



THALES

*Airborne Integrated Systems for Safety Improvement,
Flight Hazard Protection and All Weather Operations*



**FLYSAFE
FORUM N° 01
FLYSAFE OVERVIEW**

**27 – 06 – 2006
EUROCONTROL Brussels**



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The challenge of Air Transport Safety



- Air traffic will **triple** in the next **20** years

- Ambition of Vision 2020 is that increased traffic will **not** be accompanied by **increased** accidents, meaning ...

... the performance of safety-related systems and procedures must be **tripled** in the 20 years

- This improvement must be achieved with :
 - All weather operation
 - Operation at airports 24 hours per day
 - 99 % of flight departing within 15 min of schedule



The FLYSAFE initiative



- Several EU programmes were put in place to deal with the challenge of maintaining the high level of safety of Air Transport
- FLYSAFE is THE programme of the 6th Framework Programme which addresses the challenge of Air traffic Safety from an **integrated operational perspective**:

"How to provide the crews (and controllers) with the right information / signals at the right time to prevent / further reduce risks of accidents in all circumstances"



- First target: transport aircraft
- Application to business jets and helicopters also studied



The FLYSAFE initiative



- **FLYSAFE contributes to meeting the ACARE agenda objective through :**
 - the design, validation and testing of a **on-board Integrated Surveillance System (ISS)**, going a generation further than the emerging integrated safety systems
 - the design, validation and testing of **ground Weather Information Management Systems (WIMs)**, gathering all relevant atmospheric information to inform the aircraft along their mission

- **These systems are designed to deal with :**
 - All flight phases
 - All weather situation
 - At minimum cost and weight



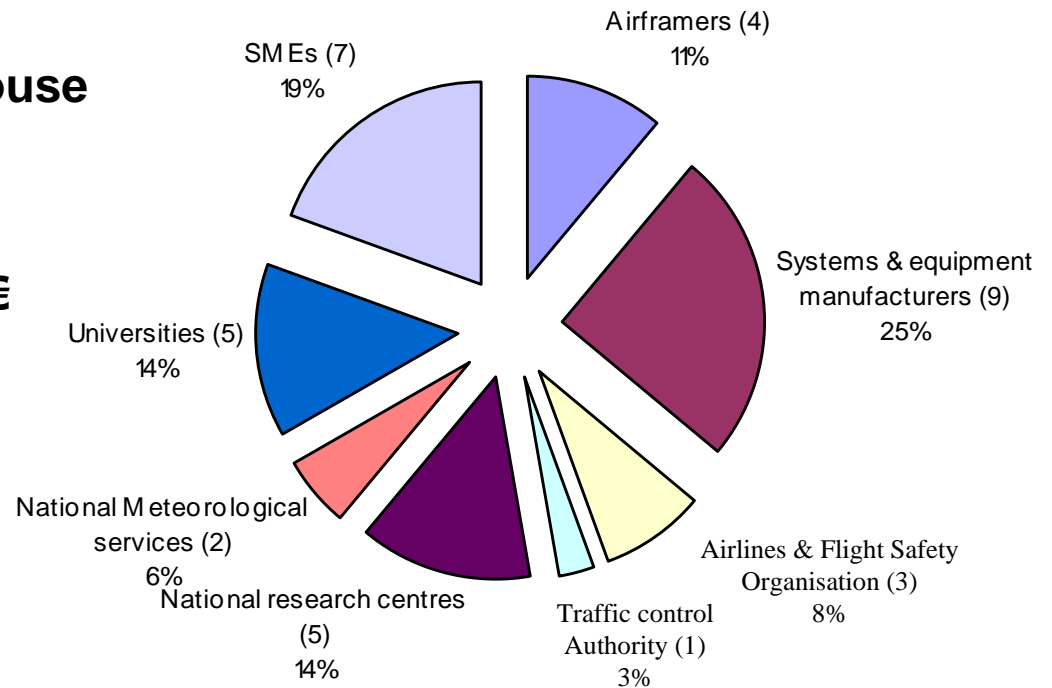
The FLYSAFE initiative



- **Project full title :** *Airborne Integrated Systems for Safety Improvement, Flight Hazard Protection and All Weather Operations*
- **Integrated Project of the 6th Framework Programme of the European Commission**

- **Coordinator: THALES, Toulouse**
- **36 Partners**
- **52,2 million €**
- **EC contribution: 29 million €**

- **Started on February 1st, 2005**
- **Duration: > 4 years**





The FLYSAFE consortium



36 Partners from 14 different countries constitute a powerful consortium



FLYSAFE Partners location



- ★ Austria
- ★ Belgium
- ★ France
- ★ Germany
- ★ Greece
- ★ Italy
- ★ Malta
- ★ Netherlands
- ★ Portugal
- ★ Russia
- ★ Slovenia
- ★ Spain
- ★ Sweden
- ★ UK





