KLM, a multi-faceted group, is offering to support their customers even more. Today, thanks to the development of technology and data, the concept of travel has evolved. Travellers start the journey at home, sat looking at their smartphone and continue to the final destination. Air-France-KLM is looking to create value for its customers, to adapt to changing travel habits and to really be in line with travel of the future. The GAFA companies and startups are really influencing the sector through technological innovations that they are making widespread. Big Blank is enabling startups to benefit from the power of a major group to help launch their products or services. Big Blank's desire: to be there as soon as the idea emerges.

There are several phases that enable Air France-KLM to remain attentive to the needs of its customers:

- Continuing to improve the products and services of the Group's airlines,
- Creating new products, new services and new offers to address issues that did not exist in the past. We decided not to give a name related to Air France-KLM or more generally aviation to the startup studio. Big Blank is the Group's brand new creation to create the travel of the future.

"Big Blank has been around for a year now. We are a team of ten employees and are launching eight projects," explains Hubert. "Everyone is from the world of business and all come from outside the Group. Thanks to their experience, they can help and support Big Blank projects."

Where are you based ?

At the heart of the entrepreneurship and startup ecosystem - in a coworking space in Paris! Paris is the leading tourist destination in the world, so for us it is a fascinating playing field.

Which innovations are you focusing on ?

At Big Blank, everything is possible, whether this means an entrepreneur coming with a new idea, a concept that exists on the other side of the world or an innovation developed by our dedicated team - every idea

enters into our process.
The issues encountered by travellers constitute our selection criteria, as they are a sign that there is a significant market to be addressed. The first selection will take place on a themed level. We want to focus on the travel market, which incidentally is very broad. Then, we will look at the potential of this market: are there technological barriers? What is the time-line for launching the project? Big Blank is a recent structure, we need projects that can quickly be launched onto the market. Lastly, the final filter will be the quality of the team. For us, it is essential to have a high implementation capacity.

What topics attract Big Blank ?

Today, the evolutions of new technological building blocks such as digital technology and artificial intelligence are opening up a wide range of opportunities to help reinvent the travel of the future. For travellers, expectations are constantly changing. For this reason we, as travel professionals, have to transform this experience, develop our offer and welcome new stakeholders to meet traveller expectations.
One of the main themes is sustainable development. As a result, we are working alongside airlines to find new solutions to reduce waste. We are also thinking about limiting over-tourism so as not to worsen the travel experience of our customers. It must be increasingly human, accessible and authentic. This is what we are looking for in the projects we are developing.

What are the different process stages and how long does it take to develop a concept ?

The creation process is based around four steps. The first is an issue definition phase that involves really understanding it to find a suitable solution. The next step is about coming up with a feasible, realistic solution. At the end of this step, if we decide that the project is viable, the entrepreneur will create their startup and will have full ownership and responsibility for their company. The third step involves prototyping the solution to make the idea a reality. Validating this step leads us to the investment phase. The challenge for Big Blank is to own some of the company capital as a minority shareholder, as the objective is not to take control of the startup, but to be in a good position to identify the future growth drivers these new stakeholders might be. With the capacity to support entrepreneurs throughout their projects and invest and produce thanks to our developers, graphic designers and analysts, Big Blank acts as a real member of the team!

Can you talk about your projects ?

The goal we set ourselves was to release our first project in a year. This project is currently in the final investment stage, and we will be announcing it very soon. The concept of this startup is to offer an equipment rental service for families travelling with young children, who find it difficult to transport tons of items for their children. We want to offer them a simplified, logistically-easy solution, so they can travel with peace of mind.
For this project, the technology is not innovative, but the business model and service are!
Our aim is to launch two new startups by the end of 2019.

INDUSTRY AND SOCIETY : WHAT ISSUES FOR DIGITISATION AND COOPERATION BETWEEN HUMANS AND MACHINES

BY NICOLAS DAVEAU, IENAC09

Digitisation is clearly one of the most commonly-used buzz words in companies. The aviation industry is no exception. Many companies in the sector are speaking about wide-scale digital transformation plans, and few companies in the sector are not including the digital aspect into their strategic approaches. In this article, I will try and present some of the beliefs I gained on digital transformation applied to aviation, as well as the stumbling blocks and opportunities I have identified in my short experience in this area.

Having defined the terms, I will quickly describe the challenges that I feel are key to the industry. I will describe how they apply directly to aviation and then try to address the more society-based challenge of digital transformation in the conclusion, setting out how it will play an important role in solving the major challenges of the century (climate change) and the relation to work.

Firstly, I would like to specify what I mean by digitisation. For me, digitisation is the meeting between issues, not necessarily new ones, and the technological acceleration taking place since the early 2000s. This technological acceleration is characterised by three essential factors. The first is the enhanced performance of digital technologies (speed of wireless communications, CPU, GPU, etc.). The second, which is linked to the first, is the drastic decrease in the costs of implementing these technologies. Lastly, there is the advent of digital ubiquity, headed by the widespread use of smartphones and new social habits (especially via social media), which accelerates connections between economic agents. Two particularly impressive examples for industry are :

- Ease of access to effective storage and computing facilities (via the major cloud stakeholders) which, combined with access to top open source products or the reduction in the cost of sensors and smart objects, enables the considerable sophistication of many business processes
- The exponential reduction in the cost of procuring and implementing robotics (drones), sensors (Lidar type) or 3D printers, which has considerably improved access to these technologies, which were previously reserved for major industrialists and corporations.

Not everyone will agree with this definition, which is inevitably incomplete and does not cover everything digitisation can mean. I do, however, think that this definition at least helps convey a major part of what is happening: an interaction between the technological acceleration of the past 15 to 20 years and the social phenomena resulting, or not, from this acceleration. As we have covered the important issue of defining the terms, we can now describe the challenges for the aviation industry.

CHALLENGES FOR THE AVIATION INDUSTRY

Firstly, I think we can identify two major challenges related to digital technology for the aviation industry :

- The generation of new revenue (potentially via a redistribution of the value chain within aviation or outside of it)
- Expanded operational excellence in the broadest sense (including in HR and finance support roles, etc.).

GENERATION OF NEW REVENUE AND DISRUPTION OF THE VALUE CHAIN

For the first objective, I think it is important to highlight the fact that the issues or needs the stakeholders are addressing are not fundamentally new. Uber did not invent the need for mobility, nor did Facebook or Instagram invent the need to belong to a community or feel accepted and valued by it. These companies essentially found new, original ways to respond to this, via better use of these technologies, which resulted in considerably redistributing value. This is particularly visible in the areas of digital marketing and advertising, which are the central pillars for companies such as Google and Facebook.

Can the same be said for aviation ? Even though it cannot be completely excluded, it seems unlikely in the short or medium term. Aviation is subject to long cycles, partly explained by the significant safety constraints and the technological complexity of the product, in terms of both manufacturing and operation. Although the technological changes mentioned above have already resulted in the changes we will look at later, they have not yet enabled (apart from a few exceptions) a radical modification of the appearance of the aviation industry. An example of a major change that may be possible could be the appearance of short-distance autonomous flights to replace the existing mobility offers, distributed over potentially new channels. In short, although these innovation topics are very hot, they are not yet a reality or a planned short-term change.

If, for just a moment, we put aside the potential major disruptions to the sector, digitisation has already resulted in the possibility to generate new revenue for the industry. Today, notably thanks to big data and analytics, the service branches (maintenance, air operations, traveller experience etc.) are freeing value and sometimes even enable a modification of the existing market structure. The data platforms that release data silos and share them between industry stakeholders, such as Skywise, are a good example of the way in which digitisation reduces the waste caused by friction in data exchanges and integration. To a lesser extent, we can also mention certain innovative service offerings from specialised start-ups enabling better performance (notably thanks to machine learning) in areas that already have a significant service offering (air traffic management on the ground or in flight, fuel saving, etc.).

As we have just seen, digitisation may be a vector for transformation, providing the capacity to provide new services or products. In the following section, I will focus on the tip of the iceberg, which I have named Digitisation & Operational Excellence. Although the term may seem vague, I use it to mean the whole business of using digital technology to improve the production methods for goods and services and company organisation.

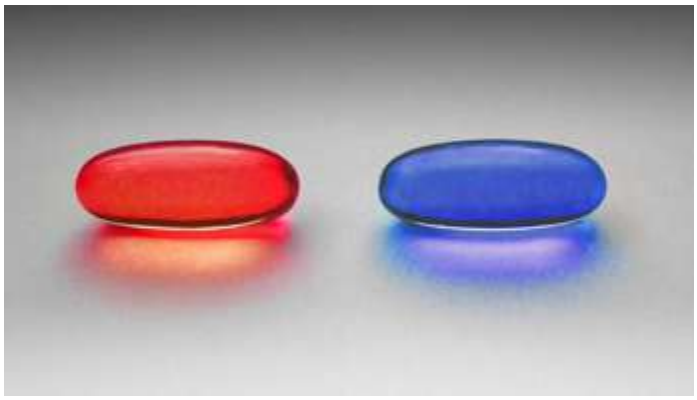
DIGITISATION & OPERATIONAL EXCELLENCE

This is doubtlessly currently where the biggest challenge lies for digital transformation. The challenge for stakeholders is to understand how they can go through their digital transformation and therefore gain effectiveness (in terms of time, cost and quality). In my understanding, this covers very varied spaces such as, for example, refining industrial facilities for a manufacturer (production, engineering or procurement), reviewing the passenger experience for an airport or an airline or even improving HR and employee training processes.

Putting the trade, and, even more so, human beings, at the centre of change seems to me to be the main element in sustainable, successful digital transformation. Various transformation measures fail due to the illusion that success lies in adding technological layers to current operations and that it is enough to hire brilliant data scientists and operational developers (devOps) to ensure success.
From this point of view, it is interesting to look at the ways certain companies in the sector have suffered disappointments and failed in their transformation approach.
One of them is limiting themselves to the digital transformation of the company's IT department, potentially creating a new function, but retaining a conventional internal customer/supplier relationship between the profession and IT. This model does not work as it often

does not allow a suitable reformulation of the issues that the profession is resolving with the onset of new technologies.
One of the most common examples is that of analysing data via machine learning and more generally by what is commonly referred to as AI (I say commonly as the term is subject to various misunderstandings). Too many projects are designed with what we could call a technological bias. This is often characterised by the objective of rolling out technology to replace human decision-making with purely algorithmic decision-making.

To take a relatively easy example, I remember a project that had the objective of automatically classifying customer requests to identify the most critical among them using Deep Learning. When delivering the first PoC (Proof of Concept), the model's performance was very good, around 90 to 95% in terms of recall and precision. The issue was that assessments showed that humans had the tendency to no longer correct the algorithm in the few percent of complex cases where it went wrong. As a result, a certain number of critical requests were not detected and the precision and accuracy metrics were doomed to fail. When they realised, the project managers decided to refocus, implementing a simpler recommendation engine than the previous classification model, which would alert the operator when a critical request was being missed. The interface then presented a series of similar past critical cases and enabled the operator to browse the technical data for these cases to better understand whether they were critical or not. Thus, a reduction of nearly 45% in the rate of critical requests undetected by the operators was observed, i.e., effectiveness that was twice as good as with the first PoC.



