ANNUAL REPORT

DSNA
The French Air Navigation Service Provider

2018

RÉPUBLIQUE FRANÇAISE
Liberté • Égalité • Fraternité

MINISTÈRE
DE LA TRANSITION
ÉCOLOGIQUE
ET SOLIDAIRE

dgac
DSNA

member of
FABEC

MEMBER OF
SESAR
JOINT UNDERTAKING

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2018

The French air navigation services controlled 3.2 million flights in 2018, with 117 days at over 10,000 flights per day. This means that on 15 November 2018, DSNA had already controlled the traffic of the year 2015! This is an indication of the safety, quality of service and sustainable development challenges awaiting air traffic control in the years to come.

In Western Europe, air traffic is marked by a very concentrated seasonal distribution with increasingly emphasized peaks. DSNA and all the operational stakeholders are mobilized to optimize the management of air traffic flows on the European scale. Innovative digital tools have been developed and offer new services to match requirements as closely as possible.

DSNA is committed to a strategy of long-term investment to improve its performance. The technical modernization of its air traffic control systems is a key element of this. Safety and cybersecurity remain unavoidable requirements to ensure a future for air transport in a durable way. Thanks to the high degree of skills among DSNA personnel, this goal will be brought to completion for the benefit of the customers and users of the Single European Sky.
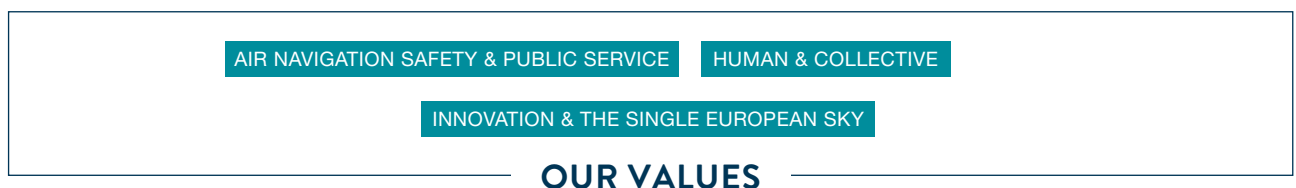
Maurice GEORGES
Director of Air Navigation Services

USERS & CUSTOMERS, EUROPE, PARTNERS, TERRITORIES

CUSTOMER-ORIENTED
SAFETY SERVICE

THE SINGLE EUROPEAN SKY
AND INTERNATIONAL ACTION

SERVICE TO AIRPORTS
AND TERRITORIES

OUR CHALLENGES

Optimised ATM
network services

Advanced
air traffic services

High-performing
airport operations

Enabling aviation
infrastructure

THE SINGLE EUROPEAN SKY

1 INTEGRATED
SAFETY INITIATIVE

2 TECHNICAL
MODERNIZATION

3 OPERATIONAL
TRAINING

4 ORGANIZATION
OF SERVICES

5 MANAGEMENT

6 PARTNERSHIP

OUR PILLARS

AIR NAVIGATION SAFETY & PUBLIC SERVICE   HUMAN & COLLECTIVE

INNOVATION & THE SINGLE EUROPEAN SKY

OUR VALUES

DSNA's strategic plan

HIGHLIGHTS
OF 2018

EVERYDAY ACTIONS TO BUILD A DSNA
THAT MEETS THE REQUIREMENTS OF TODAY'S AND TOMORROW'S PERFORMANCE
IN TERMS OF SAFETY, ENVIRONMENT, CAPACITY AND COST EFFICIENCY

BORDEAUX ACC

Major reorganization of military zones and air routes in this region.

DSNA WINS AN AWARD AT THE MADRID CONGRESS

For commissioning the RECAT-EU service at Paris-CDG & Le Bourget, airports, a European first.

A NEW CONTROL TOWER FOR STRASBOURG

Commissioning 21 March 2018.

A RENOVATED TOWER FOR PARIS-ORLY

Commissioning 28 March 2018.

EXTENDED CAP (SESAR)

Live trials with short-term regulation measures conducted between France, Spain, EUROCONTROL and four Spanish airlines to minimize the impact of delays in the South-Western region.

AIRSPACE ARCHITECTURE STUDY (SESAR)

Participation in this prospective study, an initiative of the European Commission entrusted to the SESAR JU to address the increase in traffic.

AIR TRAFFIC

11,105 flights controlled on Friday 6 July 2018, a daily record in Europe.

DSNA IS ISO 9001:2015 CERTIFIED

Renewal of the ISO certificate in accordance with the new standard.

DRONES IN CIVIL AIR TRAFFIC

Experimentation with a MALE military drone: the controller identifies the drone just like any other traffic in a controlled airspace.

MARCH

JUNE

JULY

FEBRUARY

MAY

MARSEILLE ACC AND MARSEILLE SNA

Takeover by the Marseille-Provence approach of lower airspace managed by the Marseille ACC.

A NEW IFR ROOM FOR BÂLE-MULHOUSE

More spacious and more modern, to prepare for the future.

XSTREAM (SESAR)

Live trials led by Paris ACC on the pre-sequencing of flights into Paris-CDG beyond our borders (*Extended AMAN*), with the aim of improving flight efficiency and arrival capacity at peak times.

4-FLIGHT

DSNA and the manufacturer Thales are committed to a commissioning at Reims ACC and Marseille ACC in Winter 2021/2022, and at Paris ACC in Winter 2022/2023.

CDM@DSNA SEMINAR

The annual meeting for the different stakeholders to study new shared operational solutions and prepare for the next aeronautical summer.

NOVEMBER

A NEW CONTROL TOWER FOR PAU

Commissioning 16 November 2018.

DECEMBER

SIA: FLY INFORMED!

SIA celebrates 60 years of history and a future in digital.

THE FRENCH WEST INDIES

Development of the future control position with electronic stripping at Pointe-à-Pitre (SEAFLIGHT program).

U-SPACE

Launch of a call for partnerships to promote and structure solutions to improve drone management in controlled airspace.

PUBLISHING NOTAMS VIA THE EAD

Gradual migration of the aeronautical information services to EUROCONTROL's European Database (EAD).

NATIONAL AIR TRANSPORT WORKSHOP

Forum on environmental performance.

SINAPS (SESAR)

First evaluations at Bordeaux ACC of a tool optimizing the configuration of en-route control sectors, a project based on artificial intelligence.

SEPTEMBER

OCTOBER

Paris-CDG
Le Bourget

AUGUST

PARIS-ORLY

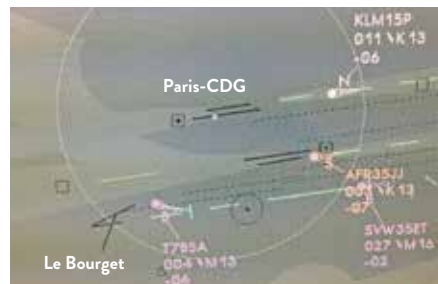Commissioning of a new East-facing departures satellite procedure.

DATA LINK: ENRICHED SURVEILLANCE

A new functionality available in the 5 ACCs allowing the controller to dispose of real-time flight parameters.

PARIS-CDG & LE BOURGET AIRPORTS

Commissioning of the triple, independent and parallel PBN approach procedures, a European first.
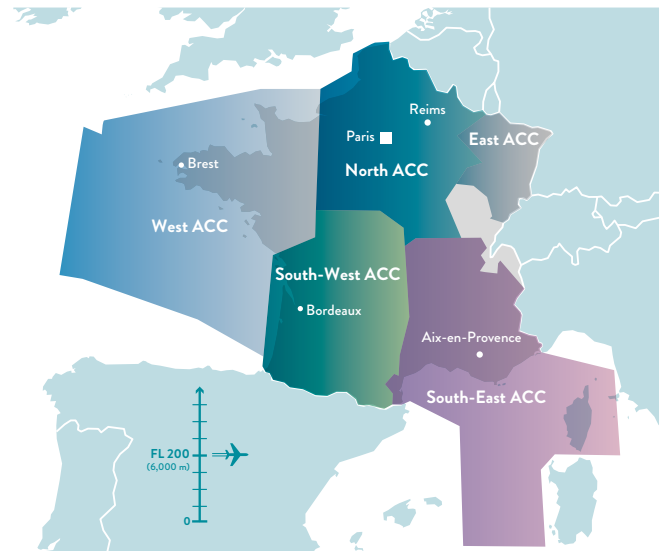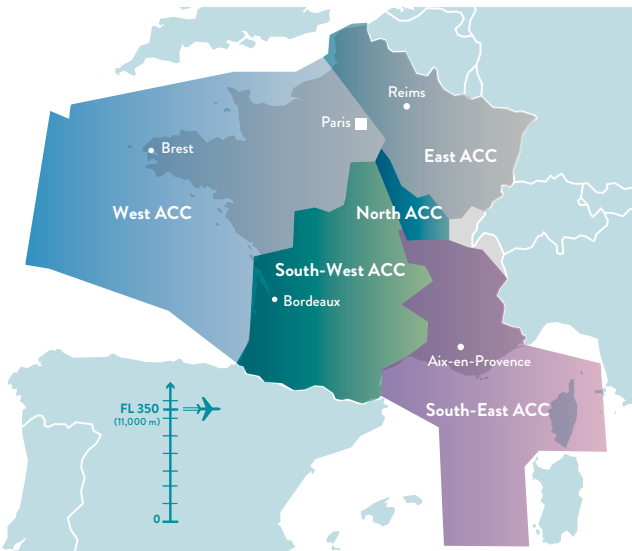
ORGANIZATION OF THE **AIRSPACE**

With 1,000,000 km², the French air navigation services manage one of the largest airspaces in Europe.

The DSNA numbers **five en-route control centers (ACC)** located at Brest, Paris, Reims, Aix-en-Provence and Bordeaux, **nine mainland regional services in charge of approach control and aerodrome control (SNA)** with headquarters located at Nantes, Lille, Paris, Strasbo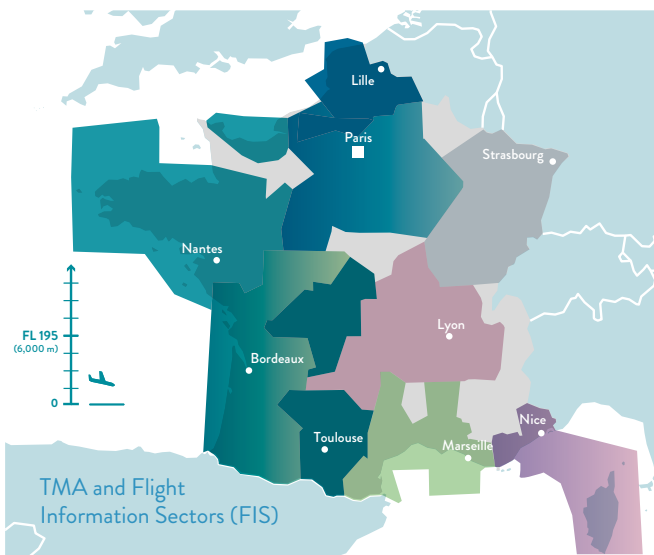urg, Lyon, Nice, Marseille, Toulouse and Bordeaux along with **three overseas services** in the French West Indies-Guyana, in the Indian Ocean and in Saint Pierre and Miquelon. It provides support to the civil aviation services of the overseas collectivities of the Pacific (French Polynesia, New Caledonia, Wallis and Futuna).

On 31 December 2018, the DSNA carries out its air traffic control mission across 74 airfields on the French mainland and 12 overseas airfields.

**UPPER AIRSPACE > ** ACC SKILLS AREAS

Reims
Paris
Brest
East ACC
West ACC
North ACC
South-West ACC
Bordeaux
Aix-en-Provence
South-East ACC
FL 350
(11,000 m)
0

Reims
Paris
Brest
East ACC
North ACC
West ACC
South-West ACC
Bordeaux
Aix-en-Provence
South-East ACC
FL 200
(6,000 m)
0

**LOWER AIRSPACE > ** SNA SKILLS AREAS

Lille
Paris
Strasbourg
Nantes
Lyon
Bordeaux
Toulouse
Nice
Marseille
FL 195
(6,000 m)
0
TMA and Flight Information Sectors (FIS)

AIRFIELDS MANAGED BY THE SNAS

Lille
Paris
Strasbourg
Nantes
Lyon
Bordeaux
Toulouse
Nice
Marseille

01

AIR **TRAFFIC**

DSNA **ANNUAL REPORT 2018**

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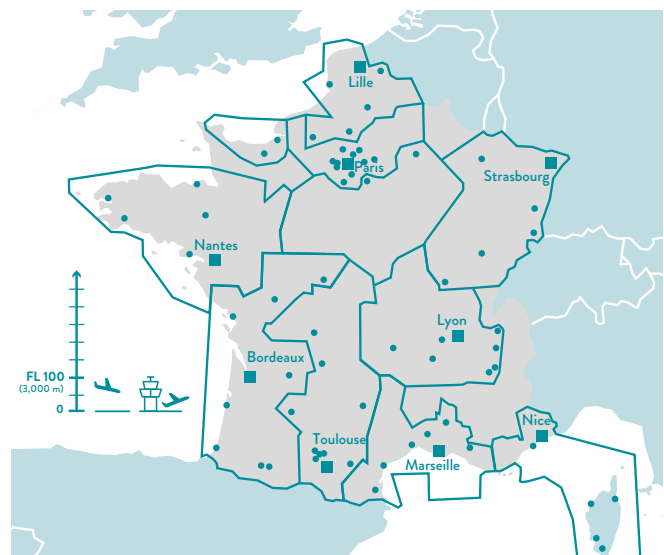
AIR TRAFFIC WITH **SUSTAINED GROWTH,** FROM TERRITORIES TO THE SINGLE EUROPEAN SKY

The French air navigation services controlled 3,224,532 flights in 2018, an increase of 2.8 % on 2017 mainly accounted for by overflights. With 8 830 flights controlled on average per day, 2018 is a new record! To measure the challenges linked to this boost, this is the equivalent for 2018 of one 2015 summer month of traffic more.

High season: an increasingly dense traffic with 117 days at over 10,000 flights per day. From April to October, the air navigation services controlled 260,000 flights more than 10 years ago.

Low season: average traffic of 7,300 flights per day. 2018 was marked by significant rises (+ 5%) in traffic in March, November and December compared to the same periods of 2017.

2018 New weekly traffic peak in July with 76,117 flights, or on average 10,875 flights per day.

6 weeks, from Monday 2 July to Sunday 2 September 2018, are part of the Top 10 busiest weeks.

2018 6 JULY New daily traffic peak with 11,105 flights: a European record!

9 days, from 22 June to 31 August 2018, are in the Top 10 busiest days.

The traffic controlled in France is composed of 51% overflights, 36% international flights (arrivals in France or departures from France) and 13% of domestic flights.

In 2018, **overflights** increased by 4% on 2017, particularly due to traffic flows with Spain: Germany/Spain (+6%), Italy/Spain (+8%). For the French airspace, the Spain/ United Kingdom flow remains by far the greatest flow of overflights. From October to December 2018, overflights increased by 7.2% on the fourth quarter 2017, which was penalized by heavy storms in December.

Similarly, **international flights** rose by 2% on 2017 owing to traffic with Africa (+3%) and Spain (+2%). From October to December 2018, these flights also greatly increased (+4%).

In 2018, 194 million passengers traveled on international and internal flights serving French mainland airports, i.e. an increase of 5% on 2017. This growth, greater than movement growth, is explained by an optimization of the number of passengers carried and the use of higher-capacity aircraft, of 150 to 200 seats.

The ten leading French mainland airports in terms of IFR movements (arrivals and departures)

	2018		Variation
1. Paris-CDG	488,878	↗	+1.1%
2. Paris-Orly	231,773	↘	-0.1 %
3. Nice-Côte d'Azur	144,343	↗	+1.0%
4. Lyon-Saint Exupéry	113,601	↗	+1.0%
5. Toulouse-Blagnac	101,661	↘	-2.0 %
6. Marseille-Provence	98,371	↗	+0.4%
7. Bâle-Mulhouse	82,666	↗	+3.7%
8. Bordeaux-Mérignac	70,174	↗	+4.7%
9. Nantes-Atlantique	61,317	↗	+5.9 %
10. Paris-Le Bourget	56,856	↗	+4.9 %

Internal traffic has remained stable in terms of movement but has beaten its 2000 record in terms of passenger traffic, with a million more travelers. The main regional and Overseas airports recorded a rise in their movements thanks to the opening of new lines and an ever-increasing proportion of low-cost airlines.

