

# **ANASTASIA**

***Airborne New and Advanced Satellite techniques and Technologies  
in A System Integrated Approach***

**Presentation at Aeronautics Days 2006,  
Vienna 19-21 June**

**Jean-Yves CATROS**

# ANASTASIA

- **European Commission Project, 6<sup>th</sup> framework programme**
  
- **Integrated project, aeronautical and space priority**
  - 20 ME Euro
  - 30 partners
  - Starting date: 1st of April 2005
  - Duration: 4 years
  
- **Goal: To define the Future satellite based CNS Avionics beyond 2010**

# Partners

- **30 Partners : 13 countries, Large Industrials, SME, universities, Research centers**
- **Core Team :THALES-AVIONICS, AIRBUS, DASSAULT-Aviation, DLR**
- **Cordinator : THALES-AVIONICS**
- **Expertise**
  - ◆ **Airframers: Airbus ( F and G), Dassault Aviation (F)**
  - ◆ **Satellite : Inmarsat(UK), Astrium(F)**
  - ◆ **Research centres: DLR(G), NLR(NL), EADS research centers(F, G) ,Thales research center(UK), Joanneum(A)**
  - ◆ **Universities: INSA/ENAC(F), Tech univ Brauschweig(G), Vigo univ(SP), UCL(UK), Imperial college(UK), University of Surrey(UK)**
  - ◆ **Suppliers : Skysoft(P), Data respons(N), Gatehouse(DK),Geozup (R), Triagnosys(G), Rhea systems(B), WIS(UK), Sirehna(F), EADS(F,G), Astrium(F), Selex(I), THALES Avionics(F, UK), ERA technology, ASCOM (CH)**

# RATIONALE

## ■ Rationale/Input :

- **New needs : The foreseen increase of the traffic will request to improve operational capacity and safety of the air transport system**
- **New space based technologies : Satcom, satellite navigation**

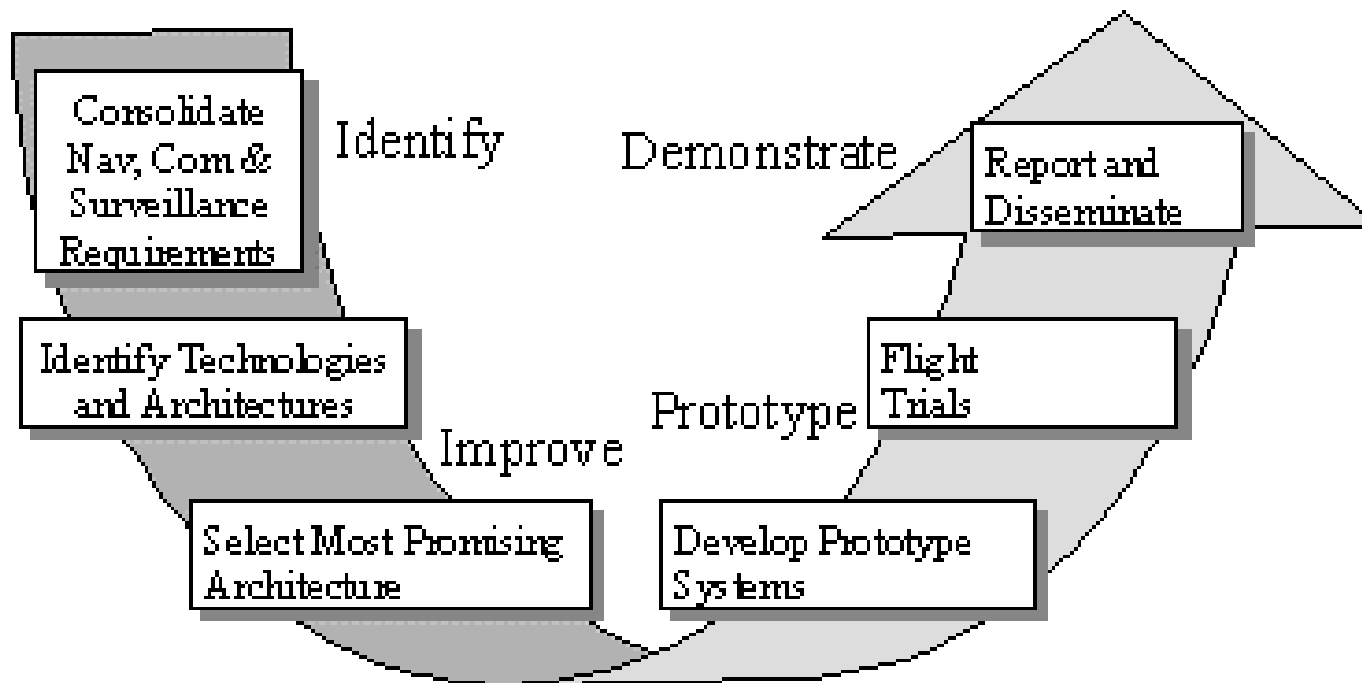
## ■ Output :