Through this real example, we can clearly see the difference between an initial approach involving simply mechanising a human decision and another one, involving using the capacity of the algorithms to go through vast amounts of data and analyse it to quickly and relevantly contextualise human decision-making.

In addition to the ethical issue this may raise in some cases - which we will come back to - the desire to simply replace human decisions with machine decisions often comes from a poor understanding of what machines are good at and the different things humans are good at.

Although machine learning algorithms may effectively solve very specific issues (image recognition, translation, etc.), they are still not currently capable of general reasoning and are often useless at finding relevant correlations in areas that have not been previously called into question by a human. For this reason, in the vast majority of cases, fine functional analysis is necessary to really understand the decision-making mechanism of an engineer or a technician and its impact to then design an effective interaction between humans and the algorithm, which will result in better decision-making and a stronger impact. In other terms, digitising a business process requires reformulation of the issue in which humans increase the effectiveness of their decision-making via an optimal interaction between themselves and the machine or their algorithm. This issue of cooperation between humans and machines naturally leads me to my last section and my conclusion on the more society-based challenge of digital transformation (and notably the use of data analysis technologies).

SOCIETY-BASED CHALLENGE

As I mentioned earlier, the purely technological approaches to digital transformation often fail as they do not make the most of the way humans and machines complement each other However, in my opinion, this performance argument is not the only one that works in the idea that humans must be at the centre of digital transformation. Work, and human activity in general, has a social and ethical dimension, which must encourage us to pay more attention when undertaking a digitisation or mechanisation effort for a human activity and the decisions it involves. Work cements societies as it is the reflection of dependencies of their functions, just like the various organs in the human body, which perform different tasks, depending on each other. In aviation, as elsewhere (recruitment, law, etc.), what I earlier referred to as "technological bias" can pose a risk of de-humanising work and losing the meaning, which could result in humans weakening their connections and desire to create a community within a company. If, however, we use the complementary nature of humans and machines to solve the most complex issues and face the major challenges of our time (primarily climate change and protecting the biosphere), we could certainly contribute to building a more sustainable and peaceful society. The industry we work in must play its role regarding this challenge, and notably the challenge of the increasing environmental impact of air transport.

AIR SAFETY: TOWARDS MORE EFFICIENT OVERSIGHT THANKS TO RBO

In order to maintain and improve safety performance in aviation in the context of the steep increase in flights and in aircraft complexity over the coming decades, ICAO has adopted a global safety management system, introducing RBO (Risk Based Oversight) in 2014. Going beyond regulatory compliance and permitting oversight to be adapted to the risk profiles of accredited organizations, this approach modifies the methods and tools of the Authorities. Anticipating this major change, OSAC has been working for several months to define risk analysis models and develop new tools.

The exclusive use of technical and regulatory data, obtained by conformity checks to the applicable regulations, is insufficient. A rational approach based on risk requires taking into account the defined model elements that may impact the accident risk, beyond the strict framework of regulatory requirements.

The compliance analysis carried out today by OSAC will therefore be completed by considering the performance and complexity of the supervised organizations. This is a complete overhaul of the current safety oversight process and means that OSAC will adapt the technical control by modulating the duration of the oversight cycle and / or by adapting the content and the nature of the oversight actions according to the risk profile results.

The risk profile of an organization therefore corresponds to the risk factors inherent in the nature of the supervised organization's operations.

This includes :

- the nature and particularities of the organization
- the complexity of its activities
- the risks resulting from the activities performed

With the support of the Apave Group, OSAC has developed powerful tools that make it possible, based on performance and complexity factors derived from the technical data and their analysis, to establish the risk profile of each organization supervised. These results will help decision making and in no way automatically dictate decisions regarding the content of oversight programs.

Indeed, the flexibility offered by the RBO approach is not intended to exempt Authorities from their obligation to verify the supervised organization's compliance with each of the requirements defined in the applicable European regulations. However the RBO will make better use of the resources allocated to oversight via more or less intrusive audit programs according to the organization's risk profile.

Finally, the RBO mechanism makes it possible to better identify the hazards, to measure the associated risks and to demonstrate effective mitigation of these risks. It allows the competent Authority to focus oversight on organizations that require special attention, thereby enhancing the effectiveness of control. At the same time, a better understanding of risks across the aviation industry will help to better calibrate supervision.

Already deployed in other aeronautical sectors, particularly in the areas of Airports and Operations (OPS), this requirement for the adaptation of oversight based on a risk analysis of supervised organizations will come into effect at the end of 2019 in the field of continuing airworthiness (future regulation (EU) 1321/2014). OSAC is authorized by ministerial decree to control the implementation of this regulation.

Strengthened by the expertise and experience of the Apave Group and its subsidiaries in terms of risk management, OSAC wishes to go beyond the regulatory requirements in the mid-term by integrating various other elements in the analysis models, such as financial and organizational inputs or including additional reference systems such as the current standards in the field of aeronautics, space and defense (EN-9100 series).

OSAC, a subsidiary of the Apave group, is authorized by ministerial decree to carry out the technical control of civil aviation. As part of the Authority, OSAC issues, suspends and withdraws approvals from production, maintenance and maintenance training organizations, issues airworthiness documents for aircraft and issues aircraft mechanics licenses.

"IBM 4 AVIATION", WHEN AERONAUTICS MEETS IT

Let's start with a story ! On July 20, 2019, the world celebrates the fiftieth anniversary of the Apollo 11 Moon Landing. Some four thousand IBMers were involved in the Apollo program : pioneering the technologies; building the computers; writing the software programs that launched the missions and guided them safely back to Earth, and inventing the miniaturized circuity that converted a mainframe the size of a refrigerator into something the size of a suitcase. Today, IBMers continue to advance new frontiers in areas such as Quantum computing and AI. In 2018, IBM helped launch the first AI-powered astronaut assistant, CIMON (Crew Interactive Mobile Companion), to the International Space Station.

Multi-decades trail of experiences and partnerships in the Aerospace, Defense and Airlines industries, were the building blocks of IBM Teams' business expertise and specific solutions development for aeronautics.
Scope of applications ranges from Manufacturing, Supply Chain, Maintenance Repair & Overhaul (MRO), Assets Management, to tailor-made e-solutions enhancing airlines customers experience or weather forecast for instance.

The Weather Company, an IBM Business, offers aviation weather forecast products that streamline aeronautical decision-making with accurate and highly reliable aviation and inflight weather data and decision support tools. From Corporate Flight Departments to Fixed Based Operators, Airports to Air Carriers, The Weather Company serves aviation interests worldwide by providing the critical weather information that helps customers control costs, enhance flight safety and improve efficiency.
Every phase of flight is impacted by weather. We've served the mission critical weather needs of air carriers for nearly 30 years, by combining the world's most accurate weather data with industry-leading AI called IBM Watson, Internet of Things (IoT) and analytics technologies.

MRO is another specific area in which IBM has developed long partnerships with Airlines and Aircraft Manufacturers. With Maximo for Aviation, aviation companies can efficiently schedule and manage aircraft maintenance to maintain regulatory compliance and minimize periods when an aircraft is grounded. The efficient (MRO) of aircraft increases flight availability and extends the life of airframes, engines, and other components of an aircraft.

It is also possible to develop more customized solutions, meeting specific project goals and cost reduction requirements. The increase in the air traffic, combined with rising oil prices, lead aircraft manufacturers to pursue continuous investments and improvements in the concept of communicating aircraft.
Rapid inflight data transmission, processing and analysis, allows to anticipate and optimize maintenance and refueling operations. IBM has developed specific SaaS (Software as a Service) solutions to host and manage aircraft manufacturers'

applications used by airlines that collect this data and whose solution is based on private cloud infrastructure.

Our last example, out of many, illustrates the complementarity between IT and Airlines industries : the recent collaboration with American Airlines, for whom customer experience is a major point of differentiation.
To become more responsive to customer needs, American Airlines needed a new technology platform and a new approach to development that would help it deliver digital self-service tools and customer value more rapidly. IBM is helping the airline migrate some of its critical applications to the Cloud while using new methodology to create innovative applications quickly while improving the customer experience.

American Airlines also asked IBM for help with an urgent. The airline wanted to give customers better self-service capabilities in the event of a forced rebooking due to a major weather event disrupting operations. While American Airlines algorithms typically rebook passengers on the next best flight, customers had to call the reservation desk or visit an airport agent if they wanted to discuss other options. American Airlines wanted customers to be able to see other possibilities and update their flight selection via the website, mobile app or at a self-service kiosk.
As the first step in the Dynamic Rebooking project, IBM and American Airlines' developers met and rapidly built more than 200 user stories to guide the development of the new app. Next, the teams identified their first MVP (minimum viable product – the simplest possible application that meets the business requirements) and started to code.
After just four and a half months, the Dynamic Rebooking app was released to production in eight airports, and steadily rolled out to more airports while testing, development and updates continued in the background to release enhanced versions. Hosting on the IBM Cloud Foundry platform paid further dividends when Hurricane Irma struck. The business decided overnight to deploy the app globally to all of American's airports.

Innovation and growth in the fields of Aerospace, Defense and Airlines have, from the outset, been closely linked to the upsurges in information and digital technologies, and this symbiosis is now accelerating with the pervasive extension of the latter to all players and all economic models in the industry. We look forward to seeing you soon and wish you all good flights in the meantime.

Find out more : https://www.ibm.com/fr-fr/industries/aerospace-defense

THE FUTURE OF AIRPORTS

BY MARC HOUALLA, IENAC82 & IAC89 CEO OF PARIS-CHARLES DE GAULLE AIRPORT AND CHAIR OF ENAC ALUMNI AND GAËL LE BRIS, IENAC07 SENIOR AVIATION PLANNER, WSP USA AND CHAIR OF THE AIRPORT THINK TANK OF ENAC ALUMNI

« The future of airports » is an initiative of the ENAC Alumni Airport Circle, with the participation of « The French-Speaking Airports » and the Aircraft/Airport Compatibility Committee of the Transportation Research Board (TRB). This project is bringing twenty or so leaders together to identify and discuss the trends and breakthroughs that could modify the airport industry by 2040 and 2070. By the end of the year, it will issue a series of publications.

By 2070, there should be over 10 billion people on the planet, with a quarter of them in Africa. Although slightly over half of the world's population is now considered middle class, it is probable that future open skies agreements will topple the protectionist barriers still present in some regions, thus improving cross-border travel.