France remains the country controlling the most flights in Europe. Germany experienced a rise in traffic of 4% on 2017, Italy of 6% while the United Kingdom and Spain saw their traffic fall by 6% and 2% respectively.

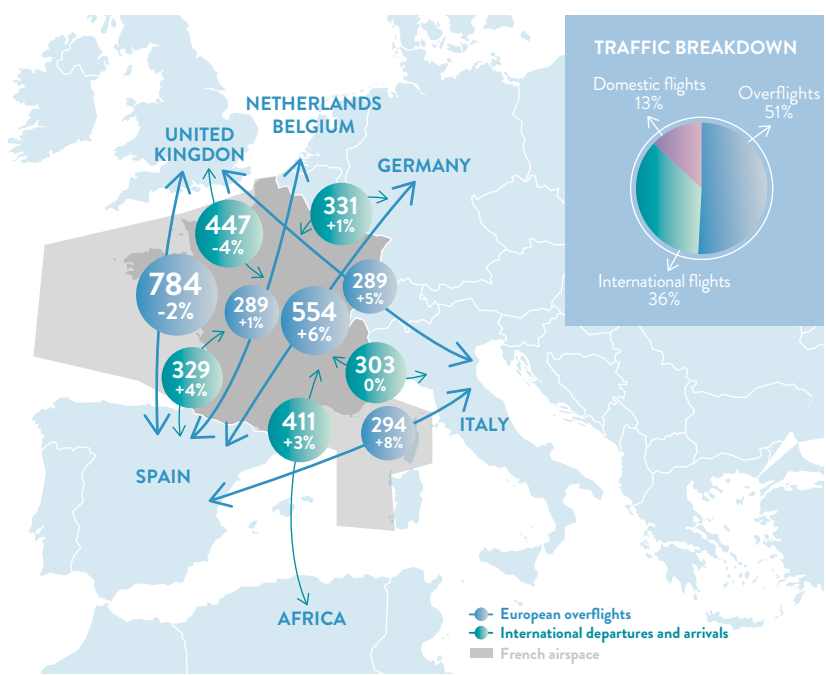## Annual variation in IFR traffic controlled in France — Source: DSNA

+3%
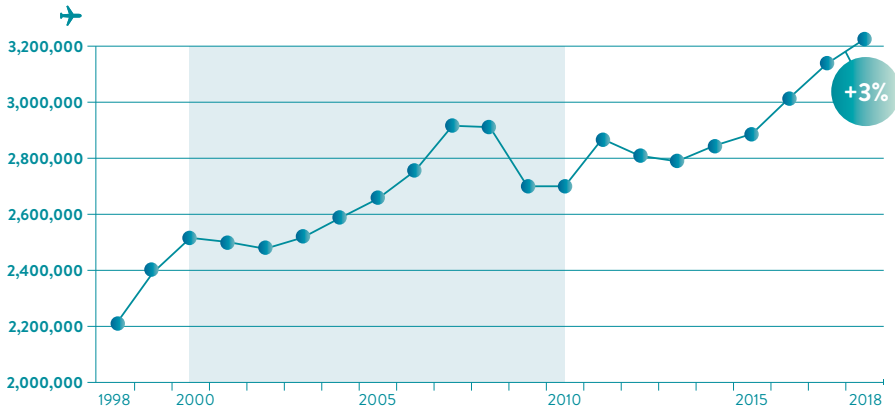
The Top 6 customer airlines of DSNA by number of controlled flights — Source: DSNA

	2015	2016	2017	2018
1. Air France + HOP!	420,000	408,000	377,000	392,000
2. EasyJet	290,000	310,000	329,500	347,500
3. Ryanair	252,000	275,000	307,000	341,000
4. Vueling Airlines	89,000	101,000	101,000	105,500
5. British Airways	99,000	100,000	99,000	105,000
6. Lufthansa	76,000	75,000	78,500	85,500

The main traffic flows in France
Average number of flights per day and 2018/2017 variation — Source: DSNA

TRAFFIC BREAKDOWN

Domestic flights 13%
Overflights 51%
International flights 36%

NETHERLANDS
BELGIUM
UNITED KINGDON
GERMANY

447 -4%
331 +1%
784 -2%
289 +1%
289 +5%
554 +6%
329 +4%
303 0%
411 +3%
294 +8%
ITALY

SPAIN

AFRICA

— European overflights
— International departures and arrivals
— French airspace

02

AIR NAVIGATION SAFETY & PUBLIC SERVICE

FLIGHT SAFETY

Bordeaux-Mérignac airport at dawn.

The promotion of safety is the number one mission of DSNA. Far from being a restriction, it is a driver of development. DSNA is committed to integrated management system for an even greater mastery of our professional practices. For this purpose, the French air navigation services are taking all the preventive and corrective actions necessary for its continuous improvement, based on a "just" culture promoting experience feedback, and applying the severity classification method (RAT) required by European performance regulations.

SAFETY INDICATORS

In 2018, air navigation safety indicators (en-route loss of separation, number of incidents between civil and military aircraft, intrusions of VFRs into controlled airspace, runway incursions) have remained stable (p. 12).

However, the increase in air traffic and the requirements of technical modernization and systems automation, which have become increasingly interoperable, make it necessary to renew and strengthen our risk management model.

A NEW BARRIER SAFETY MODEL

To derive greater benefit from operations in matters of safety event analysis and safety studies, in 2018 DSNA committed to a new risk management approach compliant with the new European regulation IR ATM 2017-373 of the EASA applicable on 2 January 2020.

This approach is based on the use of a barrier safety model representing the contributions of each stakeholder of the safety chain. It is used to better identify weak signals, from real time to the most organizational actions and to better understand resilience mechanisms for a system as complex and interconnected as that of air navigation.

SAFETY PLANS

DSNA has developed operational safety plans for aerodrome and approach control, air traffic control in the Paris region and en-route control. In particular, it played an active part in developing the new European plan for prevention of runway incursions, putting the emphasis on better synergy between the concerned stakeholders: airfield operators, vehicles, air navigation services providers, airlines and monitoring authorities. In late 2018, DSNA had performed 80% of the actions on the main airports.

ANALYSIS OF SAFETY EVENTS

Safety events deemed important are always the subject of an analysis to define ways of improvement.

Where the examination of civil/military incidents is concerned, DSNA takes part in the Permanent Group of the Airspace Directorate for the safety of Air Traffic Management (GPSA), co-chaired by the DIRCAM. the military air traffic directorate, and the DSAC, the national supervisory authority.

Indicators for measuring the safety level for en-route control — Source: DSNA

Losses of separation per 100,000 flights

Number of airproxes for 100,000 flights

The standard minimum en-route radar separation between two aircraft is 5 Nm in the horizontal plane and 1,000 ft in the vertical plane. The safety net alerts the controller to an air miss risk.
Two indicators are monitored: the "HN 70" when the separation between two aircraft is less than 70% of the standard and the "HN 50" which corresponds to 50% below the standard.
In 2018, the frequency of occurrence of a loss of separation < 70% was 0.78 flight for 100,000 controlled flights and that of a loss of separation < 50%, of 0.09 flight for 100 000 controlled flights.
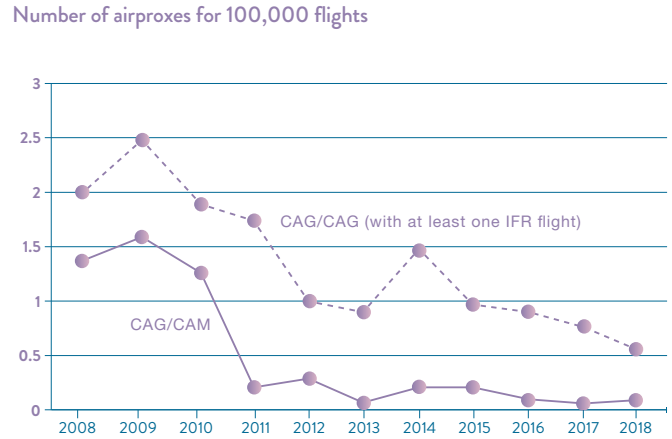
In France, two types of air traffic co-exist: general air traffic (CAG) and military air traffic (CAM).

An airprox is an incident without consequences during which two aircraft met in a hazardous proximity situation. In 2018, the pilots filed 0.56 "CAG/CAG" airproxes implying at least one IFR flight every 100,000 flights and 0.09 "CAG/CAM" airproxes every 100,000 flights.

CIVIL-MILITARY COORDINATION

Any airspace reorganization is the result of a long and rigorous work, based on mutually trusting collaboration between the various partners.

A major reorganization of military zones and flows in South-West France was implemented on 1st March 2018. In this region of heavy civilian traffic where military activity remains intense, this new configuration pro-

vides better flight safety and promotes direct routes for civil flights thanks to flexible management of the airspace.

This project is based on a reconfiguration of high-altitude military zones compatible with new-generation arms equipment and enabling activities from the ground to unrestricted altitude. The air controllers of Bordeaux ACC, meanwhile, now dispose of more spaces around the main traffic nodes and a double axis for all levels for Paris-Barcelona flows. The consistency of this new route network on the European scale has

been ensured thanks to close coordination with the Marseille, Madrid and Barcelona control centers. The military zone TSA34 was remodeled to include a zone core and modular extensions by flight level, allowing volumes to be precisely adjusted to the requirements of military missions. Thus, according to the use of this zone, airlines are now able to plan quasi-direct routes from the Spanish border to the Swiss border.

AERONAUTICAL INFORMATION

DSNA is certified to deliver the aeronautical information service on the French mainland and Overseas. Services based on paper or electronic information are gradually being replaced by the provision, at any time, of digital data accompanied by new services.

In 2018, the SIA has continued its modernization into the digital era by remodeling the data management and production chain, by reflecting on the different forms of management and production of aeronautical information to meet operational requirements as well as possible, and by integrating new technical standards (p. 13).

Military Coordination and Control Center (CMCC) co-located at Brest ACC.

PRACTICAL SAFETY-RELATED ACTIONS IN 2018

ENRICHED SURVEILLANCE FOR EN-ROUTE CONTROL

In 2018, the 5 ACCs used a new functionality enabled by digital data exchanges between the ground and onboard systems (Data Link): enriched surveillance.

The en-route air traffic controller is informed, on his or her screen, of the flight parameters provided by the on-board system: instantaneous heading and speed, flight level selected by the pilot. This approach makes it possible to gain efficiency, while giving priority to radio communications for the control instructions.

Enriched surveillance also constitutes an additional protection barrier in matters of safety, by detecting any inconsistencies between control instructions and flight parameters, especially for flight level separations.

In this example, the controller authorized the flight to climb to FL 240 and the pilot inadvertently selected FL 340.

OUR PARTNERS TALK
ABOUT DSNA

"The DSNA was a major participant of the EAD, the European database managed by EUROCONTROL, a centralized, single aeronautical information reference database.

Since 4 September 2018, the International NOTAM Office (BNI) in Bordeaux has been using the EAD to issue its NOTAMs in English and French. With nearly 40,000 NOTAMs a year, DSNA is the most largest producer in Europe.

By moving its services to the EAD, DSNA is reducing its costs while benefiting from a rigorous, high-quality and fully integrated service. This service will be gradually extended to the BRIAs, which also deal with flight plans and briefings.

Between now and end 2019, all the French stakeholders in the AIM should be using the EAD's services via tools connected to the Internet. This will be a major step for the EAD."

The NOTAM is a temporary aeronautical publication intended for pilots, which contributes to flight safety.

ON-GROUND AND ON-BOARD SAFETY NETS FOR INCREASED SAFETY

In certain parts of the European airspace, traffic is increasingly dense and complex to manage. In a situation of sustained traffic growth, all the participants of the air sector are mobilized to make safety their prime challenge.

On the technical front, DSNA is perfecting its safety nets for en-route and approach control with functionalities that will make it possible to detect any potential conflict ahead of time even more successfully. The controller disposes of different alert levels as a function of hazardous situations: hazardous proximity of aircraft in flight (Short Term Conflict Alert: STCA), non-standard proximity of an aircraft with the ground (Minimum Safe Altitude Warning: MSAW), proximity of an aircraft to a regulated traffic area (Area Proximity Warning: APW).

On the side of the aircraft manufacturers, the on-board anti-collision system (T-CAS), limited to conflict resolution messages in the vertical plane, has considerably evolved: it is used to reduce the number of false alarms, and prompts the pilot to reduce his or her rate of climb or descent in the event of an occupied flight level. The coming versions will concern even more precise functionality for parallel approaches, drone detection and, eventually, avoidance messages in the horizontal plane.

These additional control and piloting assistance tools contribute to even safer and more efficient air traffic.

THE **ENVIRONMENT**

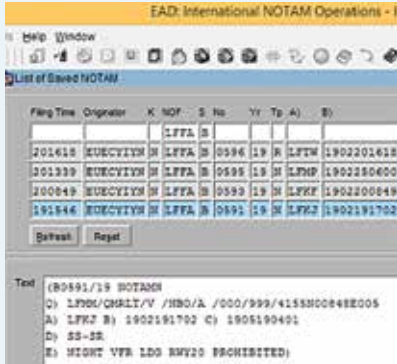**The reduction of the environmental impact of air navigation is the second strategic priority of DSNA, with the goals of:**

❙ reducing noise pollution in the vicinity of airports by optimizing approach and take-off procedures;

❙ lowering the fuel consumption and gas emissions for flight phases above 2,000 meters by offering airlines more optimized routes (direct trajectories, flight levels appropriate to the aircraft performance).

LIMITING THE IMPACT OF NOISE

An air traffic impact study (EICA) is used to measure and evaluate the environmental impacts which will be caused by the creation or modification of new trajectories. The study is then presented to the Consultative Commission for the Environment (CCE) for the airport in question and to the ACNUSA, an independent authority, when the airport falls within its remit.

In 2018, DSNA performed several impact assessments, mostly based on continuing the introduction of new RNAV-type satellite procedures:

❙ studies for the airports of Paris-CDG, Le Bourget, Orly and Beauvais which did not require any acoustics calculations;

❙ studies for the airfields of Agen, Cannes, Carcassonne, Figari, Grenoble and Montpellier, which required environmental impact calculations (noise, gas emissions, population count);

❙ studies for the airports of Bâle-Mulhouse, Nantes and Toulouse, using more complex indicators of noise, overflights and gas emissions.

DSNA also carried out a specific study to guide the Lyon-Saint-Exupéry airport in a "balanced approach".

In 2018, DSNA continued its work on reviewing the conditions for conducting public surveys in the event of changes to air traffic in order to better target the communities really affected. Its services also work on both day-time and night-time use of continuous descents for arrivals at Paris-CDG, by 2023. A first stage consists in validating a new trajectory design ("RNAV to ILS") for which the precision of the satellite guidance must enable the two runways to be managed independently (SESAR project p. 15).

REDUCING GAS EMISSIONS

In 2018, the optimal use of the French airspace, by the attribution of direct routes to aircraft when possible (p. 12) and the tactical management of flights by air traffic controllers, made it possible to reduce the distances flown and save approximately 128,000 tonnes of fuel, or a reduction in CO_2 emissions of 400,000 tonnes.

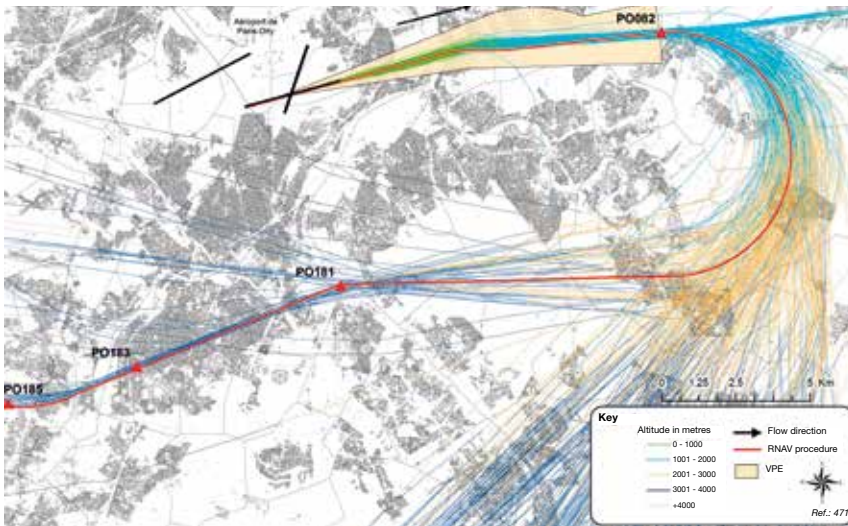## CONCRETE ACTIONS IN 2018 FOR THE ENVIRONMENT

LIMITING THE IMPACT OF NOISE

A new East-facing departures satellite procedure at Orly

After 18 months of consultation with politicians and resident representatives, a new satellite procedure for flights departing from Paris-Orly airport facing East was commissioned on 16 August 2018.

