

A New Major Initiative of European Cooperation in Flight safety: FLYSAFE

A new European programme on on-board flight safety systems has started:

An important piece of the ACARE (*Advisory Council for Aeronautics in Europe*) plan has been put in place early in 2005: the FLYSAFE Project.

Selected and launched as part of the 6th Framework Programme of the European Commission, FLYSAFE aims at defining and testing new tools and systems contributing to the safety of flights for all aircraft.

Coordinated by THALES, it groups 36 partners from 14 countries for a 4 year joint effort (from February 2005 to January 2009), and a total cost of 53 million Euros, partly funded by the Commission.

Project Goal:

Aircraft remains one of the safest means of transport. However, assuming air traffic maintains its steady growth, leading to tripled traffic in 2020 compared to 2000, there is a potential increase of the risks of accidents by the same ratio. Though they are exceptional, these accidents are considered as unacceptable, and the Aeronautics community in Europe set itself the objective to reduce by a factor of 5 the probability of accidents in air transport.

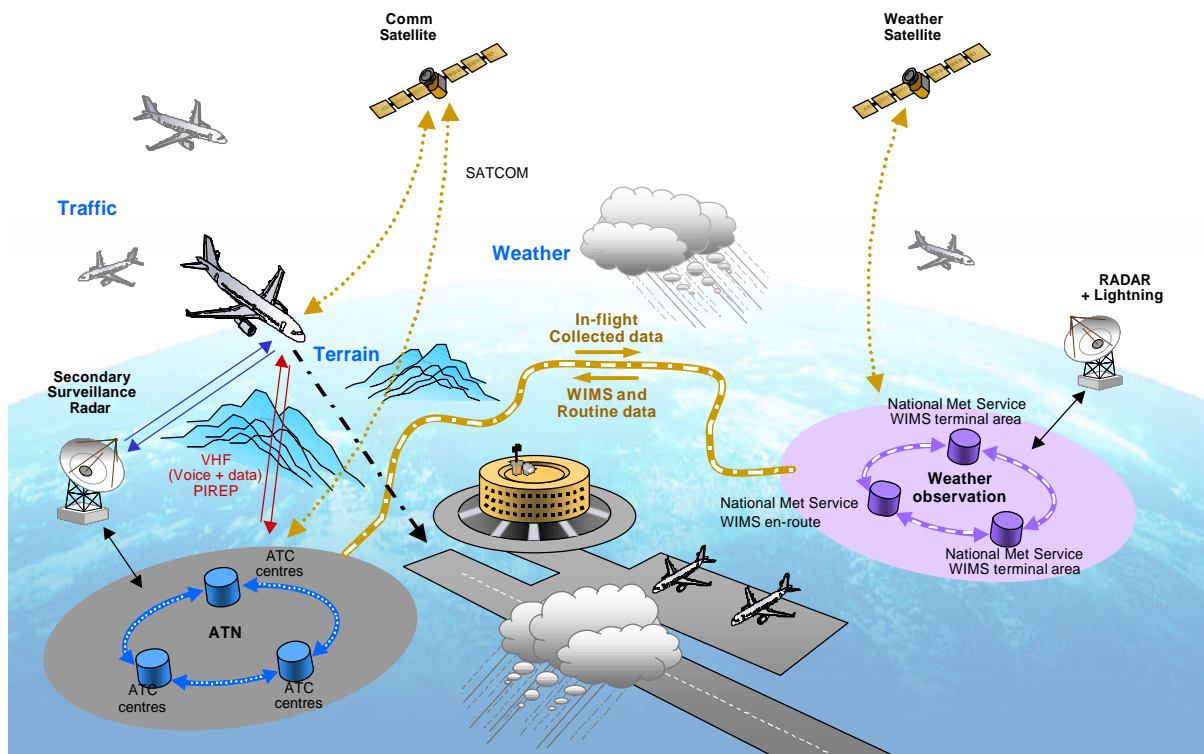
Past accidents have led to extensive and very detailed analyses and studies, bringing to light the diversity of the causes and the roles of the different players in the life and operation of the aircraft: maintenance personnel, pilots, controllers or third parties.

FLYSAFE is more particularly dedicated to the analysis and definition of new on-board systems, and of the tools on the ground for feeding them with the information that they require.

The project is structured upon the three “threats” which play a major role in the accidents:

- Collision with other aircraft
- Collision with terrain and obstacles
- Adverse atmospheric conditions

that correspond to three parallel development branches. The project must lead to the validation of new concepts in collecting and presenting safety-related information to the pilot with regard to these threats, isolated or in combination.