Other Contributors to FLYSAFE

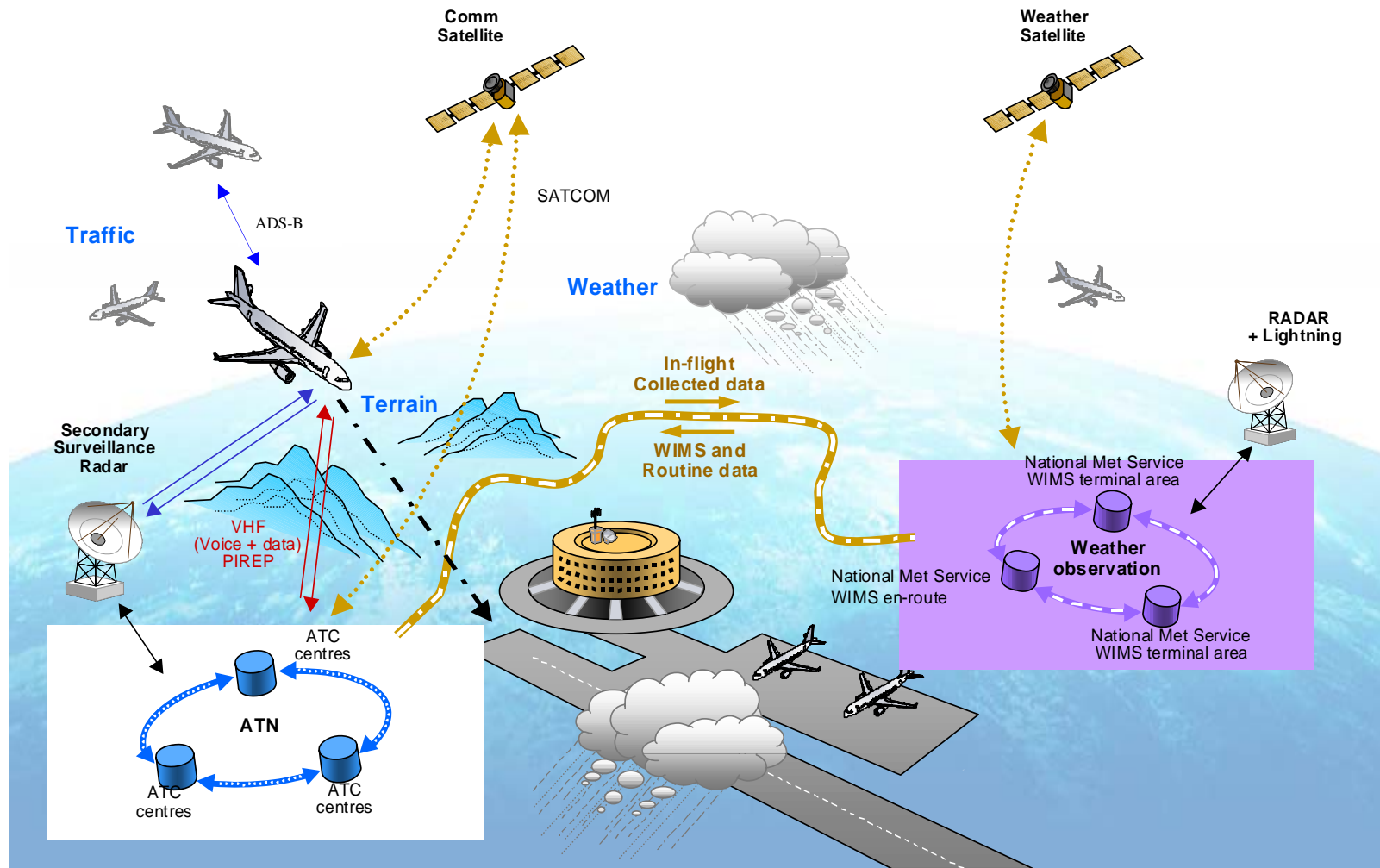


- **FLYSAFE is also supported by the [External Expert Advisory Group \(EEAG\)](#), grouping :**
 - **Pilots and persons from airborne operations**
 - **Air Traffic controllers**
 - **Certification authorities**
 - **Weather specialists**
 - **EU reviewers**

- **They meet regularly with the FLYSAFE Team and provide guidance / advice on the way forward**