- **To propose new CNS satellite based systems and architectures to fit with these new needs, on the basis of the evaluation of these new technologies**

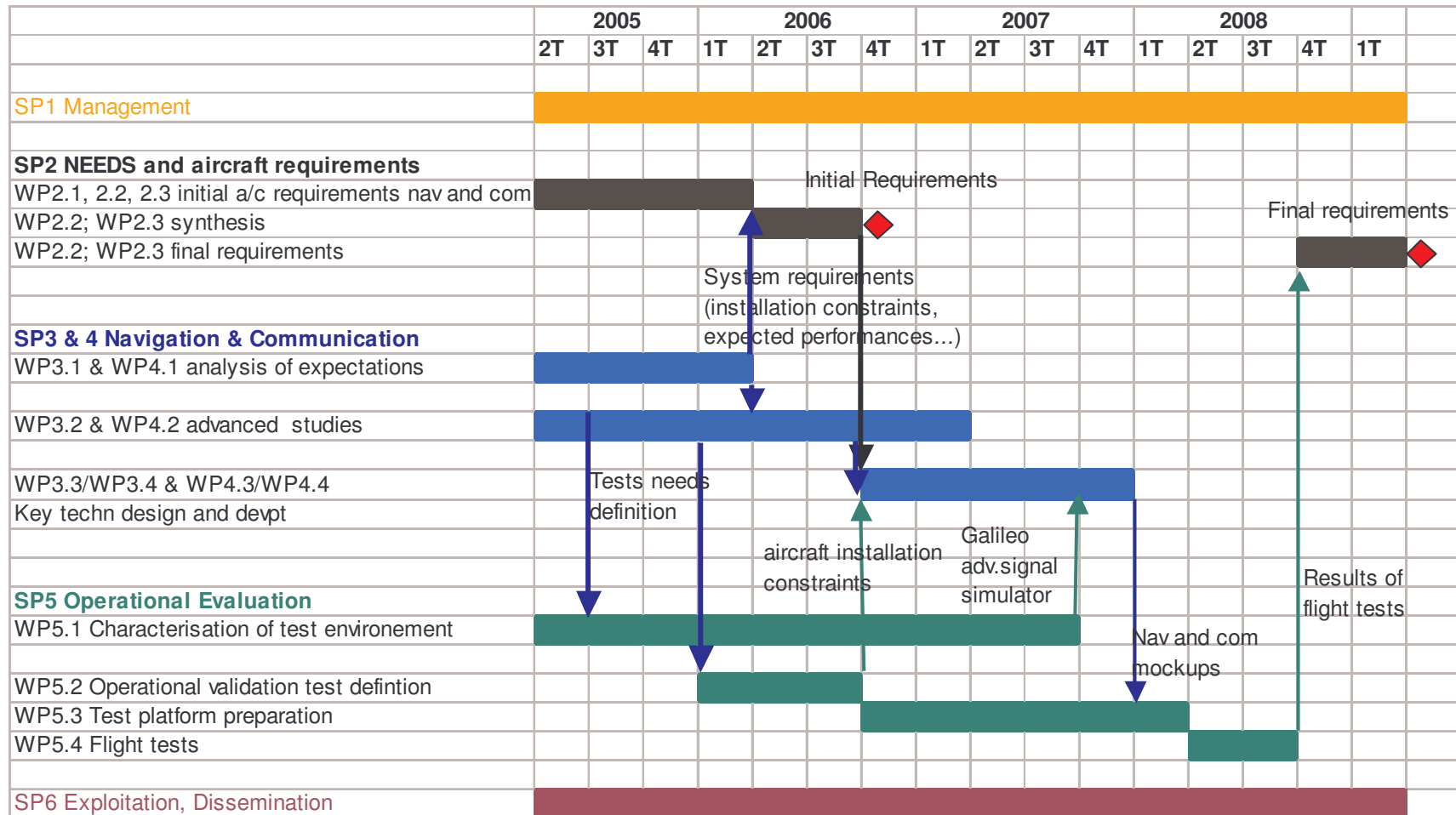
# The ANASTASIA objectives

- **ANASTASIA aims to carry out research, evaluation and cost benefit analysis to define future satellite based CNS avionics beyond 2010**
- **Navigation**
  - Investigate Multiconstellation, multifrequency satellite positioning
    - ◆ Antenna design
    - ◆ Advanced signal processing
    - ◆ Receiver integration
    - ◆ Hybridisation techniques with low cost inertial sensors
- **Communication**
  - To establish the requirements for an affordable aeronautical Satcom system for ATM
  - To design, implement and demonstrate a preliminary such Satcom system
  - Prototype Higher bandwidth services and Systems for future a/c Communication requirement
- **Consolidate future needs of Surveillance with the requirements and key technologies from COM & NAV**

