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SPECIAL EDITION

51st PARIS AIR SHOW LE BOURGET

INTERNATIONAL AIR TRANSPORT INDUSTRY

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

Ministère de l'Écologie, du Développement durable et de l'Énergie

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CONTENTS

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INTERVIEW
SÉGOLÈNE ROYAL, FRENCH MINISTER FOR ECOLOGY, SUSTAINABLE DEVELOPMENT AND ENERGY – *P. 04*

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Interview with Emeric d'Arcimoles

Paris Air Show 2015: a perennial success!

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EMERIC D'ARCIMOLES
Chairman of the Paris Air Show Le Bourget

The 51st edition of the International Paris Air Show once again promises some exciting surprises. Focus on this global gathering for the sector, to take place this year from 15 - 21 June.

The Paris Air Show needs no formal presentation. For more than a century now it has brought together, every two years, the world leaders in the aerospace industry. Always spectacular, surprising and vibrant, this event remains not only a showcase for the general public but also an economic lever for the professionals. This year, once again, it's all systems go!

"We're fully booked!" exclaims Emeric d'Arcimoles, chairman of the show. *"All the exhibitor spaces are booked as are the chalets. There's a notable rise in American participation, as well as a strong contingent of French SMEs and midmarket companies gathered under the banner of the Regions."* In 2013, the Paris Air Show welcomed more than 2,200 exhibitors, 285 delegations, 150 aircraft and 315,000 visitors. The 2015 Show is sure to follow suit, and is aiming at equivalent figures. *"The results of the 2013 satisfaction survey produced a satisfaction rate of 90%, with 30% saying they were very satisfied. Quite unprecedented!"* states an enthusiastic Emeric d'Arcimoles, who then goes on to say: *"... and it all augurs well for this coming June."*

"THE PARIS AIR SHOW REMAINS THE WORLD'S BIGGEST AERONAUTICAL GATHERING"

Continuing to combat pollution

Along the same lines as the previous edition, the first four days of the show are reserved for professionals, with the three remaining days open to the general public, avid to witness the aerial demonstrations. *"These general public days remain of prime importance, since they put on show the power and the grandeur of the aeronautical industry for the world to see. They should not be taken for granted,"* says the event commissioner, before adding: *"And, in order to receive visitors under optimal conditions, we have set up a veritable bus station at Le Bourget, complete with shelters."*

A welcome initiative indeed, considering the heavy downpours that marked the 2013 edition!

Once inside the halls, what will be found there? Even if the exhibitors are remaining discreet about the innovations and promised contracts to come, the events and entertainment programme has been released. Business meetings, Elite programmes for corporate VIPs, aviation meet, etc., will be spread throughout the week. *"In the light of the upcoming COP21*,"* says Emeric d'Arcimoles, *"due to take place at Le Bourget next December, we shall be promoting the efforts made by the aerospace industry in combating pollution, and which are often under-appreciated. On the morning of 18 June, a debate in the presence of Laurent Fabius will bring together climate experts, government authorities and representatives from industry."* CORAC, the "Council for Civil Aeronautical Research", dedicated to the aircraft of the future, will be presenting all the latest technological innovations in its pavilion. The *"L'avion des métiers"* careers initiative will also feature once again this year, illustrating the various production-related aeronautical professions. This offers young people a concrete means of discovering who does what in the design of an aircraft.

This 51st edition of Le Bourget therefore looks set to be a top-notch event with, as the common thread, the innovation and dynamism of the industry: an industry that is, according to Emeric d'Arcimoles, *"in stabilisation phase, but stabilisation on an upward curve"*.

* Convention of the parties on climate change.

Interview with Ségolène Royal

Offering every French citizen access to low-carbon mobility

SÉGOLÈNE ROYAL
Ministry of Ecology, Sustainable Development and Energy

In a context of fighting climate change, how do you see growth in air transport?

◆ **SÉGOLÈNE ROYAL:** Air transport represents 2% of gross domestic product in France. It contributes to the dynamism of our country, not to mention commercial, economic and cultural exchange.
In the context of the transition towards sustainable development in France and Europe, and to limit the impact of our economy on climate change, this sector is subject to a duty to ensure its environmental performance. It represents 2% of greenhouse gas emissions at international level.
At national level, CO_2 emissions by French domestic air traffic have dropped by 23% since 2000. Research and development in the aeronautical and energy fields have played a key role in France, with commitments by the sector.
In order to provide access to low carbon mobility services for all French citizens, we must improve the technology of our fleets using ever-greener and lighter vehicles and aircraft, reducing dependency on fossil fuels, and adapt our operating and flight control procedures to achieve more economic results and promote the use of the mode of transport with the lowest emission levels per traveller, depending on the length of the journey.
At international level, the International Civil Aviation Organization (ICAO) is working to implement a worldwide system based on compensating for CO_2 emissions in the air transport sector.

End-2014, the State committed to providing €5.1 million in financial support for the E-FAN project. Why is this assistance being granted?

◆ **S. R.:** The E-FAN project is a 100% electric aircraft developed by the Airbus group. The prototype has already flown. I was able to see the E-FAN operate at the Toussus-le-Noble aerodrome.
This is the aircraft of the future, which will simplify relationships between local inhabitants and light aviation, while giving aeronautical training a future.
The E-Fan represents real achievement as part of sustainable development policy in the air transport sector, providing inspiration for the future and justifying the State's contribution of €5.1 million over 18 months, in addition to the initial support provided by the regions of Aquitaine and Poitou-Charentes and the Ministry's programmes.
Furthermore, a French partnership has built up around the E-Fan incorporating international industrial operators such as Airbus or Safran, SME or middlemarket firms specialised in composite materials and electronics, and aeronautical training schools such as the ENAC*. This project promotes sustainable development.

How do you appraise Air France's Lab 'line for the future initiative?

◆ **S. R.:** In the last 50 years, the aeronautical sector has reduced the consumption of aircraft by almost 80%. Until now, the aviation sector has been obliged to use liquid fuel with very high energy content meeting severe operating limitations in order to fly large long-haul airliners. Technologies are evolving and we must support innovation in order to be on the front line of sustainable development, creating the activities and jobs of the future.
Air France's use of synthetic fuels, which do not compete with the food industry, up to 10%, can improve the carbon footprint of a flight by up to 80%, according to a durability analysis covering the entire life cycle.
The feedback from these trials is precious in view of considering an alternative to 100% kerosene flights, and we must face the challenge of creating a fully-fledged French synthetic fuel sector for aviation purposes. Electric aircraft, solar aircraft, aircraft flying with synthetic fuels, these are just a few options enabling the air transport sector to contribute to the fight against climate change.

* École nationale de l'aviation civile (French Civil Aviation Academy).

Interview with Alain Vidalies

Restoring fair competition with airlines of the Gulf

ALAIN VIDALIES
Secretary of State for Transport, Maritime Affairs and Fisheries

You will be chairing the CORAC meeting that will take place at the Paris Air Show. Why is this event important?

◆ **ALAIN VIDALIES:** The Paris Air Show, the world's number one aerospace exhibition, provides a showcase for the French manufacturing industry, in order to demonstrate its know-how and innovations. It is the perfect time and place for organising a meeting of CORAC *(Conseil pour la recherche aéronautique civile* - Council for Civil Aeronautical Research). CORAC mobilises all French stakeholders in preparing the future of the aeronautical industry. These stakeholders work towards producing air transport that is more competitive and more environmentally-friendly.
The French aeronautical industry stands out for its excellence, but new competitors from the emerging countries are beginning to come to the fore. To maintain its technological lead, it needs to invest in research.
This CORAC meeting will make it possible to run the rule over the current projects: the design of new piloting systems; new production and assembly methods; and a research platform dedicated to new aircraft configurations. This research is an investment priority for the French Government and benefits, as such, from the "Programme of Investment for the Future".

"FRANCE OCCUPIES A STRONG POSITION ON THE CIVIL UAV MARKET."

A "Council for civil UAVs", created in the framework of the "New Industrial France", was established in early 2014. What is its mission?

◆ **A. V.:** France occupies a strong position on the potentially lucrative civil UAV market. This market already represents, on the national scale, some 40 manufacturers, 1,000 operators and 2,500 jobs. Turnover for the sector should reach €300 million by the end of the year. This type of aircraft offers multiple development possibilities: in the audiovisual field; in the surveillance of large networks and civil works; and in agriculture. Most of the operators are still small companies, each operating a limited number of drones. Our objective is to facilitate the development of first-tier industrial players, capable of meeting the needs of major clients such as the SNCF, EDF and construction companies.
The French Government is determined to develop an industrial channel for civil UAVs. This is precisely the role of the "Council for Civil UAVs" *(Conseil pour les drones civils),* chaired by the director of the DGAC: structuring the sector in coordination with all stakeholders, in order to come up with a technological roadmap akin to that of CORAC.

In the light of the Le Roux Report, the Government took measures to enhance the competitiveness of French air transport. What actions are being taken by France at European level in order to ensure a more equitable balance between the EU carriers and those of the Gulf states, in particular?

◆ **A. V.:** At the request of France and Germany, this point was on the agenda of the European Council of Transport Ministers on 13 March of this year. Alongside Alexander Dobrindt, the German Transport Minister, we proposed to our counterparts and to the European Commission to adopt a common strategy in order to restore fair competition with the airlines of the Gulf.
We wish to provide the European Commission with a mandate for negotiation, with the intention of obtaining the guarantee that extending the traffic rights granted to foreign airlines should be associated with genuine control of their mode of operation, particularly with regard to the public subsidies and guarantees from which certain of these airlines benefit.
I am delighted that this proposal received a favourable reception from the European commissioner responsible for transport, and the support in particular of the Netherlands, Belgium, Sweden and Austria.

Interview with Marwan Lahoud

Aeronautical construction tomorrow and beyond

MARWAN LAHOUD
Chairman of GIFAS,
the French aerospace industries association

Thanks to a successful ramp-up in production, the French aeronautical industry closed 2014 with a show of solid growth and full order books, providing a sound basis for continuing the modernisation of production facilities and attracting the necessary talent for the pursuit of growth.

The French aeronautical industry closed 2014 on the back of global revenue to the tune of €50.7 billion, up by 2.9%; exports up by 6%; orders to the value of €73 billion (matching the record set in 2013); and a positive contribution of €23.6 billion to the balance of trading. *"It has been a solid year,"* confirms Marwan Lahoud, President of GIFAS.

Buoyed by the civil sector (77% of revenue and 83% of orders), this growth owes a great deal to the capacity of the supply chain. With €16.5 billion revenue (up 6%) and orders estimated at €16.8 billion (up 5.2%), the OEMs and SMEs of GIFAS have demonstrated their capacity to keep pace with the rapid rate of production ramp-up. From 2007 to 2013, the proportion of revenue dedicated to exports increased by 43% with the OEMs and by 27% with the SMEs. The only blot on the landscape is the *"Loi de programmation militaire"* ("Military Planning Act"), for which the funding has still not been secured. This is a situation that: *"endangers the very existence of hundreds of SMEs, for whom the switchover from military to civil is purely theoretical,"* according to the GIFAS President.

An attractive branch of industry

In 2014, the industry accounted for 10,000 hirings, with the net creation of 2,000 new jobs, although 2015 will be a year of "stabilisation", according to Marwan Lahoud. The 8,000 planned recruitments (24% manual workers, 42% engineers, 28% technicians and 6% clerical staff) will, for the most part, replace departing staff.

Faced with the difficulties of filling certain posts (welders, fitters, boilermakers, CNC machinists), GIFAS will be relaunching the *"L'avion des métiers"* careers initiative at this year's Paris Air Show. *"We need to demonstrate the full diversity of our business lines and the career opportunities that they offer, so that the SMEs can find the operators that they need in order to support the ramp-up in production that lies ahead of us,"* Mr. Lahoud goes on to say.

Alongside this, GIFAS has built up partnerships with various teaching establishments. The accent, moreover, is placed on work/study training. In 2014, 6,000 young people pursued this type of training, with 100 or so on "shared paths" between a major corporation and an SME. *"In 2015, we shall be maintaining the work/study training dynamic and shall increase the number of shared paths,"* the GIFAS President declares.