FLYSAFE overall concept



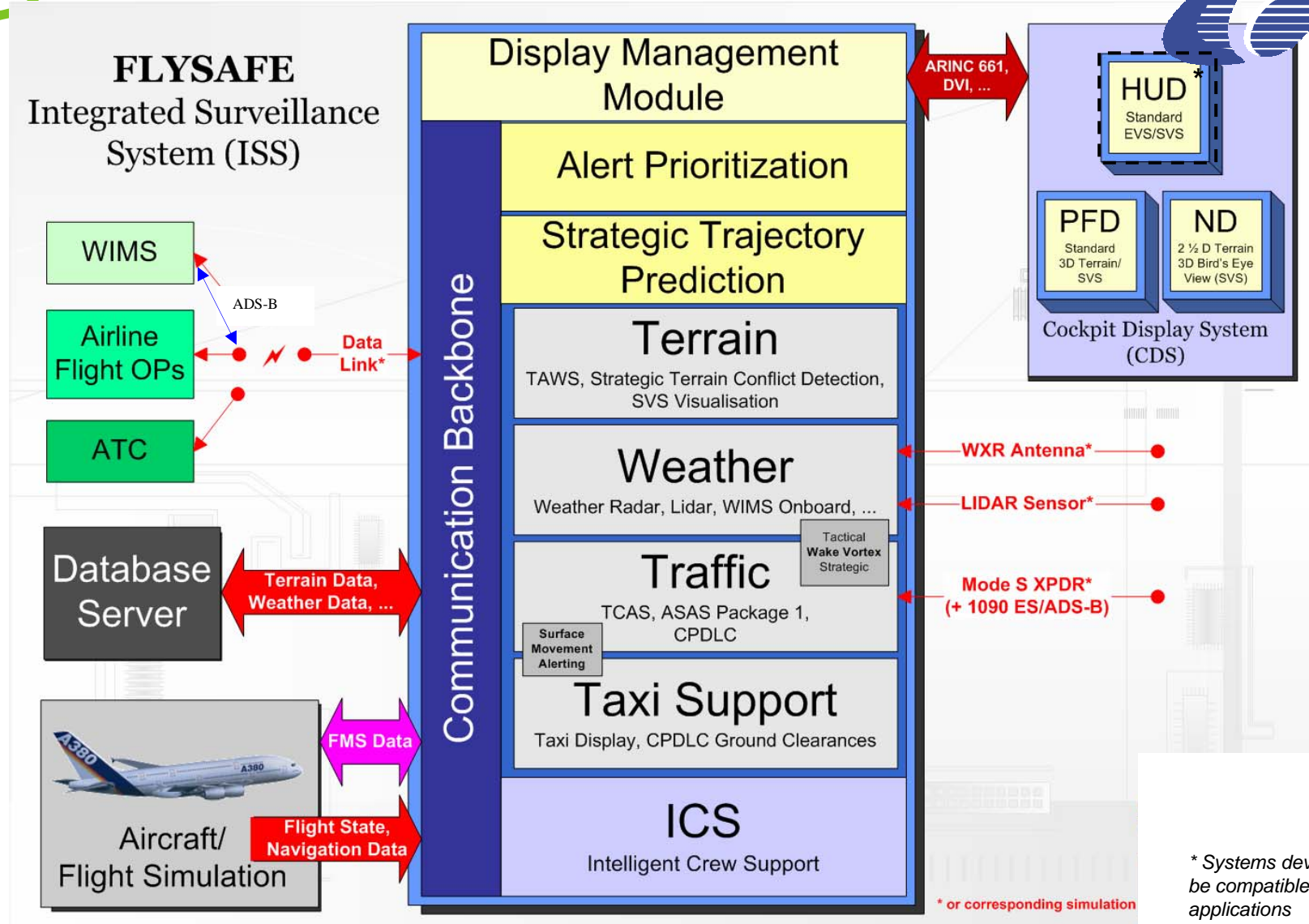


FLYSAFE NG-ISS



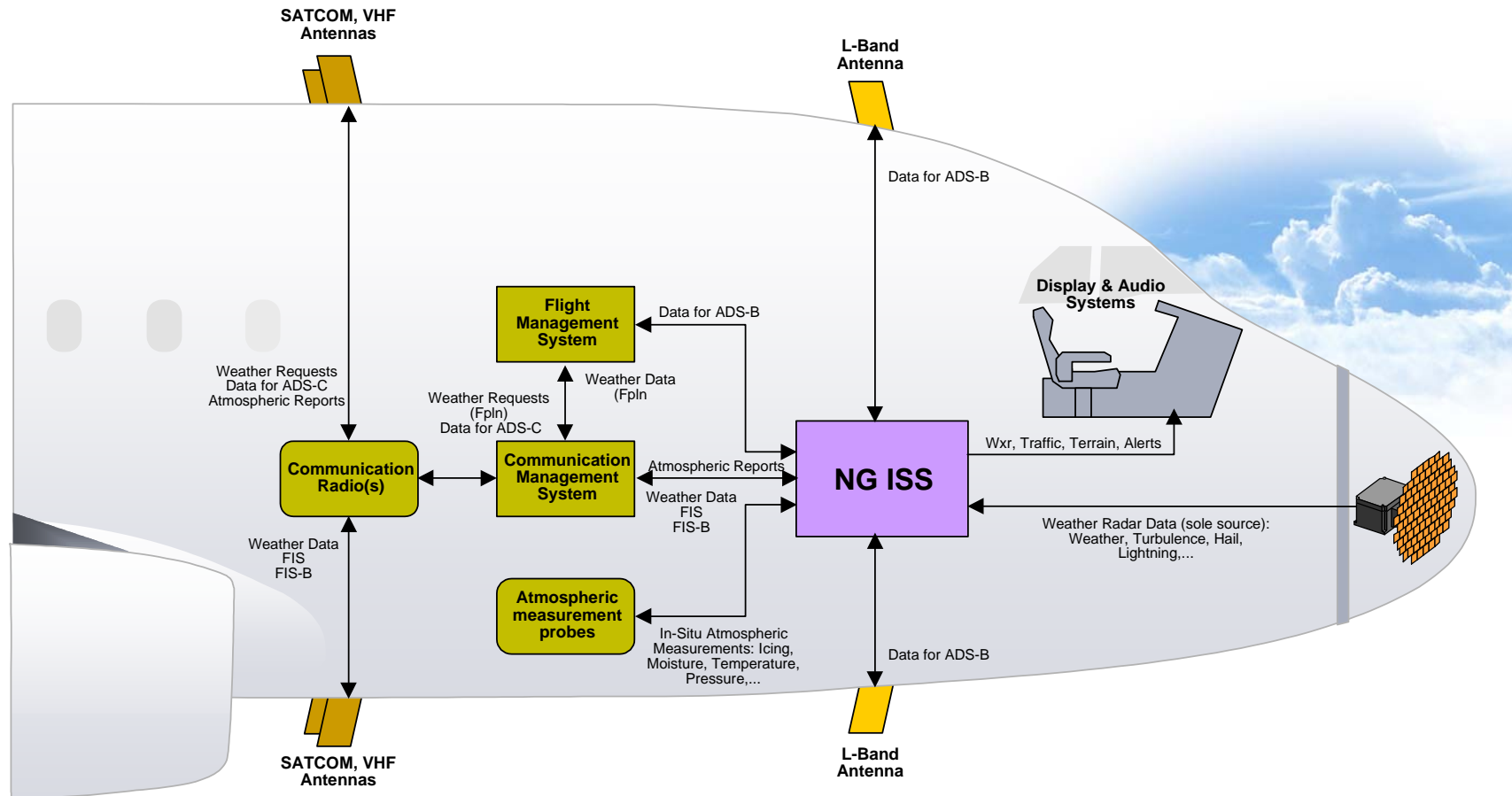
- **FLYSAFE will design and develop a new generation ISS with:**
 - **New on-board systems and functions**
 - ◆ improved situation awareness
 - ◆ advanced warning
 - ◆ alert prioritisation
 - ◆ enhanced human-machine interfaces
 - **New sensors and sensor fusion technique**
 - **Improved on-board weather hazard detection and data fusion with new ground-based, specific weather hazard information products, uplinked to the aircraft**
 - **All on-board means integrated in a consistent system, with innovative HMI**
 - **And their integration into a global ATM environment**