Almost 68% of the world will live in an urban area by 2050. Certain local communities will also be boosted by their inter-connectivity and relations with large cities. The next generation of adults will have grown up in an extremely connected society, refusing bureaucracy and rigidity. By 2040 and therefore by 2070, in the absence of a coordinated global policy, it is now very probable that human-made climate change, which is already having substantial effects, will significantly impact our lifestyles and infrastructure.

These changes will require an unprecedented innovation effort from the airport industry and its partners to rise to the operational, technical and organisational challenges, as well as the social, political and strategic ones.

The airport manager role has radically changed over the past few decades. Historically infrastructure developers and operators, managers have gradually become providers of safety, security, hospitality and even entertainment services for their passenger-customers. Airport managers have become managers of passenger, aircraft, luggage and vehicle flows - the sequencing and fluidity of which are integral to effectiveness. In addition, more recently they have become data integrators, experience creators and vital social players in terms of regional development.

This change to the airport manager role has consequently modified airport performance objectives : improvement of the passenger route, flow optimisation, creation of airport capacities in line with demand, etc. The increasing use of innovation by airport managers is largely explained by the consideration of these new objectives. Therefore, major airports, in collaboration with airlines, are now making huge investments in the technologies of the Internet of Things, blockchain and smartisation (e.g. RFID, biometry, big data, etc.). Some are even preparing for future developments with machine learning, artificial intelligence and deep automation, to improve the effectiveness of operations, the quality of the passenger route and the safety and security of the increasingly-complex and dense airport ecosystem.

For the longer term, research centres are focusing on the airport applications of their studies on robotics and augmented reality to define new passenger services, but also for the emergence of new ground and air transport modes. Electrified aircraft propulsion through the air as well as Connected Vehicles and Autonomous Vehicles (CVs/AVs) on the ground are a major stake for airports, not only to facilitate the emergence of new mobility modes but also to reach the zero CO_2 emission goal the major global airports are aiming for by 2050.

As you can see, using innovation and new technologies will considerably transform the content of the airport manager role. Beyond the establishment of new technologies, innovation, owing to its naturally cross-cutting character, is a real driver for transforming the airport manager culture.

Although the largest transportation hubs are preparing for some of these challenges, this is not always the case for all decision-makers, smaller airports or developing or less advanced countries.

One of the missions of the ENAC Alumni discussion circle on airports, and notably its "The future of airports" initiative, is to decode the major technological trends that will impact the managers of airports and make them more accessible. We would like to invite you to our meeting in December so we can look at the future of our industry together.

REVOLUTIONISE THE INDUSTRY WITH DATA

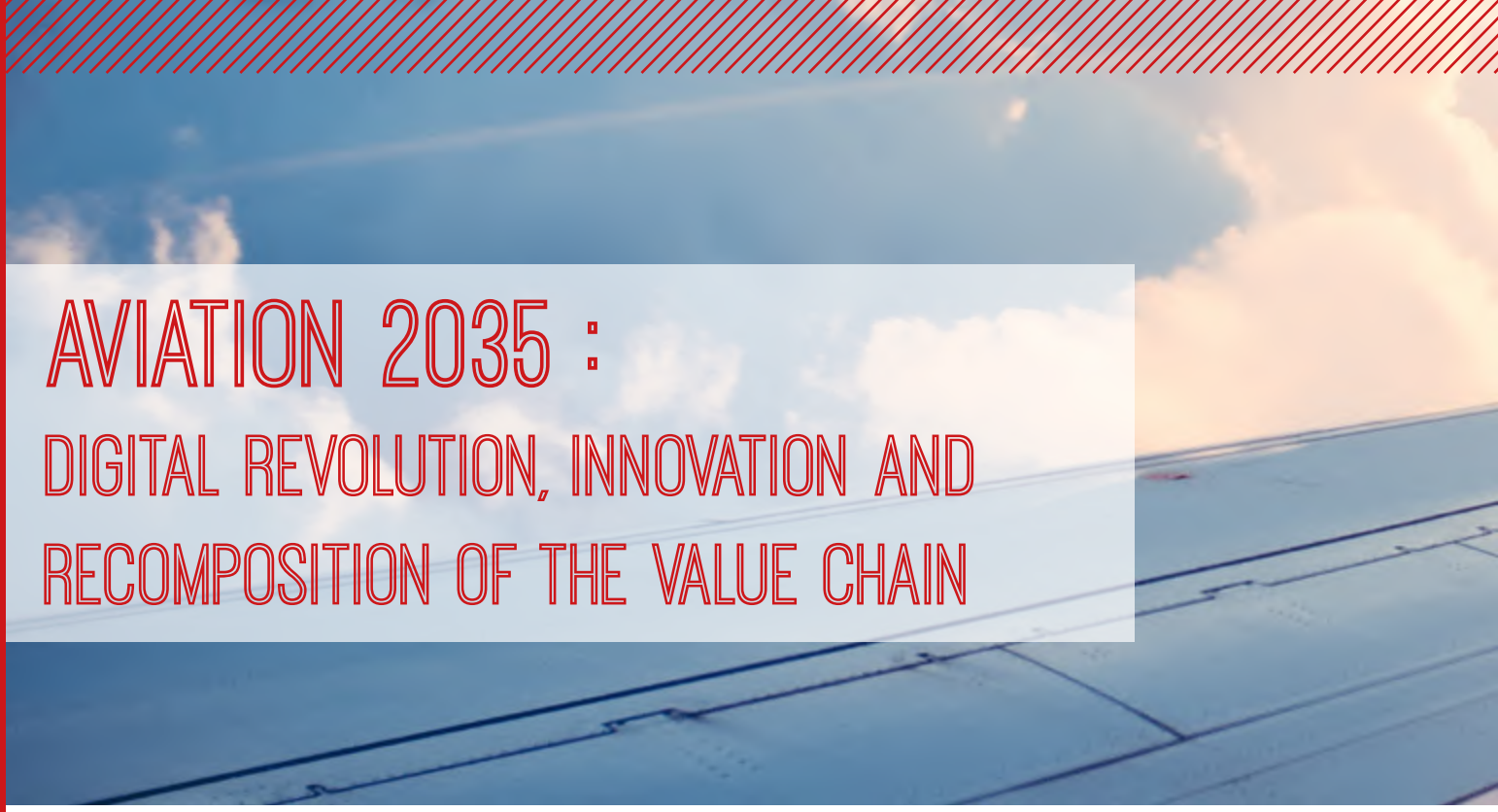
Skywise connects and coordinates aerospace with the power of data

Photo Credit : AIRBUS 2018 - photo by P. MASCLET / master films

Each and every commercial aircraft in the skies today gathers information from thousands of data points. The Airbus A350, for instance, has over 250,000 sensors on-board which generate over 10GB of data every single flight hour, reporting on performance, maintenance needs and more. As well as carrying passengers safely from A to B, a modern day aircraft is a computer in the sky. And if all of this information – as well as the streams of data available to airlines, airports, manufacturers and suppliers – can be brought together, it carries the key to revolutionising the industry. "About $40 billion is spent on delays in the United States, and thousands of flights every day are late," says Matt Evans, Head of Skywise & Analytics Accelerator at Airbus. "It's because airlines, airports, and their partners don't have access to certain data that would help them anticipate and resolve issues before a plane takes off or lands late." So in June 2017, when Airbus launched Skywise, a platform capable of pooling and analysing data from across the aviation ecosystem, it was the start of something big. Skywise identifies patterns, makes predictions, and suggests actions to improve how airlines run, ultimately improving how passengers experience air travel.

> We can take some of the biggest problems in our industry — grounded aircraft, production rates, and operational delays — and use advanced analytics to help solve them.

As Johan Lundgren, CEO of easyJet, enthuses, "It will transform the way that we maintain and operate our aircraft, with the long term aim of eliminating delays due to technical faults." In fact, easyJet is already feeling the benefits. Skywise is helping the airline's engineers to intervene early to replace parts before they start showing signs of failure. With advanced analytics, Skywise helps operators to gain new insights from their own data, but also access and learn from the cumulative knowledge of 20,000 Airbus engineers who have tracked the performance of each aircraft that is feeding data into Skywise. Being able to predict and schedule maintenance before planes are grounded prevents passengers from experiencing delays and cancellations, and enables more flights to operate on schedule. Over 60 airlines already use Skywise, and Airbus aims to connect 100 airlines and approximately 10,000 aircraft by the end of 2019. In the near future, Skywise will also become available for Airbus helicopters and other product operators too. As the platform grows, countless more opportunities and applications are emerging, and this is incredibly exciting for the future of the industry. For Johan Lundgren, CEO of easyJet : "Our investment in the Skywise platform can really make a tangible difference for thousands of passengers by harnessing the power of big data to reduce delays."



AVIATION 2035 : DIGITAL REVOLUTION, INNOVATION AND RECOMPOSITION OF THE VALUE CHAIN

Between now and 2035, Aviation will experience a greater change than it went through over its first 80 years as a commercial industry.

By 2035, Aviation will experience a greater change than it went through over its first 80 years as a commercial industry. It has already been through three strategic eras, from (i) the era of monopolies (until the 1980s), to the eras of (ii) continental competition, until the mid-2000s. Then it entered the era of (iii) hyper-competition, which is now at its peak. The industry will soon go through a transition phase between hyper-competition and the next era, (iv) hyper-cooperation, which we can foresee now thanks to early signs.

The previous eras saw great changes, such as hub & spoke operations, new generations of aircraft, the emergence of commercial activities at airports, and the first cooperation between “different species” (e.g. interline agreements between low-cost carriers and legacy airlines, and joint ventures to develop new aircraft programmes).

Each player in the value chain will lead their digital revolution and come up with new business models.

The coming of age of digital technologies not only results in an acceleration of the ideas and changes taking place or already anticipated, but also makes the sector enter into an area of uncertainty and recomposition of value distribution between stakeholders in the chain: manufacturers, airlines, airports, air navigation and distribution stakeholders.