A350 and rapid transitions

In order to face the major challenge of the ramp-up period for new products (A350) and the rapid transitions – from A320 to A320neo and from CFM56 to LEAP – GIFAS is banking on reinforced across-the-board consistency in the industry, permanent investments in the production facilities, and the "Industrial Performance" programme, a State/Industry partnership aimed at micro-enterprises/SMEs and launched by GIFAS. *"In 14 regions, we have a mechanism that makes it possible to share know-how and provide training in the same production and management tools for both major prime contractors on the one hand, and OEMs and SMEs on the other,"* stresses Marwan Lahoud: *"Internal consultants from within the industry have delivered 4100 training days to 400 SMEs/micro-enterprises."*

The industry is also going to pursue its modernisation along three lines: the development of common digital platforms for sharing data, the integration of the business sectors and the anticipation of changes to the regulations. *"We need to be ready here and now for tomorrow and beyond,"* declares the GIFAS President.

Interview with Violeta Bulc

Creating a more competitive and integrated market

VIOLETA BULC
European Commissioner
for Transport

How do you envisage addressing the many challenges of the aviation sector during your term of office?

◆ **VIOLETA BULC:** What I would like to see in place is a dynamic, positive and innovative strategy, for stimulating international and regional competitiveness. I believe that we need to engage in dialogue and work with our neighbours in order to create a level playing field and fair competition. Today, we are in a single market as far as airlines are concerned, but this is not the case outside the EU. Relations with third-party countries fall mainly within the remit of the 28 Member States. There must be discussion about the legal framework, so as to work together on how to address the general aviation regions and the commercial partners.

"WE NEED TO WORK WITH OUR NEIGHBOURS IN ORDER TO CREATE A FAIR COMPETITION."

Other regions have placed aviation at the heart of their commercial strategies. Fierce global competition, coupled with a relative loss of capacity of the EU's main airports, risks compromising our position on the global aviation market. Capacity constraints are another major concern that we need to deal with, and rapidly. Increased capacity will encourage growth, and have a positive impact on job creation in the sector.

The new strategy must also take account of common priorities with regard to regulations, such as the revision of certain safety standards, but also new rules for the development of the civil UAV market, for example. Despite concerns relating to security, safety and privacy, this market offers an opportunity that Europe cannot afford to miss. The European aviation community came together in Riga in March 2015 and drew up several basic principles, which may in particular be supported by signing up online to the Riga Declaration.

Common priorities for developing infrastructures and a specific strategy for stimulating competition are also crucial for the future of aviation. This is a major challenge for airline companies in Europe. What is needed is to meet the increasing demand for routes and better connections, while at the same time reducing costs and the environmental impact. We need to create a more competitive and integrated aviation market, using regional connectivity to best effect.

The first step in defining the new aviation strategy consists in gathering the opinions and ideas of everyone involved in the aviation ecosystem, by means of a public consultation that runs until 10 June 2015. I am confident that the end result will pave the way to success for European aviation.

How do you believe that Europe should organise itself in order to encourage innovation in aeronautical construction?

◆ **V. B.:** The EU aviation policy is suited to the needs of the various users of the airspace, and is focused on the competitiveness of the European industry. Yet internal competitiveness must also come from innovation, for which Europe is well placed in many domains. But this competitive edge must be underpinned.

EU leadership in aeronautical manufacturing generates many highly qualified jobs. This stimulates technological innovation, which then seeps into other sectors of the European economy. Our industry is a global precursor in many aeronautical domains, such as air traffic management, UAVs, biofuels, decarbonisation technologies and R&D. Digital technology is increasing the productivity and hence the competitiveness of the industry. Innovative business models ensure the global competitiveness of EU airlines. Young Europeans are therefore attracted to careers in all the fields of aviation, and the courses on offer from the European universities correspond closely to the needs of the aviation ecosystem, and to the need for a global reputation for excellence.

INDUS-TRY

Clean Sky 2 in cruise flight mode

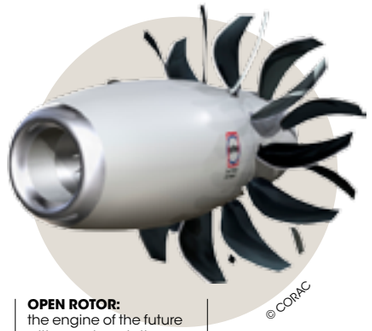
Launched in May 2014, Clean Sky 2 is an aeronautical research programme intended to accelerate the path to maturity for the game-changing technologies required for a qualitative leap in the environmental performance of aviation.

Backed by almost €1.8 billion of public subsidies, Clean Sky 2 is an impressive European public-private partnership in which aeronautical industry heavyweights, SMEs, universities and R&D bodies join forces in order to address extremely ambitious environmental objectives. The official launch of Clean Sky 2 was announced by José-Manuel Barroso on 9 July 2014 as Europe's most important aeronautical research programme.
Launched in the framework of the new European "Horizon 2020" programme, this second phase of the Clean Sky programme also constitutes a major challenge for European aviation, whose ambition is to increase through innovation its technological leadership in the context of heightened global competition. Scheduled to run until 2023, Clean Sky 2 should make it possible to go further in the development of technical demonstrators in order to attain the objectives set by the European advisory council, ACARE*, in line with the new European roadmap: "Flightpath 2050". *"Clean Sky 2 focuses more on the platforms equipped with highly integrated demonstrators, i.e.: full-scale research concept platforms for the three broad domains of: wide-bodied aircraft, regional/business aircraft, and rapid hybrid rotary-wing aircraft. Another new feature of Clean Sky 2 is the line of research dedicated to light aviation, which we were keen to include in this second stage,"* explains Patrice Desvallées, now deputy technical director for European cooperation at the DSAC (*Direction de la sécurité de l'Aviation civile*).

Open-rotors, cockpits, rapid hybrid helicopters...

Airbus should in particular be flight-testing, in cooperation with Safran, an "open-rotor" engine. The industry is also highly involved in the demonstration programmes devoted to the "more-electric aircraft" architectures, and to the cockpit of the future, as well as in the platform dedicated to new fuselage architectures. Another major line of research will target the helicopter of the future, with work in particular on the concept of the convertible helicopter. Just as in the first phase, an assessor will be tasked with evaluating the technological and environmental gains recorded on the eight platforms. As a driving force, and keenly involved since the very start, the DGAC sits on the Clean Sky "State representatives group". *"One of the great assets of Clean Sky (and Clean Sky 2) is its public-private partnership system, with real commitment over time from the public authorities and the manufacturing industry,"* points out Myriam Habib, vice-head of the Office for Aeronautics Research Support Policy at the DTA. Clean Sky 2 should ultimately bring together over 800 partners selected from multiple RFPs, with 40% of these partners being SMEs.
Henri Cormier

*Advisory Council for Aviation Research and Innovation in Europe.



OPEN ROTOR: the engine of the future with counter-rotating high-speed propellers, from Safran.

© CORAC

In sight

Bringing Clean Sky 1 to maturity

_Even if Clean Sky 2 brings with it several new fields of research, such as light aviation (aircraft with 19 seats maximum), it will also be drawing on the results obtained previously by those involved in this research programme. It will also place a greater accent on the flight demonstration of the Clean Sky 1 technologies.
The first Clean Sky period made it possible in particular to make significant progress in the field of propulsion (inducted turbofan, UHBR engines) and in fields such as natural laminarity, and integrated & optimised systems (e.g., via cockpit technologies).

The neo option, a strategy that pays

The A320neo* and A330neo, enhanced versions of already-existing aircraft, are designed to satisfy the keen expectations of the market without having to wait for the advent of the game-changing technologies, which are not yet sufficiently mature.

© A. Doumenjou-MasterFilms/Airbus 2014

AIRBUS A320NEO waiting for its PW1100G-JM engines.

Even if the new, "game-changing" technologies applied to airliners are promising, their maturity and their development costs do not yet meet expectations.
However, the airline companies are becoming increasingly demanding on a market which today exerts rigorous demands in terms of performance, savings and environmental protection. *"This is the reason why Airbus has again used an incremental development strategy on existing aircraft, based on re-engining, aerodynamic modifications and innovations in the cabin. Applied successively to its A320 and A330, this strategy is once again paying off,"* explains Sylvain Four, head of the major programmes office at the DGAC.

"ITS STRATEGY ENABLES AIRBUS TO MAINTAIN, AND EVEN INCREASE, ITS MARKET SHARE."

SYLVAIN FOUR / HEAD OF THE MAJOR PROGRAMMES OFFICE AT THE DGAC

"It makes it possible to rapidly satisfy the needs of carriers by offering them improved versions of existing aircraft, while limiting the aircraft manufacturer's financial and technological risks. In this way it enables Airbus to maintain, and even increase, its market share, faced with ever stiffer competition," Sylvain Four goes on to say.
Although Boeing may have been the first to apply this principle with its famous 737, on three occasions, and then later, on the 777 and the 747, Airbus has already had recourse to this with the A340-600 and then the A330 (developed from the A340).
Of course, the success of this strategy rests above all on the operational qualities of the aircraft to which it is applied. Yet the challenge, when up against a Boeing 737, was no less significant, with the market segment for "single-aisle / medium-haul" aircraft currently representing almost 80% of Airbus sales!

Almost 60% of the market

"With the A320neo, we have outstripped Boeing and widened the gap in terms of performance," stresses Didier Evrard, Airbus programmes director, who acknowledges moreover the risk taken with respect to a possible new aircraft that Boeing might have launched to replace the 737. *"We had studied this solution but, considering the quality of the existing product and the developments that had already been carried through, we adjudged that re-engining was a satisfactory solution in terms of performance gain."* Furthermore, the cost of development was limited since it amounted to some €1.5 billion compared to more than €10 billion for the A350 XWB.
Just a few months after the maiden flight of the A320neo, the wager seems to have paid off, since by the end of 2014 Airbus had already seen 3621 orders placed, despite the competition from the B737MAX. These sales place the European manufacturer in the lead with almost 60% of market share in this segment. By the end of December, there were a total of 5129 aircraft from the A320 family, all versions combined, on order - equating to almost 9 years of guaranteed production.
With some 95% of the parts common to the A320neo and to that of the current version, the industrial transition between the two programmes is facilitated. The production rate should consistently rise to reach 46 aircraft per month in the second quarter of 2016, both versions combined. The main modification is an aerodynamic one, with the wings now equipped with "sharklets", large ailerons at the end of the wing.
The engines will be proposed with two options: the PW1100G-JM from Pratt & Whitney, and the LEAP1-A from CFM International *(see box insert)*. Thanks to these engines, the cabin innovations and these "sharklets", the A320neo will offer up to 20% fuel savings per seat.
The aircraft is due to come into service in the second half of this year (with the P&W engine), then in 2016 with the CFM LEAP engine. Improvements will continue to be made subsequently, on both the engines and the cabin layout.

A challenger for the 787

For its part, the A330neo, also retaining 95% of the airframe of its predecessor, will be proposed with just one engine type: the Rolls-Royce Trent 7000. Its improvements derive for the most part from the new A350 XWB, such as the wing aerodynamics (in particular thanks to the wing-end mechanisms), the onboard systems, the avionics and, here again, the cabin layout. The bottom line economically can be summarised in fuel reductions amounting to 14% per seat. In addition, the aircraft will generate less noise and will benefit from an increased flight range.
This sets the A330neo therefore in direct competition with the Boeing 787, and in place of the future -800 version of the A350. Sales expectations for it amount to some 1000 models by 2032, representing one-quarter of the market in this medium/long-haul segment. It is due to come into service in T4 2017.

Régis Noyé

**New Engine Option.*

© Snecma/Safran

In detail

LEAP, the all-challenging engine

Successor to the celebrated CFM56, the LEAP is the new-generation engine that has also been chosen to equip the B737MAX and the Chinese C919. It is developed by CFM International, a 40-year old joint company between the French Snecma (Safran) and the American GE. It incorporates multiple technologies thanks to which it reduces by 15% both fuel consumption and CO_2 emissions. LEAP orders already amounted to over 8400 units on 31 December 2014, including some 2400 for the A320neo, representing more than 50% of the market share for this aircraft.