FLYSAFE High Level architecture

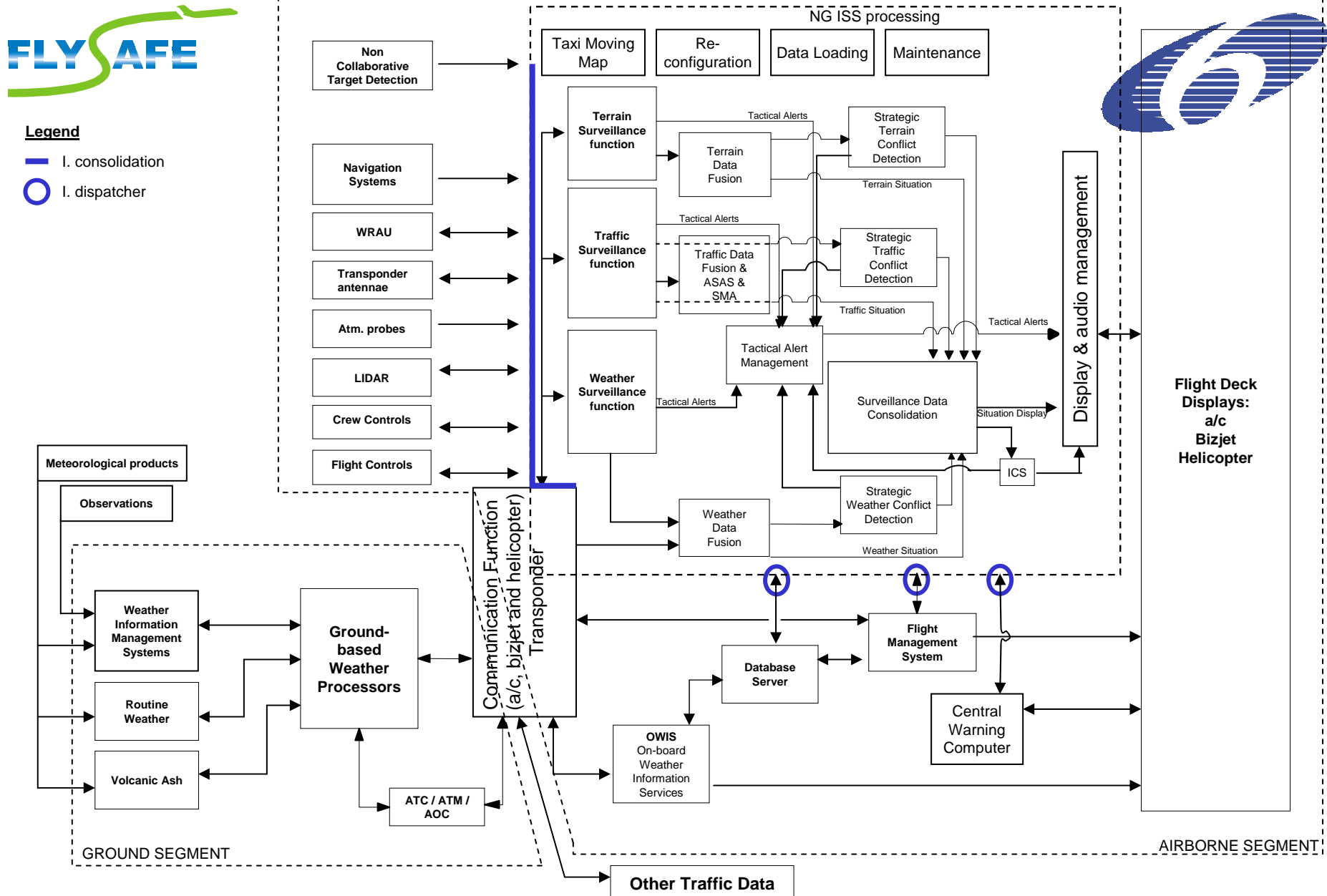




FLYSAFE NGISS on-board architecture



Data transmitted to the aircraft: WIMS data + standard product for volcanic ashes, standard MET forecast products
 Data transmitted to the ground: atmospheric report, altitude, P, T, humidity, EDR





FLYSAFE WIMSS



- **FLYSAFE will develop ground-based Weather Information Management Systems (WIMS) :**
 - They will provide accurate forecasts of specific atmospheric hazards to be uplinked to the cockpit with the potential to forward them to Air traffic Management (ATM)
 - 4 WIMSS, addressing
 - ◆ Clear Air Turbulence
 - ◆ Thunderstorms
 - ◆ Icing
 - ◆ Wake vortices
 - Information on hazards currently available will also be uplinked to the cockpit (including volcanic ash)