FLYSAFE overall concept

Risks of collision with other aircraft:

In the aircraft currently operated by airlines, the pilot knows the position of other aircraft through contact with the air traffic controllers on the one hand (mainly by voice communications), and the information provided by the ACAS¹ on the other.

FLYSAFE set itself the objective of providing the pilot with a more detailed and accurate knowledge of the situation of the surrounding traffic, which could potentially present some risks of collision:

- In flight, by means of the integration of ASAS package 1 functions on-board
- On the ground, through the presentation of high precision position of all aircraft in the airport area. This will be achieved in capitalising on the results of major previous European projects, like MA-AFAS, VICTORIA², or projects still under completion like ISAWARE II, EMMA³, also funded by the European Commission.

Risks of ground collision:

CFIT (*Controlled Flight Into Terrain*) is a dominant category in the accidents occurrence. Today's on-board systems can provide a very high quality of aircraft position, but the pilot does not always have a good situation awareness with regard to terrain and obstacles. On one hand, the topographic and airfield charts need to be used and on the other hand, the information provided by the TAWS⁴ safety net.

FLYSAFE aims at developing new functions to allow the pilot to visualise the ground, on demand, using different presentation modes. They will be combined with alert functions when risk arises of ground collision in the short and medium term.

¹ Airborne Collision Avoidance System

² European Project, 5th Framework, 2nd call, 2001 - 2004

³ European Project, 6th Framework, 1st call, 2004 - 2008

⁴ Terrain Avoidance and Warning System

FLYSAFE will also allow the study of new data correlation and data fusion functions, between on-board radar and stored ground data.

Alert functions will be differentiated to trigger the most appropriate pilot's reactions.

Adverse atmospheric conditions:

Though they are not the exclusive cause of accidents, atmospheric conditions frequently play a role as "facilitators", in increasing flight crew stress, diminishing the capacity of manoeuvre, or the visibility.

The original ambition of FLYSAFE is to develop ground systems allowing the crew to have accurate and reliable knowledge of its atmospheric environment, with capacity to visualise at all times risk areas, with regard to the different hazards:

- Thunderstorms and cumulonimbus
- Icing conditions
- Clear Air turbulence (CAT)
- Wake vortex turbulence (WV)
- Other meteorological hazards for which well-tried warning mechanisms already exist, such as for Volcanic ash.

To reach these goals, the UK Met Office and Météo France have combined their effort to those of DLR and the University of Hannover, and will develop ground tools to predict, format, and transmit meteorological information to aircraft, on demand, taking the expected aircraft trajectory into account.

On the aircraft, this information will be combined with data from atmospheric probes and sensors, to generate an analysis of the situation and forecast the most likely outcome.