"The LEAP engine represents a triple challenge: technological, with extremely significant gains in terms of fuel consumption, along with a reliability level comparable to that of the CFM56 from the moment it goes into service; financial, with a development budget of some $2 billion; and an industrial transition challenge, with production that could reach 1,800 engines per year in 2019, with the CFM56 itself rising to 1,600 units this year."

CÉDRIC GOUBET / DIRECTOR OF THE CIVIL ENGINES DIVISION AT SNECMA

"WITH THE A320NEO, WE HAVE OUTSTRIPPED BOEING AND WIDENED THE GAP IN TERMS OF PERFORMANCE."

DIDIER EVRARD / AIRBUS PROGRAMMES DIRECTOR

Two new Falcons at Dassault

After the longest-lasting crisis yet for business aviation, Dassault Aviation launches two new high-end Falcons on the market. As well as a sign of its confidence in the future, this also represents a major economic and industrial challenge.

© P. Stroppa/Dassault Aviation

© Dassault Aviation

TOP, the Falcon 8X has a range of 11,945 km.

LEFT, the Falcon 5X is capable of transporting up to 19 passengers.

Paradoxically, it is the lightest aircraft that were most affected by the crisis hitting business aviation since 2009. For the analysts, this is the sign that there existed a very specific demand from users for luxury aircraft capable of addressing precise needs, both in terms of flight range and cabin volume. Dassault Aviation therefore made the decision to launch simultaneously, at the height of the crisis, and faced with still high levels of competition, the development of two new programmes: the Falcon 5X and Falcon 8X. These aircraft are situated respectively in the long-range twinjet with very large cabin, and ultra long-range trijet segments. Their two main competitors are the Gulfstream (G500, G600 and G650ER models) and the Bombardier (Global 7000 and 8000).

The biggest investment

"These aircraft represent the biggest investment in Falcon programmes to date," declares Éric Trappier, CEO of Dassault Aviation. It is indeed thanks to its solid financial muscle and a strategy with a long-term perspective that the family-owned company is able to face this challenge, in the wake of the worst crisis ever to have affected business aviation.

Another challenge lay in the simultaneous development of the aircraft. One can just imagine the workload that this must have represented in the upstream phases, in the design offices, and the workload then to come for the testing and certification teams. Mastering these operations was facilitated by the use of extremely sophisticated IT tools. Not least among these was the digital mockup, linking in real time all industrial partners with data that was kept permanently up-to-date.

Major assets

Dassault Aviation also knew that it could draw on two major assets, testified by a total of 2,400 Falcons delivered to date in more than 90 countries: the trust of its clients and its remarkable technical quality.

"Many qualities have contributed to the success and the reputation of the Falcon," explains Sylvain Four, head of the major programmes office at the DGAC: *"Firstly, there are the cutting-edge technologies, derived from the military aircraft technologies developed by the company, and relating to the aerodynamics, the structure and systems. This includes for example the digital flight control system (DFCS), which is now extended to include all the moving control surfaces on the Falcon 5X."*

"MANY QUALITIES HAVE CONTRIBUTED TO THE SUCCESS AND THE REPUTATION OF THE FALCON."

SYLVAIN FOUR / HEAD OF THE MAJOR PROGRAMMES OFFICE AT THE DGAC

The result translates into better performance, making it possible for example to take off from a short runway and fly to more distant destinations without stopover. Ultimately this leads to greater flexibility in operation, underpinned by excellent reliability.

"These levels of performance are backed up moreover by low operating costs, resulting from reduced fuel consumption and maintenance costs," Sylvain Four goes on to say.

"All these qualities have built up market trust for Dassault Aviation, with the company demonstrating that it has been able to keep its promises," confirms Olivier Villa, Senior Vice President, Civil Aircraft, Dassault Aviation.

This trust has been again translated into bumper orders, compared to previous years, boosted by the Falcon 5X and 8X.

The largest cabin cross-section

With a flight range of 9,600 km, the Falcon 5X is the first totally new aircraft to be produced from many years in the "long-range" category. Ensconced in the heart of the business aircraft market, between the "large" and the "ultra long-range" categories, this segment currently offers better potential, with customers today favouring comfort and autonomy.

The Falcon 5X will have the largest cross-section cabin of all the Falcons (2.58 m wide and 1.98 m ceiling height), accommodating up to 19 passengers. Another powerful argument in favour of the Falcon 5X comes in the form of its new French Silvercrest engine, developed by Snecma (see box insert). Lastly, the aircraft benefits from ultra-modern avionics and display systems.

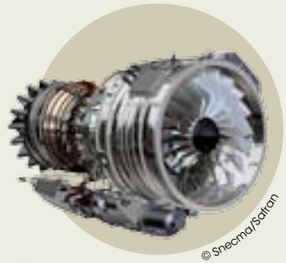
Its maiden flight is scheduled for the second half of 2015 and its certifications (EASA and FAA) are expected in late 2016.

The longest range

For its part, the Falcon 8X is derived from the 7X, but with sufficient changes to merit a change of designation, and now constitutes the model with the longest cabin (13 m) and the greatest action radius (11,945 km). *"It really was developed taking into account two priority market demands: an action radius extended by 900 km, enabling flights between Paris and Singapore, Moscow and Los Angeles and Tel Aviv to New York, for example; and a cabin that is an extra 1 m long, enabling a wider diversity of cabin fittings, such as the addition of a rest area for the crew,"* Olivier Villa declares.

Equipped with the same Pratt & Whitney Canada PW 307 engines as the Falcon 7X, the Falcon 8X made its maiden flight on 8 March this year, and it is scheduled to come into service by the end of the year.

Régis Noyé



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In detail

The Silvercrest engine: a first for Snecma

_The Silvercrest engine is the first civil engine entirely developed by Snecma, and the first engine for business aircraft designed by the firm. Drawing on the new technologies of the CFM and LEAP engines, it offers substantial fuel savings (-15%) and enhanced eco-efficiency. Among its other benefits, an integrated maintenance system ensures optimum reliability. As well as Dassault Aviation, it has also been chosen to equip the Cessna Longitude. *"No other engine could have offered the same performance for the Falcon 5X,"* Olivier Villa is keen to stress.

The CO_2 standard in the approach phase

Aviation is getting mobilised to implement the first global standard for CO_2 emissions. Here we take a look at the challenges and tasks relating to this standard, due to be introduced in 2016.

Great news for the climate! With Paris gearing up to host COP 21[1], the aviation industry is moving forward with the drafting of a global CO_2 emissions standard for aircraft. Decided upon at the general assembly of the ICAO in October 2010, this standard is meant to anticipate the effects of CO_2 emissions linked to the increase in air traffic in the decades to come. Though aviation may only account for around 2% of the world's CO_2 emissions today, the forecast growth in air traffic means that action is required here and now. *"We should not forget that here we're talking fairly long time scales, and that this standard will not come into force before 2020 at the earliest. What is more, the new standard will only start to make its effects felt progressively, as the aircraft fleets are renewed,"* stresses Jonathan Gilad, deputy director for sustainable development at the DTA[2]. After validating the metrics for this standard in 2013, the Committee on Aviation Environmental Protection (CAEP)[3] is today working on its technical specifications: regulatory levels, date of applicability, type of aircraft concerned (aircraft certified before or after the date of entry into force).

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Knowing where to place the cursor

The decision on this new global standard will be taken at the CAEP meeting scheduled for February 2016, ahead of the ICAO assembly in late 2016. Currently, one of the main points of discussion relates of course to the stringency level of this standard, which differs fairly significantly from the standards for noise and for NOx, adopted in the past by the ICAO. *"This CO_2 standard differs from the previous standards insofar as it ties in with an economic optimisation approach on the part of the manufacturers, in whose interest it is that their aircraft consume as little fuel as possible. We therefore need to strike the right balance so as to obtain the environmental effects desired from this standard, without endangering the economic viability of the manufacturers,"* Jonathan Gilad goes on to say.

Henri Cormier

Airbus keenly involved in drafting the future standard

Airbus works in close collaboration with the Member States of the CAEP via the implementation of best practices or standards, such as the CO_2 standard currently being developed. *"We work with the experts of the CAEP to ensure that this new standard can fit in alongside all the already-existing standards, without calling into question the fundamental principles of safety,"* explains Olivier Husse, Environmental Policy Director at Airbus. This standard is also intended to promote the technological developments on the European manufacturer's aircraft over the years to come. It is certainly the case that Airbus invests significant sums in R&D, as Olivier Husse is keen to underline: *"Airbus invests around €2 billion annually in R&D for developing incremental innovations intended to improve the performance of our aircraft. This CO_2 standard needs to be developed in such a way as not to impede these technological developments, or not to force technological developments that would not be robust for our sector."*

1. Conference of the Parties of the United Nations Framework Convention on Climate Change.
2. Direction du transport aérien (French Air Transport Directorate).
3. Structure of the International Civil Aviation Organization (ICAO).

Successful take-off for Coriolis Composites

The robotised fibre placement cells developed over the past 15 years by Coriolis have won over the big clients in the European aeronautical industry. This is a success based in particular on a policy of innovation and co-development.

© Y. Zedda/Coriolis Composites

A ROBOT OF CORIOLIS COMPOSITES based near Lorient (Brittany).

Founded in 2001 by three student engineers, Coriolis Composites has become in less than two decades a company of stature in the composites sector. When this SME, based near Lorient (Brittany) got off the ground, its sights were set more on the open sea than the sky. The idea of the three young graduates was to develop innovative fibre placement systems that could be adapted for use with standard robots, and to propose them to the boatbuilding industry. Yet salvation would finally come down from the skies and, more precisely, from Airbus, which placed its first order with the Breton SME in 2006. What came next is the tale of a success story: Dassault, Daher, Bombardier… the orders came in thick and fast, and the staff numbers increased tenfold in just two years. This success was largely due to the flexibility of the system developed by Coriolis Composites. *"Our machines,"* explains Clémentine Gallet, CEO of Coriolis Composites, *"are designed on the basis of industrial robotics, and their small size and flexibility make it possible to produce a large number of different parts, from the rear of the Falcon for Dassault through the engine nacelles for Safran to the fuselage of the A350 for Airbus."*

A co-development approach

The success of the company, which today employs some 120 staff, and which has more than 30 clients on its books and forecast revenue for this year set to exceed €25 million, also owes much to the collaborative and co-development approach undertaken with its big clients. The discussions and work undertaken in conjunction with the large aeronautical corporations for developing prototypes and validating *ad hoc* technologies constitute one of the keys to the rise to prominence of Coriolis Composites. The company has also been able to develop a major R&D activity by channelling over 15% of its revenue every year into R&D. Supported by the DGAC, the SME is today one of the partners associated with the "Aeronautical Factory of the Future" project, developed within CORAC*, and here too profits from the collaborative approach alongside the major corporations and OEMs involved in this line of research. *"Currently we are associated with the research platform and we are capable of launching projects ourselves,"* says Clémentine Gallet, with an air of contentment.

Henri Cormier

**Conseil pour la recherche aéronautique civile* (Council for Civil Aeronautical Research).

A cross-functional vision

Aside from financial support, the DGAC offers innovative SMEs such as Coriolis Composites precious support with their R&D strategy. In the CORAC framework, the role of the DGAC consists in supporting collaborative projects that bring together both big industrial corporations and partners of more modest dimensions. *"We have a cross-functional vision of the sector and a capacity for dialogue with the entire industry, which allows us to coordinate the efforts of the various parties. And it is vital that the research strategies of these parties are set out along a timeline and according to objectives that are both ambitious and realistic,"* stresses Chems Chkioua, head of the aeronautical research support policy office of the DTA*. *"The DGAC experts provide us with constructive feedback and make it possible for everyone to work confidently together. We know that we won't be asked to work on projects that don't stand up to scrutiny"* explains Clémentine Gallet.