This RNAV procedure replaces a conventional procedure based on radio naviga-

tion equipment installed on the ground. Its design was the subject of many meetings to avoid altering the general organization of air traffic flows. The objective was to keep transfers of nuisances to a minimum and promote overflight of a non-urban area (forest).

Paris-Orly: departures at runway 08.

Triple PBN approaches at Paris-CDG & Le Bourget

As part of the SESAR "Enhanced Arrivals and Departures" projects, the Paris-CDG control unit and EUROCONTROL are studying the improvement of the air traffic patterns for the use of parallel and independent triple PBN approaches, commissioned on 9 October 2018 in Paris-CDG & Le Bourget.

The study particularly focuses on the phase of interception of the ILS axes of the two airports. Besides the safety benefits, a considerable environmental benefit is expected due to an improvement of the vertical profiles. By strategically separating the North and South approaches, this new design should make it possible to make both pairs of runways independent.

The project is also studying a better feeding of the regulation area by a North/South segregation of the flows carried out further upstream, using new high-altitude crossing point trajectories. Here again, a heavy limitation of inter-axis crossing points at low altitude would be a significant environmental benefit.

Cooperation with Skyguide

As part of the local consultation on noise pollution of Geneva airport, Skyguide, the Swiss air navigation operator, had studied the repositioning of the interception of the ILS axis to limit overflights of the residents of Lake Leman (PETAL project).

DSNA had carried out an impact assessment and a first campaign of noise measurements from October 2017 to February 2018 across two sites of Haute-Savoie, Chens-sur-Léman and Thonon-les-Bains, prior to the commissioning of this modification in April 2018.

A second noise measurement campaign was carried out by DSNA from October 2018 to January 2019 on these same sites. The results obtained will be published in June 2019.

Arrival over Geneva airport.

National Air Transport Workshop: opening of the forum on environmental performance by Élisabeth BORNE, the Ministry in charge of Transports.

CONSULTATION

As part of the National Air Transport Workshop, DSNA organized a forum on the Environment on 4 September 2018 at EUROCONTROL (Brétigny), in which many stakeholders took part: politicians, ACNUSA, residents' and professional associations.

Environmental performance is an essential component of the sustainable development of air transport. How to meet the challenge of making the rise in air traffic more acceptable where the environment is concerned? On its side, DSNA showed a determined commitment to reducing the environmental impact of air navigation, by presenting operational measures already in place and the projects in development.

All the discussions played a part in the development of the new national strategy for air transport, presented on 8 March 2019.

COMMUNICATION

DSNA has committed to total transparency regarding its everyday actions towards politicians, residents' associations and overflown populations to keep them ever better informed. In late 2018, DSNA made available to residents near the airports of the Paris region a display of aircraft trajectories in quasi-real time via the VITRAIL software (ADP Group). This initiative required the signing of a protocol ensuring data security and defining the terms of distribution of DSNA radar data.

A similar work is being undertaken with the large regional airports that have expressed a need for it.

BIG DATA @ DSNA

The emergence and development of mass data processing (Big Data) represents an opportunity for DSNA to improve our global performance. The strategy of DSNA is to develop these new technologies, particularly to visualize all this data and to measure its performance.

The first project, called FEAT (Flight Efficiency Analysis Tool), based on a platform fed by operational data specifically coming from radars and flight plans, has the aim of exploring Big Data and developing new applications in the fields of flight performance and the impacts of low-altitude air traffic. The initial work concerns the consolidation of the whole data exploitation chain, from the data supplier to the user.
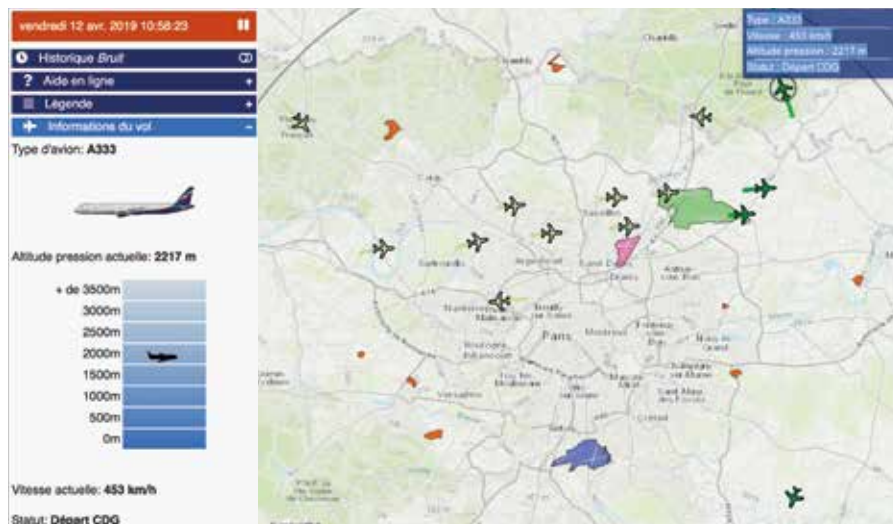
VITRAIL (ADP Group), an online visualization tool for the air traffic serving Paris-CDG & Le Bourget and Orly airports, fed by the radar data of DSNA.

FLIGHT **REGULARITY**

In 2018, 30% of flights were delayed by over 15 minutes departing from mainland airports. The breakdown of causes was as follows: rotations in series (10%), airlines (8%), passengers (4%), air navigation (3%), airports & security (3%), and bad weather conditions (2%).

Another indicator is used to assess the flight punctuality: the average delay due to air traffic regulations, the so-called "ATFCM delay". When certain air control sectors are saturated due to an excessively high traffic demand, the flights are regulated for safety reasons.

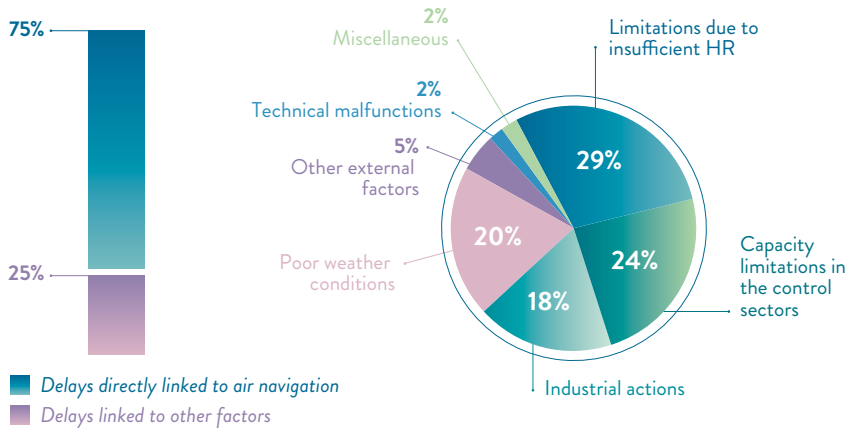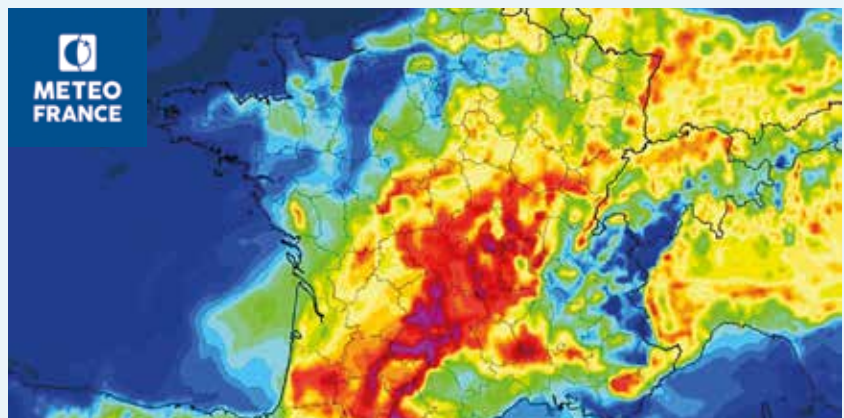In 2018, delays in Europe reached record levels. The French air navigation services generated 6,253,135 minutes of delay, or almost twice as much as in 2017, 92% of which were related to en-route. Taking into account the number of flights controlled, this **average delay per flight accounts for 1.94 minute** (1.13 min/flight in 2017). The decrease in the number of qualified air traffic controllers and the structural limitation of the capacity of certain control sectors account for more than half of causes. Measures for going round for the spaces managed by the en-route centers of Karlsruhe and Maastricht, near saturation, generated more traffic in French airspace, which was already very congested, and therefore more delays for French centers. Moreover, weather conditions (snow and storms) were much more penalizing than in previous years. On the corporate front, the situation was difficult in Marseille ACC, which went through a long industrial action in the second quarter of 2018.

The Flow Management Position in ACC has tools with very advanced functionality for fine-tuned management. It optimizes the capacity of the airspace in collaboration with the European Network Manager (EUROCONTROL).

Breakdown of delay causes related to air traffic regulations — Source: DSNA

75%

25%

2% Miscellaneous

Limitations due to insufficient HR

2% Technical malfunctions

5% Other external factors

Poor weather conditions

29%

24%

20%

18%

Capacity limitations in the control sectors

Industrial actions

■ *Delays directly linked to air navigation*
■ *Delays linked to other factors*

🗨 **OUR PARTNERS TALK** ABOUT DSNA

Stormy conditions across France: 4 July 2018 at 17 hours.

Météo France is the provider of meteorological services for DSNA. The progress in recent years on digital weather and climate forecasting, and the large budget share that Météo France is devoting to research, are allowing it to develop innovative products for aeronautical forecast.

"European airspace is seeing more and more air traffic regulations caused by poor weather conditions, with considerable impacts on punctuality. In France, 2018 saw the 30-year record for stormy conditions!

We are working on fine-tuning our forecast models so that operational stakeholders can anticipate their operations, both in the pre-tactical and tactical phases. In 2019 we will be participating in the initiative launched by EUROCONTROL: to establish shared weather forecast on the scale of the European network, then to share the same view of the developing situation over the day. This reliable information will make it possible to define a set of scenarios, with bypass routes if necessary, coordinated with the concerned control centers. All operators will have access to this information."

CONCRETE ACTIONS IN 2018 TO IMPROVE PUNCTUALITY

On the strategical level, the major airspace designs such as those implemented in 2018 in the regions of the South-West (p. 12) or South-East, between the Marseille ACC and the Marseille approach (p. 26), contribute to better air traffic fluidity.

DSNA is also working on the optimization of en-route sectorization. Thus, since 29 March 2018, after two years of studies with the neighbouring centers, Reims ACC disposes of a 23rd control sector. This sectorization of the airspace is better adapted to the characteristics of the traffic flows in this very busy region, which offers more fluidity to flights serving the airports of the United Kingdom and the Netherlands.

On the pre-tactical level, DSNA has been working with airlines, Météo France, airport managers and the Network Manager (EUROCONTROL) to develop collaborative decision-making (CDM) processes even further as performance tools for optimizing operations of the route network, in nominal and adverse conditions alike.

▮ to manage reroutings on the European scale to optimize the network as a whole;

▮ to extend the CDM beyond airport operations. Advanced collaborative management makes it possible to avoid saturated en-route sectors and, when degraded situations occur, to improve resilience to return to a nominal situation more quickly;

▮ to dispose of a shared view of the weather forecasts over all sectors and ensure consistent and optimized management of regulations and scenarios;

▮ to make the CDM tools even more efficient while expanding their scope and making them more interoperable. This has resulted in a common will among the Network Manager, our partners and our customers to share a number of operational data via the "B2B@NM" collaborative service. In 2018, DSNA perfected its CDM tools: CDM@DSNA portal, SALTO 2020, 4Me, and BigSky (p. 30).

THE CDM PROCESS EXTENDED TO A CROSS-BORDER TRAFFIC FLOW MANAGEMENT

Since 2016, the DSNA has been developing an advanced process for collaborative ATFCM regulation measures (MAC) on the national scale to define, with the airlines and the Network Manager, the best options for routes avoiding very busy control sectors and thus minimize the implementation of regulations by the air traffic control.

The CAP (Collaborative Advanced Planning) *tool,* available on the DSNA portal to which nearly 30 airlines are connected, served as a base for a transboundary demonstration between France and Spain in 2017 and 2018 as part of the SESAR 2020 "Network Collaborative Management" project piloted by the Network Manager. The following took part: the control centers of Bordeaux, Madrid and Reims; Air Europa, Air Nostrum, Iberia and Iberia Express.

For the part of the exercise concerning the Bordeaux and Madrid control centers, the goal was to better refine the traffic demand during the scheduling of flight plans, on a South-North flow crossing the very busy control sectors of the Bordeaux ACC. To do so, using the DSNA portal, the flow regulators (FMPs) of Madrid and Bordeaux established collaborative processes in total transparency with the airlines, taking into account the local restrictions and the requirements of the airlines. The "extended" CAP thus made it possible to offer the airlines appropriate flight levels when the control sectors were saturated and to better distribute traffic without creating any instabilities at network level.

Beyond this exercise, since Summer 2018, the CAP has been used by the Karlsruhe (DFS) control center.

Live trial of the "Extended" CAP between France and Spain — Source: SESAR
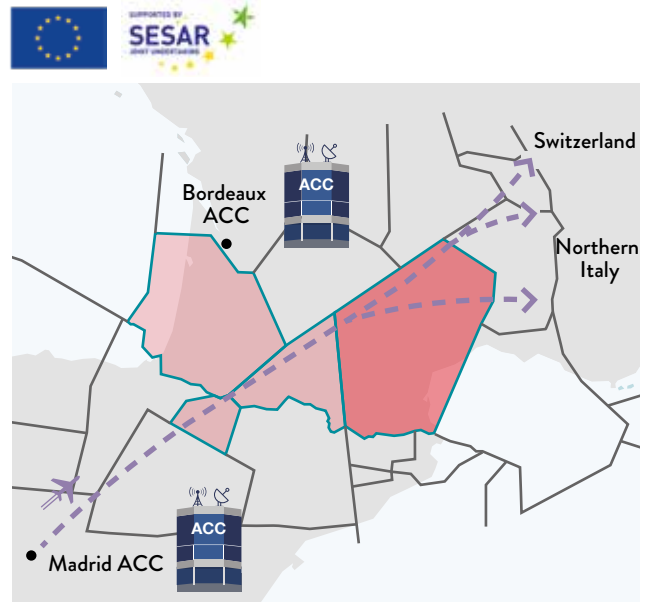
□ *Very busy control sector at the Bordeaux ACC*

By way of example, on 12 of the 15 days of the Summer 2017 exercise, the CAP measures made it possible to avoid the application of regulations, representing estimated savings of 4,111 minutes of delay.

03

HUMAN &
COLLECTIVE

HUMAN RESOURCES

In 2018, the Aeronautical Information Service (SIA) celebrated its 60th anniversary.

On 31 December 2018, the workforce of DSNA personnel working on the French mainland and Overseas (West Indies-French Guyana, Indian Ocean, Saint Pierre and Miquelon and Pacific Collectivities: French Polynesia, New Caledonia, Wallis and Futuna) amounted to 7,409 people, with a male-female distribution of 72% – 28%. This workforce is down by 0.6% on 2017. 93% of employees (6,859) operated on the French mainland and 7% (550) Overseas.

For the air navigation services of the Pacific, DSNA provides functional and technical support within the framework of agreements.

MANAGEMENT AND TRAINING OF TECHNICAL PERSONNEL

DSNA manages for DGAC the careers of the three technical bodies: ICNA (ATCO engineers), IESSA (ATSEP), and TSEEAC (Senior technicians). The provisional management of this personnel was the subject of careful monitoring given the time needed to train and obtain technical and operational qualifications.