Human – machine interface

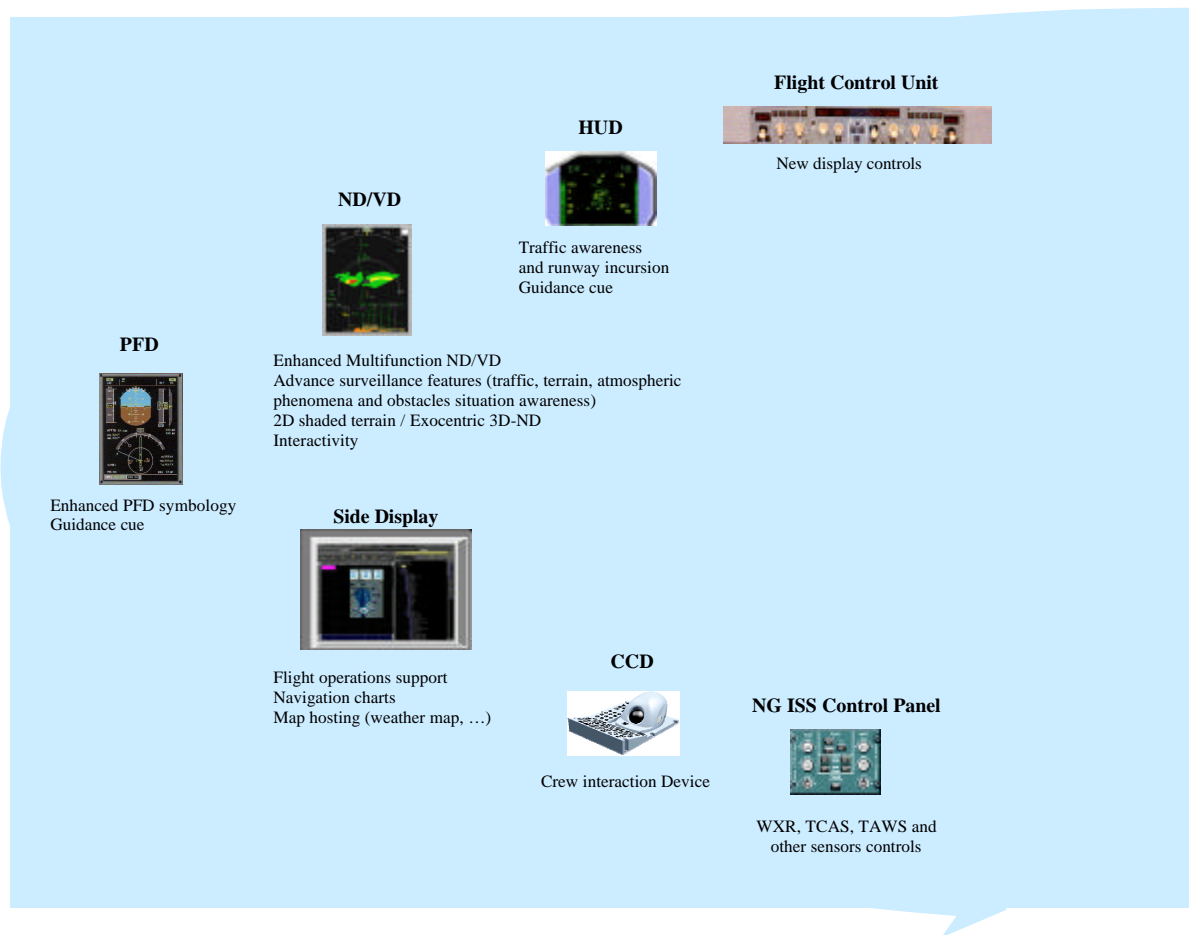
All the on-board systems are developed with the same final objective: offer to the crew better knowledge of its environment in the long, medium and short term during the flight, in all conditions. FLYSAFE will also define the most appropriate means to present this information to the pilot in view of his/her real needs and the hazards encountered, whilst not increasing his/her workload.

Validation through ground and flight tests

Once all functions and systems have been developed, it will be necessary to check that they contribute to the definition of a consistent overall system, and also to check that they contribute, individually and jointly, to the reduction of accident risks.

This will be achieved through the integration of all functions in one platform that will be tested in the simulator at NLR, Amsterdam. It will allow simulation of the complete aircraft environment: aircraft behaviour, atmospheric conditions, other traffic in the air and on the ground, terrain, obstacles and a realistic ATC environment, with a high degree of accuracy.

A flight test campaign will allow testing of the performance of some individual systems, and will provide data for HMI validation.



Overview of the Flight Deck

Exploitation objectives

The 36 FLYSAFE partners will formalise, within the programme, their plans for exploiting the acquired results, individually or in conjunction with other members of the project. All partners have the same ultimate objective: to contribute to the ACARE goal to define innovative and affordable new means that will contribute to guarantee the highest level of air traffic safety by 2020, when the developed systems will have been exploited by a wide group of aircraft operators around the world.

The 36 partners of FLYSAFE:

Airframers:

AIRBUS France
Eurocopter Deutschland
Dassault Aviation

System providers:

Thales Avionics, coordinator
BAE SYSTEMS
Diehl Avionik Systeme GmbH

Research centres:

DLR (Oberpfaffenhoffen)
NLR
ONERA
CNRS
TsAGI

Met Offices:

UK Met Office
Météo France

Universities:

University of Hanover
Université Catholique de Louvain
Technische Universitaet Darmstadt
Cranfield University
University of Malta

Airlines:

Adria Airways
Air Malta

Air Traffic Control authorities:

AustroControl

Specialised companies:

GTD Sistemas de Informacion
Euro Telematik AG
Galileo Avionica
Hellenic Aerospace Industry
Jeppesen GmbH
AIRBUS Deutschland
Rockwell Collins France
Thales Air Defence

Specialised SMEs:

Avitronics Research
AVTECH
Deep Blue
Skysoft Portugal
Hovemere
USE2ACES
Thales Laser

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