FLYSAFE weather aspects



The 4 categories of atmospheric hazards addressed by the WIMs

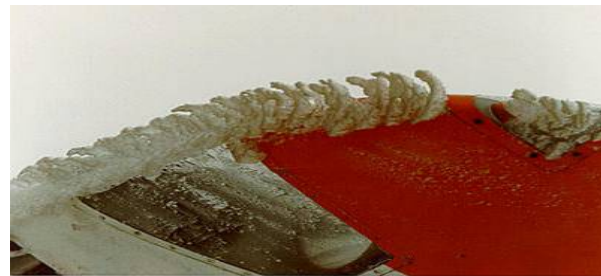
■ Wake vortices



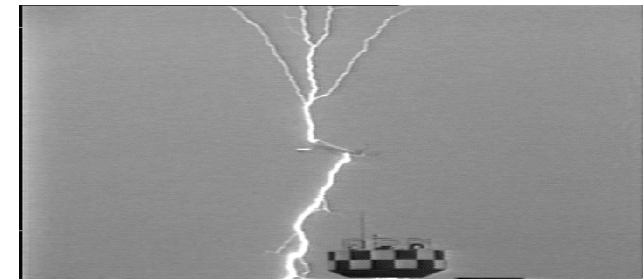
■ Clear-Air-Turbulence



■ Aircraft icing



■ Thunderstorms



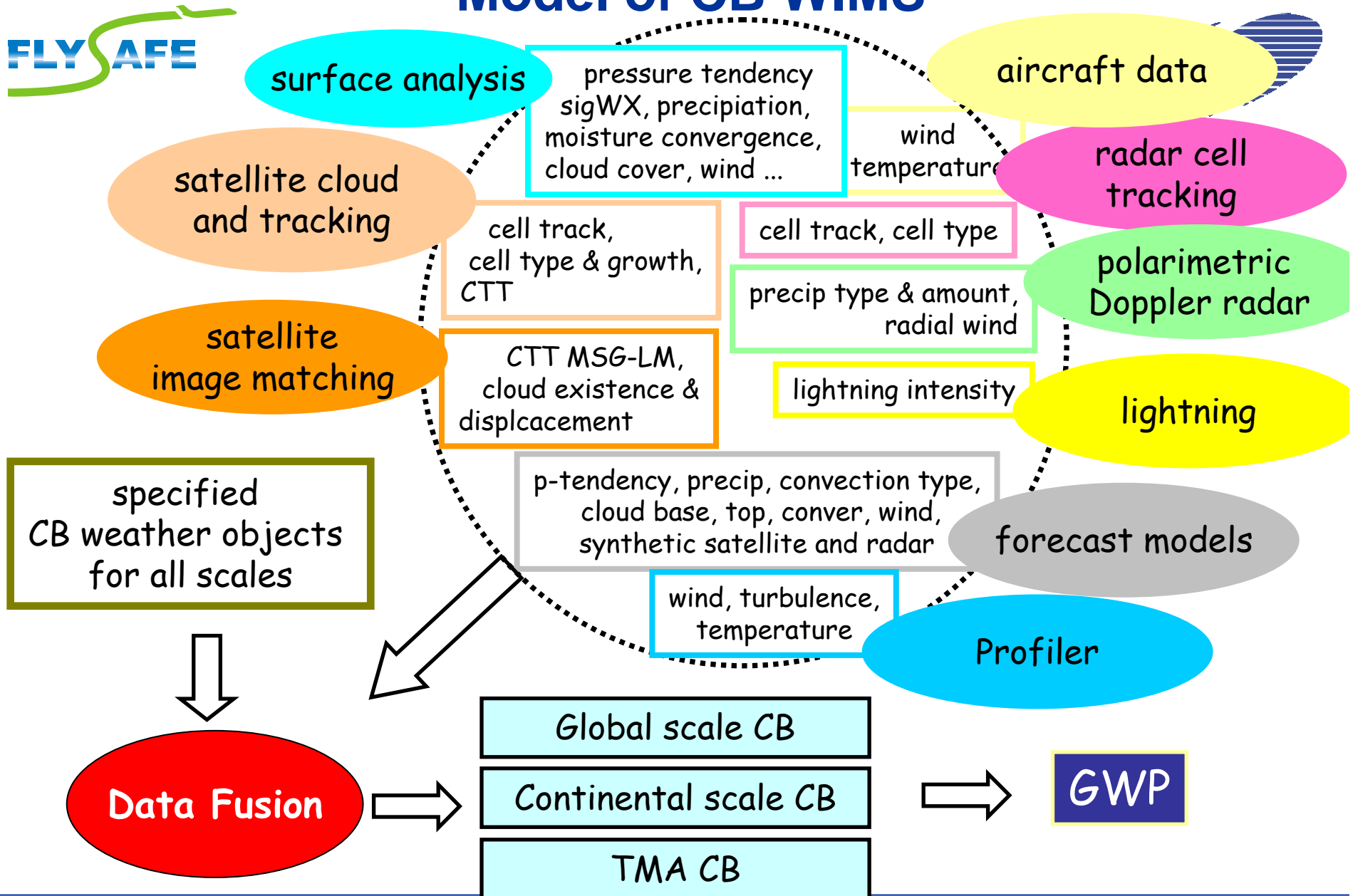


FLYSAFE WIMS



- **WIMs will provide route relevant information particular to the specific flight on three scales:**
 - **Global scale, with particular emphasis on field of view of satellite image**
 - ◆ **Low resolution data and relatively infrequent updates**
 - **Continental scale**
 - ◆ **Mid resolution data and fairly frequent updates**
 - **TMA scale**
 - ◆ **High resolution data with frequent updates**