**Direction du transport aérien* (French Air Transport Directorate).

Civil UAVs
Generating a flight plan

Thanks to a favourable regulatory environment, France has become one of the international leaders in the field of civil UAVs. Today, the industry is looking to develop its structures so as to maintain its lead and guarantee its future.

© Novadem

NX110 DRONE
from the designer and manufacturer, Novadem.

Recently, at a trade fair in the Netherlands, the managers of one of the best-known American start-ups in the world of civil UAVs told me that they didn't have any commercial assignments for the big corporations on account of the impediments linked to the absence of regulations", says Emmanuel de Maistre, representative of industrial operators for the FPDC (*Fédération professionnelle du drone civil* - French Professional Federation for Civil UAVs) and boss of the UAV operator, Redbird. Last February, the FAA[1] finally unveiled its initial recommendations for regulating the use of commercial UAVs in US airspace, a full three years after the first regulatory framework established in France, which has enabled the French civil UAV industry to really take off and become the European leader in this domain. Today, the French civil UAV industry accounts for just short of €100 million in revenue, and over 1,000 operators. The media and communications sector continues to account for the lion's share, with around 80% of the market, and the proportion of industrial operators on the market is showing a slight increase. Their representation amounts to around 10% to 20% of the total, with real prospects of development in the building & civil works, and long-distance networks surveillance sectors, according to Emmanuel de Maistre. Then of course there is agriculture, which is likely to utilize increasingly the remote detection capability provided by drones for guiding the irrigation of crops or regulating fertilisation, for example.

> Discover the regulations and specific procedures for piloting a UAV.

Advantages and fragility of the sector

According to the FPDC, the civil UAV industry could be worth several hundred million euros by the end of the decade, and represent 5,000 - 7,000 jobs. *"Today we have many advantages to help us succeed. The regulations have already facilitated many things, enabling us to be at the cutting-edge in this field. In addition, the industry is comprehensively catered to by every stakeholder from end to end of the production line, and can boast leaders in terms of equipment and service offerings,"* states Chems Chkioua, head of the aeronautical research support policy office of the DTA[2]. This is an encouraging state of affairs, but this is not to overlook the obstacles that do exist and which must be eliminated in order not to hold back the anticipated growth of the civil UAV industry in France. The first of these obstacles is the fragility of the sector, on account of the prevalence of SMEs, or even micro-enterprises, involved in it. *"We mustn't rest on our laurels since we are by no means out of the woods yet. We should not forget that UAVs remain an ancillary activity for most of the companies present in the sector, and that these companies cannot live 100% off their drones business,"* Emmanuel de Maistre explains. The development of a full-fledged civil UAV industry will therefore involve the heightened commitment of the major clients, the arrival of investors in these companies, and the pursuit of a regulatory policy making it possible to provide a favourable framework for the development of the industry.

Helping the industry to develop a structure

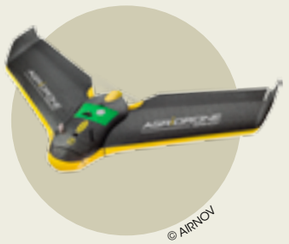
The establishment, in the framework of one of the 34 plans for the "new industrial France", of a "Council for civil UAVs" (*Conseil pour les drones civils*) undoubtedly constitutes a strong signal for the future of the sector. Based on the principle of CORAC[3] and chaired initially by the DGAC Director, Patrick Gandil, this Council for civil UAVs should provide the opportunity to bring together all the stakeholders in the industry to reflect on ways to break the constraints holding back the industrial expansion of civil UAVs. On the various committees of the Council, manufacturers, operators, potential clients and DGAC representatives will seek to come up with a technological roadmap, to examine the desirable and possible changes to the regulations, to find the best means of supporting the industry financially, and to promote the industry internationally. *"The role of the DGAC on this Council is not to prescribe measures or to rule the roost, but to coordinate the efforts of all those involved, whether they be heavyweights in the aeronautical sector such as Airbus, Sagem or Thales, or more modest participants. The purpose of the Council for civil UAVs is to encourage a truly collaborative approach and thereby to make telling progress,"* says Chems Chkioua. How do we produce certification or qualification systems suited to the uses of all? How do we find a way of harmonising procedures with the aerodromes? What training needs to be put in place for UAV operators? How do we help the manufacturers with their exports? The Council will be looking to provide answers to these questions, and many more, over the months to come. It is all about ensuring that the French civil UAV keeps flying at the head of the pack.

Henri Cormier

"THE PURPOSE OF THE COUNCIL FOR CIVIL UAVS IS TO ENCOURAGE A TRULY COLLABORATIVE APPROACH."

CHEMS CHKIOUA / HEAD OF THE AERONAUTICAL RESEARCH SUPPORT POLICY OFFICE OF THE DTA

1. *Federal Aviation Administration.*
2. *Direction du transport aérien* (Air Transport Directorate).
3. *Conseil pour la recherche aéronautique civile* (Council for Civil Aeronautical Research).



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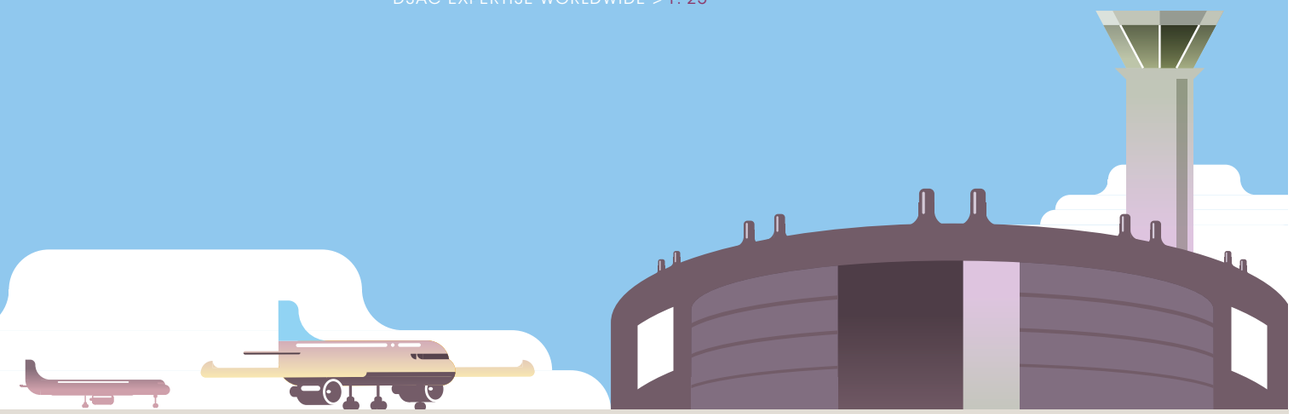
In practice

Flexible and scalable regulations

_Striking the golden mean between the economic necessities of a rapidly-developing sector and the safety of people and property on the ground, as well as that of other air users: this is the spirit of the regulations drawn up very early on by the DGAC. Generally speaking, UAVs may not, unless specifically authorised, overfly populated zones or fly near to airport zones.
In addition, the overflight of certain sensitive sites such as nuclear power stations is prohibited. Civil UAVs are classified according to their usage and their weight. Four nominal flight scenarios have been determined according to the complexity of use of the UAV, and the "routine" treatment of these scenarios has been established. These regulations, dating from 2012, are due to be updated in the course of 2015. This update should make it possible to tweak the predefined scenarios in order to tie in more closely with operational needs; to clarify certain requirements; and to alleviate some of the administrative procedures with the purpose, in particular, of better meeting the needs for reactivity on the part of the operators. The adaptation of the training requirements for UAV pilots according to their activity is also currently under discussion.

AIR TRANS-PORT



> Comprehensive information about the Lab'line project and the future of biofuels.

Lab'line
All aboard for the future

Since October 2014, an Air France plane takes off on a weekly basis from Toulouse for Paris-Orly with biofuel in its tanks. It's a flight that prefigures the "green" flights of tomorrow. Focus on this "Lab'line" which is in service until next September...

Aviation, unlike other modes of transport, does not today have any alternative to liquid fuels. In this context, the Airbus A321 flight operated on 21 October 2014 by Air France between Toulouse and Orly airport was of quite particular importance. It marked the launch of the "Lab'line for the future" operation, with which the DGAC is associated, and which consists in operating for one year a weekly flight run on biofuel. The biofuel used is a mixture of 10% maximum farnesane, a chemical derived from the fermentation of sugar cane and produced by Total-Amyris, and fossil-sourced kerosene. The analysis of the sustainability of this biofuel throughout its life cycle (from production of the biomass to the burning of the fuel) has demonstrated that its use could improve, by up to 80%, the carbon inventory of the flight, and that it would not be in competition with the food industry. *"For several years, certified biofuels have been available. Today, the obstacles are more economical, logistical and organisational than technological or scientific. Lab'line ties in with this logic. It is an operation that should make it possible, among other things, to see just what the operational impacts are of the long-term use of biofuel on a commercial flight,"* declares Anne-Laure Gaumerais of the Office for Aeronautics Research Support Policy at the DTA.

Biofuel and optimised flight profiles

Qualified as a: *"true showcase for innovation in the service of sustainable development"* by the Air France managers, Lab'line therefore attempts to delineate what green travel of the future will be like, by combining the use of biofuels and the implementation of innovative operational measures, technologies, products and services. The 21 October flight thus combined a payload of biofuel and the use of air navigation procedures aimed at limiting noise pollution and gaseous emissions. *"For this flight, as for the others, the objective was to obtain an optimised take-off, with continuous climb up to optimum cruise flight level, then to facilitate a continuous descent approach to the runway without levelling out, in order to reduce gaseous emissions and the noise perceived on the ground,"* explains Alain Bourgin, environmental mission head at the DSNA. Even if the conclusions deriving from this Toulouse to Paris-Orly flight operation are very encouraging with regard to reducing the environmental impact *(see box insert)*, there is still quite a way to go in order to transition from the experimental phase to the industrial operations phase, whether this involves the creation of a true national biofuels industry for aviation or the establishment of *ad hoc* operational facilities, akin to the "Business Trajectory" provided for in the SESAR programme. With "Lab'line for the future", the ball has been set rolling.

Henri Cormier

© C. Le Havel/Air France

21 NOVEMBER 2014. Launch by Air France of the "Lab'line for the future" operation.

Key figures

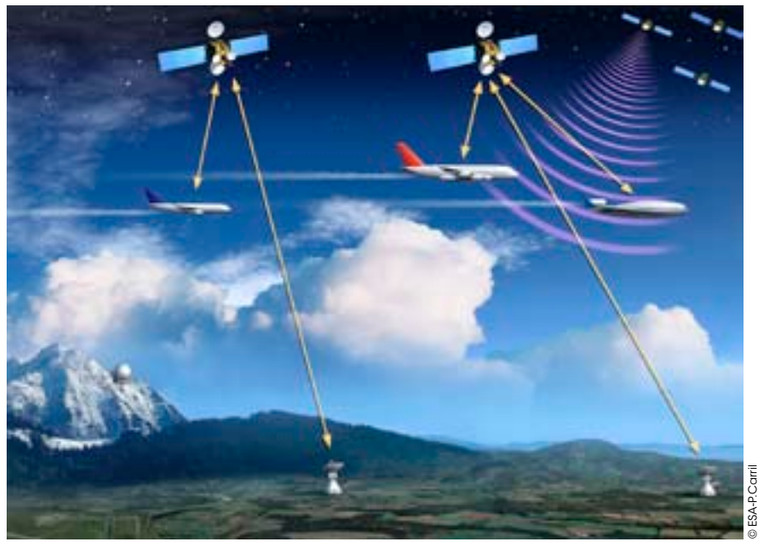
Manifest reductions in gaseous emissions and noise

The results observed for this Air France flight conducted in the framework of Lab'line demonstrate savings of between 250 to 300 kg of fuel. This reduced consumption is obtained thanks to the set of measures put in place (continuous descent approach, reduced structural weight, etc.). This effectively generates an improved flight carbon inventory, underpinned by the use of a biofuel. The optimised flight profile has also made it possible to reduce sound pollution by between 4 and 5 dB.

> All information about the European SESAR programme.

SESAR Programme
Heading towards 2020… and beyond!