DSNA entrusts the recruitment of this personnel to ENAC, the first FABEC training Academy (p. 42). With ENAC, DSNA also determines the content of the initial training courses and adapts them to regulatory changes. ATCOs and ATSEPs courses are delivered in alternation between ENAC and DSNA operational units.They are recognized as Master's Degree (level Baccalaureate + 5 years).

DSNA also manages the assignments of its future technical personnel and their professional mobility via campaigns when positions become available, examined at joint administrative committees twice a year.

GUIDING MANAGERS IN BUSINESS TRANSFORMATION

DSNA has launched an initiative of accompanying managers involved in technical modernization. The aim of this approach is to help them with managerial transformation and bring together the various initiatives in progress (experience feedback on the organization of DTI, project, program and portfolio Support Units: UA3P, innovation approach…). Seven transformation work areas have been identified: safety/cybersecurity, program management, engineering and innovation, skills and Human Resources, trust, partnerships, and digital transformation.

To develop a collective management culture for its activities and promote better control of their execution and steering, DSNA has created the UA3P Unit. In 2018, a project management methods/training/tools base was developed and tested on several pre-projects. This modernization of work methodology has made it possible to integrate best practices in the area of projects, programs, and portfolios, particularly concerning steering by value and deadline compliance.

Breakdown of staff by department

7% DTI
7% Overseas SNA
28% Mainland SNA
14% SW Region SNA
20% Paris Region SNA
21% ACC
1% DO Hq
2% DSNA Hq
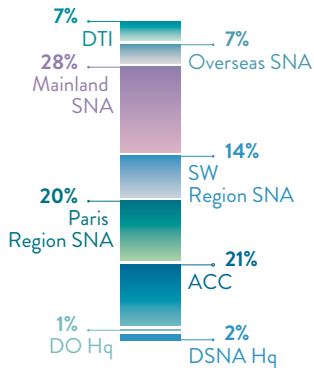
TOTAL
7,409 people

BREAKDOWN BY ORGANIZATION	
Paris region SNA	1,465
South-West region SNA	1,028
South-East ACC (Marseille)	580
East ACC (Reims)	492
West ACC (Brest)	486
South-East SNA	358
South-South-East SNA	344
Center-East SNA	329
North-East SNA	295
West SNA	290
South SNA	249
West Indies/French Guyana SNA	242
North SNA	192
Indian Ocean SNA	75
Saint Pierre-and Miquelon DSNA	40

Variation of the workforce (not including trainees)

ATCOs: 3,739 / 4,077
ATSEPs: 1,318 / 1,398
TSEEAC: 1,138 / 1,188
Other personnel: 1,214 / 1,324

0, 1,000, 2,000, 3,000, 4,000

■ 2009 ■ 2018
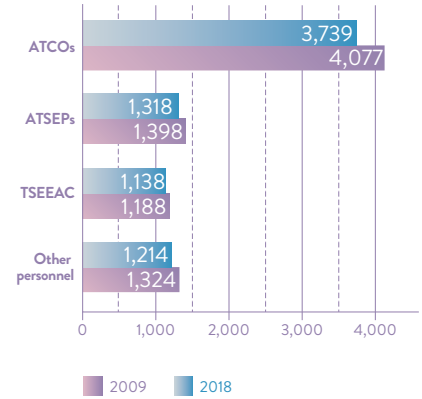
Distribution of controllers holding a valid license by control unit

SNA* (ICNA): 46% (1,605)
ACC (ICNA): 44% (1,534)
SNA* (TSEEAC): 10% (323)
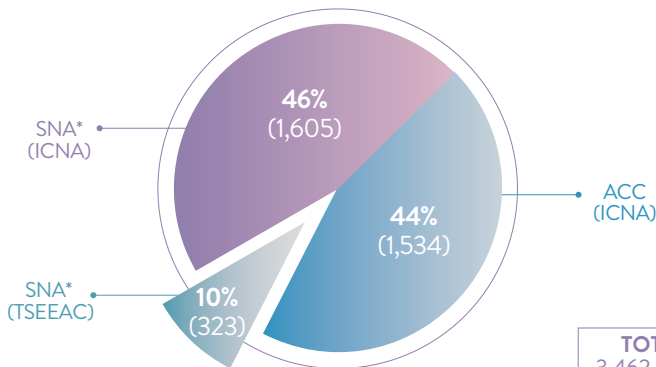
TOTAL
3,462 people

* This category includes mainland SNAs and overseas territories

Breakdown of maintenance personnel by department

CESNAC 4% (55)
DTI 13% (174)
OTHER ENTITIES* 3% (42)
DSNA Hq DO Hq SIA 2% (29)
ACC 28% (365)
SNA 50% (653)
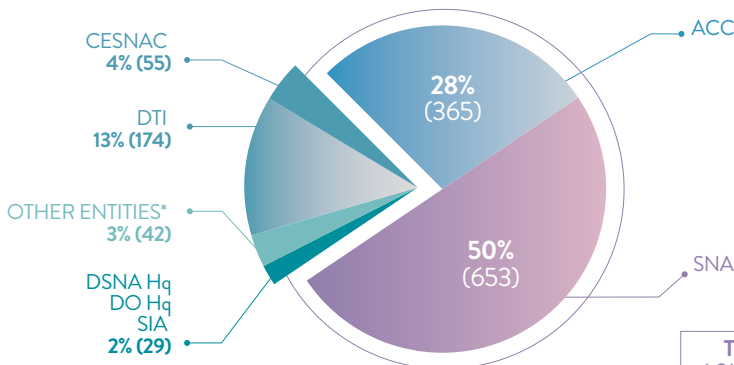
TOTAL
1,318 people

* DSNA/SPM, French Polynesia, New Caledonia, Wallis and Futuna

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ADAPTING THE ORGANIZATION OF OUR SERVICES

To improve our performance and the productivity of our services, DSNA is constantly reorganizing the airspace between the en-route and the approach control centers, and negotiates with the personnel representatives for a better-fitted organization of work in the control rooms and the technical services.

In the area of optimization of Human Resources management, significant increases in capacity have been obtained by adapting duty rosters for ATCOs in line with the 2016-2019 DGAC social protocol, particularly at Reims ACC, Brest ACC and Bordeaux ACC. However, these increases have shown their limits in the face of major local variations in traffic. This continuous improvement approach to productivity and performance must be continued.

After a decade of constant reduction of air traffic controller staff numbers, recruitment resumed with nearly 100 controllers per year. But due to their training course, these people will only be operational from 2021 at best. In view of the scheduled increase in air traffic, this recruitment must be maintained, or even intensified over the next decade.

THE INTEGRATED MANAGEMENT SYSTEM

To improve our overall performance in accordance with European requirements, DSNA has implemented a management system integrating safety, security, the environment and quality. The aim of this approach is to improve both our internal operation and relations with our external contacts, mainly the users of the airspace.

In 2018, DSNA renewed its ISO 9001 certificate as per the 2015 standard. The updates of the procedures and methodologies, in particular key documents such as the Management Manual and Strategy Steering, were successfully conducted under this new version of the standard. The DSNA will be integrating these new elements in a "simple" and "highly efficient" way.

In addition, synergies are sought between risk management with portfolios/programs/projects (UA3P) and their integration into this approach.

In the area of cybersecurity, DSNA is continuing the development of its SOC *(Security Operations Center)* which monitors, evaluates and defends IT networks by collecting the events recorded by the systems. CESNAC at Bordeaux is an active operational component. The SOC will continue to be enriched in the years to come by the collection of a growing amount of information.

VARIATION IN THE PRODUCTIVITY OF EN-ROUTE AIR TRAFFIC CONTROLLERS

In 2009, **the air traffic** controlled by the French air navigation services amounted to 2,700,258 flights. In 2018, it reached 3,224,532 flights, or an increase in 19.4%.

During the same period, due to the national context of control public spending, **the numbers of qualified en-route controllers** fell significantly by 9.2%, from 1,608 to 1,460.

The **"Productivity"** indicator is the ratio of traffic to the number of control hours completed. **Since 2009, the increase in productivity is valued at 13%.**

Traffic — Qualified controllers in the ACCs — Productivity — Control hours per month per controller
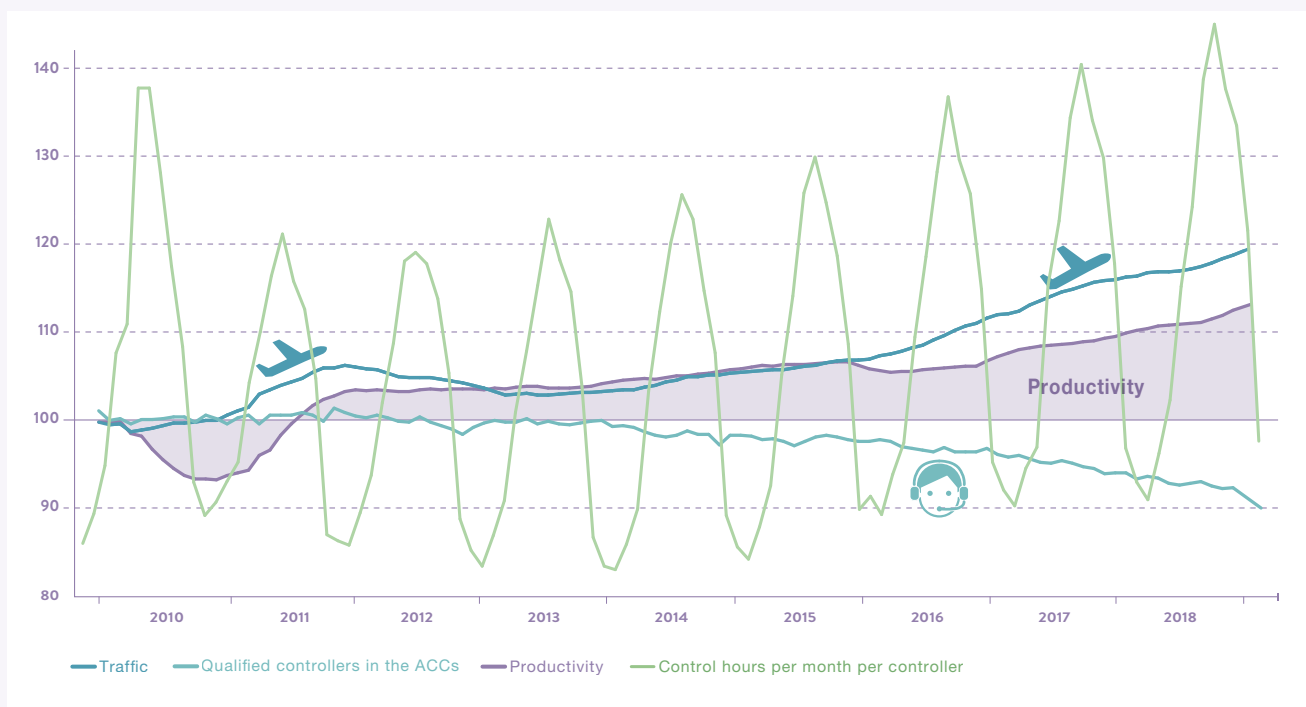
04

COMPETITIVENESS
& **CUSTOMER**
SERVICE

FINANCE

The management of finance and purchases contribute to the overall performance of DSNA. DSNA's budget is established in a particular budgetary framework: the "Aviation control and operation" appended budget (BACEA). The accounts are certified annually by an external service provider.

INCOME AND EXPENDITURE

in 2017, the total income of DSNA amounted to €1,659m or a drop of 1% on 2017.

This result is linked to the drop in unit rates of route charges and charges in terminal areas (RSTCA) on the mainland. The route charges which accounts for 84% of the DSNA budget is kept at a unit rate among the lowest in Western Europe. As regards the RSTCA, the de-averaging measurement occurring on 1st January 2017 (Zone 1: CDG and Orly; Zone 2: other airports) made it possible to reduce its rate by around 20% for zone 1 airports.

INCOME		NUMBER OF SERVICE UNITS	UNIT RATE	AMOUNT
Mainland	Route charges	21,272,731	€63.61	€1,351m ↘
	RSTCA	1,101,919	Zone 1: €174.62 Zone 2: €217.21	€213m ↘
Overseas	Oceanic charges	361,219	€35.78	€13m →
	RSTCA	2,773,028	€12.00	€33m ↗
Proceeds from air navigation charges (total)				€1,610m
Income other than charges (sales of products and services)				€49m ↗
Total				**€1,659m**

EXPENDITURE EXCLUDING PAYROLL	AMOUNT
Contribution to external organizations	€221m →
Investments	€216m ↗
Current operations	€182m ↘
Total	**€619m**

For its operating budget excluding payroll, DSNA consumed €619m in credits. The contribution to external organizations (Météo France, EUROCONTROL, delegated airspaces, ADP Group, ENAC) accounts for 36% of these expenses. As part of the modernization of the support functions, DSNA is continuing the integration of its single purchasing-business center, whether they are operational or technical.

To maintain the competitiveness of its services, the DSNA invests on average €300m per year over the 2015-2019 period. In 2018, 46% were devoted to the major technical programs preparing for the future, 41% to corrective and scalable maintenance (MCO) of existing installations and upgrades to systems and 13% to civil engineering.

2015-2019 PERFORMANCE PLAN

Good governance requires transparency, effectiveness and consistency in our ability to be accountable to each of our contacts.

To continuously improve the effectiveness of its actions, DSNA must meet performance objectives in terms of safety, capacity, environment and cost control. DSNA's strategic plan gives a consistent overall view on the ways of achieving these objectives, by offering high-quality and competitive services to all of our users, customers and partners in a way that meets the expectations of each of them.

DSNA steers its performance by objective and thus ensures the proper implementation of its strategy. In addition, it must meet a performance plan established at FABEC level (p. 42) with an economic section defined at national level, for the reference period 2015-2019 known as RP 2. In December 2018, the European Commission adopted the framework regulation applicable to the next reference period 2020-2024 (RP 3).

Variation of the en-route charge rate in France — Source: DSNA
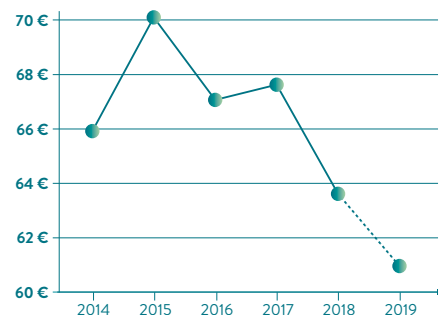
Proceeds from air navigation charges — Revenue — Source: DSNA

2017
- 13 M€
- 219 M€
- 1,637 M€
- 31 M€
- 1,374 M€

2018
- 13 M€
- 213 M€
- 1,610 M€
- 33 M€
- 1,351 M€

French flags 44%
Foreign flags 56%

French flags 15%
Foreign flags 85%

MAINLAND
- En-route control service fees
- RSTCA

OVERSEAS
- RSTCA
- Oceanic charges
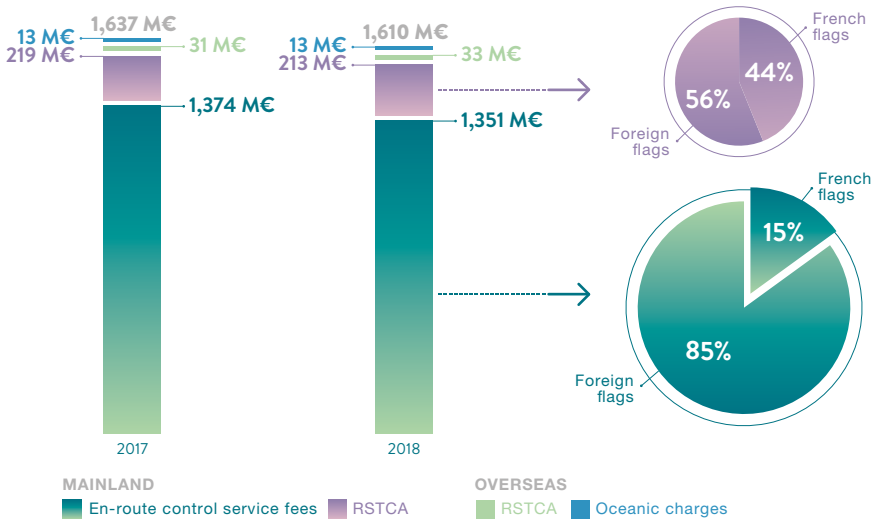
Control tower at the Saint-Denis airport in La Réunion.

