

# PROJECT and ACTIVITIES



## PROJECTS & ACTIVITIES

ENAV is one of the major European Air Navigation Service Providers, in terms of volume of controlled airspace, movements and hours of flight, investments in technology innovation and R&D.

ENAV has an outstanding expertise in Air Traffic Management (ATM) operations and services, in the development and validation of new concepts and procedures for the continuous improvement of its performances, in assisting the Supply Industry to design and engineer new systems to safely support the Air Traffic Controllers (ATCOs) in their highly demanding tasks.

The main responsibilities of the Company are related to:

- Air Traffic Services
- Aeronautical Communications and radio-navigation
- Aeronautical Information Service, mapping and obstacle charts
- Aerodrome Weather Service
- Flight Inspection
- Recruitment, Training and Licensing of Personnel
- Advise and studies on any matter related to ATS
- ATM and CNS Systems definition, acquisition, operation and maintenance

Furthermore, ENAV participates, manages, coordinates and actively contributes to several international programmes, projects and large scale research, development and validation activities, among which:

- SESAR Joint Undertaking
- BLUE MED
- 4-FLIGHT
- Coflight
- EGNOS

In line with its mission, ENAV plays a leading role in the Mediterranean Area by promoting synergies with other Service Providers and of neighboring regions in support of the Single European Sky Implementation.

Finally, ENAV experts are actively involved in the most important international Organizations such as ICAO, EUROCONTROL and CANSO and participate in major international committees, working groups, expert panels dealing with CNS/ATM matters.

ENAV International projects and activities aim at developing synergies with the major European ATM stakeholders in order to improve the service level provided to the airspace users and the wider community.



SESAR is the most challenging Programme for the modernization of the European air traffic management: it originates from a proposal developed by the aeronautical industry in 2003. ENAV had immediately joined this ambitious initiative: in 2004, ENAV instituted a Consortium along with 8 important European Air Service Providers (AENA, AUSTROCONTROL, DFS, DSNNA, NATS, LFV, LVNL, NAV Portugal). Successively, an unprecedented Consortium composed by 29 organisations was assigned EUROCONTROL's call for tender for the achievement of SESAR Definition Phase objectives.

ENAV actively fostered and participated in the Definition Phase - ended in 2008 - substantially contributing to the definition of the new concept of operations and the related European ATM Master Plan – approved by the European Council of Ministers in March 2009 – which defines how to develop and deploy the new ATM system supporting the SESAR ATM concept required to contribute to the overall Single European Sky objectives by 2020. Given the complexity of the Programme, in 2007 the European Union created a single management entity: the **SESAR Joint Undertaking** (SJU). Co-founded by EUROCONTROL and the European Commission, the SJU is a public-private partnership in which 15 industry members perform the R&D activities necessary for the modernization of the Air Traffic Management (ATM) system in Europe. ENAV has been member of the SJU since August 2009, having participated in a complex negotiation process, aimed at the assignment of the activities established by approximately 300 Research and Development projects connected with the Master Plan.

ENAV, defined as an excellent candidate and endowed with remarkable potential for the Programme, was invited by the European authorities to take part in the initial Core Group of SESAR. Upon completion of the negotiation



SESAR - Master Plan Stakeholder Forum - Roma

process, ENAV, with the signing of the “Membership Agreement”, granted the SJU a contribution of about 70 million Euros in terms of resources and technologies, which will be used for the execution of the R&D projects. ENAV subsidiary, Techno Sky and SICTA Consortium, as well as ENAV sub-contractor, IDS S.p.A., also took part in making the contribution. In view of its contribution to the SESAR Programme, ENAV received a share of voting rights within the Administrative Board of the SJU. The SESAR Programme is an opportunity for ENAV, its affiliates and sub-contractors as well as the national industry. The power of the SJU lies in the mandate received from the European Council of Ministers to realise a new-generation ATM system, preparing the standards and rules of inter-operability that will become binding with the Single European Sky Regulation.