First, let's look at the changes for each of the stakeholders in the chain:
- For aircraft manufacturers and their sub-contractors, thanks to digital technologies - directly or indirectly - it is about the capacity to have an unmanned aircraft, the cyber risk management requirement, factory 4.0, open innovation and enhanced simulation capacities and collaborative development tools, the management of composite materials, the reduction of emissions, the use of data to change maintenance strategies and adapt them to the flight conditions in a "customised" way, the change of supply chains via 3D printing, and so on.
- For airports, it is the ability to accurately plan for fluxes and business to come in an hour's time (or even in real time) by processing data and via forecasting tools, and, as a consequence, to coordinate their infrastructure in an agile, flexible way. Of course this will result in major changes in the very design of the terminals to take account of this new reality and change work organisation and the definitions of airport professions. It also means a possible overhaul of the airport processes, to eventually perform certain passenger or luggage processes outside the airport: when will check-in and automated security checkpoints directly in the (electric, autonomous) shuttle lead you directly to the jet bridge ? It is clear that the fluidity of this passage process and the increased power of new forms of mobility, etc., will have an impact on non-aviation revenue such as retail, car parks, etc.
- For airlines, major changes may appear (see following paragraph) but the monetisation of passengers should already be taken into account : in short, a powerful consumer (or a producer) is "captive" for a certain amount of time, sat in seat 22C. This person may either consume on ecommerce sites on smart aircraft (e.g. skydeals.shop) or perform work proposed by a platform (e.g. foulefactory.com), etc.
- For air navigation, the challenges are related to the topics of sky capacity optimisation and inspection automation using AI, the monetisation of the "sky infrastructure" via yield techniques for example, and, of course, the integration of drones and the emergence of very-short-haul flights (air taxis, etc.).
- For distribution stakeholders, the challenges around mastering data and technology are major: GDSs (Amadeus, Sabre, Travelport etc.) must reinvent themselves whilst GAFA companies, web agencies and mobility platforms, through customer knowledge, data, AI and technology are in a position to harness value.

Changes that are a lot more fundamental are foreseeable and will reshuffle the cards between stakeholders in the chain.

If we now look more generally at the value chain and the distribution of roles between the stakeholders in this chain, major changes can be forecast :

• Airlines' business models could move towards fully integrated and consolidated global players or to white-label aircraft operators, evolving from generating revenues and profits by selling transportation services to offering "free tickets" provided by platforms (GAFA or mobility platforms), but monetizing their client bases to third parties. (you do not pay to enter a department store and you are actually in a department store for the duration of the flight. Moreover, you cannot leave very easily !).

• Aircraft manufacturers could try to offer aircraft as services (selling flight hours, with or without a crew, etc.) whilst investing to consolidate horizontally and offer smarter and more versatile next-generation flying machines.

• Infrastructure providers will need to make fundamental changes to their operating models in order to cope with anticipated growth and price pressure.

This results in two independent areas: the (de)regulation of the aviation industry (in terms of the environment, the economy, sovereignty, etc.) on the one hand and (ii)strategic consolidation movements on the other :

• (i) For regulation, the world will be "closed" or "open". These two worlds are characterised by loose or strict rules in the open sky agreements, the ownership of airlines, the ownership of personal data, the options for use and monetisation and the pricing of aircraft tickets and rare infrastructure resources. All these regulatory aspects will enable various degrees of consolidation and monetisation of key assets by the incumbent stakeholders (customer bases, infrastructure, etc.). Last but not least, environmental regulations will have a considerable impact on air transport demand.

• (ii) For the change to the value chain, you have to consider two opposing options for airlines and aircraft manufacturers : horizontal concentration or vertical integration. We may also see the emergence of aircraft manufacturers who are suppliers, managers and operators of fleets, who will sell flight hours to airlines, or even airlines coming together and managing enough data to become more knowledgeable than the aircraft manufacturers on the management of fleet operating costs.

Four possible scenarios for Aviation in 2035

There are four possible scenarios based on these two areas :

In scenario A, "Oligopolies, the exclusive club", the aviation industry is structured around a set of "global champions" in each cluster of the ecosystem. This is a scenario where you ultimately have around ten airlines (or airline Groups) at global level, several major airport Groups managing the main airports, which will have been privatised, air navigation consolidated by continent, etc. Each of these stakeholders will fight using data to harness the most value possible from customers.

In scenario B, "Utilities, the calm regatta", the aviation landscape is shaped like the landscape of utilities today, i.e., around a set of regional champions, with regulated demand, pricing and ownership. Total revenue for the industry is, however, limited by strong environmental regulation, which limits passenger demand. But these conservative regulations are beneficial in that they contain competition and value capture by new entrants.

In scenario C, "'Aviation-as-a-service, the great squeeze" or the

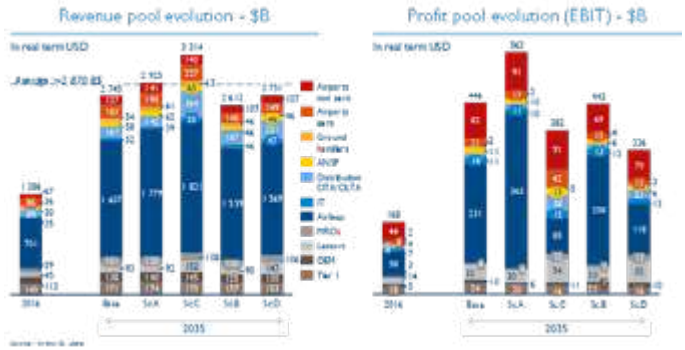
This article is based on an exclusive study by the firm Arthur D. Little : https://www.adlittle.com/en/aviation-2035

Uberisation of air transport, airlines are becoming white label operators : airlines lost the customer battle and are meeting the demand of the GAFA companies, who manage the customer : they are becoming fleet logistics specialists. Aircraft manufacturers are keeping their aircraft and selling flight hours to airlines, managing costs thanks to flight hour cost management obtained via data and AI. Airports and air navigation are merging to become "total infrastructure providers" and optimising the customer experience on the ground.

In scenario D, "Department store", airlines retain control of distribution and the customer interface but their brands are disappearing: aircraft cabins are monetised to third parties (e.g. the Vuitton premium cabin, the Apple business cabin and Carrefour or Nike class (choice)) looking for their own brands/products/services and fleets are managed (but not operated) by "aircraft-as-a-service providers". Economic and personal data regulation limits the loss of profit for airlines by preventing too much value capture by distribution platforms or infrastructure providers.

The growth of the sector and the distribution of value between the players will depend on this scenario

All the scenarios above have been modelled to envisage both overall growth in the sector and the distribution of value between players. The results of this simulation are presented below :



To conclude, in the background of the data battle and digital domination, is the battle between the US, Europe and China (and India)

But which of these four extreme scenarios will determine the future 2035 scenario ? Several factors are appearing as deciding factors :

- Environmental performance, acceptability (or not) by society, and its regulation,
- The "data" battle (customers or aircraft) : who will ultimately own this data - manufacturers, airlines or platforms ?
- Digital technology and technology in general, the capacity to rapidly implement possible advances will enable the acquisition of major competitive advantages. We are led to think that concentration to have the capacity to sufficiently invest in these new technologies and their rapid implementation will be a determining factor. This concentration - horizontal or vertical - will concern all players in the chain : manufacturers and sub-contractors, airlines, airports, navigation and distribution

Lastly, in this rationale of consolidation and the need to invest in technology and innovation, it is also clearly necessary to have a regional reading : the US, Europe and China (and doubtlessly India) will each have their development scenarios, with the post 2035 prospect of the challenge of dominating this industry, which is, by its nature, ultimately global in structure.

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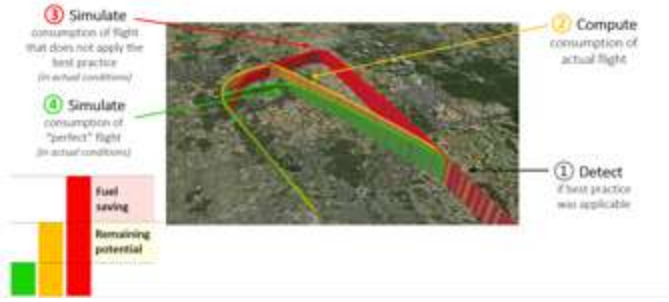
HOW AI PROVIDES NEW « BEST PRACTICES » FOR ECO-FLYING

There are major and recognised environmental and financial benefits to eco-flying. However, implementing an effective strategy in an airline requires a formal framework to monitor the implementation of best practices as well as a continuous improvement process. Artificial Intelligence, and machine learning in particular, may prove to be essential for a software publisher in this area. This is what we are trying to show here.

THE NOTION OF BEST PRACTICES FOR ECO-FLYING

There are two essential components in a continuous improvement process. 1) offering pilots and analysts the possibility to study and assess each flight and 2) combining the studied best practice with assessments that take account of the specific features of each flight : assessing the optimal implementation of the best practice, assessing non-implementation of the best practice, and assessing performance achieved for the studied flight. The first two assessments must be made in context with, for example, weather, the aircraft type, the transported load and the topography. Then, and for each flight, the best practice implementation rate and the gains recorded are calculated, as well as the gains still to be made. These analyses are also relevant to pilots, as an essential part of the continuous improvement process.



Let us take the example of a continuous descent arrival. Using an extensive flight heritage for a type of aircraft, an arrival airport, a runway and a STAR, as well as the operating conditions, it is possible to simulate optimal implementation as well as non-implementation of the continuous descent arrival. Based on the operational context and statistical models or machine learning models, we deduce baseline performance data for both scenarios - typically fuel consumed. These baseline values are then compared to the fuel consumed for the flight in question, based on the flight data.

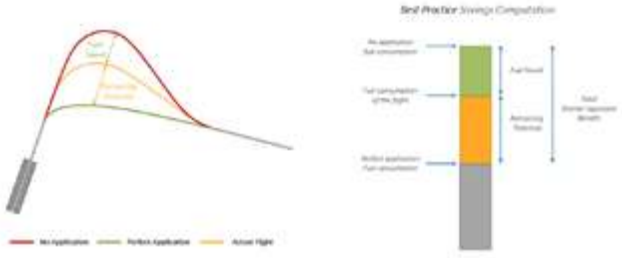
VISUAL APPROACH CHALLENGE

Amongst the new best practices, monitoring visual approaches is a challenge : a visual approach is a shorter approach than conventional approaches - a short-cut. Pilots, conditions permitting, can ask Air Traffic Control, the decision-maker, if it is possible. A visual approach is therefore not conventional and not formalised. How then can you ascertain baseline performance ?

Experience from pilots themselves shows that visual approaches may be requested and potentially approved under certain visibility conditions for certain runways of certain airports. Now, from a software perspective, with an analytical and automated process, we can recreate this pilot know-how in a structured, quantified form. For this, once again we will turn to machine learning, which we will refer to here as "learning".

ARTIFICIAL INTELLIGENCE AND LEARNING

Learning is used to characterise visual approaches. Amongst other things, we are able to distinguish approaches "not too far off" but that are due to Air Traffic Control guidance, and not implementing the best practice. We formalise applicability criteria for visual approaches, then again using learning, and for each applicability level, we determine the optimal short approach. The advantage of learning, compared to pilot knowledge, is linked to the number of flights studied and therefore a "depth" of extracted knowledge. At OpenAirlines, we process around 3 million flights a year.



By using this method on data from over thirty customer airlines, we have established average savings for the short approach, for a Boeing 737 or an Airbus A320 of around 35 kilograms of fuel and over 120 kilograms of CO2. Today, for certain eco-flying best practices, learning is used to recreate the standardised framework for a continuous improvement process regarding the implementation of visual approaches and it is hard to imagine how this would be possible without learning.