Variation of the technical program of investment and corrective and scalable maintenance (MCO)

Investments and MCO (M€)
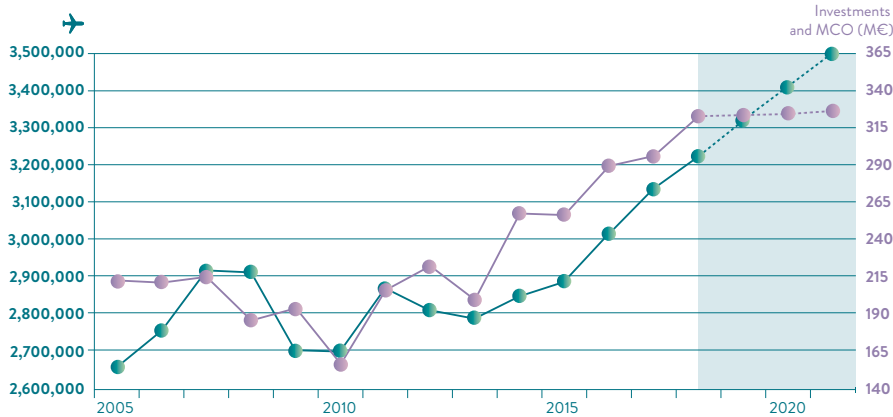
AIr traffic control at night in the Toulouse-Blagnac airport

Unit rate of en-route charges in 2018 in Europe — Source: EUROCONTROL

- < 59€
- < 69€
- < 79€
- > 80€

UNITED KINGDOM BELGIUM GERMANY POLAND
CZECH REP.
FRANCE SLOVAKIA
SWITZE-RLAND AUSTRIA HUNGARY
63.61 € CROATIA
ITALY
PORTUGAL SPAIN
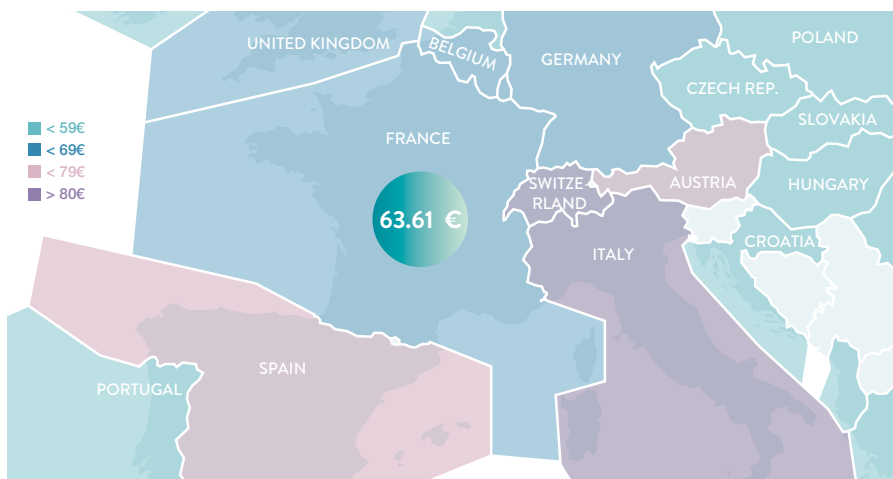
MAJOR TECHNICAL AND OPERATIONAL
ACHIEVEMENTS

A renovated Tower for Paris-Orly. The large-scale project was completed in March 2018.

AIRSPACE ORGANIZATION AND MANAGEMENT

MAJOR REORGANIZATION IN SOUTH-EASTERN FRANCE

Since 1st February 2018, a new interface between the Marseille ACC and the Marseille-Provence approach has been implemented. It provides better safety and greater capacity. The flights through airspaces around Montélimar up to FL 145 (4,400 meters) are now managed by the Marseille approach, which makes it possible to improve the compatibility between IFR flights and VFR flights, between civil flights and military flights. With the Marseille SNA taking over these spaces historically managed by the Marseille ACC, DSNA is continuing its policy of reorganization of the lower airspace for the benefit of all users.

The success of this project is the result of negotiations held at national and regional levels for over two years, among many stakeholders of light and sports aviation or Defence. The innovative management of this new interface will be able to accompany the ambitious development of the Marseille-Provence airport, the sixth largest airport of France in terms of movements.

EXTENSION OF THE CLERMONT-FERRAND FIS

Since 29 March 2018, the Clermont-Ferrand organization provides the approach control service for the Rodez airfield (4,000 IFR flights and 10,000 VFR flights) and is extending its flight information sector (FIS) into this region.

The Clermont-Ferrand organization is already supplying these services for the Saint-Étienne airport. This technical and operational achievement contributes to optimizing the organization of the approach control and flight information services. It has mobilized services for several years for the definition of the spaces and procedures, the implementation of the technical pre-requisites, the dialog with the different parties and the training of personnel.

GROUND-GROUND COMMUNICATIONS

2018 saw the completion of the network architecture interconnection under Internet Protocol (IP) between DSNA and Defence. Data flows of flight plans, radars, and RSFTA aeronautical messaging will gradually be migrated to this new network. A high-level agreement protocol was signed on December 2018.

Marseille-Provence control tower.

Control position at the Bordeaux ACC.

GROUND-AIR DATA LINK

ENRICHED SURVEILLANCE

Data exchanges by digital link between mode-S radar and mode-S transponder offer the en-route air traffic controller the option to dispose of the flight key parameters. This new functionality known as enriched monitoring was rolled out in the 5 ACCs in 2018. It is used to reduce voice communications and gain information about changes in the behavior of a flight more quickly (p. 13). With enriched surveillance, the controller appreciates having better knowledge of the situation of the flights in his or her sector.

CONTROLLER-PILOT DATA LINK COMMUNICATION (CPDLC)

Three of the four Data Link services are operational in France above FL 195 (6,000 meters). The main service used is frequency transfer, in the form of written messages. This form of exchange makes it possible to significantly lighten the controller load across certain sectors. In 2018, 10% of flights were connected in the French upper airspace. Airlines have the obligation to equip themselves by February 2020 to fly above FL 285 (9,000 meters).

The fourth service which consists in sending control instruction data over links (ground-level, route, heading or speed clearances), will be implemented at Marseille ACC and Brest ACC by summer 2019.

A European regulation defines the use of the Data Link, as a prelude to the advanced automated functions planned in the Pilot Common Project. DSNA is actively participating in projects with the aim of a harmonized deployment of Data Link services in Europe.

NEW CONTROL TOWERS

These new buildings replace control towers dating from the end of the 1950s. They provide a more streamlined working environment to air traffic controllers and maintenance personnel, for the benefit of DSNA's customers and users.

STRASBOURG AIRPORT

The new facility inaugurated on 21 March 2018 houses the headquarters of the North-East air navigation services, the control tower (28 m high with a lookout of 102 m²), the approach control room with FIS position, and the technical department. The approach control room benefits flights departing from or arriving in Strasbourg airport, as well as those serving the Karlsruhe-Baden-Baden and Lahr airports in Germany. With this new building, all technical equipment is gathered in a single spacious and modern area that is ready to host any future systems.

PAU-PYRÉNÉES AIRPORT

The new 30 metre-high tower, which entered service on 16 November 2018, provides controllers with an improved view of the platform, and of certain critical areas in particular. The 70 m² lookout is home to four positions (SOL, LOC, FIS and APP). The "Pyrenees" approach, shared by Pau and Tarbes, is equipped with 30" screens. The building also houses an 86 m² technical room with the latest generation equipment, such as the CLEOPATRE radiotelephone system.

Enhanced surveillance: the controller can access flight parameters in real-time.

Strasbourg: IFR approach room and FIS position in the new tower.

Dzaoudzi-Pamandzi Airport (Mayotte).

SATELLITE NAVIGATION

By the end of 2018, DSNA had equipped 96% of IFR runway ends in mainland France and its overseas territories, allowing pilots to use satellite navigation for their approach, landing or take-off trajectories. 88% of these procedures also benefit from vertical guidance. A European leader in the deployment of PBN *(Performance Based Navigation)* procedures, DSNA is the first air navigation operator to possess an innovative network of category 1 ILS approaches that combines conventional ground support with satellite technology.

This dynamic meets the European regulatory requirements as of 2018 on the implementation of PBN for all flight phases. PBN procedures offer approach or departure trajectories that are better able to meet environmental and safety standards.

On 9 October 2018, Europe's first parallel, triple, independent PBN approach concept was launched at Paris-CDG and Le Bourget (p. 15). This system is operable in mixed ILS/PBN mode, and means that these two busy airports can maintain high runway availability even when one of the ILSs is unavailable or being replaced.

DSNA OVERSEAS

In France's overseas territories, there is a special cooperation arrangement between DSNA and the local government departments and their international counterparts. This mainly relates to hurricane and crisis management (such as power cuts), as well as improving search and rescue (SAR) services.

The communication networks for the air navigation technical systems have been modernised, and work is under way in French Guyana to improve radio coverage. The ADS-B system for managing air traffic with e-strips, which is well-suited for sites not equipped with radar, is currently in service or being rolled out. In the Caribbean and French Guyana, a project to modernise ATM system has been set up so the three control agencies can benefit from the shared design and infrastructure, opening up the possibility for pooled training and specialised maintenance resources. The training simulator was delivered to Pointe-à-Pitre at the end of 2018.

During the national summit on air transport, a seminar dedicated to overseas territories highlighted the importance of flight routes for these regions. By modernising its overseas services, DSNA is contributing towards their economic development.

VOR maintenance visit at the Saint-Denis airport in La Reunion.

CUSTOMER AND USER RELATIONS
GEARED TOWARDS OPERATIONS

Air France received a delegation of parking management for all airlines based at CDG 2. Located within the South control tower, the parking regulator optimises resources as close to real-time as possible, in close coordination with the air navigation officers in charge of ground movement.

PREPARING THE 2020-2024 PERFORMANCE PLAN

Over one hundred representatives from French and international airlines and their associations, airports, European authorities, the French weather office and military bodies attended a seminar on "Air Navigation Performance" in Paris on 13 April 2018, as part of the national air transport workshop.

This meeting provided an opportunity to present the outcomes of actions carried out by DSNA in the RP 2 period from 2015 to 2019, in terms of improving its performance and gathering stakeholder opinions for the next performance plan for RP 3 2020-2024. Traffic growth forecasts mean that France, situated as it is at the heart of the European network, must future-proof in terms of the safety, resilience, capacity and modernization of its systems as part of the SESAR program.

In the medium-term, DSNA's performance will be supported by two main levers:

▮ investment (major system modernization programs, digitalization, cybersecurity, agile innovation, ongoing maintenance of current systems);

▮ optimisation of human resource management (staff sizes, training, and work organization).

DSNA NEWSLETTER

This newsletter has been delivered to more than 1,700 professional recipients in airlines, general aviation users, airport operators, organizations and professional bodies.

The topics covered are consistent with current operational needs. For example, in 2018 DSNA presented on the measures taken in the Chambéry TMA for the ski season, the new routes around Beauvais, the benefits of dynamic airspace allocation between Marseille and Geneva, the flow regulation measures for summer 2018, and the benefits of enhanced surveillance (S mode).

CDM@DSNA SEMINAR

In 2018 this forum explored the resilience mechanisms against air traffic disruption, and the need to streamline collaborative decision-making (CDM) processes and tools by increasing their scope of application, their inter-operability, and the amount of operational data shared. This is essential for optimising airspace capacity and route network operation.

The 'dsna.fr' DSNA portal that hosts CAP (Collaborative Advanced Planning, p. 18) and Orly's curfew management tool has received particular praise from companies.

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SALTO

4Me

DSNA portal

BigSky

B2B@NM

EPEIRES

iAMAN

The CDM@DSNA tools are connected to the operational data from B2B@NM, the collaborative web service of the Network Manager (EUROCONTROL). A pioneering initiative from SWIM, the air navigation extranet that received the Single European Sky "Innovation Award" at the World ATM Congress 2019 in Madrid.

NEW AIR-TO-GROUND COMMUNICATION EQUIPMENT

Given the fact that the spectrum of frequency ranges allocated to civil aviation is nearing saturation point, new European regulations require operators to equip their aircraft with more efficient radio systems, with 8.33 kHz spacing between VHF voice communication channels. This requirement, which already applies to upper airspace, shall come into force on 1 January 2021 below FL 195 (6,000 metres).

In 2018, Europe granted France €7.9 billion in funding to convert its radio equipment in light aircraft. DSNA and CNFAS (French National Council for Aeronautical and Sporting Federations) have compiled a list of practical guidelines for the transition period. A similar approach has been taken to establish a gradual conversion plan for government aircraft.

DRONES IN CIVIL AIR TRAFFIC

At both national and European level (p. 41), DSNA is highly involved in drone development projects, which represent a real short-term operational challenge for overall air traffic management (ATM) performance.

In July 2018, DSNA and the French Air Force conducted trials in south-west France using a MALE military Reaper drone with similar performance to a regional aircraft, in order to define an operational concept for integration.

The final results will be shared with the EASA, which is responsible for issuing the next set of regulations on the matter.

Experiment: the air traffic controller at the Bordeaux ACC sees the drone (RPAS) like any other traffic in the controlled airspace and manages its cross-over with a KLM flight at FL 190 (6,000 metres).

INNOVATION
& TECHNOLOGY

Single
European
Sky Award 2019
Madrid, 12 March 2019

INNOVATION AWARD

**Interoperability with the
EUROCONTROL Network Manager**

By EUROCONTROL – Network Manager, ENAIRE, Deutsche
Flugsicherung GmbH, Direction des Services de la
Navigation Aérienne, skyguide – Swiss Air Navigation
Services Ltd, Maastricht Upper Area Control Centre,
Air France, Schiphol Nederland b.v, Copenhagen Airports A/S,
RocketRoute Ltd, Nice Côte d'Azur Airport

AN AMBITIOUS STRATEGY
FOR TECHNICAL MODERNIZATION

POWERED BY
SESAR

SESAR
DEPLOYMENT MANAGER

LE VOL PARFAIT
DSNA

Cofinancé par le mécanisme pour l'interconnexion
en Europe de l'Union européenne

Free Route   **SWIM**

4Me
DSNA Portal
SALTO   **EPEIRES**
BOLT

BigSky

4-FLIGHT   **ERATO EE**
Coflight   **N-VCS**

Data Link

Extended AMAN
Extended ATC Planning
Extended CDM
U-space

AIM
Airport Safety Nets
A-SMGCS (SMAN)
CDM   **DMAN**
Digital Advanced Tower

Coflight

AMAN
RECAT-EU
PBN

SYSAT
CATIA
CLEOPATRE

Data Link

CRNA

S Mode   **CssIP**   **Cybersecurity**

■ Structural program   ■ Agile, cooperative, digital and innovative complementary solution   ☐ CDM tools

The 4-FLIGHT simulator at the Reims ACC.

SYSAT: test platform used by the Orly control unit to configure its lookout needs / April 2019.

The DSNA's technical modernization program, with its funding of €2 billion during the period 2010-2025, has reached its halfway point. It consists of:

❚ future-proofing in the framework of the European SESAR program;

❚ completing all ongoing major programs while ensuring that existing systems remain at their operational condition;

❚ developing operational technical solutions that are more agile, cooperative, digital and innovative, within an integration environment (ATM 2) that reduces innovation roll-out times (DSNA portal, 4Me, SALTO, BigSky).

Breakdown of investments in 2018
Source: DSNA

Civil engineering
and development
of systems

Major
technical
programmes

13%

46%

41%

Maintaining
in operational
conditions (MCO)
of existing installations

INNOVATION & TECHNOLOGY ||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||| | | | | | | | |

33
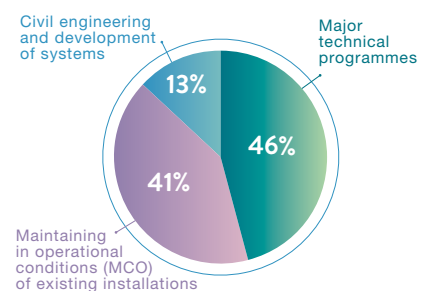
Reims ACC: visit by representatives from DG Move (European Commission), the INEA and the SESAR Deployment Manager for a demonstration on the 4-FLIGHT simulator and the advanced ATFCM tools that benefit from joint European Union funding / February 2019.