Model of CB WIMS





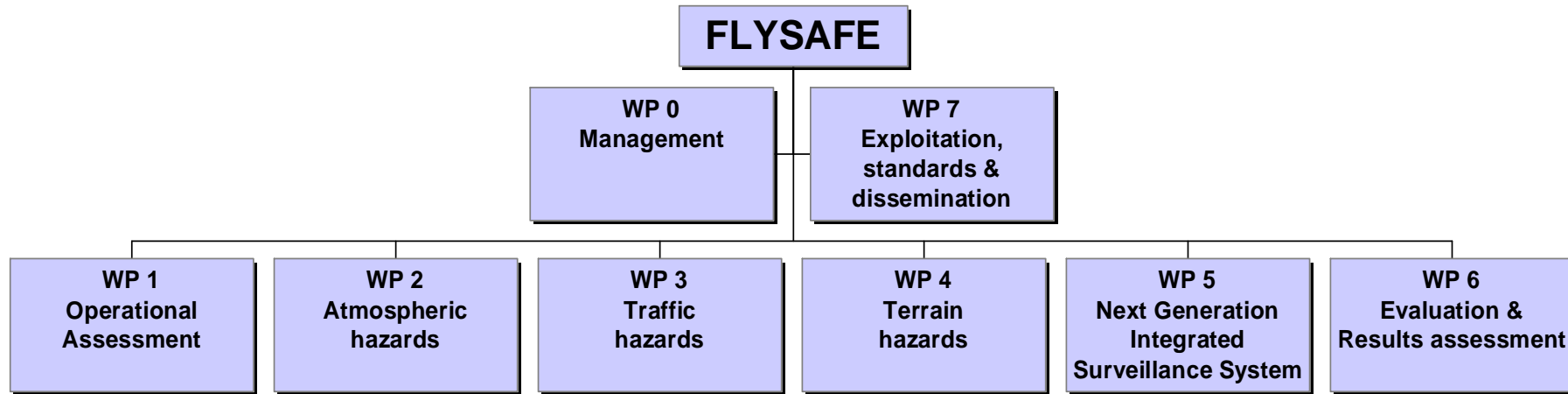
FLYSAFE “Driving factors”



- **How we structured the project / how we work:**
 - **Review of past accidents, analysis and definition of means (that would allow) to prevent them with careful consideration of human factors issues &**
 - **Interview of pilots**
 - **Definition and development of solutions in three branches for the different hazard information management**
 - **Weather, with specific studies in atmospheric hazards**
 - **Traffic**
 - **Terrain**
 - **Definition and validation of a new generation integrated solution**
 - **Support the design and development with standardisation and certification activities**