Upon conclusion of the first R&D phase, lasting from 2008 to 2014, the SESAR programme begins deployment at the same time as launching a second development phase, called SESAR 2020.



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The objectives of the SESAR[1] programme, from the start, have consisted in organising and co-funding of research dedicated to air traffic management in Europe improvement. To reach these objectives, the European Commission created a body called SESAR Joint Undertaking (SESARJU), responsible among other things for receiving and then allocating the necessary funding for planned research and development. *"In the course of its first phase,"* recalls Pierre-Yves Huerre, vice-director of strategy planning at DSNA *(Direction des services de la navigation aérienne* - French Air Navigation Services Directorate), *"the SESAR programme targeted the organisation of research with different partners in fairly free fashion with regard to the directions to take, even if this was against a background of attempting to harmonise the systems and procedures that would ultimately be implemented."* In the course of the 2006-2008 period, it was therefore a matter of determining the broad outlines of the envisaged research programmes. A document was then drafted in the form of a master plan, receiving the name of the "Air Traffic Management Master Plan". *"The ATM Master Plan is intended to provide a framework for the air traffic management system developments as desired by the stakeholders. It describes these developments, the services to be provided to users and the expected performance gains,"* explains Dominique Stammler, SESAR programme director at the DSNA for this period.

Adapting to developments in air transport

Designed to be a scalable document, this master plan benefits from periodic revisions, in order to adapt it to certain contextual changes. For example, since 2006 air traffic has grown less rapidly than predicted, but has become structured in an unexpected way featuring ever greater traffic peaks. Likewise, the fluctuations in the price of oil have brought to the fore environmental concerns and the notion of flight energy efficiency. The first major revision of the ATM Master Plan was therefore conducted in 2012. *"A second revision has been worked on since December 2014,"* says Pierre-Yves Huerre. As a founding document, the ATM Master Plan provides a framework for the activities born from the objectives that it sets. *"The SESAR JU work programme,"* says Dominique Stammler, *"includes in particular carrying out the R&D operations as identified in the Master Plan. Deployment itself is intended to implement the functionalities deriving from this R&D."* This is where the Pilot Common Project, or PCP, comes in.

Deadlines

The PCP is a document that provides a framework for deployment of certain functionalities described in the ATM Master Plan (*see* Aviation Civile *No. 371, pp. 28 and 30*). It takes the form of a European Commission implementing regulation. As such, its observance is mandatory for the parties concerned. It will be followed up by other Common Projects, each aiming at the implementation of additional functionalities. For a new functionality to be included in a common project, it must have been, according to Dominique Stammler: *"considered sufficiently mature, in other words studied, developed and identified as offering performance improvements, via simulations, demonstrations and validations."* *"The PCP specifies implementation deadlines for each of its functionalities. These deadlines range from 2018 to 2025, applicable airports and airspaces are also detailed in the PCP,"* says Patrick Souchu, SESAR programme director at DSNA. Appointed on 5 December 2014 by the European Commission, the Deployment Manager, or DM, is a body that plays a major role in the process. It is composed of representatives of major operator structures: 4 groups of air carriers, 11 ANSPs[2] and 25 airports. Its advent marks the beginning of the deployment phase for technical solutions generated by the SESAR programme. The first of these is the "Free Route" concept, that includes direct routing at Flight levels above 31,000 feet (approximately 9,450 m) should be in place by 1 January 2018 at the latest.

The DM: multirole player

Responsible for the actual deployment, the DM follows up the implementation of the PCP, examines any problems encountered and proposes solutions to resolve them. It is then the DM's job to coordinate the actions of those involved in constructing the implementation projects, in line with the obligations laid down by the PCP. Yet the DM also serves as intermediary between the project sponsors and the trans-European transport network executive agency (Innovation & Network Executive Agency, or INEA), the European agency that hands out the funding granted by the European Commission. Out of a global envelope of €3 billion for the period 2014-2020, €300 million were recently earmarked for a request for proposals with a view to launching deployment, including €240 million for the PCP.

François Blanc

1. Single European Sky ATM Research.
2. Air Navigation Service Provider.

Interview with Patrick Souchu, SESAR programme director at the DSNA

New projects of research

Just what is SESAR 2020?

◆ **PATRICK SOUCHU:** SESAR 2020 is the extension to the development phase of the SESAR programme for the years 2016 to 2024, piloted by SESAR JU with the contribution of its members. It draws on €585 million funded in the framework of the European Commission's Horizon 2020 program. SESAR 2020 includes a work programme composed of exploratory research projects, 18 applied research projects and a dozen or so demonstration projects.

What are the issues facing this new phase of SESAR?

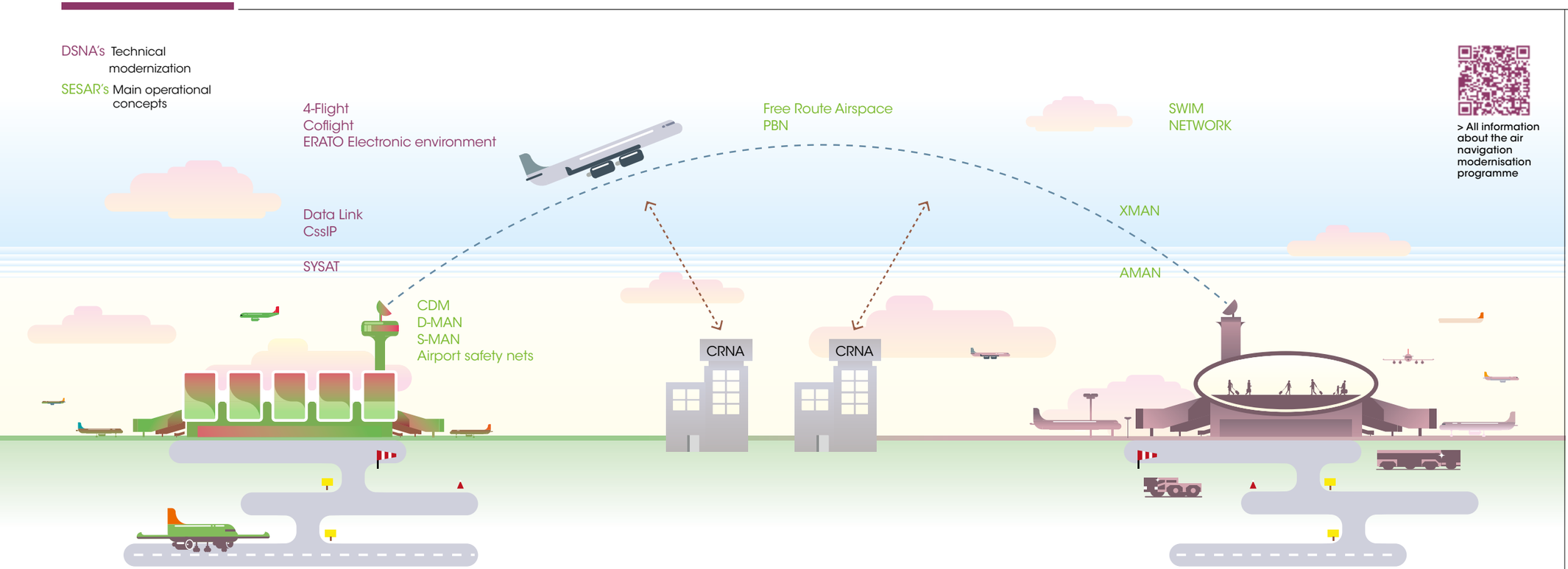
◆ **P. S.:** The demonstration projects are tied in with the prospects for risk reduction linked to the deployment of new functionalities, in particular those of the PCP (Pilot Common Project). The applied research projects will make it possible both to extend the concepts defined in SESAR 1 and to launch new ideas that could be deployed as a follow-on from the PCP, in line with the results of work carried out in the framework of SESAR 2020 dedicated to ATM system performance improvement in airports, network management and advanced ATS[1] services. SESAR 2020 should also enable better integration of RPAS[2] in air traffic management.

"The applied research projects will make it possible both to extend the concepts defined in SESAR 1 and to launch new ideas."

What is the calendar for SESAR 2020?

◆ **P. S.:** 19 member applicants, including the DSNA, were selected in October 2014. A request for proposals is scheduled for May 2015 with the objective of initiating a first wave of projects before the end of 2015. A second wave of projects will follow on from this in 2018.

1. Air Traffic Services.
2. Remotely Piloted Aircraft Systems.



> All information about the air navigation modernisation programme

DSNA
Towards a new technological horizon

The DSNA is committed to a short to mid-term technical modernisation approach. Certain research tasks carried out in the framework of the European SESAR programme are leading it to do this at just the right time.

Today, in France, air traffic management is based on a complex IT system called CAUTRA (*Coordination automatique du trafic aérien* - Automatic Coordination of Air Traffic). Developed in stage up until the start of the 1980s, its gradual enhancement facilitated improved performance. *"Our systems are robust, but they are technologically outdated,"* warns Pierre-Yves Huerre, deputy director for strategy and planning at DSNA (*Direction des services de la navigation aérienne* - French Air Navigation Services Directorate). It so happens that certain developments derived from the SESAR[1] programme are offering DSNA the prime opportunity to modernise its technical resources.

What SESAR offers

The fruits of the research prompted by SESAR: *"require a generational overhaul of our system with, in particular, the stripless environment[2] and the 4D trajectory concept[3], rather than an upgrade of the existing technology,"* states Pierre-Yves Huerre. By the same token, the air navigation telecommunications networks, until now structured around analogic facilities, are required to operate using digital data processing over IP[4]. *"This is a large-scale project, since once the analogic network has switched over to IP mode, we will still have to migrate all the applications linked to the network,"* says the deputy director of planning and strategy. *"A large proportion of our lines were switched over at the end of 2014, and the process should be terminated in June 2015. The migration of the application software will follow on from this."* As for the SWIM[5] concept, it is: *"built on the idea that the aircraft becomes one of the nodes of the network, in the same way as the aerodromes, the flight control centres and the airlines operations centers, with all these elements being interconnected and called upon to communicate via an automated system,"* he goes on to explain.

Work on a major scale

DSNA's strategy consists therefore in leveraging the advent of new technical solutions, while complying with the time frame of the PCP[6]. The main benefits expected from this technological generation upgrade relate to the higher precision in the aircraft's flight path prediction; the efficiency gains obtained by optimising data exchange between ground installations and aircraft in flight; and the increased capacity of the communication networks.
Other possible outcomes require considerable work to be carried out. This includes replacing the telephone and radio communications systems of the five "air navigation route centres" (CRNA - *Centres en route de la navigation aérienne*). *"The first upgraded centre will be that of Brest, scheduled for 2017-2018,"* relates Pierre-Yves Huerre.
The SYSAT (*Système approche et tour* - Approach and Control Tower System) programme aims at equipping all approach control centres and control towers in metropolitan France with more modern and efficient equipment. *"This is a challenge that we need to address between now and 2021, both in terms of the purchasing of the materials and the appropriation of the equipment and its interfaces by the DSNA personnel,"* he goes on to say. *"Overseas, the investment programme will make it possible to pursue the modernisation of the air navigation installations. So it is that, in the regions of the Pacific and Atlantic Oceans under French control, in the vicinity of French Guiana, new satellite-assisted air traffic control systems (ADS-C and CPDLC) have already been successfully introduced. Extended coverage (ADS-B) has been installed in Reunion and New Caledonia, feasibility studies are underway in Saint Pierre & Miquelon and a first deployment is tabled for French Polynesia,"* says Pierre-Yves Huerre, *in conclusion,"* Pierre-Yves Huerre concludes.