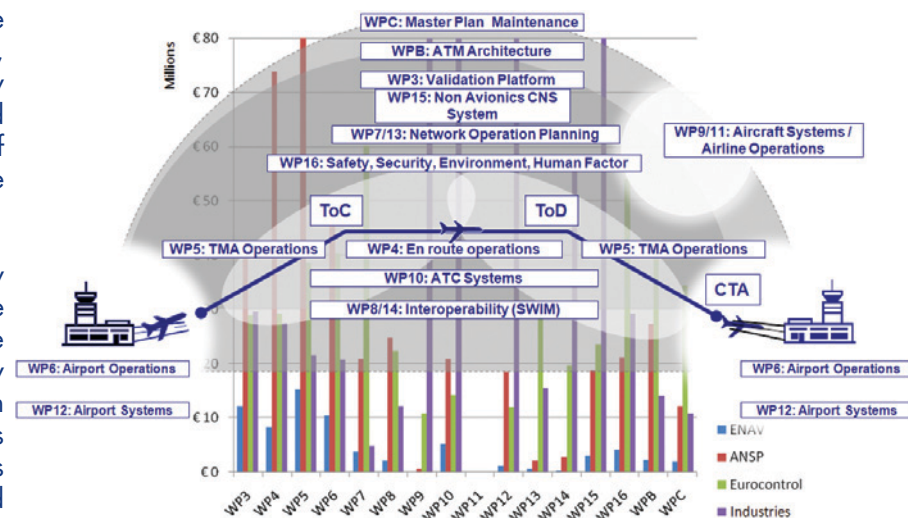
More in detail, the ongoing **Development Phase** has taken over from the Definition Phase and shall result in the validation of new technologies to improve performances and services, consolidating the ATM Master Plan. It is currently working on “early benefits” which can be delivered in 2010-2011 with a view to synchronise and integrate plans from research to operations, with a multi-stakeholders’ approach providing fit-for-purpose solutions from almost 250 projects already in execution. The work programme will continue through the Deployment Phase (2014-2020), which will follow the early deployment of first Implementation Package identified by the European ATM Master plan, which will see the planning translated into reality with large scale deployment of new systems and implementation of associated functionalities of the new ATM system by 2020 (completion date of SESAR Implementation Phase).

As Member of the SESAR JU, ENAV is strongly determined to support the successful outcome of the SESAR initiative. Investment plans have been aligned to achieve the ATM capability level envisaged by the so called Implementation Package 1 (IP1), which constitutes the basis of tomorrow’s European ATM system. To this end, ENAV will rely on proven expertise and its advanced prototype systems unit to conduct SESAR validation exercises using pre-industrial and simulation platforms in pre-operational environments, meeting SESAR JU demand for shortening the gap between R&D and implementation. ENAV membership in SESAR JU, besides confirming its leading role in shaping future of ATM in Europe, also constitutes a unique opportunity, interest and willingness to drive the change process fully geared towards the new generation of a European ATM system – safe, effective and modern - satisfying the needs of its customers and worldwide.

## ENAV AND SESAR JU AT A GLANCE

- ENAV participation in SJU R&D activities entails a noteworthy effort in terms of human resources and technologies (evaluated **70 million Euros**), which also involves the subsidiary Techno Sky and SICTA Consortium (60% ENAV) with affiliate status, and IDS, a private company in the field of ATM, as main subcontractor.
- ENAV involvement in the period 2009-2016 consists of **5.500 man/months**, e.g. around 60 Full Time Equivalent resources.
- **LVNL Consortium** – Netherlands’ Service Provider - will assist ENAV in the execution of a number of tasks as “Associate” Partner
- ENAV participates in **85 Projects** (out of 310), 15 of which with “Leader” role.
- ENAV is leader for the **Validation & Verification Platforms** evolution and development (Work Package 3)

## ENAV IN SESAR WORK BREAKDOWN STRUCTURE



For further information, please contact:  
 ENAV - Cristiano Baldoni (cristiano.baldoni@enav.it)



The Single European Sky regulatory framework, issued in order to obtain a more efficient, highly integrated and flexible management of the airspace has, as a relevant milestone, the implementation of Functional Airspace Blocks (FABs) by the EU Member States.