Photo Credit : ADP

INNOVATION FROM THE PERSPECTIVE OF A GLOBAL AIRPORT PLAYER : THE ADP GROUP

VARIOUS CHALLENGES IN DEVELOPING THE AIRPORT OF THE FUTURE

In an increasingly competitive environment between major hubs, composed of various challenges such as the growth of air traffic or sustainable development issues, innovation is no longer just an option for the airport industry.

One major issue is therefore : how can we optimise our infrastructure, whilst air traffic is continuing to rise and our spaces cannot be extended ?

Airports are no longer simply places to pass through, they are real living spaces. New technologies will reduce restrictions for passengers on their routes, giving them precious time, for a totally new travel experience.

This new generation of airport will have to combine a smooth passenger route, new mobility solutions and an effective infrastructure.

AN INNOVATION MODEL FOR A NETWORK OF AIRPORTS

The ADP Group has chosen to both develop service-based innovations, but also to work on ground-breaking innovations to design new services and invent the airport experience of the future.

To support this ambition, the ADP Group has created a dedicated innovation structure for transformation and company competitiveness. This scheme, unique in the airport industry, named the Innovation Hub, is developing a systemic approach based on an ecosystem of partners (start-ups, academia players, incubators, investment funds, etc.), which is transforming airport platforms into real "Living Labs".

To speed up this innovation process, the ADP Group network of airports will gradually have labs, just like the space created at Paris Charles de Gaulle airport. This unusual location, spanning over 400m², located at the heart of the airport city, has received 12,000 visitors including 45 airports and 20 technologies presented in the technology show room. Around fifteen experiments a year are also launched in three areas - the smart airport, new forms of mobility and robotics.

OUR VISION OF A SMART AIRPORT : A COMBINATION OF PASSENGER EXPERIENCE FACILITATION AND OPERATIONAL EXCELLENCE

To achieve this, we are at a turning point : we have to build on and industrialise what exists and also come up with what does not yet exist. A huge investment of €180 million over 5 years will be dedicated to the smart airport for the 2021-2025 period.

All processes will be covered, from the customer route through operations and new forms of mobility.

TECHNOLOGIES FOR AIRPORT OPERATIONS

The Optimisation of Aircraft Trajectories on the Ground and in Flight

To illustrate real projects being developed in the airport sector, we would like to highlight the work jointly-developed with the start-up SafetyLine to optimise aircraft trajectories on the ground. Thanks to the merging of ground radar data, this solution reconstructs the behaviour of aircraft from their location on the apron to the runway threshold. This processed data provides precious information for smooth flows and the reduction of emissions (shorter taxing time, etc.).

The start-up is also developing a product for airlines to optimise climb trajectories for fuel savings.

Drones to Become more Operationally Effective

The ADP Group has been a trailblazer in dronautics, by developing various use cases such as, for example, structure inspection operations, approach light (PAPI) calibration and building thermography. We are actively contributing to the boom in the drone sector at research level thanks to the ENAC drone chair, for which we are the patron.

With the DGAC [French Directorate General for Civil Aviation] and the Toulouse start-up InnovATM, we have also developed the company Hologarde, offering a comprehensive solution that combines several sensor sources to detect malicious drones, whilst enabling the digitisation of operations for "collaborative" drones. We would like to create the conditions to protect the airport grounds from this type of threat, whilst facilitating the use of this technology in a complex airport environment.

PASSENGER FOCUS

Biometry and Artificial Intelligence to Simplify the Experience and Ensure it Runs Smoothly

Passenger-customers are at the heart of our approach, and their route must be increasingly autonomous, with physical borders disappearing. We are therefore concentrating on the automation of processes thanks to 91 boarding gates with self-boarding gates, 224 automatic luggage drop-off points and 485 self-service check-in terminals. We have already deployed facial recognition at the border and we are experimenting with Air France on using a biometric boarding pass that can be used for check-in and boarding. Our current aim is to scale up the use of biometry, so that in 2024 it will be used throughout the customer route.

Artificial intelligence is another way of simplifying the passenger route, offering them information in context. We are therefore deploying a travel buddy type solution using chatbot technology with the start-up Mindsay.

NEW LANDS TO BE CONQUERED, AUTONOMOUS MOBILITY AND URBAN AIR MOBILITY (UAM)

The Autonomous Vehicle and its Various Uses in the Airport Environment

Autonomous mobility is a medium-term solution to decongest our airports.

We tested the technology during our experiment conducted in Roissypole in April 2018, between the RER train station and the ADP Group headquarters. The results validate the technology: cross-traffic between autonomous vehicles, open road crossing, traffic near pedestrians, etc.

Thanks to this experience, we invested capital in the start-up Bestmile, a Swiss company that is offering a solution to supervise fleets of autonomous vehicles.

Airports are great for developing autonomous technology and this is a new driver to improve the flow of road infrastructure, whilst improving quality of service. We are therefore in the process of creating a road map on autonomous mobility in ten years' time, based on the different types of flow: passengers, staff and luggage.

The ADP Group as a Vital Player in New Forms of Air Mobility

VTOL (Vertical Take Off Landing) technology can be seen as a new generation of electrically-propelled helicopter. These aircraft, with quieter engines, that produce less pollution, may be used for a new service for very effective city/airport connections. To promote this new form of mobility, the ADP Group recently signed a cooperation agreement with Airbus Group to develop the first experimental routes in the Ile de France area for the 2024 Olympics. This huge challenge will be a showcase for French innovation.

This technological acceleration must not overlook the fact that airports primarily connect people : they are spaces for living, for meetings, for getaways and for fun!

Photo Credit : ADP

WHAT IF TOMORROW WAS COMING TODAY ?

BY MARION CHAIGNE, MS MTA 2009

Just like Obelix falling into his cauldron of magic potion, I have been immersed in aviation since I was a child. Thanks to the Air France camps, I travelled a lot and developed a taste for adventure over the years, up to my discovery of Trinidad and Tobago in 2002. My career path sprouted from these roots, and is as unusual as it is unpredictable.

With a Baccalaureate in the services sector, I was not destined for many years of further education. However, I ended up studying for five years after this on a work study placement. Then, the cherry on the cake was a wonderful sixth year studying for a Specialised Master's degree in Air Transport Management, which I obtained in 2010. This was by far my best school year and also important on a personal level because, since that year, for me passion has been linked to personal fulfilment.

At each stage of my career, I have been lucky to be supported, advised and guided. This resulted in me working in environments very different to each other and with multi-disciplinary, multi-cultural teams. My real taste for a challenge led me to coordinate complex, technical projects. I started working on aircraft certification regarding the limitations of airworthiness and then the use of drones for inspecting the upper surfaces of aircraft. The aim was to detect defects of around 1 mm using photogrammetry, artificial intelligence and the development of a machine learning and training programme. Through this daring project, innovation put the focus back on humans, whilst also adding value for the company. Thanks to these large-scale projects, I am witnessing technological transformations and working in a stimulating, innovative environment, inspired by principles that have been proven successful at Silicon Valley.

Talking about the new technologies around us, I should obviously refer to artificial intelligence and voice control. We are increasingly aided by smart tools and virtual assistants. Currently, there is a whole range on the public and professional markets and multiple use cases. Although these solutions are not yet quite mature, in the future we will see widespread use in our working environments. Whether or not you are convinced, these virtual assistants will be our colleagues. Chatbots are living proof of their arrival. You have not heard the end of this.

Now, I can see that this has also enabled me to develop a mindset : openness, flexibility, empathy, a taste for experimentation, an entrepreneurial spirit, a thirst for learning and a desire to pass on information best reflect who I have become professionally. I am also being trained on innovative Design Thinking, System Thinking and Business Thinking methods to best support future projects. I also had the chance to be part of an innovation community and benefited from a mentoring scheme to supplement my training. The complementary nature of theory and practice enabled me to compare the methodology to the reality on the ground and accept failures when they occur. I am proud of my varied, exciting career and grateful for all the advice I received from my colleagues, who are constantly enlightening me as regards the present as well as the future. One thing is certain, I am not about to stop!

I would like to conclude with a quote from M-C Turgeon, which I feel is very relevant : "Your dreams require you to take a risk, step out of your comfort zone, exist in the world, be different, disturb and believe in yourself".

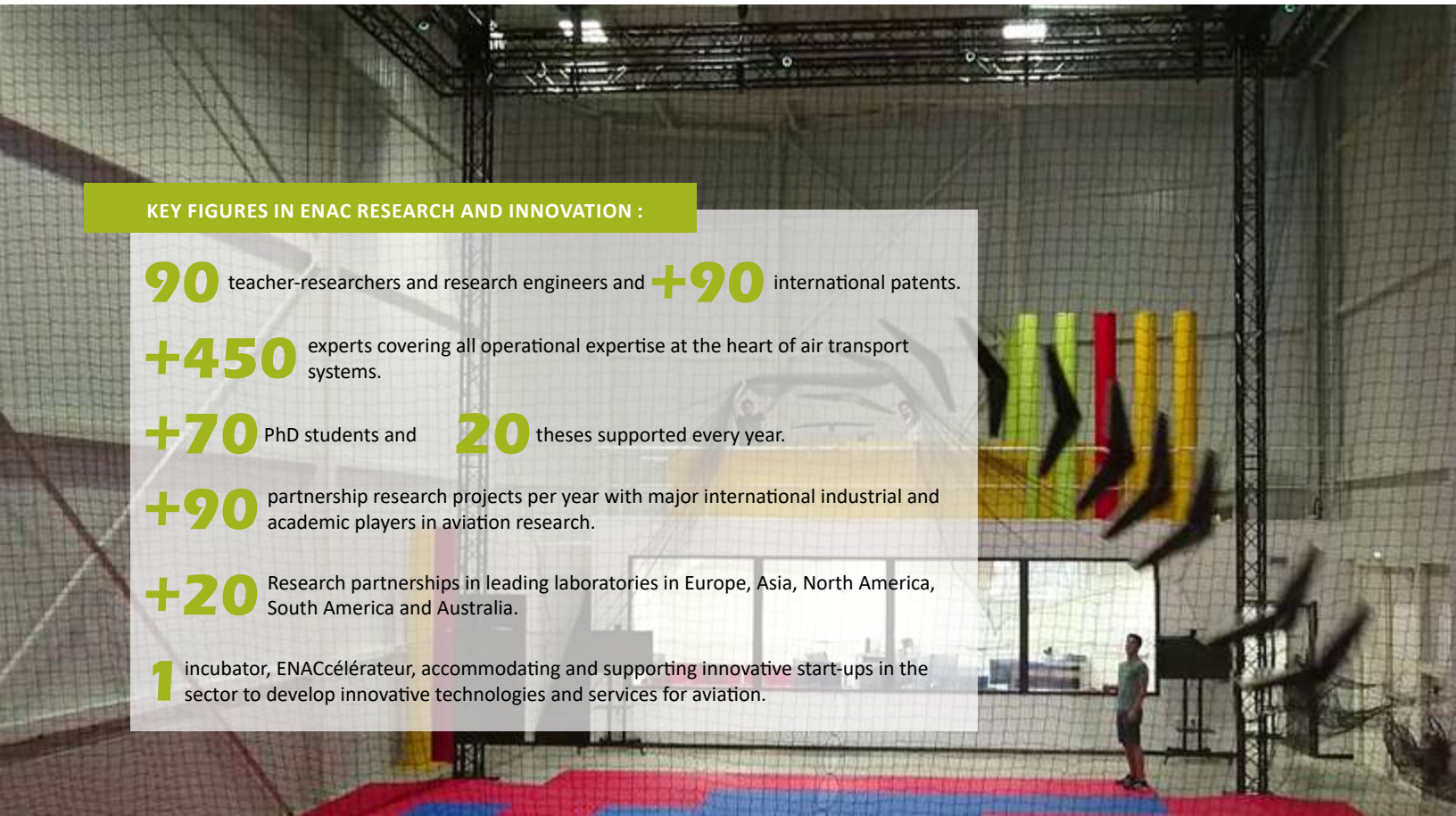
After reading this article, feel free to contact me if you would like to have a chat !