François Blanc

In progress

Initial assessments for 4-Flight

_"4-Flight is the SESAR and PCP programme implementation for DSNA", says Damien Figarol, director of the 4-Flight programme at the DSNA, by way of summary introduction. A new flight data management system, founded on a brand-new technical base, 4-Flight is meant to take over from the CAUTRA system. The technological leap induced by the programme involves pursuing two main objectives: *"The implementation of a fully electronic environment for air traffic controllers, on the one hand, and a new trajectory management system, on the other,"* Mr. Figarol explains. 4-Flight will ultimately be deployed in the five CRNAs that cover metropolitan France: Aix-en-Provence, Reims, Brest, Bordeaux and Athis-Mons. *"We're aiming to bring into service the first two centres—at Reims and Aix-en-Provence—in late 2018",* he goes on to say. In order to achieve this scheduling objective, an *"integrated team"* has been implemented. *"This involved getting all the parties to work together in close collaboration: engineers from the Technical and Innovation department of DSNA, and operational experts (air traffic controllers and electronics engineers). We therefore draw on the operational expertise of the users and integrate this into the design teams,"* explains Damien Figarol. Over the course of spring 2015, the personnel from the Reims and Aix-en-Provence centres are embarking on long-term operational assessments.
"The extended operational assessments will make it possible to validate the system, and enhance its functionalities by providing the necessary improvements in the lead-up to its commissioning," states the programme director.

1. Single European Sky ATM Research.
2. Digital, paperless solution enabling air traffic controllers to communicate with the air traffic management system.
3. Trajectory of an aircraft defined by points in the four dimensions (longitude, latitude, altitude, plus time).
4. Internet Protocol.
5. System Wide Information Management: concept targeting the expanded and optimised sharing of information between the parties concerned by air traffic management (air navigation service providers, commercial aircraft operators, pilots, airport managers, etc.).
6. Pilot Common Project (*see art. on pp. 20-21 in this issue of* Aviation Civile).

A virtuous safety loop

The last stage in the development and certification process for an aircraft, the flights carried out by EASA involving skills work of OCV[1] pilots enable its operational assessment according to two key factors: functionality and safety.


© V. Valdois/Air France

The objective of the OCV Operational test flights and expertise are to check that all the aircraft systems are suitable and usable in complete safety under normal conditions of use. This mission required 103 days of work from the OCV pilot inspector responsible for the A350 programme. This made it possible, for example, to determine the minimum level of equipment required for successfully running a commercial flight. *"We do in fact represent the last stage in a virtuous safety loop, consisting in the final validation of a system, in association with the design centre that developed the system, following on from the various phases of design, development, construction, ground and flight testing, and conformity checking,"* explains Thierry Bouchez, director of the OCV. The work of the expert pilots of the OCV is documented in "OSD[2]" reports, which serve as a reference base for the operators and training bodies.

Indeed, another important facet of the organisation's activities consists in establishing the technical criteria to be taken into account for training crews in the use of the aircraft systems. In the case of the development of a new aircraft based on an already-existing aircraft, it is the experts designated by the EASA[3], and including the pilots of the OCV, who determine whether or not the type rating (TR) of pilots can be common to the two versions. Hence, the TR for the A330 was extended to that for the A350, and the possibility of a common type rating for the Falcon 7X and 8X is soon to be studied.

Lastly, the OCV pilots also assess the conformity of flight simulators, particularly at the limits of the certified flight range. To comply with the conformity criteria and stick as closely as possible to the certification rules, close collaboration with the EPNER[4] is envisaged.

A recurrent mission

The expertise of the OCV may in fact be required throughout the service life of the aircraft. This is true every time a manufacturer makes a modification to a system such as, for example, with the operational assessment last September of the latest version of avionics for the Falcon 7X.

All this work is carried out on test rigs, through documentation analysis, on flight simulators, and by means of actual flights, with recourse to the latter being limited for reasons of economy. Flights may take place anywhere, whether in the skies above London City Airport for assessing steep approaches, or above the Alps for inspecting the HUD[5] of the Falcon 2000.

The OCV is directly attached to the DGAC but is answerable to the EASA for OSD[6] missions. It is made up of 12 pilots (including two helicopter pilots), all pilots-in-command working for airline companies, seconded for 50% of their time according to the co-opting principle. All of these 12 pilots are flight operations inspectors. The first mission of OCV is to guarantee to French Civil Aviation Director that the safety level is in accordance with the requested one.

Régis Noyé

Preliminary "acceptance testing" phase

Prior to the entry into service of an aircraft, this phase comprises two types of flight carried out by the flight testing sub-department of the DGA[7] (ex-CEV), at Istres. The flight tests make it possible to observe, in real-life situations, how the aircraft behaves, its manoeuvrability, and the operation of its systems. In complementing the ground tests, they make it possible to verify the certification criteria. "Acceptance test" flights make it possible to establish the conformity of the aircraft on quitting the assembly line. All of these flights are carried out by pilots with "acceptance testing" qualification obtained from the EPNER[4].

1. *Organisme du contrôle en vol* - French Flight Control Organisation.
2. Operational Suitability Data.
3. European Aviation Safety Agency.
4. *École du personnel navigant d'essais et de réception* - French Test Pilot School.
5. Head-Up Display.
6. Previously OEB, for Operational Evaluation Board.
7. *Direction générale de l'armement* - French Armaments Procurement Agency.

DSAC expertise worldwide

From standards development through to certification, including working on approvals for training bodies and consultancy services for foreign organisations, DSAC experts are involved in many projects and missions in Europe and around the world.


© DGAC-DSAC

A DSAC EXPERT on an Air France stopover audit in Bangkok.

Whether participating on the working groups of the International Civil Aviation Organization (ICAO), or of the European Commission and/or the European Aviation Safety Agency (EASA), the experts of the French Civil Aviation Safety Directorate (DSAC) are increasingly in demand from the big international bodies. Their contribution to projects of European or global scope concern both the development of new standards applicable to various areas of civil aviation and evaluating the implementation of new measures. *"These activities are important for us, particularly inasmuch as they enable us to ensure that the concerns of the French authorities, users and operators are properly understood and taken on board in international projects,"* explains Patrick Cipriani, DSAC director. Other actions on an international scale lead these experts to work more directly on behalf of EASA.

Audits and service provision

The Agency regularly carries out audits of the National Civil Aviation Authorities of the EU States. These "standardisation" audits call upon the involvement of 15 or so DSAC experts. French experts, naturally, do not carry out any such audits in France.

In a separate context, DSAC expertise is also called upon by EASA in the framework of contractual agreements, leading to DSAC acting as a service provider for the European agency. *"DSAC is the number one supervisory authority in Europe, in global volumes of services provided to EASA,"* says the DSAC director, speaking on the topic. *"We contribute to the certification activities, relating for example to the future E-Fan Electric aircraft, or to the modified avionics systems of the A380. This may also involve approving pilot training centres, or issuing approval for maintenance workshops abroad."* In early 2015, EASA and DSAC signed, moreover, an agreement whereby the two entities will be planning their collaboration over several years in order to be able to optimise their respective organisations.

Consulting and training

DSAC also undertakes consulting, training and cooperation missions on behalf of foreign countries. These missions may be carried out in the framework of bilateral agreements, but also under the aegis of the European Commission, which manages cooperation and assistance programmes for the benefit of countries outside the EU, in particular in Asia, South America and Africa. *"These missions may concern a variety of sectors and stakeholders, such as air traffic control, airports or air operators,"* Mr. Cipriani goes on to say. However, even though he wishes to encourage these overseas missions insofar as: *"… they offer insight and professional enhancement of real value to our agents,"* the DSAC director states that this: *"… can only take place by us deciding, on a case-by-case basis, if a given operation is compatible with our national imperatives for a given period."*

François Blanc

Key figures

50 DSAC experts
work on 100 distinct working parties for ICAO or EASA.

15 DSAC auditors
take part in EASA audit activities (pilots' medicals, flight operations, air operations, simulators, air traffic management, airworthiness).

INTER-NATIONAL

MCI Serving air safety worldwide

Elisabeth Dallo, Head of the MCI (*Mission de coopération internationale*/ International cooperation mission) at the DTA (French Air Transport Directorate), discusses the role played by her team on the world air safety scene. She also talks about what the future may hold.


© F. Stucin

What are the challenges of international cooperation?

◆ **ELISABETH DALLO:** Improving air transport safety constitutes the big challenge for international cooperation. Indeed, certain countries, for various reasons, have not attained the adequate safety level determined by the ICAO (International Civil Aviation Organization). These countries therefore seek technical assistance in order to fully assume their responsibilities.

What are the DGAC's assets in this domain?

◆ **E. D.:** As an integrated structure, the DGAC is responsible for the application of regulations and for the inspection and supervision of airports, air operations, air navigation, personnel licences and qualifications, and so on. My team and I can draw on the DGAC experts in each of these domains. We also possess a choice resource for personnel training in the shape of the ENAC (*École nationale de l'aviation civile*), French Civil Aviation Academy, certified in December 2014 as a Regional centre of training excellence by the ICAO. I would add that, for our partners –the civil aviation authorities– it is vital to work with representatives of an authority, at the same level of legitimacy and responsibility.

What have been the main developments in international cooperation in recent years?

◆ **E. D.:** The main development concerns the growth in demand, essentially due to the fact that increasing attention is being paid worldwide to air transport safety. Requests in this regard may emanate from countries where air transport is a fairly under-developed activity and where the minimum level of structures and qualified personnel is lacking; or from countries where there has been extremely rapid air transport development and which have been incapable of adapting their structures at the same rate. Then there are of course the countries affected by natural disasters, or war, or which are in the throes of political situations that cause chaos both for the aeronautical installations and for the institutions responsible for them.

How do you see international cooperation developing, in particular as far as France is concerned?

◆ **E. D.:** There will continue to be a strong element of bilateral cooperation, a factor that structures the history of our relations and our mutual trust. But we may also, and increasingly so, take part in programmes funded by the European Union and exclusively earmarked for execution by the authorities of the Member States, either directly in the case of twinning projects, or under the coordination of the European Aviation Safety Agency (EASA), calling on the skills of the civil aviation authorities of the Member States.

Is international cooperation all about institutional relations?

◆ **E. D.:** Institutional relations are necessary and indispensable. Yet since the task is enormous and the capabilities of the institutions are not unlimited, the manufacturing industry and private engineering companies also clearly have their part to play. It is also the case that the best results are obtained when there is dialogue between them and us, leading to more efficient conduct of coordinated and complementary actions.

INTERVIEWED BY *Henri Cormier*

Key figures

43 cooperative agreements signed between 1998 and 2014.

44 cooperative actions are due to be implemented, targeting 37 countries in 2015.

MCI commitment to Asia and Africa

MCI *(Mission de coopération internationale*/International Cooperation Mission) is involved, sometimes in collaboration with Airbus, on helping the Civil Aviation Authorities to reinforce the supervision of their airlines. Here are some examples of this support in the Philippines, Indonesia and Madagascar.

MCI'S TEAM, from left to right (upright): Sophie Germain, Emanuela Gellini, Emmanuel Rocque, Élisabeth Dallo, Franck Giraud; (sitting): Philippe Lambert and Marinette Lachant.

© F. Stucin

The problems linked to aviation safety have led the European Commission to set up an Aviation Safety Committee, whose decisions generate an EU "ban list" of certain airlines. This was the case for all Indonesian and Philippines airline companies, which prevented them from developing long-haul routes to Europe.
The situation has improved in recent years, since five Indonesian airlines have been taken off the list, along with Philippines Airlines and Cebu Pacific. This was made possible by the Indonesian and Philippines authorities by the implementation of mechanisms to reinforce the oversight of their air operators.
As far as Madagascar is concerned, the national carrier is currently subject to operating restrictions. This forces Air Madagascar to charter from other airline in order to operate its routes to mainland France, which is in particular financially disadvantageous.

Progress in Asia

In the framework of cooperation agreements concluded long time ago with Indonesia and more recently with the Philippines, *"the DGAC offers long-term support for the authorities of these two countries. This assistance is intended to reinforce their skills in matters of airline oversight. This involves improving the quality of the audits for the renewal of AOCs (Air Operator Certificates), and of the continuous supervision plans, as well as ensuring that the personnel responsible for this surveillance are correctly trained,"* explains Emanuela Gellini, Director cooperation Asia-Pacific for MCI (*Mission de coopération internationale*/International Cooperation Mission).
In parallel to this assistance to the Authorities, Airbus provides its support to its customers which are the airlines in order to reinforce the safety of their operations. *"These concomitant efforts are the only thing that will enable the airline to get off the EU ban list,"* adds Emanuela Gellini.
It is up to the European Aviation Safety Committee, which meets twice a year, to decide if the progress made in Indonesia and the Philippines justifies their airlines being removed from the EU ban list by the end of 2015.