A Functional Airspace Block is a portion of airspace where the air traffic is managed regardless of existing national boundaries, with operational and technical requirements aimed at simplifying and harmonizing air traffic management limiting costs, improving operational capacity and at the same time, reducing the environmental impact of operations.

The BLUE MED FAB Project, promoted and coordinated by ENAV with the financial contribution of the European Commission, is one of the most significant FABs at European level and aims at the creation of a FAB over the central/south-eastern part of the Mediterranean basin, with the active involvement of non-EU states.

Partners of the project are the EU Member States of Cyprus, Greece, Italy and Malta, with the participation of Albania, Tunisia and Egypt. Part of the project are also the Hashemite Kingdom of Jordan and Lebanon with an observer role, with additional expression of interest from non-EU countries. Project activities are developed for Italy thanks to the contribution of the Italian Air Force and ENAC, in accordance with the relevant guidelines from the Italian Ministry of Infrastructures and Transports.

The BLUE MED initiative is a three phase Project:

The **“Feasibility Study”** (2007-2008), closed in 2008 with the Conference of the BLUE MED Ministers of Transport, allowed to identify potential benefits as well as the operational, technical and economic feasibility of the FAB.

The Feasibility Study allowed also to demonstrate the importance of the establishment of a FAB over the central/south-eastern part of the Mediterranean basin, a region with a continuous growth of traffic demand and a primary interest as a major interface of Europe towards Africa and the Middle-East.



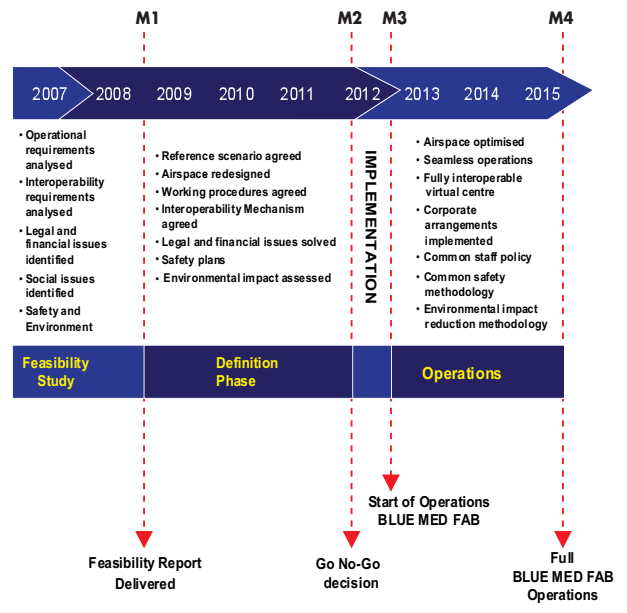
Meeting of the BLUE MED Ministers of Transport - Roma

The **“Definition Phase”** (2009-2011) is actually ongoing. All participating States are working on the new and optimal operational scenario to be progressively implemented within the BLUE MED FAB, as well as on the identification of the technical, regulatory, safety/security details showing the expected economic results, thus proving how the FAB implementation will allow reduction of air navigation service charges, with relevant benefits for air transport operators.

Within the Definition Phase of BLUE MED detailed studies are being developed on air traffic flows identified over the BLUE MED area, for a continuous route network improvement and more efficient solutions tailored on the harmonization requirements from different actors involved in the Air Navigation environment.

A relevant aspect of the Definition Phase is the technical analysis aiming at identifying, in coordination with SESAR, new functional requirements of communication, navigation and surveillance systems, with focus on the interoperability requirements of ATM systems in use within the Area Control Centres (ACCs) of the involved countries for the establishment of the **“Virtual Centre”**, an overall integrated system allowing to achieve FAB objectives taking into consideration requirements from all the concerned partners.