RESEARCH THAT FINDS

ENAC, GLOBAL RESEARCH AND INNOVATION PLAYER

Innovating in air transport means covering complex, multi-faceted, multi-disciplinary themes, requiring cutting-edge expertise and varied skills.
ENAC is the only player in the world able to use a very broad spectrum of scientific excellence, technical and operational expertise, large-scale simulation and experiment platforms and educational engineering know-how for research and teaching. ENAC's strength also lies in our ability to develop a research and innovation activity that is always in line with major issues and key challenges in the area, thanks to various top international academic partnerships and solid roots in the world of industry as well as in the implementation of the Single European Sky through significant involvement in the SESAR programme.
The ENAC research laboratory is structured into :
- Four research teams : "Data, Economy and Display", "Interactive IT", "Optimisation" and "Telecommunications".
- Three cross-cutting programmes : "Sustainable Development", "Aviation Safety and Security" and "Drone Systems".
- Two experimental platforms, open to the research community : "The Toulouse Occitanie Drone Aviary" and the "Toulouse Occitanie ACHIL" platform.

In 2018, to unite regional research teams in aerospace systems engineering around ambitious, innovative projects, ENAC, ISAE-SUPAERO and ONERA created a common research federation for the design, certification and operation of future aerospace systems.
The new research centre is structured around two main areas of application :
- Drone systems and autonomous systems
- Air transport systems
Eight mixed teams, combining researchers, teacher-researchers and research engineers from the three establishments have been working hard on themes with social challenges for air transport - the multidisciplinary design and optimisation of critical software-intensive systems, complex human-system interactions, robust and safe flying, control, guidance and navigation, planning, learning, optimal decision-making, optimisation and control, applied mathematics and digital analysis methods, electromagnetism, and communication networks and signals.



KEY FIGURES IN ENAC RESEARCH AND INNOVATION :

90 teacher-researchers and research engineers and **+90** international patents.

+450 experts covering all operational expertise at the heart of air transport systems.

+70 PhD students and **20** theses supported every year.

+90 partnership research projects per year with major international industrial and academic players in aviation research.

+20 Research partnerships in leading laboratories in Europe, Asia, North America, South America and Australia.

1 incubator, ENACcélérateur, accommodating and supporting innovative start-ups in the sector to develop innovative technologies and services for aviation.

ALUMNI INTERVIEW

JEAN-LUC SALINAS // IENAC03

Jean-Luc, you have been at the head of Maltem Canada for the past 10 months. Could you tell us more about this company ?

Maltem Canada is the Canadian subsidiary of the Maltem Consulting Group, based in Montreal. Maltem is a digital transformation and innovation consultancy company with 1,000 employees working in 12 countries.

You are an IENAC 03L graduate and started working as an aeronautical engineer in Toulouse. What led you to take this position on the other side of the Atlantic ?

Surprisingly, my career path was rather linear and logical : I simply dared to seize the opportunities that presented themselves to me!

2003-2006 : The IENAC years. If we start at the end, i.e., why I chose Canada and Montreal, we actually find ourselves at the beginning. During my studies at ENAC, I had the opportunity to spend a term in 2005 at Polytechnique de Montréal, which was my first experience and adventure in the country. Then, for visa reasons, I returned to Toulouse to complete my end-of-study placement at Onéra.

2007-2010 : Initial experience. With my IENAC qualification in the bag, I started working for Assystem in Toulouse in early 2007 as an aeronautical engineer in navigation system (ADIRS) testing for Airbus. Over three and a half years with Assystem, I gained experience with test benches, simulators and test flight analyses, initially on the A320/A340 programmes then on the A400M, the new programme of the time. After two years, one of my professional attributes was taking shape : proposing ideas ! I worked on an automation project and helped with other cross-cutting projects such as skills matrices and the creation of a training academy within the department. It was there that I created my very first training course. This was an amazing experience, in the company of my classmates. #ludo #barbie

2010-2012 : Moving towards management. I then joined the SII group in late 2010, still in Toulouse, still as an engineer and still working on Airbus

navigation systems, but this time on the other side of the fence, in the Design Office. A few months after my arrival, in early 2011, the manager of our small three-person team resigned and Pierre Durel, my project manager (I would like to thank him), offered me the position of Team Leader. The following year, I took over another team. I was then Team Leader for nine engineers, including two in India. This was the start of my Offshore experience : I was faced with remote skills development, the culture and the accent ! Fortunately, my team was very operational and autonomous and everything ran smoothly.

2012-2014 : The opportunity. Nine months went by and then one Thursday evening in September 2012, SII management invited me to a meeting. They explained that an SII department was having issues and needed a new project manager and that they had me in mind. Of course, I had to give my response the next day !!! Strangely, it was an easy decision. As I said in my introduction, it seemed linear and logical.
So I found myself project manager for 20 or so engineers in an area that I was not familiar with and did not understand : avionics network systems. Above all, I was thrown into the eye of the storm : the project was directly monitored by the Director of the agency (which had 650 engineers at the time) as Airbus had given us three months to raise the bar before deciding to switch supplier - #nopressure! On top of this, there was the challenge of a pilot work unit flat-rate system being used. I learned about crisis and conflict management, project management, risk management, action plans, Ishikawa diagrams, budget management and so on. In short, I gained five years of experience in one !!! A year later, we passed all areas and the following year I was made Bid Manager at the same time for responses to large tenders (6 months, 3 rounds, 200 response pages, €5m in budgets, a transnational context, etc.) and I managed the transformation of some of our Offshore business. Incidentally, I was able to travel to Bangalore for ten days to train our Indian engineers.

2015-2018 : The "expat and intrapreneurship" adventure. At the end of 2014, I had been managing my service centre for two years and it was time to face a new challenge. I was 32 years old, my son was 3 years old and with my wife we decided that if we wanted to move abroad, it was now or never. We targeted a few countries and I learnt that SII was launching a new subsidiary in Canada, Montreal specifically and, well, I knew Canada a little ! I spoke to my manager and received a reply on 25 January 2015 : "Jean-Luc, a Canadian is going to open SII Canada in early March, if you can pack everything up and arrive at the same time, the two of you can launch it together". So off we went! We prepared our work permit papers, both handed in our notice and sold both of our cars. We sold what we could online and each packed two bags. We donated or discarded the rest and the three of us took off on 2 March 2015 for Montreal in the middle of winter where it was -22°C.
SII Canada was an adventure ! The two of us arrived with no real knowledge of the market and no real business plan. In September 2018, three and a half years later, we have 120 employees in Montreal and Toronto, providing services in aeronautical engineering and IT. By then I was then COO but I had worked on the IT infrastructure, the website, hiring the premises, choosing the furniture, recruitment, business development, social networks, tenders, the internal process, certification, etc. Quite a lot really ! I also took the opportunity to gain PMP® certification in 2016. In the end, it was a difficult but incredible adventure. We were very proud to gain recognition from our peers as a finalist in the Gilles Demers award in the Quebec Reach and Wealth category for aeronautical SMEs in Quebec.

From 2019 : New adventure. Finally, in late October 2018, I set myself a new challenge and left to join Maltem Canada as CEO.

Although "logical" to you, this career path was strewn with obstacles and challenges. What was your key to success ?
I think one of the major keys to my success was being surrounded by the right people and having support - having a mentor. For me, this was Olivier Lopez, Director of Operations at SII at the time when I was project manager. He supported me, advised me and listened to me. This is a real must-have in the world of work.
I also think one of the things that really helped me was the way I faced difficulties. I always saw them as a challenge - a game almost. It is not success or failure that is important, but trying to succeed - and not being afraid to try - learning lessons to get a better result next time ! In a nutshell, you have to be demanding of yourself and want to improve.

We are talking of success but how is your new company, Maltem Canada, doing ?
I started at Maltem Canada in late 2018 with Marc Giraud-Sauveur, a friend and partner. Ten months later, we have 19 employees in Montreal and several renowned customers in Quebec.
We are very happy with this growth and are continuing to recruit locally and abroad. Incidentally, I was very happy that in September I was able to recruit an ENAC alumnus specialising in UX design. We have been able to develop several areas of expertise : cybersecurity, software development, agile coaching, BI and Big Data and consultancy in innovation, notably in coaching start-ups and Blockchain. Of course, if you are specialised in one of these areas and Canada appeals to you, I may have a job for you :)

What encouraged you to embark on another adventure ?
Good question ! Lots of people thought I was crazy ! As you may have noticed in my career, I have always worked in consultancy. I think that today I want to create a new consultancy company to suit me, with a focus on the employee. I think that the most important component is my desire to pass on what I can : being able to offer opportunities like

the ones I had, to launch my employees into a long-term career and offer them support. At the same time, I found a lot of parallels with the Maltem values : the innovative technological area and corporate environmentally-friendly thinking #maltemimpact.

Passing on and sharing, is this an important part of your personality ?

It is ! Well, I try ! I have always been very drawn to training throughout my career. I started by creating aeronautical technical training, then I also created training when I changed jobs. Today it is focused on Excel and PowerPoint, risk management, project quality, tenders, etc. It is quite varied - I adapt to suit needs. I recently gained Quebec government trainer accreditation. I increasingly take part in panel discussions or conferences to share my experience. I was able to take part in a panel discussion on recruitment in Startups for Montreal's FrenchTech. I led a two-hour conference at PMI Montreal on crisis management in teams #feedback and I also proposed a discussion to a procurement audience on how to redesign the way of creating tenders for consultancy services. There was also the conference with ENAC Alumni on how to successfully move to Canada. Recently I haven't taken part in as many events as I was launching Maltem Canada, but I hope to soon be able to share my experiences again.