Economic challenges in Madagascar

Madagascar also benefits from an assistance plan whose object is to reinforce the supervisory capacities of its civil aviation authority. Signed in May 2014 and funded by France via the SAFE fund of ICAO, this plan has two facets. The first involves assisting the authorities, and is conducted by Egis Avia. The second consists in an exchange programme for inspectors between the DGAC and its Malagasy counterpart.
An initial one-week mission for a DGAC inspector based in Reunion thus took place in February 2015. *"Our assistance contract aims at helping the Malagasy civil aviation authority in meeting international standards. Yet the authority must also, to this end, conduct a certain number of actions such as the hiring of airworthiness and air operations inspectors. These hirings have, moreover, begun to take place,"* says Sophie Germain, Director cooperation Africa for MCI. The progress made in this fashion will benefit not only Air Madagascar but also the companies plying domestic flights. *"There is indeed a great deal economically at stake with services to tourist sites that are currently developing rapidly, such as Nosy Be"*, Sophie Germain concludes.

Olivier Constant

Financial support of Airbus for the ASEAN zone

In the framework of MCI assistance plans in Asia, Airbus is not restricting its financial support to a handful of countries including Indonesia and the Philippines. Its commitment extends in fact far more widely, since it encompasses more globally the ASEAN (Association of Southeast Asian Nations) market. *"This market is expanding rapidly. It constitutes a priority for Airbus. Airbus is not simply content to sell its aircraft there, but wishes also to ensure that these aircrafts are operated in accordance with international safety criteria (ICAO standards). There are two support levels: the first is financial, and concerns the programmes developed by the DGAC in the sovereign domain. The second relates to the support that we provide by way of our expertise. The fields concerned are: pilot training, maintenance management, and flight operations support. This operational support is all the more crucial insofar as the ASEAN nations are experiencing booming growth rates. The challenge is therefore to have access to trained personnel, including by way of our Airbus ProSky subsidiary, in the fields of ATC (Air Traffic Control) and ATM (Air Traffic Management). We can also, if the airlines ask us to, make an adviser available to them. The role of such an adviser is to provide answers to all the questions that the airline may have in matters of the organisation of maintenance and operations"*, explains André Poutrel, international safety programmes director at Airbus.
The DGAC, for its part, handles the entire coordination of the operation, including all relations with its foreign counterparts.

"THIS ASSISTANCE IS INTENDED TO REINFORCE THEIR SKILLS IN MATTERS OF AIRLINE OVERSIGHT."

EMANUELA GELLINI / DIRECTOR COOPERATION ASIA-PACIFIC FOR MCI

France-Vietnam: a fruitful collaboration

Regarding the extremely strong growth in its fleet of commercial aircraft, Vietnam once again approached the DGAC for help in improving its air operator supervision procedures. An overview.

The links between the DGAC and its Vietnamese counterpart, the CAAV, date back quite some time. They hark back to a technical cooperation agreement signed on 5 October 1998 and tacitly renewed ever since. It was therefore only natural that the CAAV should once again turn to its French partner in late 2013. Faced with the continuous growth in the size of the commercial aircraft fleet, *"(the CAAV) approached us to see if we were prepared to carry out specific on-the-job training in Vietnam for the inspectors tasked with the oversight of the air operators. The objective for the CAAV is to ensure that this surveillance is compliant with the international standards. We answered in the affirmative, and began work in the first half of 2014. This training concerns the inspectors of the CAAV responsible for conducting ground and flight operation audits for the airlines, for monitoring aircraft airworthiness and for monitoring the maintenance workshops that they have certified,"* explains Emanuela Gellini, Director cooperation Asia-Pacific for the MCI (*Mission de coopération internationale*/International cooperation mission).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Supplementary instructor training

Dispensed on-site, the supplementary training requested by the Vietnamese involves selecting two inspectors for each of the fields of training. Once their training is complete, following a three-week session, they will become instructors responsible for dispensing, in their turn, training to new entrants or to personnel already in office within the CAAV. With the financial support of Airbus, three experts will therefore be sent to Vietnam in the first half of 2015. A former DGAC expert, having taken early retirement, will therefore be responsible for the ground operations segment while a pilot inspector for flight operations from the DSAC (*Direction de la sécurité de l'Aviation civile* - Civil Aviation Safety Directorate) will handle the flight control component. An expert from the OSAC (*Organisme pour la sécurité de l'aviation civile* - French Civil Aviation Safety Organisation) will complete the trio for monitoring airworthiness and maintenance.

"This contribution is all the more crucial considering the sustained growth in deliveries of aircraft from Airbus to this country. Vietjet Air will indeed be receiving on average more than one A320 per month in 2015," explains, for his part, Michel Guérard, Vice-President Flight Safety Operations at Airbus. The manufacturer has also made a consultant available to the aforementioned company since late 2014, in order to answer all the questions that the airline may have concerning the organisation of maintenance and operations.

Olivier Constant

On-the-job training

This training will be dispensed under real-life conditions. *"Our experts will show them, among other things, how to conduct an audit for an airline by using the regulations and the manuals developed by the CAAV,"* says Emanuela Gellini. *"In order to meet the training needs of the Vietnamese authorities, we set up several meetings in Hanoi in January 2015,"* states Jean-Philippe Pinaud, Flight Operations Inspector at the DSAC. *"These enabled us to define a tailored programme and a schedule that would allow the DSAC to present its working methods to the Vietnamese personnel. This programme consists in jointly conducting inspections, both on flights in operation and in sessions on the flight simulator. In this way we hope to satisfy the demands of the Vietnamese authority, but there can be no doubt that this exchange will be beneficial for all, and this sharing of experience could prove constructive for both parties."*

Albania chooses DGAC

Albania has chosen France and Romania to train its local administration in the aeronautical standards of the European Union. Endowed with a budget of €800,000, this European twinning project will mobilise some 50 experts until 2016.

In 2013, Albania benefited for the second time from a European twinning operation dedicated to civil aviation. Endowed with €800,000, this project will enable it to bring its aeronautical standards into line with those in force in the skies of the European Union. Out of the European bodies that may have helped it in this regard, it chose the DGAC in association, for the occasion, with its Romanian counterpart. *"The objective is to effect convergence between the Albanian system and that of the European Union in the field of operator regulation and surveillance,"* says Franck Giraud, Europe region task officer for the MCI (*Mission de coopération internationale*/International cooperation mission).

During the initial phase, between spring and autumn 2014, DGAC experts went to Albania to identify the domains and sub-domains where there are significant deviations between the local standards and those of the European Union. *"This assessment phase makes it possible to identify the actions to be carried out and the resources to be mobilised,"* Franck Giraud explains. This incremental work is then regularly formalised and validated progressively by the European Commission.


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Prioritising actions

This identification makes sure above all that the priorities are properly classified, as Franck Giraud points out: *"Since it would be impossible to fulfil such a vast mission in just two years, we have therefore identified the sectors in which we would provide most added value, by means of a permanent dialogue in order to determine what type of expertise is most relevant."*

This brought to light the domains on which the teams will be focusing: supervision of air navigation services, the environment, aligning the regulations ("transposition"), and security. On a day-to-day basis, this mission is quite unlike those that we usually carry out internationally. *"Albania already has a system that works, but it is based on the standards of the ICAO, which are less strict than those of the European Union,"* says Mr. Giraud. *"Its audit system, for example, will have to be modified for certifying air navigation service providers and thereby converge with the standards of the European Union."*

In total, this twinning operation should mobilise 50 or so French and Romanian experts who will be training an equivalent number of their Albanian counterparts, in application of various methods: traditional on-site training, to make it easier to understand the European standards and transpose them; study visits during which an Albanian team will come to Paris to familiarise itself with the practices of the DGAC; and OJT (on-the-job training), consisting in putting into practice in France a training course already taken in Albania in order to get a better perception of the differences in the standards and practices. Launched in spring 2014, the operation should be terminated in 2016.

Gilmar Martins

Twinning: a step on the path to EU membership

Created in 1998, twinning is one of the Instruments for Pre-Accession Assistance (IPA). Its purpose is to help countries wishing to join the European Union to prepare for adopting and implementing EU law. Since 2003, the western Balkans, eastern Europe, Central Asia and Mediterranean third-party countries (ENPI - European Neighbourhood and Partnership Instrument - zone) are eligible for this partnership instrument between the administrations of the Member States and their counterparts in third-party countries. Once a need is identified, the EU launches a call for proposals open exclusively to public bodies. On average, a twinning operation lasts two years and mobilises €1.5 million. The IPA budget for the period 2014-2020 amounts to €11.7 billion*.

*http://ec.europa.eu/enlargement/instruments/overview/index_fr.htm

French-Indian Master's in air navigation

In cooperation with DGAC and ENAC,
India is now training its future air navigation managers
by offering a specialised Master's degree.

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TOP: Four of the five French members of the steering committee and executive board.

LEFT: Master's opening ceremony, Hyderabad, 9 March, 2015.

India represents an enormous potential market in air transport. Testifying to this are the acquisitions of aircraft by its airlines in order to meet the growth in demand, along with the links established with European manufacturers such as Airbus, ATR and Eurocopter (now Airbus Helicopters). In parallel, in order to address a situation of continuous growth, the Indian authorities have undertaken to develop their civil air navigation services. This has prompted AAI (Airports Authority of India) to establish cooperation and technical exchange relations with DGAC, in order to benefit from the latter's expertise, with the authority-to-authority relationship offering a guarantee of perfect impartiality in the relations between the two partners.

A cooperation agreement was signed in 2010. In early 2013, AAI asked DGAC for support in assessing its training needs for air navigation personnel, in particular air traffic controllers and maintenance technicians. A Mission, funded by DGAC, consisting of two experts from ENAC (*École nationale de l'aviation civile*/French Civil Aviation Academy), and the DGAC representative at the French Embassy in Delhi, visited CATC's facilities at Allahabad (India) and then drafted a report on the subject. Training, among others, engineers, technicians and air traffic controllers, ENAC has all the skills in-house to satisfy the needs of AAI.

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50 TRAINEES PER SESSION AND 17 WEEKS OF TEACHING FROM ENAC LECTURERS AND CONTRIBUTORS FROM AAI.

The Mission report brought to light a certain deficit with regard to the managerial training, in other words the training of the managers in charge of supervising air traffic controllers and equipment maintenance technicians. This gave rise to the project proposed by DGAC for the creation of a specialised "Air Navigation Service Provider Management" Master's course for training: *"a new generation of managers in the requisite techniques, so as to understand and support the current and future sustained growth of air transport in India,"* says Philippe Lambert, Director Cooperation Near and Middle East/South Asia Region for MCI (*Mission de coopération internationale*/Department of international cooperation). These managers will subsequently be occupying the posts of technical supervisors and air traffic control room managers. To this end, DGAC, ENAC and AAI agreed to conclude a commercial agreement that was signed in August 2014, following on from long and detailed negotiations.

The teaching of this Master's, delivered in the framework of the CGE (*Conférence des grandes écoles* - Conference of French Business and Engineering Schools), commenced in March 2015. It is dispensed at CATC (Civil Aviation Training College), the Indian equivalent of ENAC, and concerns 50 trainees per session (i.e.: 25 controllers and 25 technicians). The course programme comprises 17 weeks of teaching from ENAC lecturers and contributors from AAI, followed by a 4-6 month internship. Following this, the trainees present their thesis, which will be submitted to a joint jury.