The **“Implementation Phase”** (2012+) will start within 2012. This phase will progressively determine a paramount shift in the organization of air navigation services over the Mediterranean basin, bringing competition advantages in the area and benefits for the users in terms of an enhanced efficiency of the service, reduction of delays and cost containment, with a lower environmental impact of operations.



For further information, please contact:  
Cristiano Cantoni (cristiano.cantoni@enav.it)

[www.bluedmed.aero](http://www.bluedmed.aero)



The 4-FLIGHT Programme was launched in 2006 by ENAV and DSNA (Direction Des Services De La Navigation Aerienne) the French Air Navigation Service Provider, which pursued such collaboration after the successful technological cooperation between the two Parties in the context of COFLIGHT Programme.

ENAV and DSNA aim at developing, through the 4-FLIGHT Programme, the next generation ATC common system, in compliance with SES Regulations - namely the Implementing Rules and Community Specifications, which includes and accelerates the execution of SESAR Implementation Package 1, and paves the way to integrate the future Implementation Packages 2 and 3, defined within the Single European Sky ATM Research (SESAR).

The 4-FLIGHT Programme is developed in two main steps, which cover a timeframe up to 2020:

- **STEP 1** - Development and Delivery of a new generation ATM system – Baseline System – by 31st December 2014.

The new ATM System will be realized through a very pragmatic and time driven approach, based on common components - inter alia flight data processor COFLIGHT and Surveillance system based on ARTAS - and specific components, both developed according to common user requirements (UR). Such URs were elaborated in conformity with SESAR operational concepts.

The Baseline System delivered at this stage and available by 2015 will be perfectly aligned with SESAR requirements and ready to implement the outcomes resulting from SESAR Research and Development activities, due to be finalised by 2016. Indeed, 4-Flight Programme will deliver an architecture able to take in key concepts of operations, such as the Gate-to-gate one: in this respect, the new system will enable to achieve a dramatic enhancement of en-route, TMA and approach ATC services with significant benefits for airspace users, as well as it will constitute the foundation of the SESAR Industry Based Platform for the validation for SESAR outcomes.

- **STEP 2 Target System** - Incremental evolution of the Baseline System achieving the full alignment with the new Operational Requirements introduced by SESAR Programme - by 2020.

The open architecture previously mentioned will also enable the quick integration of SESAR outcomes by putting into operations a system based on common Operational Concepts and therefore consistent with the Operational Requirements developed by SESAR Programme.

The 4-FLIGHT system is a key enabler for the management and control of the en-route, terminal and approach air traffic. It will guarantee the optimal performances in terms of safety, capacity, environmental impact and cost efficiency for ENAV and DSNA, contributing to a dramatic improvement of the network performances in Europe.

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For further information, please contact:  
ENAV - Fabio Milioni (fabio.milioni@enav.it)



The **Coflight-eFDP** System is a next generation Flight Data Processing System designed to meet the needs of European Air Navigation Service Providers (ANSPs) for the next 20 years, satisfying the need for the harmonisation and interoperability of air traffic management systems in Europe. It also aims at facilitating the integration of advanced tools in the global ATM system.

The system will replace the legacy flight data processing systems that currently exist with a very advanced new generation system, with no disruption to service through a staged implementation plan. The system, harmonised and interoperable on a European scale, is able to support air traffic control operations for the next 20 years, for the benefit of all air transport stakeholders.

The system contains features that will satisfy the general needs of ATM in Europe and with an open design that will allow its integration in any particular air navigation services provider's environment.

The system supports the following missions:

- Flight data services for civil ATC;
- Flight data services for military ATC;
- Flight data services for both civil and military ATC (the so-called co-localised mission).

The Civil Air Traffic Control is the main mission that the system shall support. In this mission, the system shall provide services for En-route ACCs, Approach ACCs, and to Aerodrome Control Functions.

In the Military Air Traffic Control mission, the system shall provide services to military Air Traffic Controllers for the control of military flights, in a manner similar to the civil ATC mission.