You are a specialist in digital transformation. What are the major challenges today ?

Incorrectly, when we refer to digital transformation, we instantly think of technologies, digital tools such as ERP, CRM, and so on. It is actually primarily a transformation that will change behaviour, uses and even organisations that are no longer suitable. Digital transformation is firstly change management, where you place humans at the centre of the equation. Also, to support change, one of the keys to success is often the full involvement of management. #foodforthoughtforyourcompany.

For emerging technologies, what is the future trend ? Artificial intelligence ?

I don't know if artificial intelligence is the future trend but it is certainly the current one. Big Data has entered mainstream technology - even if few really implement it.
Here in Montreal, artificial intelligence is booming, notably since the Turing prize recently won by Yoshua Bengio, a professor at the University of Montreal and Scientific Director of the Quebec Artificial Intelligence Institute (Mila). Companies such as Element AI and Imagia are emerging as well as divisions in major groups such as Thales cortAIx, Google, Facebook, Microsoft, etc. I had the opportunity to undergo a week's training in Deep Learning last year and I'll admit that the scientific advances are impressive. But does this mean that AI will be used in all industries and companies ? I'm not so sure. I think there is still a big gap between the concept and application in business processes. We always come back to the main point: what is a use case and what is my ROI* ? This is not currently obvious. It is also limited by the real lack of talent available to rise to these challenges.

I think that the main topic of 2020 will be cybersecurity. Hardly a week goes by without a major company announcing a leak, failing or ransomware attack. Recently, this affected Desjardins (the main Quebec bank), Air Canada, the ICAO and Equifax in the US. Statistics show that 32% of employees have accidentally sent confidential information to hackers.
Digital transformation takes place very quickly when ROI is no longer the issue. As soon as the image of a company comes into play, there is no longer a need for a direct ROI. In addition, I think that organisations are becoming aware that firewalls and antiviruses are not protection enough. Today, you have to think about raising employee awareness and data governance - this really is huge background work.
*Return On Investment

You have now been in Quebec for 4 years. Could you tell us a bit more about the local market ?

This is the tricky part, as comparing France and Quebec is a real expat error ! Of course, the market is very different. You have to adapt and learn the local customs, such as learning the importance of after-work drinks. You also have to understand that the Toronto market is very different to

the Montreal market. Ontario (which I visited with SII) is like another country !

Lastly, today you are an active member of the E-Quebec Alumni network. Have you been an active member of ENAC Alumni for many years ?
I recently joined Hugo Virchien who has been leading the community for almost four years. We try to organise an after-work event or meal three times a year. Generally around 15 people attend.
Personally, I have always tried to breathe life into the network. For example, when I was in Toulouse, I was the placement supervisor for two IENAC students. In 2009 with three IENAC friends, I also founded the Pink Floyd Rugby organisation, which is made up of former ENAC rugby players (male and female) - I was Chair until 2014. The organisation celebrated its 10-year anniversary this year and has really grown under the leadership of Marie Gower. This enabled us to proudly represent ENAC during the annual tournament of the prestigious French engineering and business schools, notably by winning the trophy for both men and women ! #proud

THE AUTHOR

Jean-Luc Salinas - Animator of the Quebec Chapter

ALUMNI INTERVIEW

JENNIFER MAZERIE-PAREDE // IATOM12

Jennifer, you have graduated from the ENAC with a Master IATOM. Why did you choose that speciality ?

Following my professional bachelor in Aeronautical Maintenance, I absolutely wanted to work for an airline and discover the world of its operations. Furthermore, I had been dreaming of joining the ENAC. So when I heard about the existence of this master, I thought it would be an opportunity for me. I have no regrets !

Would you like to share your work experience with our readers ?

During my studies, I had a first hand experience in the environment department of ATB (Toulouse Blagnac Airport) as a seasonal employee. This experience allowed me to discover the world of airports which I really enjoyed. I also did an internship during my professional bachelor at Air France Industries in Blagnac. There I discovered the maintenance world with both its benefits and its complexity. I did my end-of-study internship at Air Méditerranée, as a Flight Operations Engineer. I got the opportunity to sign a permanent contract (CDI) and to develop my professional skills for two years within this airiline. When Air Méditerranée stopped operating, I worked as a sub-contractor for the ETOPS Department of Airbus. In the meantime, I had been in touch for several months with people from AKKA who wanted to meet me. As I felt I was being too far from airlines, I accepted a job interview. AKKA offered me a Flight Operations Engineer position with the objective of developing support for airlines. closed its doors, I left for Airbus as a sub-contractor, in the ETOPS department. It had been several months since people from AKKA wanted to meet me, and being too far from the airlines at Airbus, I accepted an interview. I was offered a Flight Ops Engineer position with the objective of developing support for airlines. I thought it was challenging and I went for it.

Since you graduated from the ENAC, you have been working in flight operations, what is it ?

In my opinion flight operations is a lot of things depending on the context. Through my airline experience, it includes all the operations that are done on the ground and in flight: it is the management of a flight from A to Z with both the ground part consisting in handling, catering, fuel, the passengers' management, shuttles, hotels, crew schedules and so on, and the whole flight part including crew training, flight plan preparation, line studies, weight and balance, safety, documentation, etc. All this with regards to regulation and safety.

You've been working for Akka Technologies for 3 years, can you introduce your company ?

AKKA Technologies is an engineering and consulting group created in 1984 by Maurice and Jean-Franck RICCI.

We work in the industrial and services sectors, especially aeronautics and automobile (representing 80% of our revenues) but also energy, telecommunications, defence (...).

This leading position is explained by AKKA Technologies investing every day to be at the forefront of innovation and development. For example, during the financial crisis a few years ago, some projects were put on hold, or even cancelled. The group's Executive Board decided to promote the skills and know-how of its engineers by creating AKKA Research. It is a research and development centre where engineers from all our subsidiaries design the technologies of tomorrow. Thus, we have built the SMART BERTONE, whose goal was to boost acceleration and braking of the Smart, ultimate city car, to make it an urban F1 without emission of any particle !

Or the Link & Fly, our conception of what the airplane of tomorrow could be. Through these projects, we develop solutions in a given field of activity which could be exported to another domain.

In the aeronautics sector, AEROCONSEIL allows us to be the only EASA PART 21 J and 21 G, PART M and PART 145 approved consulting firm (limited to boroscope activities). This enables us to be present at all times of the lifecycle of an aircraft. Thus, our aeronautical activities are divided into three main areas :

- ASW (Software, IT, ...)
- ASE (Engineering)
- ASO (Operations) to which the Flight Operations Division belongs

MEET JENNIFER MAZERIE-PAREDE (IATOM12), FLIGHT OPERATIO TECHNICAL FOCAL POINT CHEZ AKKA TECHNOLOGIES

You've been joining the Flight Operations Department, could you introduce us to its activities and tell us about your missions and your customers ?

Flight Operations within AKKA TECHNOLOGIES belong to the Aircraft Support & Operations (ASO) Business Unit. It is an integral division in the same way the Aircraft Modification and Airworthiness Technical Services division is. I often say that in the ASO Business Unit we are able to take care of an aircraft from A to Z, A being its creation on FAL and Z being its demantling... in between there is the whole operations phase during which we can intervene in almost all areas.

Within the FLO division (FLight Operations), there are two departments : Operational Control Centre (OCC) and Flight Ops Engineering (FOE). Activities are targeted for airlines such as French Bee, Air Caraïbes Atlantique, Air Sénégal, Air Belgium, Air Archipels and so on

but also for manufacturers namely Airbus, ATR, Dassault, etc...
There is a transverse activity across these two departments dealing with compliance / quality / Safety Management System. It supports our customers in complying with regulations, in obtaining labels and approvals and in overseeing all of this within the division itself. Indeed, we apply for example to ourselves, within the division, the IOSA requirements to get closer to the requirements of our customers.
Within this division, I am a technical advisor and I intervene on the pre-sale and the launching of the projects. I take part to the development of the division with the definition of new products for our customers. I am also involved in school partnerships and recruitments. Step by step I try and contribute to the establishment of full support chain for airlines. My last mission has consisted of creating the transverse compliance / quality / SMS activity.

Since 2018, Akka has been offering a new solution for airlines, meaning outsourcing flight dispatch assistance to your Operations Control Centre, can you tell us more about it ? Why this new service ? What are airlines looking for in trusting you ? Are there any recruitment needs related to this development ?
Indeed, for almost a year we have been offering our services as Operations Control Centre. We had noticed that airlines were struggling to manage the turnover existing amongst flight dispatchers or to manage seasonal peaks. So we began in 2017 with setting up some technical assistance to strengthen airlines' teams. Then slowly but surely the question came up of creating our own centre. Therefore it has been necessary to recruit and get our own experts. Our objective is to diminish the workload of the airline's own Control Centre with regards to the definition of their flight plans considering the most optimized route according to the events of the day. We can also monitor flights. We use software that allows us to position ourselves today in the market and to offer an attractive solution. Airlines trusting us are not just looking for some help, they expect to be able to rely on us as if we were one of its departments, as an actual partner. Today our team is complete but still we are planning to strengthen it.

What are the upcoming projects ?
In FLO, we have lots of projects in mind :) We are developing an activity dealing with ferry flights and we aim at providing services in crew management. We are already involved in the recruitment of flight crews on behalf of airlines and we want to go even further, especially now that we are appointed 24h / 24 7/7 through our CCO.

During Paris Air Show (Salon International de l'Aéronautique et de l'Espace), you've signed a partnership agreement with ENAC Alumni. What were your motivations and more specifically what objectives does your department have by getting closer to the association of ENAC graduates ?
Our motivations through this partnership are multiple. We expect to get closer to experts who share the same passions we have so that we can exchange and gain mutual enrichment through this community. We want to promote our activities through ENAC ALUMNI and give to alumni who may be interested the opportunity of getting to know us.

Do you already have ideas for events or actions that you will propose with ENAC Alumni to students and Alumni at the beginning of the school year ? Would you like to share these with our readers ?
We would like to take part in professions' conferences, to introduce more details of our various activities and who we are. We want to be there on After Works in order to exchange with our ambassadors of tomorrow and continue promoting the ENAC within our company. In FLO we are a few ALUMNIS well aware of this network and we wish this dynamic to keep on existing.

What can we wish you for this year by our side ?
Lots of good moments for sharing let's hope :)

Any message from Akka Technlogies to our readers ?
We are delighted to start this wonderful adventure with you all, and we are eager to share with you this common passion that binds us all.

THE AUTHOR

Jennifer Mazeries-Parédé

IT HAPPENS WITH ENAC

FOCUS ON ASEPMA'S PROJECTS //

BAMBA FALL, MSMTA12
ASEPMA'S COORDINATOR

Could you present ASEPMA ?

The Senegalese organisation for promoting aviation professions (ASEPMA, created in 2014), resulted from the desire of students and professionals to promote information on aviation professions and make this culture accessible to young people from all backgrounds to enable everyone to experience this passion.