THE MODERNIZATION OF AIR TRAFFIC MANAGEMENT (ATM) SYSTEMS

Developed by DSNA, ENAV and Thales/ Leonardo industrial consortium, the **Coflight** system of advanced flight data processing represents a major operational and technological breakthrough. Forming the core of DSNA's future ATM system, it will allow the controller to optimise trajectories, thereby reducing fuel consumption and flight times.

❚ **En-route:** launched in 2011 by the signing of a framework agreement with Thales, the **4-FLIGHT** program will be deployed in winter 2021/2022 at the Reims ACC and Marseille ACC pilot sites, then in winter 2022/2023 at the Lille ACC. This *stripless* system incorporates the latest generation Java HMI, alongside innovative and effective flight management and safety tools.

In 2018, the pilot sites continued with their technical installations and configuration, and conducted new assessments of actual traffic. The interconnection with Defence requires special attention for the equipment of CMCC and flight tests control position. Work is being carried out on the STRIDA/ CAUTRA interface.

Upon completion, the Brest and Bordeaux ACCs (which currently operate in the ERATO electronic environment) will also be equipped with 4-FLIGHT.

❚ **Approaches and Towers:** the aim of the **SYSAT** program is to modernise the ATM systems in mainland for aerodrome and approach control operated by the DSNA, based on an existing industrial system that will be adapted to its technical environment. The DSNA selected the SAAB-CS industrial consortium to implement SYSAT for Group 1 (Paris-CDG/Le Bourget and Paris-Orly). The priorities are handling the obsolescence of the ground safety system (A-SMGCS) at Paris-CDG for winter 2021/2022 and the operational use of the SYSAT system including the A-SMGCS for the Orly tower in winter 2022/2023.

These key programs for French ATM have benefited from joint European Union funding.

4-FLIGHT is a major innovative project that represents a technological breakthrough in terms of development and deployment. In 2018, the 4-FLIGHT roadmap was consolidated by the signing of an amendment formalising the comprehensive commitment of DSNA and Thales until the three ACCs enter service, particularly in terms of costs and lead times. The production of an additional version of Coflight is timed to coincide with this development. A program integrated with the industrial partner will make it possible to monitor the risk control plan on a monthly basis, especially with regards to the simulator, degraded mode management, and specific functions for the Paris ACC.

The training of air traffic controllers and maintenance personnel, against a backdrop where periods of heavy traffic are becoming increasingly longer, remains a crucial point. In this regard, the experience gained from the conversion to ERATO (EEE) will prove invaluable.

INTEROPERABILITY OF TECHNICAL SYSTEMS: A FIRST TRIAL

The various air traffic management technical systems currently used in Europe each have their own standards. In order to facilitate the sharing of flight plan data, the SESAR program aims to implement greater interoperability (IOP) of these systems by 2020, through the EUROCAE ED133 standard. For DSNA, this standard will be incorporated in Coflight, 4-FLIGHT and SYSAT.

On 26 April 2018, DSNA successfully completed a SESAR interoperability demonstration for a trajectory of a dozen scenarios between three interconnected platforms: Coflight in Toulouse (DTI), iTEC in Langen (DFS) and Coflight in Rome (ENAV). This trial underscored the initial operational benefits that could be derived from sharing trajectories and coordinating a given flight between different centres. Route modifications could be exchanged, and demonstrated that the sequence in affected control centres and sectors was immediately updated with a recalculated 4D trajectory and shared via SWIM (System Wide Information Management) services. These continuous updates will also optimise the tools used by controllers, such as AMAN (Arrival Management) or MTCD (Mid-Term Conflict Detection).

The interoperability of technical systems is therefore an essential pre-requisite, especially for utilising Free Routes and managing User Preferred Routes.

THE MODERNIZATION OF COMMUNICATION, NAVIGATION AND SURVEILLANCE (CNS) SYSTEMS

DSNA is the first major air navigation operator in Europe to possess a modern infrastructure for ground-to-ground communications (p. 26), with operational Voice over Internet Protocol (VoIP) communications. Its RENAR-IP network is able to host new services, that are ever more demanding in terms of performance and reliability. It will be integrated with the PENS European IP network, which will host 40 other European aviation operators. This environment will offer increased resilience of communications within the European airspace, particularly against cyber attack threats.

DSNA is pursuing its efforts to update its radio and telephony systems, which are critical for security, with the N-VCS project for the ACCs and Paris-CDG, the CATIA project for Approaches and the CLEOPATRE project for smaller aerodromes.

DSNA also provides means for air-to-ground communication via Data Link, and a dense network of satellite approach procedures.

WAC Madrid 2018: DSNA and EUROCONTROL received a distinction for the RECAT-EU project implemented in Paris-CDG and Le Bourget, a European first. This project served to optimise the separation between aircraft during approaches.

DSNA at the yearly *World ATM Congress* in Madrid.

JANE'S ATC AWARDS	
2015	XMAN for flights to London Heathrow (Extended AMAN)
2016	Collaborative Advanced Planning (CAP)
2017	RWSL@CDG
	Integrated SESAR Trials for Enhanced Arrival Management (iStream)
2018	RECAT-EU@CDG & Le Bourget
2019	*Triple, independent and parallel PBN approaches@CDG & Le Bourget (nominated)*

SINGLE EUROPEAN SKY AWARDS	
2017	RNP Implementation Synchronised in Europe (RISE) - SESAR project
	Augmented Approach to Land (AAL) - SESAR project
	Transition to ERATO at the Bordeaux ACC (honourable mention)
2019	Digital transformation in ATM: the B2B@NM services
	AEFMP cooperation with Spain, Portugal, Morocco, Algeria and Tunisia (honourable mention)

Coflight: flight trajectories in 4D.

DSNA IN THE DIGITAL ERA

BOLT

A compact and modular platform, BOLT will be Coflight's first roll-out. With BOLT, operatives will have access to extremely precise information regarding actual trajectories. The tool will be available in summer 2019 in DSNA portal, and will make it easier to anticipate the Orly curfew. It will also be used at the Reims ACC for assessing the XMAN procedure at several airports (p. 43) and will be gradually integrated into SALTO, the latest tool for FMPs.
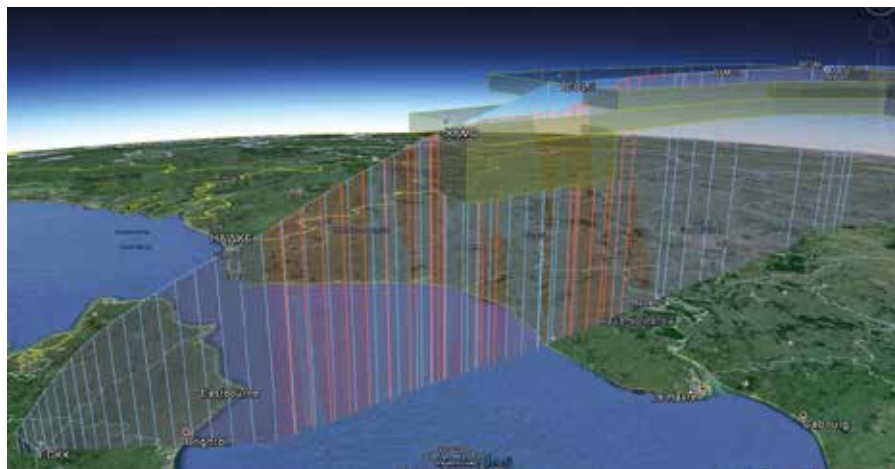
COFLIGHT CLOUD SERVICES

DSNA and its Swiss counterpart, Skyguide, are trialling the use of a *cloud* service to provide flight trajectory data remotely, based on Coflight. This is a pioneering initiative for virtualised services in air traffic control, which are at the heart of the vision advocated by the Airspace Architecture Study (p. 39). The first tests were carried out in 2018 between the Paris ACC (the data provider) and the en-route centre at Geneva (the client).

Before this new activity is implemented however, an economic and legal framework will need to be defined.

DATA MANAGEMENT

BIG DATA@DSNA: DSNA is conducting exploratory work into the field of big data mining, with a view to developing business-specific application software and centralised, secured and documented storage solutions for data. Implementing this approach would entail supporting current analysis work and innovative data mining initiatives such as the FEAT project (p. 16). The capability to grant rapid and easy access to data is a major lever for optimising working methods. Nevertheless, rules governing the sharing and provision of such data must be set, as must rules protecting sensitive or private data.

The knowledge and skills required to develop this area of expertise pave the way to new business areas, which themselves will need qualified resources. To this end, SIA at Bordeaux has upgraded certain business areas to include experts in aeronautical data, administration and management throughout the data's entire life cycle. In an age where data is increasingly abundant and complex, proficiency in high-tech tools and new products/associated services requires highly-nuanced administration of aeronautical data.

DIGITALISED ADVANCED TOWER

DSNA is gradually rolling out digital technological innovations that have been tested within the framework of the SESAR program. These include the launch of an augmented video system for monitoring ground movement in hidden areas at Orly airport, remote aerodrome inspections (evaluation of the Miquelon aerodrome control service by the air traffic controller at Saint-Pierre, and a study in Cannes for the Quai du Large heliport), and the study of a remote tower centre for multiple aerodromes.

Each airport is unique, and therefore the appropriate studies must be carried out before any such solutions may be implemented. The digital transformation currently taking place in European ATM also requires an in-depth understanding of the human factors at play.

AERONAUTICAL INFORMATION MANAGEMENT (AIM)

As part of its AIM program, DSNA has launched its SEPIA project to facilitate the end-to-end digitisation of the aeronautical data processing chain, and to ensure compliance with European regulation on data quality. The most advanced services in this program concern drones (SOFIA Drones), flight preparation (SOFIA Briefing), and the national Obstacles database.

These tools and services will make it possible to meet any new requirements, by offering interactive and dynamic data displays in real-time that can be targeted by user, similar to the smartphone maps that are available to inform recreational drone users of airspace restrictions.

The aeronautical information can be accessed on tablets or smartphones.

In October 2018, the European Commission set up a Wise Persons Group. Amongst the recommendations given for a more efficient Single European Sky by 2035, the report highlighted the importance of the role of technical modernization in air traffic control, and the contribution of new innovative technologies.

DSNA IN THE DAYS OF ARTIFICIAL INTELLIGENCE

The SINAPS project developed by DSNA in partnership with ONERA as part of the SESAR program is a concrete example of the advanced use of artificial intelligence in ATM. It uses complex algorithms (including Machine Learning) to optimise the configuration of en-route control sectors. This theme is addressed in the Architecture Airspace Study (p. 39).

A promising experiment was conducted in September 2018 at the Bordeaux ACC with the room manager and FMPs to assess the operational benefits in terms of time saved, contributions to decision-making and capacity optimisation.

France's airspace comprises 168 basic sectors, which may be optimised depending on the traffic characteristics.

ATM STRATEGY FOR FRANCE

DSNA has signed an agreement with IATA (International Air Transport Association) to develop, as part of a well-established collaborative decision-making process, a coordinated strategy for:
- *the organization and management of its airspace, both upper and in the terminal area;*
- *the investments accompanying its modernization of air traffic management.*

The chief initiatives will be the subject of a level 1 document, currently under consultation, and will be detailed for closer supervision in a level 2 document. This approach will make it possible to measure the impact of new ATM systems on airlines during deployment, and to provide any corrective actions necessary.

So that this drive to optimise airspace and air traffic can benefit to all European citizens, IATA is seeking to replicate the same approach with Europe's other main air navigation operators.

06

THE SINGLE
EUROPEAN SKY

THE **SESAR** PROGRAM

World ATM Congress 2018 / DSNA stand: the SESAR Walking Tours attract a lot of visitors. They are an opportunity to showcase the sheer variety of SESAR projects, whether they are still in the R&D phase or ready for deployment in Europe.

The SESAR program, the technological pillar of the Single European Sky, aims to modernise Europe's air traffic management (ATM) system by developing new operational concepts in a new-generation technological environment with coordinated standards. As part of this, DSNA is pursuing seven key strategic objectives:

❶ Safeguard its strategic, industrial choices.

❷ Define the measures needed to implement Free Route in a high-density airspace.

❸ Promote its operational concepts based on close integration between the pre-tactical phase (ATFCM) and control (ATC).

❹ Participate in the development of solutions for optimisation of flights arriving at saturated airports.

❺ Develop the Virtual Centre service offering as part of Coflight Cloud Services.

❻ Continue efforts to modernise controllers' tools.

❼ Incorporate drones in IFR traffic and develop management solutions for their operation in the airspace (U-Space).

In 2018, DSNA proposed a solution called the Basic Extended ATC Planning Solution (bEAP) to the SESAR JU, a public-private partnership. This solution is listed in the 2019 catalogue of SESAR solutions, in the section on Advanced Air Traffic Services.

bEAP is the result of an operational evaluation conducted on Extended ATC Planning (EAP) at the Reims ACC during SESAR 1 in 2015, when the controllers incorporated 52 of the suggested 55 regulatory measures known as Short Term ATFCM Measures (STAM), subsequently halving delays.

In a dynamic and efficient approach between user and developer, the Reims ACC deployed a dedicated tool called 4Me, connected to the B2B@NM services (EUROCONTROL). 4Me allows controllers to access services optimising the link between the pre-tactical phase (ATFCM) and real time (ATC). In the beginning, with 4Me the controller is able to better take account of regulatory STAM measures, and has access to Extended AMAN pre-sequence information.

The bEAP solution is a basic version that will evolve to eventually incorporate more advanced functionality, as studied in SESAR 2020: decision-making aids, traffic simplification algorithms, and dynamic airspace management.

The 4Me tool, a multi-application portal for SWIM services for operations, is being gradually deployed in the 5 ACCs.

THE IOP: A SOLUTION TO THE FRAGMENTATION OF EUROPEAN AIRSPACE

🔴 Hotspot
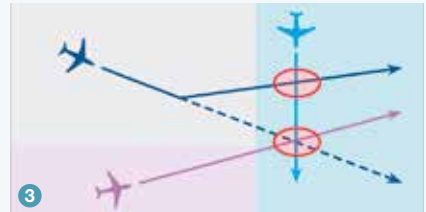
In 2018, DSNA led a SESAR demonstration on the interoperability (IOP) of technical systems between three sites: Toulouse, Langen and Rome (p. 34).

In the event of adverse operational situations (for example, a hotspot generated by an attempt to bypass a storm cell ❶ or by a direct route and delayed flight ❷), the SESAR solution "IOP Flight Object" provides a better predictability and is able to use any dynamic airspace configuration. It also reliably detects conflicts and aids in their resolution ❸.

DEVELOPMENT
(SESAR 2020)

This second development phase, launched at the end of 2016, forms part of the "Horizon 2020" European program, which groups together European Union funding for research and innovation. With €585 million, it is able to keep ATM R&D activities running until 2024.

In the SESAR 2020 program, DSNA is involved in:

▌ approving 32 new SESAR solutions (DSNA leader for SAFE projects assessing various ground and airborne safety nets, and ToBeFree on the Free Route);

▌ three cross-disciplinary projects;

▌ the assessment of four large-scale projects (DSNA leader for the xStream project: p. 40).

This contribution revolves around the following areas: trajectory, air traffic flow and capacity management (ATFCM), Free Routing, air traffic control tools, optimised arrival management, airport security, Virtual Centre and traffic management with drones.

In 2018, the DSNA also participated in the study of a new airspace architecture in Europe, the Airspace Architecture Study *(AAS),* an initiative of the European Commission entrusted to the SESAR JU. Without ATM modernization and without any new upgrades, air traffic delays in Europe will continue to grow to unprecedented levels. This study, primarily focusing on the en-route phase, presents a vision of the Single European Sky that incorporates innovative technology. It is divided into three steps: deployment of cross-border Free Route spaces in 2025, virtualisation of services in 2030, and Trajectory Based Operations in 2035.

DSNA's strategic plan is an integral part of the transformation program spearheaded by the SESAR JU's European ATM Master Plan, and is complemented by this study.

DEPLOYMENT

The operational implementation of SESAR projects is subject to financial support from the Connecting Europe Facility (CEF), with funds of €2.5 billion.

An initial functionality package resulting from the work carried out in SESAR 1 was identified in a 2014 European regulation called the Pilot Common Project (PCP), with deadlines stretching from 2018 to 2026. Projects directly associated with the PCP are managed via the SESAR Deployment Manager (SDM). Other projects linked to the Single European Sky are managed with the INEA directly.