The system shall manage both IFR and VFR flights, providing specific services to VFR flights.

The system supports also different states for the aforementioned missions:

- Operational state;
- Training state, for training air traffic controllers and supervisors;
- Testing state, for testing new software versions, new operational procedures and interoperability capacities.

The system brings the following state of the art functional improvements to flight data processing systems:

- Trajectory predictions based on 4D calculation, advanced aircraft modelling, consideration of the aircraft intent, downlink of aircraft parameters, traffic flow and airport constraints, and meteorological data;
- Improved coordination with the integration of all the letters of agreement between centres and the application of Flexible Use of Airspace (FUA) principles;
- Integration of data provided by air/ground datalink applications;
- Highly reactive management of airspace and route structures, dynamic adjustment of sector boundaries to balance ATC capacity and traffic load and the automatic calculation of the consequences for flights.

The system includes support for the emerging European interoperability standards including:

- Support for interoperability between ATS providers, IFPS/CFMU, pilots, aircraft operators and airports;
- Integration of en route and approach with sequencing tools;
- Introduction of multi-sector planning tools;
- Improvement of coordination procedures with Medium-Term Conflict Detection (MTCD) at centre boundaries;
- Acceptance of direct routes through multiple centres.

In order to reduce maintenance costs and to facilitate developments, the system is based on an object-oriented architecture, in compliance with recognised standards (CORBA, object languages).

This new highly fault-tolerant architecture complies with the Safety Regulatory Requirements applicable to CNS-ATM systems (2096/2005 and 482/2008 European regulations).

The basic philosophy of the implementation programme is to reduce risks to a minimum by adopting an incremental development strategy. The level of change at each step will be limited, enabling integration in stages in the overall National and European ATM system architecture, rapid corrections in the case of error and a quick return on investment.

Four versions of the system are developed:

- First version (V1) which sets up the new architecture;
- Second version (V2) which replaces the existing

FDP systems and provides improved interoperability capacities with aircraft by air/ground datalink;

- Third version (V3) which provides improvements in the areas of ground interoperability;
- Fourth version (V4) which provides improvements in the integration of trajectory negotiation and trajectory comparison by air/ground datalink.

For further information, please contact:

ENAV - Vittorio Pascucci ([vittorio.pascucci@enav.it](mailto:vittorio.pascucci@enav.it))

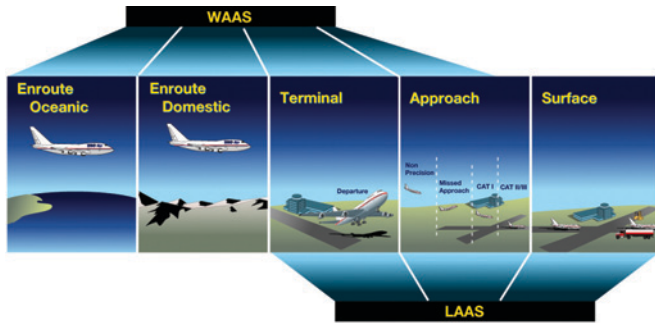


EGNOS (the European Geostationary Navigation Overlay Service) is a joint project involving the European Space Agency, the European Commission and EUROCONTROL, the continental air navigation safety organization.

Since the beginning, ENAV participated to the Project by providing both financial contribution and expertise as Air Navigation Service Provider.

Indeed Italy, with the support of ENAV, assigned more than 60 million Euros to ESA ARTES 9 Program, which studied, developed and implemented the System; moreover, experts from ENAV participated to the definition of Operational requirements from Civil Aviation Operators and Users. Such participation, still ongoing, has been provided at working group and task force level within the ICAO, ESA, EUROCONTROL and EC working arrangements dealing with Satellite Navigation matters. A main role has been played by ENAV in the current commercialization of the SiS (Signal in Space) by setting up - together with other European ANSPs - the ESSP EEIG (European Economic Interest Group), which fostered the initial phases of service definition.