Promoting French know-how

This is all overseen by a steering committee composed of two members of AAI, two ENAC representatives[1], and Philippe Lambert. In charge of monitoring the progress of the programme, it meets once a year. An executive board, made up of two representatives of AAI and two members of ENAC[2], oversees the smooth running of the Master's from an operational point of view. The responsibility for assigning the participants for the Master's course is the remit of the Indians themselves. Philippe Lambert insists on the importance of this Master's, a project that will extend over several years. The development potential of air transport in India is considerable, with the authorities nurturing the ambition to raise the country to world number three status in this domain by 2020. On the French side, the involvement of MCI will make it possible for the latter to promote French know-how, and may lay the groundwork for other projects of the same kind in India itself or elsewhere in the region. This project represents a unique technical, human and cultural endeavour for everyone in the ENAC and DGAC teams involved in it.

Germain Chambost

1. Marc Houalla, ENAC director; Corine Primois, International and development department at ENAC; Philippe Lambert, DGAC.
2. Mathy Gonon, Head of SINA (Information Systems and Air Navigation), ENAC; Fabrice Fabre, training manager, ATM department, ENAC.

Questions for Marc Houalla, director of ENAC
***(École nationale de l'aviation civile*/French Civil Aviation Academy)**

A label of excellence for ENAC

ICAO (International Civil Aviation Organization) awarded the Regional Training Centre of Excellence status to ENAC in late 2014. This acknowledges the value of the teaching provided by this French academy.

The label of excellence that ENAC has just obtained from ICAO consists in what precisely?

◆ **MARC HOUALLA:** It marks ICAO acknowledgement of the quality of the educational structure and content of ENAC programmes, and of the resources deployed in their execution, in terms of both quantity and quality. Through this label, ICAO attests to the excellence of the aeronautical training (air navigation, aeronautical engineering, piloting) of ENAC, excluding aeronautical construction of course, and in particular of the training in relation to air transport safety.

What returns may be expected from this, over both the medium and long term?

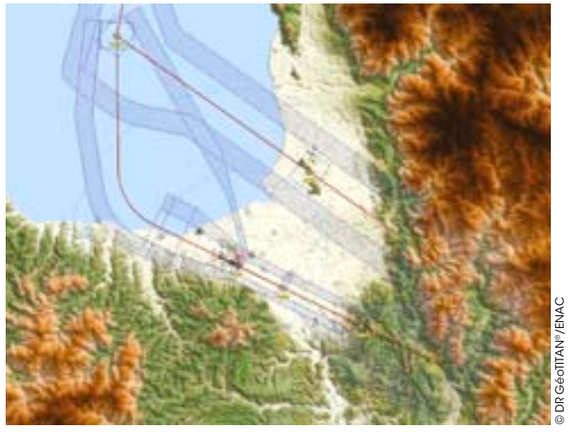
◆ **M. H.:** It gives us better visibility, and endorses the "ENAC" and "DGAC" brand internationally. This raises our profile in many countries, and in particular in countries that do not possess the suitable structures for delivering short or long-term training. ICAO, which acts as a policy-maker for these countries, may be led to recommend us to them. This is in particular the case when ICAO has funding available for certain training programmes. This recognition from ICAO also facilitates our development and promotional activities, which are very costly in terms of human and financial resources.

"This raises our profile in many countries, and in particular in countries that do not possess the suitable structures for delivering short or long-term training."

Satellite navigation, From Africa to Asia-Pacific

The DGAC has been closely involved in the activities of the PANS-OPS offices in Beijing and Dakar, which contribute to the deployment of satellite procedures for air navigation.

Since 2009, ICAO (International Civil Aviation Organization) has been promoting the concept of PBN - Performance-Based Navigation - in order to get States to publish satellite-guided procedures. *"All the Member States of the ICAO need to put in place a PBN plan to enable adoption of procedures that are simplified, safer and more fuel-efficient. This involves recourse to satellite navigation rather than classic methods such as radar, ILS or VOR,"* explains Sophie Germain, Director cooperation Africa for MCI (International Cooperation Mission) of the DTA (French Air Transport Directorate).



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GéoTITAN® EXPERT SOFTWARE, the flight procedures design aid.

A vast zone in Asia

To support the States in the implementation of these PBN plans, PANS-OPS offices have therefore been created. The first being set up in Beijing in 2009, the Asia PacificFlight Procedure Programme ("FPP-APAC"). It alone covers the entire Asia-Pacific zone. Its role is to help in establishing air navigation procedures via satellite in the framework of the ICAO PBN plan. *"The personnel working in this office are instructors. Their mission is to train the designers of procedures for the countries in the zone requesting such training,"* says Emanuela Gellini, Director cooperation Asia-Pacific for MCI.

The DGAC supported the creation of the Beijing office by supplying, free of charge, ten GéoTITAN® software licences for procedure creation. It also traine d the first instructors for this office, with the support of the ENAC. The DGAC is, moreover, counted among the *"active participating states"* of the Beijing office. This allows it to be present on the steering committee and to promulgate its know-how across the region.

Dakar for the whole Africa

Covering all of Africa, another office has been operational in Dakar since 2 June 2014: the African Flight Procedure Programme (AFPP). Aside from training designers, this office is meant to support States in each of the deployment stages for PBN procedures (from design to operational validation). It is hosted by the Agency for Aerial Navigation Safety in Africa and Madagascar (ASECNA - *Agence pour la sécurité de la navigation aérienne en Afrique et à Madagascar)*, which provides air traffic control services for its eighteen Member States. France, for its part, funds the post of programme manager (former DGAC agent having taken early retirement) for a period of three years. Also a member of the Dakar office executive committee, the DGAC crowned its support by providing the office with five free licences for GéoTITAN®.

Olivier Constant

GéoTITAN®

Created in the late 1990s, GéoTITAN® is an expert software tool for flight instrument procedures design developed within the ATM (Air Traffic Management) department of the ENAC (French Civil Aviation Academy). Marketed by CGX Aéro, GéoTITAN® is deployed in the procedures design offices of the DSNA *(Direction des services de la navigation aérienne* – French Air Navigation Services Directorate). It is also distributed in the following countries: Ireland, Norway, Poland, Portugal, Morocco, Senegal, Tanzania, Kenya, Sudan, Mexico, Colombia, China, Philippines and Indonesia. In total this amounts to more than 100 licences deployed worldwide. GéoTITAN® continues to be developed year-on-year in order to adapt to changes in the regulations.

> Find out about all the news and projects for DSNA Services.

DSNA Services: exporting expertise

As the expertise and consultancy office of the French civil aviation administration, DSNA Services' mission is to promote the know-how of DGAC and ENAC' personnel worldwide. It has been involved in 35 projects in 17 countries since 2013.

According to Hervé Toro, Chairman, DSNA Services is particularly committed to *"... improving the safety and performance of air transport. To do so, it draws on the expertise of personnel working daily on operational sites worldwide and in all fields of civil aviation."*

According to Patrick Gandil, DGAC director general and co-founder of DSNA Services with ENAC: *"DSNA Services' customers recognize its responsiveness and its tailored-made solutions that fit their needs, and its expertise and values of excellence."* For his part, Marc Houalla, ENAC director, considers that: *"On national and international projects in civil aviation DSNA Services is the guarantee to benefit from the know-how of DGAC, its ANSP and the excellence of ENAC training."*

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Three fields of action

DSNA Services offers consulting, engineering and operational training services in all fields of civil aviation: air navigation, regulations and supervisory. The expertise of DSNA Services in air navigation covers air traffic control and technical related services. *"Aircraft guidance often stands for the most visible activity of a civil aviation authority,"* says Stéphane Durand, DSNA Services director. Regulation related services include, among others, the drafting of reference regulatory documents such as the Civil Aviation Act and Code on behalf of an authority. Lastly, where air safety is concerned, DSNA Services supports its clients to comply with international standards set by the International Civil Aviation Organization (ICAO). *"This may lead to implement a supervisory authority, to modernise an existing organisation, or even to draft the technical manuals that support a supervisory inspector when checking the compliance of the flight documentation or the aircraft state,"* says Stéphane Durand.

Training services

The clients of DSNA Services are therefore civil aviation authorities, air navigation service providers and airports. As a sideline activity the company can also carry out studies on behalf of airlines. For all these sectors, DSNA Services provides practical training as a complement to the academic programmes of ENAC. *"DSNA Services can top up the offerings of the French industry and bring together various partners to work hand in hand on projects,"* states Hervé Toro in conclusion.

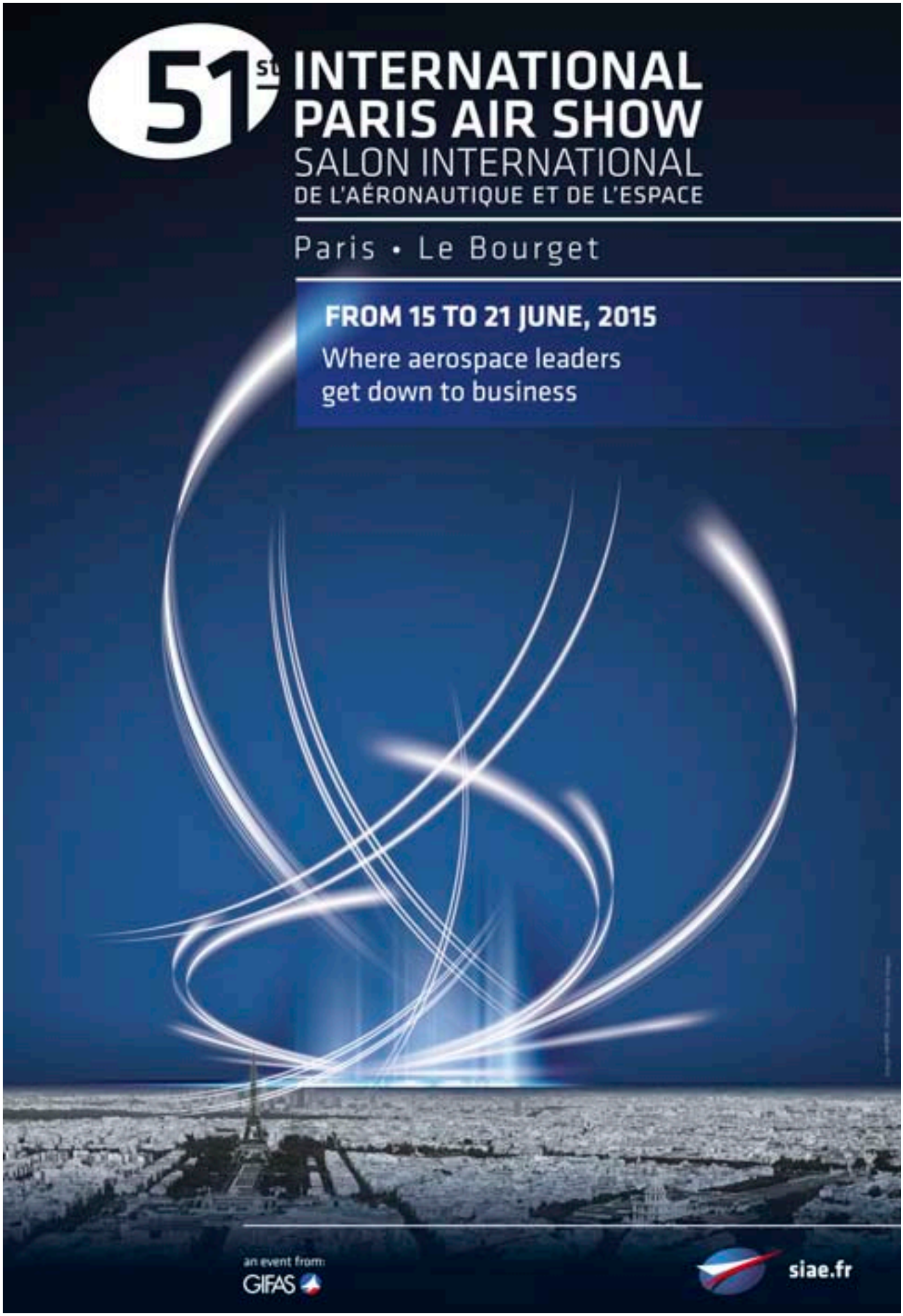
François Blanc

Key figures

11,500
operational experts
on the five continents

35 projects
in 17 countries

4 domains
Regulation and supervision,
Operations,
Engineering and Innovation,
Operational Training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