2018 saw the following highlights:

▌ monitoring of CEF projects from 2014-2015-2016;

▌ the launch of 8 CEF projects from 2017 with the SDM (joint funding of €29.8 million);

▌ enhanced monitoring of the SDM on 4-FLIGHT programs (CEF 2014-2015) and SYSAT (CEF 2014).

30 co-funded DSNA projects

NEW OPERATIONAL CONCEPTS

IMPROVING FLIGHT EFFICIENCY
AND ARRIVAL CAPACITY AT PEAK HOURS

The xStream project (Cross-border SESAR trials for enhanced arrival management) led by DSNA involves 16 partners. Its purpose is to demonstrate improvements in terms of safety, the environment, and flight efficiency. Live trials have been conducted during periods of heavy traffic at airports in Paris, Zurich, London and Frankfurt, testing two complementary concepts - Target Times of Arrival (TTA) and cruising flow management far ahead of the destination airport.

The Paris ACC evaluated these two methods for flights arriving at Paris-CDG between May and October 2018. The Flow Management position (FMP) at the Paris ACC used a tool derived from the AMAN (iAMAN) connected to EUROCONTROL's Network Manager, which enabled him to predict arrival sequences.

BETTER ADAPTING TRAFFIC DEMAND TO LOCAL CONSTRAINTS

The FMP and Paris ACC allocate flights **a Target Time of Arrival (TTA) upon their departure** from European airports, so as to optimise the arrival sequence at Paris-CDG airport. The TTA is sent and coordinated automatically with the European Network Manager.

The image opposite shows the iAMAN tool where flight AFR98MZ has been given a TTA of 09:37, improving its ATFM delay by 4 minutes. The results obtained have shown that, overall, ATFM delays on arrivals can be reduced by 5%.

Furthermore, with this procedure companies can notify the FMP of their priority flights, allowing the FMP to optimise the arrival sequence accordingly (the Arrival Flexibility concept).

PRE-SEQUENCING FLIGHTS OUTSIDE OF FRANCE

The operational assessment covered arrival flows coming from the South-East, taking into account flights located up to 350 NM (650 km) from Paris-CDG (Extended AMAN).

The Paris ACC FMP coordinates with the upstream control centres in Milan, Geneva and Zurich to **reduce the speeds of certain cruising flights** and smooth out traffic peaks arriving in the Paris ACC's UJ sector (shown in orange on the map) responsible for the tactical sequencing of arrivals to feed into the Paris TMA.

This procedure makes it possible to absorb delays into cruising altitudes. It reduces the distance covered by flights arriving in the UJ sector, improving environmental efficiency (reducing fuel consumption and CO_2 emissions) while optimising capacity in terminal sectors thanks to better predictability. It ultimately reduces the approach controller's workload in Paris TMA.
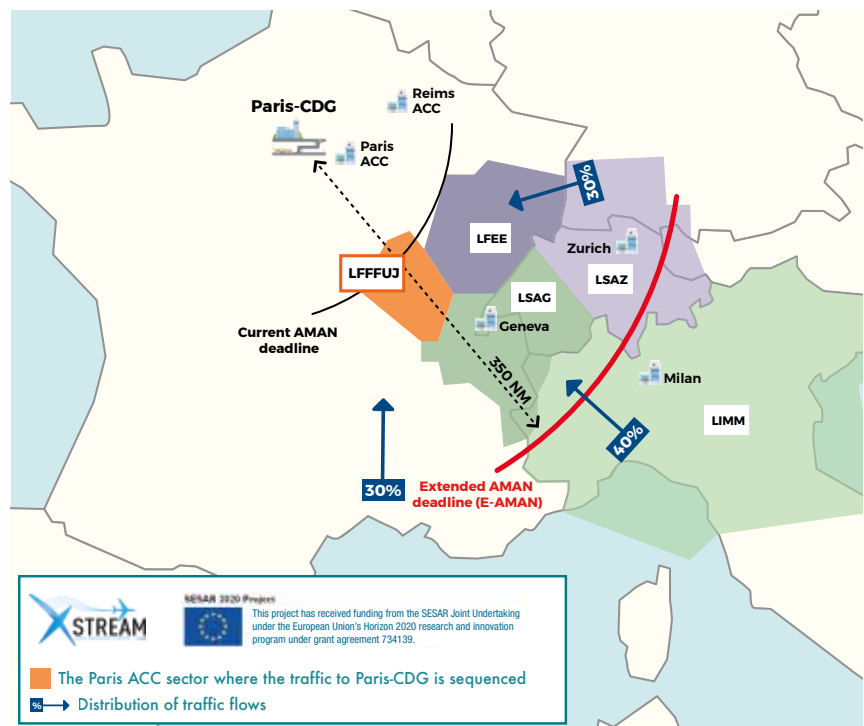
SESAR 2020 Project

This project has received funding from the SESAR Joint Undertaking under the European Union's Horizon 2020 research and innovation program under grant agreement 734139.

The Paris ACC sector where the traffic to Paris-CDG is sequenced

% Distribution of traffic flows

RESEARCH & DEVELOPMENT

FAST-TRACKING DRONE INTEGRATION IN A SAFE SKY

DSNA is closely involved in the construction of **U-space,** which safely incorporates drones without degrading capacity or compromising safety, the environment and privacy. It supports new applications for drones that take part in public interest operations, such as search and rescue, emergency services, and maritime surveillance.

DSNA's vision is to create a new airspace where manned and unmanned aircraft can evolve in a safe and effective manner. Exchange between services pass through networks (such as the internet or aeronautical network) and SWIM services. DSNA promotes a collaborative and balanced approach that focuses on the needs of drone operators.

In December 2018, DSNA launched a **call for partnerships** to organise U-space solutions that will improve drone management in controlled airspaces, integrate Remotely Piloted Aircraft Systems (RPAS) in civil traffic, and meet flight safety, security and economic efficiency criteria.

Thanks to its experience, DSNA is a very active player on the international scene. It is heavily involved in European **SESAR 2020 projects:**

CORUS
Concept of operations for European unmanned systems

This project, headed by EUROCONTROL, involves 9 partners. It aims to define operational concepts and flight rules for drones at very low altitudes in uncontrolled European airspaces.

USIS
U-space Initial Services

This project, led by Thales, involves 7 partners. It explores the services required for drones, by experimenting with automated aids for drone operators, in coordination with air traffic agencies. The main objective is to demonstrate that the basic U-space services meet the needs for drone operations managed out of the operator's view, regardless of the environment.

PODIUM
Providing Operation of Drones with Initial UTM Management

Four large-scale demonstrations are planned for this project in 2019: in France (2 sites), Denmark and the Netherlands. These assessments will be carried out across a wide range of operations (in controlled or uncontrolled airspace, in urban and rural areas, near airports, and in mixed environments with manned aircraft), in which the operational conditions will be realistic.

THE FAB **EUROPE CENTRAL**

member of
FABEC
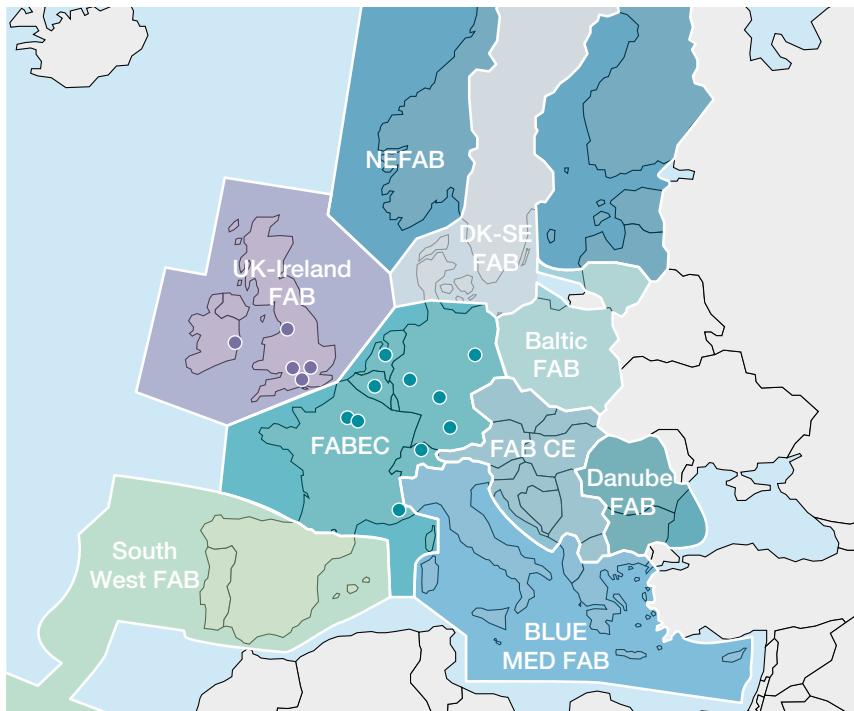
The European PCP regulation identifies 15 major airports in the FABEC and FAB UK-Ireland for which flights that arrive at peak times may benefit from the XMAN (Extended AMAN) procedure.

Top 10 European airports in 2018 by IFR traffic
Source: EUROCONTROL

FAB	AIRPORT	TRAFFIC	
FABEC	Frankfurt	511,000	↗
FABEC	Amsterdam	505,000	↘
FABEC	Paris-CDG	487,000	↗
UK-Ireland FAB	London-Heathrow	477,000	↗
FABEC	Munich	410,000	↗
South West FAB	Madrid-Barajas	404,000	↗
South West FAB	Barcelona	330,000	↗
BLUE MED FAB	Rome-Fiumicino	307,000	↗
UK-Ireland FAB	London-Gatwick	283,000	↗
DK-SE FAB	Copenhagen	169,000	↘

France is involved with Germany, Switzerland, Belgium, the Netherlands and Luxembourg in the FAB Europe Central (FABEC), situated in the heart of Europe. The goal: to create a safer, more efficient airspace with greater capacity, offering more direct routes and optimised flight levels and trajectories, thereby allowing airline companies to operate more cost-effective and less polluting flights. The close collaboration with military authorities is a crucial factor in achieving these performance objectives.

DSNA's main challenges in the FABEC are similar to those of its national strategy:

❶ **Airspace strategy:** offer more direct routes in the upper airspace, promote the French model of civil-military coordination, and optimise the capacity for large European platforms such as Paris-CDG.

❷ **Develop joint performance objectives.**

❸ **Technical systems strategy:** coordinate to ensure geographical continuity and harmonisation of SESAR deployments.

2018: PERFORMANCE OF THE FABEC AND DSNA	OBJECTIVE FABEC	COMPLETED FABEC	COMPLETED DSNA
Safety: EoSM[1] indicator			
"Safety" culture	Level C	Level D	Level D
Other objectives	Level C	Level D	Level D
Average ATFCM delay under all circumstances			
En-route	0.28 min. per flight	2.12 min. per flight	1.77 min. per flight
In terminal areas (Objective defined by the state)	0.60 min. per flight	0.73 min. per flight	0.31 min. per flight
Environment			
Horizontal Flight Efficiency (HFE)[2]	3.05%	3.25%	3.26%

1. *Efficiency of Safety Management: a compulsory Europe-wide indicator assessing the maturity of the safety management systems in air navigation service providers. Scale: level A (0%), level B (25%), level C (50%), level D (75%), level E (100%).*
2. *Horizontal Flight Efficiency: this indicator measures the difference between the length of the route actually taken and the shortest theoretical route.*

INTERFAB COOPERATION

The 9 FABs have teamed up around an initiative called InterFAB, a partnership of 31 countries that covers the same airspace, number of controlled flights per day and number of passengers carried as the whole of the United States. This initiative allows the FABs to better coordinate their operations, share experience, and formulate common goals for the challenges they face together. It also allows them to better assert their positions in the building of the Single European Sky.

Under the aegis of this partnership, workshops and conferences are organised on critical topics for European air navigation.
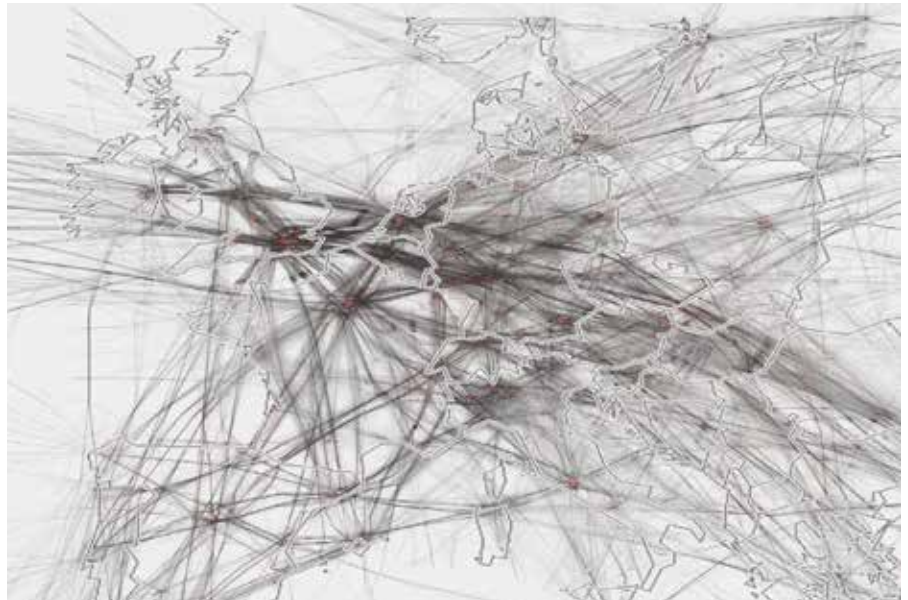
AERONAUTICAL INFORMATION

In 2018, an agreement on data provision was reached between the SIA and its German counterpart to reduce data inconsistencies at the border.

RECOGNITION FOR FABEC OUTSIDE OF EUROPE

The FABEC was awarded a prize by the ATCA (Air Traffic Control Association) in Washington on 2 October 2018 for its innovative initiatives on the volatility of air traffic and the impact of very bad weather on air traffic management in Europe. The work, which continues to this day, has been

Traffic flows in Europe.

deemed very useful by the entire aeronautical community.

CONFERENCE SPACE AT THE WAC

At the World ATM Congress (WAC) held in Madrid in March 2019, the FABEC OPS Theatre hosted two InterFAB conferences led by experts from 5 FABs and the Network Manager.

❙ One raised the question of fragmentation in the air traffic management system (airspace, infrastructure, technology, subsidiarity) and its impact on the operational performance of ATM. The harmonisation of technical standards, interoperability of systems, emergency systems, advanced coordination of operations (CDM, CAP) and national sovereignty were subjects at the heart of the debates.

❙ The other conference addressed the capacity crisis. Summer 2018 saw record delays in Europe. Discussions revolved around the complex responsibility chain of each actor involved in the smooth running of a flight, including the passenger.

Reims ACC: review on 31 December 2018 of the XMAN procedure applied to incoming flights to London-Heathrow and Zurich.

Average number of flights per month

	London-Heathrow		Zurich	
3,500				
2,800				
2,100				
1,400				
700				
0	High season	Low season	High season	Low season

XMAN

■ Total number of flights to the airport transiting into the Reims UAC's airspace
■ Number of flights receiving speed regulation from the Reims ACC
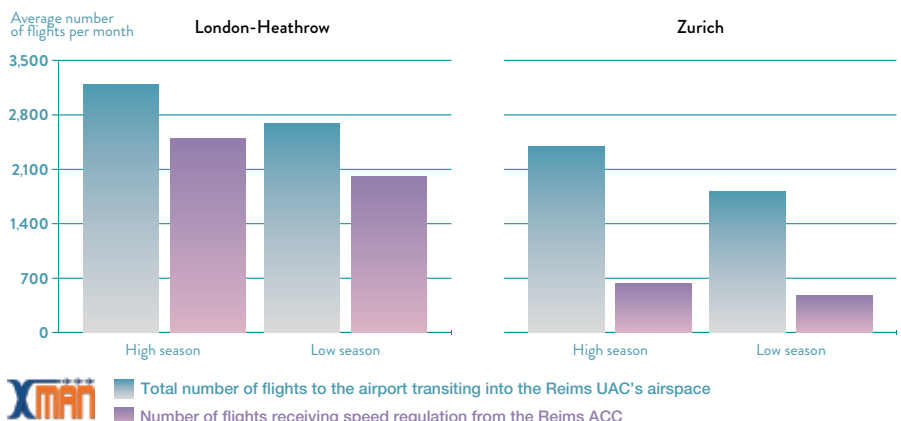
FABEC OPS Theatre at the World ATM Congress in Madrid.