ASEPMA therefore supports pupils and students in developing their aviation knowledge via various educational programmes. So as to have a social impact, our mission is to raise awareness amongst the youngest children in nurseries with fun and educational workshops on creating mock-up aircraft and learning the aviation alphabet. This pilot programme was a real success and is now in the development and adaptation phase in primary and secondary schools as well as sixth-form colleges.

Could you list some of the organisation's areas of operation ?

Our organisation has a continental reach, as our action impacts young people outside Senegal, especially young people from countries in the ASECNA area.

We also wanted to help define career plans for college/university students in the aviation sector. For two years, the organisation has been organising sessions to prepare for the competitive entrance exam to the African Meteorology and Civil Aviation School (EAMAC) with professionals from this school.

The other side to ASEPMA's work is to promote the pooling of local African and international skills via various collaborative development projects, supported by the Senegalese Ministry For Air Transportation. In this context, the various activities have been taking place.

First, there has been the collaboration with the Latécoère-Aéropostale Rally and the charity Un Morceau de Ciel Bleu in Toulouse on establishing the Latécoère certificate in Senegal, which is equivalent to the French

BIA [Introduction to aviation] qualification.
In this project, special attention is being paid to the accessibility of this aviation culture amongst young girls, so in 2018, this Latécoère certificate training was given in the Maison d'Education Mariama BA in Gorée Island.
Nearly 100 Senegalese students have benefited from this training on aviation basics.
The mid-term objective of ASEPMA is to develop partnerships both on a local and international level to support the education system.
We are also working with our partners including Un Morceau de Ciel Bleu and the Solidarity Office (ENAC - ATR allocation fund) to set up an aviation club. Note that these three structures have similar visions on aviation and young people, i.e.: the development of aviation action with young people and the Senegalese establishments, the development of aviation action with young Toulouse residents (discovery action/ BIA) and the ENAC partnership (social action).
The aim of this project is to enable the establishment of trainer training in Senegal (ASEPMA and partners), and to produce learning tools and materials (baselines, manuals, teaching activity sheets and equipment).

What can we expect on 7 and 8 December 2019 ?

On 7 and 8 December 2019, Senegal will host the Saly Air Show, the biggest aviation event in Sub-Saharan Africa.
To understand the reach of this event, you have to look back on the past four years in which we organised the International Civil Aviation Day (JACI). It had national reach whilst enabling us to unite several structures from sub-regions in West Africa such as the West African Economic and Monetary Union (UEMAO).
The aim of this event if to promote knowledge of aviation professions amongst young people in Senegal and West Africa in a more comprehensive way. In this vein, we are setting up a development strategy for all aviation activities in this zone.
So on 7 and 8 December 2019, the Saly Air Show will be the first event of its kind in Sub-Saharan Africa.
The first day will be dedicated to the general public and young people will be able to meet professionals, discovering their activities in a more tangible way. It will be the opportunity for young women from Mariama BA to show what they have learnt in their training with the young people from ENAC.
The second day will be dedicated to professionals in the form of a professional trade show and networking. The aim is to unite the major stakeholders in aviation who see potential and have an interest in Africa. It will be the opportunity for these young professionals to discuss and share a development vision for the African aviation platform.
To finish, we are aware that to encourage young people to embrace the jobs in this area, we first have to provide them with access to information. That is why organising these kinds of event is so vital !

Photo Credit : Eric BRUNO

IT HAPPENS AT ENAC

A PARTICIPATORY CLIMATE FRESCO

ENAC is taking part in the Rentrée Climat (climate-focused back-to-school period), a unifying event initiated by the "La Fresque du Climat" (climate fresco) organisation, aiming to raise awareness on climate challenges amongst as many students as possible in leading French schools and universities. This awareness-raising involves offering a climate fresco, a fun, participatory and creative workshop on climate change. It is based on collective intelligence and is very educational.

To offer these workshops to as many student year groups throughout the academic year as possible, motivated, voluntary ENAC staff members have been trained on running a fresco. Each trained staff member can therefore lead a group of six students for three hours, working together to present the causes and consequences of climate change using the explanatory cards distributed to them. At the end of the workshop, the groups of students will be able to compare their frescoes and discuss the topic.

By providing working spaces in the library and opting to offer this fresco to 200 students from different courses (engineers, air traffic controllers, technicians, etc.), ENAC is showing that we are keen to offer climate challenge training to the people who will invent the world of the future.

https://fresqueduclimat.org/
www.enac.fr

ENAC OPEN DAY IS ANNOUNCED !

Saturday 30th of November from 8:30am to 6:00pm, ENAC Toulouse organize her annual open day. The occasion for the young people and their parents to discover the differents formations and jobs proposed by ENAC. Visits of the campus, animations, informations stand and job conferences are on the program of the day. We count on your presence during this major event in the life of our school to share your passion and exchange about your jobs with the numerous visitors we're waiting for.

ENAC EXHIBITS AT THE DGAC

ENAC organize from the 2nd of december 2019 to the 3rd of january 2020, photos exhibition in the hall of the DGAC Paris about "Today's ENAC". This exhibition will bring together around twenty photos and will be the occasion to rediscover ENAC, Great School of aeronautic n°1 in Europe !

IT'S BACK TO SCHOOL FOR BIA TRAINING !

French Aviation Initiation Qualification (BIA) training is given on a voluntary basis by ENAC students on Saturday mornings at the ENAC campus to young people interested in aviation. Publishing this programme on Facebook has promoted this training to young people, students and ENAC staff, highlighting the remarkable quality of teaching in terms of management and course content.
The exponential number of applications over the past three years for the Saturday morning session is very revealing : there were 9 applications in 2017 compared to over 80 for this 2019 back-to-school period.
The high number of applicants present for awarding BIA training certificates in the month of June illustrates their attachment to and gratitude for the teaching given by the ENAC student volunteers.

Looking at the success of the 2019 BIA exam provides information on student progress.
The ENAC preparation course trained 7% of the people admitted into the Toulouse academy in 2019. In addition, the increase in the number of high scores, and especially the very high scores, shows that the average level of the students at the end of the BIA training has improved. The success rate (92.5%) is much higher than the academic average (80%). There was only one failure out of 51 applicants at ENAC and two failures out of 15 at the lycée Clémence Royer de Fonsorbes in 2019. Looking at gender in the 2019 BIA sessions at ENAC and the lycée de Fonsorbes also highlights the great success of girls (100%), whose numbers are ever increasing (34% this year), thanks to their attendance and commitment. They are actually helping improve the overall success rate (95.5%) and increasing the number of high scores (34 obtained one ; i.e. 91% of those admitted). Their results greatly exceed the boys' results (success rate : 100% compared to 93.3%, high scores : 91% compared to 81%), and therefore show that the focus on gender equality during recruitment at the start of the year was successful and should be continued.
We should specify that some weekday evenings, the students also go to schools in partnership with the Morceau de Ciel Bleu organisation and the lycée Clémence Royer de Fonsorbes.

CONTACTS

ENAC BIA Coordinators

2018 - 2019
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Paul Averty MCTA17B

2019 - 2020
Anne-Sophie Truchot MCTA 18B
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FONDS DE DOTATION

Fonds de dotation ENAC : Looking Back at the Highlights of Le Bourget 2019

The 2019 Le Bourget air show was particularly full of events for the Fonds de dotation ENAC, in terms of research, international development and social action. Let's look back at the highlights of this great event !

ATR SIGNS AN AGREEMENT TO LAUNCH A SOLIDARITY PROJECT IN SENEGAL

On 21 June 2019, a sponsorship agreement was signed by ATR and the Fonds de dotation ENAC, to support an international solidarity project between ENAC student pilots and sixth-form college students in Mariama Bâ on Gorée Island in Senegal.
This solidarity project, supported by the Senegalese aviation profession promotion charity (ASEPMA), the Toulouse charity "Un Morceau de Ciel Bleu", St-Exupéry sixth-form college in Blagnac, the Fonds de dotation ENAC, ENAC Alumni and ENAC through its students, aims to :
- Enable Senegalese students to learn about the aviation professions with the eventual issuance of an Aviation Initiation Certificate. To do so, before the training, the students and ENAC staff will work with "Un Morceau de Ciel Bleu" to design teaching kits and create ATR flight simulation software,
- Set up great meetings, training and discussions between student pilots and Senegalese college students there from 2 to 9 December 2019,
- Present the project to sector professionals and the general public during the first "Saly Air Show" at the ATR stand on 7 and 8 December 2019,
- Organise a trip to Toulouse during the 2020 Easter holidays for the most deserving Senegalese college students. This trip will enable them to discover the aviation professions and training, as well as the main Toulouse industrial sites, and the ATR assembly line in particular.

A FIRST FOR THE ENAC-AIRBUS SAFETY MANAGEMENT CHAIR

The ENAC-Airbus Safety Management Chair publicly presented the objectives and main advances for the first time since the position was created at the end of 2018. The Chair's aim is to address the new safety challenges arising due to the changes in the global aviation scene and the digital transformation of a sector undergoing major changes. The participants, Corinne Bieder, holder of the Chair, Kyla Zimmermann, research engineer and Samuel Kierszbaum, a PhD student, talked about the Chair's research areas in front of an audience composed of high-level professionals. Yannick Malinge, Senior Vice President & Chief Product Safety Officer at Airbus, reaffirmed the essential nature of research conducted in the context of the Chair for the future of Safety in air transport.

THE ENAC-ADP GROUP - SOPRA STERIA DRONE SYSTEMS CHAIR : AIRPORT EXPERIMENTS, URBAN MOBILITY AND INSERTION IN AIR TRAFFIC

The ENAC-ADP Group - Sopra Steria Drone Systems Chair was also celebrated, presenting advances in research into inserting drones into air traffic. This was the first French-speaking presentation of the new version of the Chair which, with the support of sponsors, is addressing the theme of operational safety based on artificial intelligence (AI) techniques using Machine Learning algorithms. The aim of this work is to build and assess the solutions to integrate drones in various types of airspaces, notably airport and urban spaces.

A DISCUSSION ON THE FEMINISATION OF THE AVIATION PROFESSIONS

In the context of its sponsorship agreement with GIFAS, the Fonds de dotation ENAC organised a discussion entitled "Female aviation careers : GIFAS is working alongside ENAC" on Friday 21st of June, at the open day for the general public. Intended for young sixth-form college and secondary school students at the air show, the ENAC engineers who have benefited from GIFAS international bursaries talked about their careers and experiences abroad and passed on inspiring messages to an attentive audience, in the presence of Olga Renda-Blanche, ATR Director of Human Resources and Olivier Chansou, Director General of ENAC. This in-situ operation supplements more comprehensive action, including the production of testimonial videos from female engineers, designed for social networks and broadcast on the ENAC YouTube channel.