The EGNOS system relies on 3 Geostationary satellites, 4 Control Centers (MCC) and a network of over 30 ground stations (RIMS), providing "augmenting" information on the integrity and accuracy of the positioning signals issued by the US GPS orbiting constellation. ENAV is currently hosting in its premises one MCC in Ciampino and two RIMS in Ciampino and Catania airports.



The Navigation messages calculated and broadcasted by EGNOS allow users in Europe and surrounding areas to determine their positions with an accuracy of 2 meters, compared to the 20 meter accuracy offered by GPS only signals. EGNOS has been designed with the aim of attaining certification under SES (Single European Sky) regulation, issued by the European Commission and in accordance with ICAO standards (SARPs).

EGNOS Signal in Space is provided by the ESSP SAS, which succeeded the former ESSP EEIG, on the basis of a contract with the European Commission. ESSP SAS has been certified as Air Navigation Service Provider (SES Regulations) in July 2010, whilst the certification of the Signal in Space for safety of life application is due by mid 2011.

Looking at ATM applications, the use of EGNOS with GPS, allows to perform approach procedures with vertical guidance APV (as LPV200), guaranteeing reduced minimum decision height, set at 200 feet. This reduction will allow, among others, increased runway capacity, permitting landings under conditions of poor visibility, even in airports not equipped with ILS or when ILS service is unavailable.

In addition, EGNOS will enable greater flexibility in Procedure design, allowing precision curved/segmented approaches with time and fuel savings, with consequent environmental benefits, and reduced acoustic impact in densely populated areas.

In line with the above characteristics and once the SiS will be duly certified, ENAV will use it to develop ATM approach procedures in the Italian airspace, where conditions are met, including back up procedures in case of ILS already equipped airports.

### EGNOS Future Prospects

The great interest shown in EGNOS by potential users outside the initial area of service coverage (ECAC 96), creates the conditions for the expansion of the network. The objective is to extend the system firstly southwards, and then to cover the entire Mediterranean area, including North Africa and the Middle East. Contacts are ongoing with potential partners in Africa, the Arab nations, Russia and the remaining European States, to further assess potential extensions of the EGNOS service.

EGNOS is an important part of the European GNSS Program with the following major short and medium term objectives:

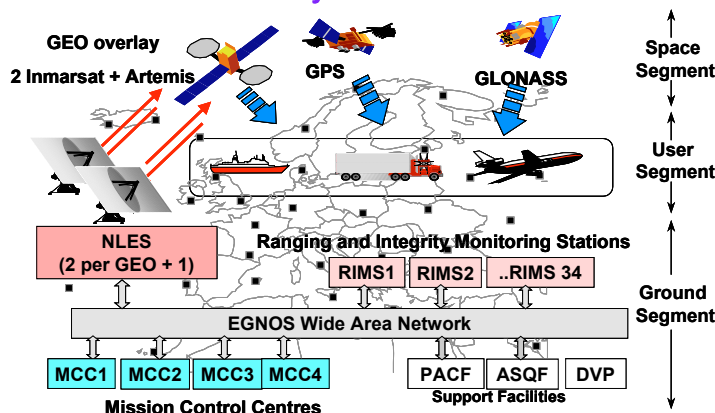
- EGNOS will follow the announced modernization of the GPS system, thanks to the increased service features following the introduction of signals on the second frequency of the GPS system itself;
- EGNOS will offer better performance for satellite navigation users in close synergy with Galileo.

In next future, it is expected that the regional configuration will be composed of two or three reliable satellite constellations (GPS, GLONASS and Galileo) supported by EGNOS within the framework of GNSS Services.

For further information, please contact:

ENAV - Giovanni Del Duca ([giovanni.delduca@enav.it](mailto:giovanni.delduca@enav.it))

### EGNOS System Architecture



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© ENAV S.p.A.  
Via Salaria, 716  
00138 - Roma  
Tel. +39.06.81.66.1  
www.enav.it

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