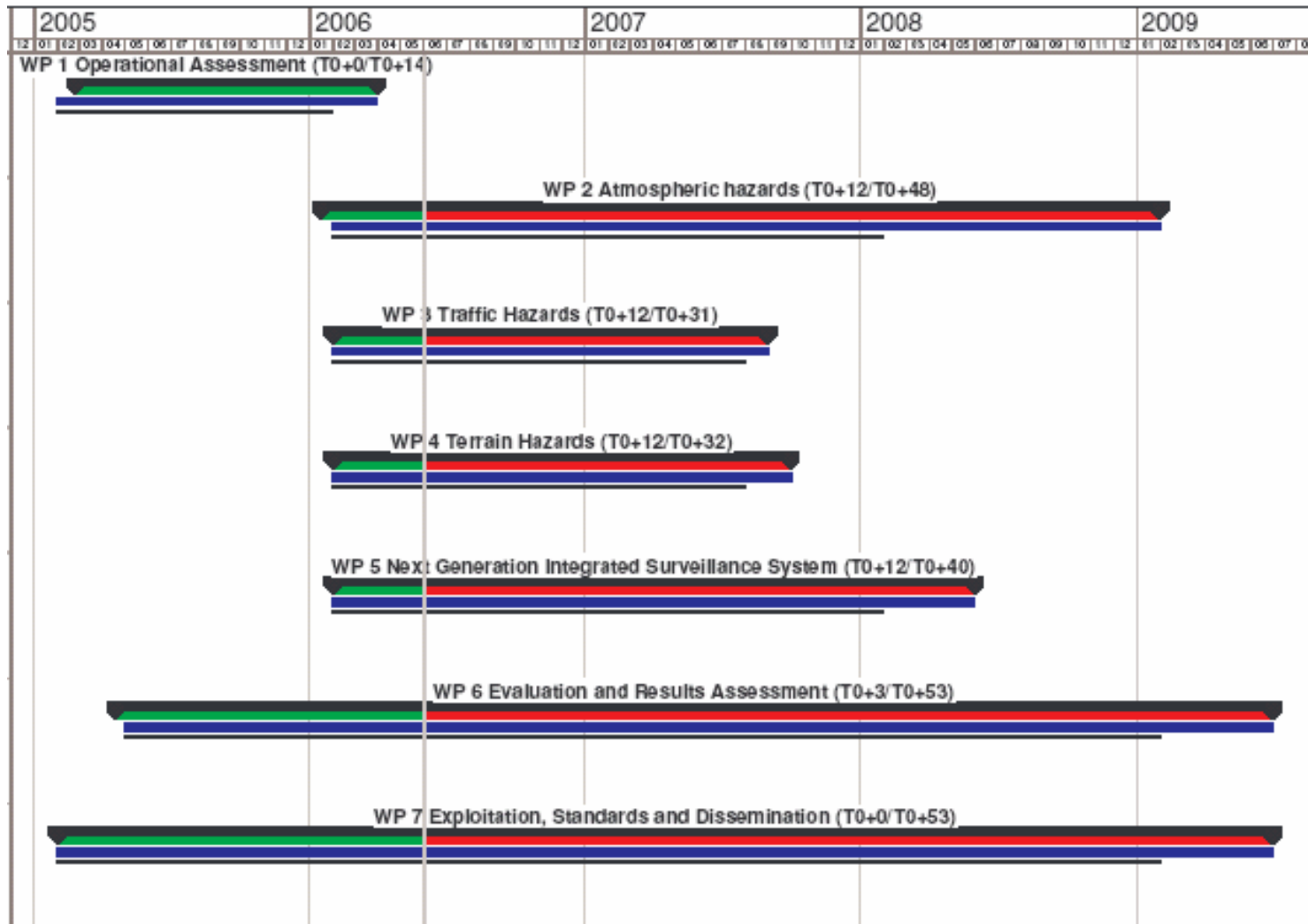


FLYSAFE WBS - level 1





FLYSAFE SCHEDULE





Results of the market acceptability pre-assessment



■ Questionnaire to pilots and airlines:

- Opening of a public web site www.eu-flysafe.net with the questionnaire on 17/06/05
- Gathering and analysis of the first results for 7/07/05

THEN:

- For increased operational coverage PMC requested to extend the period of collection of responses to the questionnaire
- decision to extend the campaign to the end of December 2005, to produce a consolidated report



Results of the market acceptability pre-assessment



■ Pilots Questionnaire results:

- A large majority of pilots (75%) expect to get improvements in the **accuracy and reliability of information related to the different hazards**, and more particularly the atmospheric hazards, in future products
- The overall results obtained highlight the need for **improved display of information** (atmospheric hazards, airport, airborne traffic, terrain and obstacle situational awareness).
- However, there was a **mix of opinions regarding which types of screen** should be used to display the new kinds of information. (Larger PFDs and NDs, Central Displays, Side Displays and also HUDs)
- There is a clear need for an **coherent availability of weather information in a timely and relevant manner for the crew as well as for the AOC personnel.**



Status and Next steps



- **The functions are currently specified at high level . They will be further defined, then developed and then integrated :**
 - **first into a common platform assembled in THALES Toulouse**
 - **then tested on the NLR simulator in Amsterdam, which 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**

ATC Simulator



GRACE in Airbus Layout



Tower Simulator



Status and Next steps



- Simulations will be performed with the involvement of pilots, in:
 - Part Task Evaluations (PTEs), held in year 3 of the project which aim to assess each of the three single functions (weather, traffic, terrain) separately. A selection of tools will be chosen to be integrated in the NG-ISS
 - The Main Task Evaluation (MTE) held at the end of the project which will allow to assess the new functions together in a real environment.



GRACE in
Airbus Layout

- Flight tests will also be performed to assess technical aspects of the new airborne weather tools



Themes of Forum 1: Interaction with SESAR



- **Though much smaller in size, and modest in ambition and time frame, FLYSAFE needs to interact with SESAR:**
 - **We will define new solutions / contribute to standards. They could / should feed SESAR in the definition of the "right way to go"**
 - **The first definition phase of SESAR has started and will soon produce its first results. We need to make sure that what we do, does not conflict with SESAR recommendations and thoughts.**
 - **Question: how can we best interact together in the next 3 years ?**



Themes of Forum 1: 3 technical topics for discussion



- **A first discussion with Eurocontrol has allowed us to identify 3 technical topics:**
 - **SA / Conflict detection / resolution**
 - **Operational processes that can / will be affected by FLYSAFE**
 - **Information / communication and the use of datalink in FLYSAFE**

We propose to dedicate one hour per topic