GLOSSARY

A

ACC
Area Control Centre

A-CDM
Airport-Collaborative Decision Making

ACNUSA
Airport Noise Control Authority

ADS
Automatic Dependent Surveillance

EASA
European Aviation Safety Agency

AIM
Aeronautical Information Management

A-SMGCS
Advanced-Surface Movement Guidance and Control System

ATCO (ICNA)
Air Traffic Control Officer

ATFCM
Air Traffic Flow and Capacity Management

ATM
Air Traffic Management

ATSEP (IESSA)
Air Traffic Safety Electronics Personnel

B

BOLT
Big data Operational Live Trajectory

C

CAUTRA
Automatic air traffic coordination

CMCC
Military Coordination and Control Centre

CPDLC
Controller-Pilot Data Link Communications

D

DSAC
National Supervisory Authority

E

EAD
European Aeronautical Database

EGNOS
European Geostationary Navigation Overlay System

ENAC
National Academy for Civil Aviation

ERATO
En-Route Air Traffic Organiser

F

FABEC
Functional Airspace Block Europe Central

FEAT
Flight Efficiency Analysis Tool

FIS
Flight Information Sector

FL
Flight Level

FMP
Flow Management Position

I

IATA
International Air Transport Association

IFR
Instrument Flight Rules

ILS
Instrument Landing System

INEA
Innovation and Networks Executive Agency

L

LPV
Localiser Precision with Vertical guidance

Lognes aerodrome

N

N-VCS
New Voice Communication System

O

ONERA
The French Aerospace Lab

P

PBN
Performance Based Navigation

PCP
Pilot Common Project

PENS
Pan-European Network Services

R

RAT
Risk Analysis Tool

RECAT-EU
European wake vortex Recategorisation

RENAR-IP
Air navigation network under internet protocol

RNAV
Area Navigation

RSTCA
Air Traffic Terminal Charge

RWSL
RunWay Status Lights system

S

SDM
SESAR Deployment Manager

SESAR
Single European Sky ATM Research

SKYGUIDE
Swiss Air Navigation Service Provider

SNA
Regional structure in charge of aerodrome and approach control

SWIM
System Wide Information Management

SYSAT
Program to modernise aerodrome and approach control systems in mainland

T

TMA
Terminal Manoeuvre Area

TSEEAC
Senior Civil Aviation Technician

V

VFR
Visual Flight Rules

W

WAC
World ATM Congress

FIND OUT MORE

AIR TRAFFIC

Monthly distribution of controlled IFR traffic in France — Source: DSNA
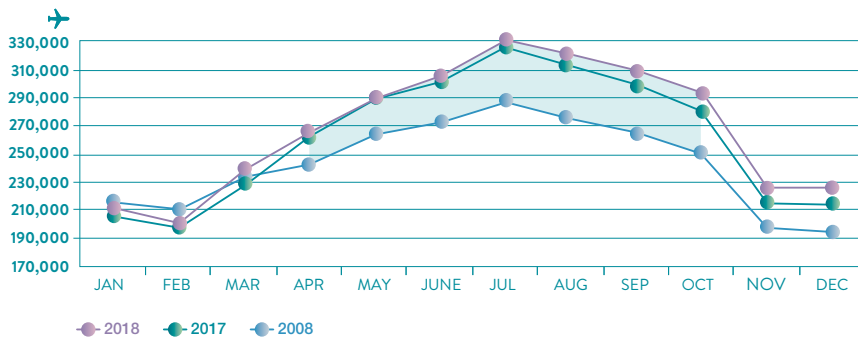
- 2018
- 2017
- 2008

Number of days with traffic > 10,000 flights per day — Source: DSNA
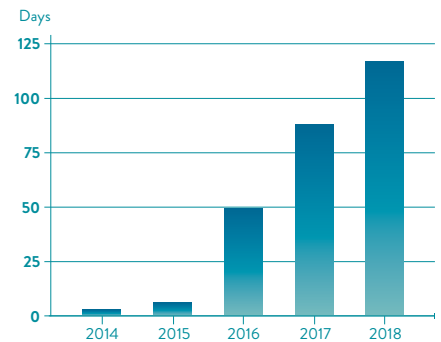
Traffic by operational unit or entity in 2018 and 2017/2018 variation — Source: DSNA

PARIS METROPOLITAN REGION SNA	IFR			VFR		
North ACC (Paris)	1,256,060	↗	+1.2%			
Paris-CDG & Paris-Le Bourget	636,109	↗	+1.0%	3,579	↘	-11.4%
Paris-Orly & General aviation	269,554	↘	-0.2%	435,623	↘	-4.3%

SOUTH-WEST REGION SNA	IFR			VFR		
South-West ACC (Bordeaux)	984,505	↗	+1.6%			
South-West SNA	163,456	↗	+0.4%	272,720	↗	+2.1%

ACCs	IFR		
South-East ACC (Marseille)	1,114,164	↗	+2.0%
West ACC (Brest)	1,086,876	↗	+3.1%
East ACC (Reims)	960,334	↗	+4.3%

SNAs	IFR			VFR		
South-East SNA	255,005	↗	+1.3%	212,081	↘	-3.3%
Center-East SNA	212,216	↗	+4.0%	383,380	↗	+8.9%
South-South-East SNA	206,669	↗	+2.1%	381,477	↗	+0.5%
North-East SNA	182,615	↗	+2.1%	182,664	↗	+8.0%
South SNA	163,736	↘	-3.9%	233,831	↘	-0.2%
West SNA	157,808	↗	+1.7%	253,783	↗	+3.4%
North SNA	111,879	↗	+3.7%	253,653	↗	+0.8%

OVERSEAS	IFR			VFR		
West Indies-French Guyana SNA	107,142	↘	-4.9%	73,310	↘	-3.2%
Indian Ocean SNA	27,701	↗	+1.2%	29,823	↗	+1.8%
Saint-Pierre-and-Miquelon DSNA	2,230	↗	+7.1%	2,180	↘	-5.0%

IFR flights: aircraft flying under instrument flight rules (commercial flights, business aircraft…)
VFR flights: aircraft flying under visual flight rules (light aircraft)

View from the control tower at Mayotte terminal.

AIR NAVIGATION SAFETY & PUBLIC SERVICE

Runway incursions in France — Source: DSNA

Number
of incursions

- **Proportion of events linked to air navigation**
- **Proportion of events judged as serious linked to air navigation**

Delay caused by air traffic regulations — Source: DSNA

In million

In minutes / per flight

Flights

Average ATFCM delay per flight

Breakdown of causes of ATFCM delay — Source: DSNA

In minutes

1.94 min/flight

- ATFCM delay due to aerodrome & approach control
- ATFCM delay due to en-route control

HUMAN & COLLECTIVE

Breakdown by body in 2018

- Other staff: **16%** (1,214)
- ATCO: **51%** (3,739)
- TSEEAC: **15%** (1,138)
- ATSEP: **18%** (1,318)

TOTAL
7,409 people

Paris-CDG: a controller in training on a simulator.

Provisional management of technical staff — Source: DSNA

	New hires	Retired	New hires	Retired	New hires	Retired
	ATCO		ATSEP		TSEEAC	

- 2017
- 2018

COMPETITIVENESS & CUSTOMER SERVICE

Revenue other than air navigation fees

2013	2014	2015	2016	2017	2018
10 M€	13 M€	21 M€	40 M€	41 M€	49 M€

DIRECTORATE FOR AIR NAVIGATION SERVICES (DSNA)

Organization chart from 1 May 2019

DIRECTOR FOR AIR NAVIGATION SERVICES
Maurice GEORGES
Deputy
Jean-Renaud GELY

CABINET
Director
Didier SERRANO
Technical Advisor
François RICHARD-BÔLE

PROGRAM DIRECTORS

FABEC Robert ANTON	4-FLIGHT Yannick MESTON
SESAR Patrick SOUCHU	Coflight Guillaume RAMONET
CDM Erwan PAGE	CAUTRA/4-FLIGHT transition Guy VILQUIN
GNSS & PBN Benoît ROTURIER	SYSAT Pierre-Yvon MOAL
AIM J-M. FERNANDEZ de GRADO	Data Link Sylvie CHAMBON
Innovation Stéphane CHATTY	Management information systems Franck MONTEIL
New ATM services Antoine MARTIN	

ADVISORS
Management of technical modernization
Damien FIGAROL
Scientific and industrial
Dominique STAMMLER
Overseas
Pascal SÉNARD

HEADQUARTERS

DIRECTORATE OF OPERATIONS (DO)
Director
Éric BRUNEAU

DIRECTORATE FOR TECHNICS AND INNOVATION (DTI)
Director
Chistophe ROUQUIÉ

PLANNING AND STRATEGY SUB-DIRECTORATE (SDPS)
Sub-Director
Philippe BARNOLA
Deputies
Axelle BARRAU
Marc TENENBAUM
SEARCH AND RESCUE DEPARTMENT
CDT Olivier ROUQUET

HUMAN RESOURCES SUB-DIRECTORATE (SDRH)
Sub-Director
Jérôme MEYER
DEPARTMENT FOR THE MANAGEMENT OF AIR NAVIGATION TECHNICAL BODIES
Sylvain RICQ
Deputy
Christian BADOCHE
DEPARTMENT FOR THE TRAINING OF AIR NAVIGATION TECHNICAL BODIES
Gwénaël LAURAIN
COLLECTIVE MANAGEMENT DEPARTMENT
Emmanuel BOURDON

FINANCE SUB-DIRECTORATE (SDFI)
Sub-Director
Patrick ROUX
Advisors
Blande CHABROL
Marie-Christine FOURNIER
Nathalie PETIT
FEES AND MANAGEMENT CONTROL DEPARTMENT
Édouard GAUCI
Deputy
Laurent BRUNEL
DEPARTMENT FOR EXPENSES AND REVENUE EXCLUDING FEES
Édith TARTRY

MISSION FOR SAFETY, QUALITY AND SECURITY MANAGEMENT (MSQS)
Head of Mission
Loïc ROBIN
Deputy
Stéphane DEHARVENGT
Officer for security
Marc SALTON
INTERNAL AUDITING AND CERTIFICATION DIVISION
N.
REGULATORY COMPLIANCE ASSURANCE DIVISION
Pierre CHEVASSON
PERFORMANCE ASSURANCE DIVISION
Hervé FORESTIER
SYSTEMS SAFETY DIVISION
Elisabeth LEFÈBVRE

ENVIRONMENT MISSION (ME)
Head of Mission
Alain BOURGIN
Feedback Program Manager
Vincent BACHELIER
PARIS REGION DIVISION
Philippe TRASSART
ACTION PLAN, SERVICE QUALITY AND COMMUNICATION DIVISION
Sébastien BOMONT
ANALYSIS, METHODS AND TOOLS DIVISION
Didier MARTIN

DIRECTION DES SERVICES
DE LA NAVIGATION AÉRIENNE
50, rue Henry Farman
75015 Paris

SDRH is located at
the Athis-Mons site

DIRECTORATE OF OPERATIONS (DO)

Organization chart from 1 May 2019

DIRECTOR OF OPERATIONS

Éric BRUNEAU

Operational Deputy
Geoffroy VILLE

Paris Region Deputy
Julien PRIEUR

Resources Deputy
Antonio DI PALO

SAFETY AND PERFORMANCE DEPARTMENT

Fanny TEJEDOR

Deputy
Olivier TEYSSANDIER

AIRSPACE DEPARTMENT

René FEILLET

Deputy
Sarah DE MAZANCOURT

INFRASTRUCTURE, SYSTEMS AND TECHNICAL PLANNING DEPARTMENT

Francis BRETON

Deputy
Etienne GUÉRIN

FINANCE UNIT

Christian MIGNOT

HR UNIT

Hervé BRIAND

PARIS REGION AIRNAVIGATION SERVICES (ATHIS-MONS)

Julien PRIEUR

Deputy
Marc LE MOUEL

General Secretary
Nizar CHAFFAI

PARIS ACC (ATHIS-MONS)

Julien PRIEUR

PARIS-CDG AND LE BOURGET CONTROL UNITS

N.

Deputy
Guillaume BLANDEL

PARIS-ORLY CONTROL UNIT AND GENERAL AVIATION

Stéphane LE FOLL

SOUTH-WEST AIR NAVIGATION SERVICES (BORDEAUX)

Gilles PERBOST

Deputy
Estelle LE GUILCHER

General secretary
Sylvie PLACIER

BORDEAUX ACC

Gilles PERBOST

SOUTH-WEST SNA

Estelle LE GUILCHER

AERONAUTICAL INFORMATION SERVICE (SIA)

Philippe PUSSET

CENTRAL AIR NAVIGATION SYSTEMS OPERATION CENTRE (CESNAC)

Antoine GRELET

BREST ACC

Emmanuel JACQUEMIN

REIMS ACC

Philippe BASSOT

Deputy
Nicolas BOULAY

MARSEILLE ACC

Pierre OUTREY

Deputy
Lionel BANÈGE

WEST SNA (NANTES)

Frédéric DANTZER

NORTH SNA (LILLE)

Alexandre CROZAT

NORTH-EAST SNA (STRASBOURG)

Claude MIQUEL

CENTRE-EAST SNA (LYON)

Simon BESSE

SOUTH-EAST SNA (NICE)

Pascal AVON

SOUTH-SOUTH-EAST SNA (MARSEILLE)

Francis PREUX

SOUTH SNA (TOULOUSE)

François-Dominique DIOT

WEST INDIES-GUYANA SNA (FORT-DE-FRANCE)

Jérôme JOURNET

INDIAN OCEAN SNA (SAINT-DENIS)

Sabine DELPIERRE

SAINT-PIERRE-AND-MIQUELON DSNA

Benoît GOSSET

DIRECTION DES OPÉRATIONS
9 rue de Champagne
91200 Athis-Mons

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DIRECTORATE FOR TECHNICS AND INNOVATION (DTI)

Organization chart from 1 May 2019

TECHNICAL AND INNOVATION DIRECTOR

Christophe ROUQUIÉ

Executive Deputy
Jean-Marc FERNANDEZ DE GRADO

Strategy and HR
Deputy
Alain POUECH

COMMUNICATION UNIT

Michel BONINI

PROJECT MANAGERS

4-FLIGHT
Nathalie FAVRE-FELIX
Stéphane JOUCLA
Christine LASSERRE
Jean-Luc LAY
Véronique MELET
Cécile MOURA

Business Change
Manager
Emmanuèle POULAIN

SESAR
Jérôme PATOUREAUX

SWIM
Guy POTIRON

SYSAT
Sylvain BAZIN

INTEGRATED MANAGEMENT SYSTEM MISSION

Laëtitia REDER

EUROPE MISSION

Christine BAILLEUL
Christophe BERTHELÉ
Liliane CAPDEVIELLE-ADÈS
Jean-Luc FOURNIER
Frédéric LECAT
Hervé LESPINASSE
Jean-Marc LOSCOS
Isabelle LUXEMBOURG

PROJECT MISSION

Patrice ROBERT

TRAINING MISSION

Stéphane SERABIAN

TECHNICAL DEPARTMENTS

SUPPORT DEPARTMENT

EUROPEAN AND INNOVATION STUDIES (EEI)

Manager
Jean-Louis GARCIA

Deputy
Jean-Luc DRAPIER

SYSTEM OPERATIONAL REQUIREMENTS (EOS)

Manager
Guy BAUVET

Deputy
Jean-Pierre PORTE

AIR TRAFFIC MANAGEMENT SYSTEMS (ATM)

Manager
Stéphane RICCI

Deputy
Véronique LAVAL

COMMUNICATION, NAVIGATION AND SURVEILLANCE SYSTEMS (CNS)

Manager
Philippe KERLIRZIN

Deputy
Eric COUDRIER

DEPLOYMENT AND OPERATIONAL SUPPORT (DSO)

Manager
Isabelle FAISANT

Deputy
N.

GENERAL SUPPORT (SG)

Manager
Gabrielle PARIZE

Deputy
Pierre LENGUIN

DIRECTION DE LA TECHNIQUE
ET DE L'INNOVATION
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