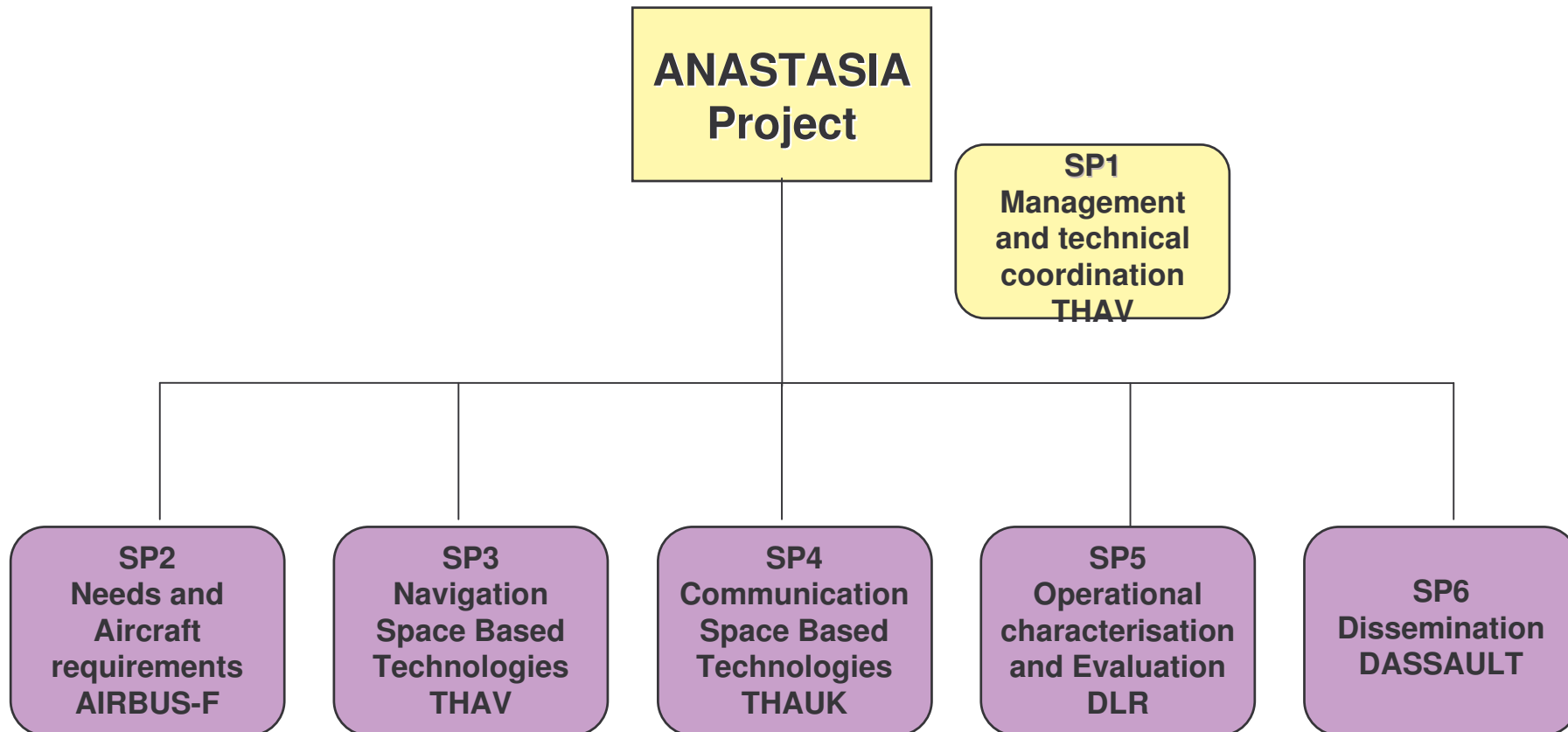
# Project Implementation



# SCHEDULE



## ANASTASIA WBS – SP level



## SP 2 Objectives

- **To identify the requirements for the new satellite based CN(S) functions for both business jets and commercial aircraft**
  - “Top – Down” analysis of the future needs foreseeable in 2020, and their associated performances
  - “Top – Down” analysis of the airborne functional requirements foreseeable in 2020, for both navigation and communication
  - “Bottom-up” assessment of the airborne opportunities introduced by foreseeable technological evolutions (identified in SP 3 and 4)

## SP3 Objectives

**Investigate and evaluate the techniques and technologies that will be the keys to the success of future space-based navigation systems:**

- **Multi-constellation, multi-frequency GNSS receivers (GPS/Galileo) for real world-wide autonomous robust navigation**
- **Signal processing techniques and antenna design for high robustness to critical Radio Frequency Interference and multipaths environments**
- **High accuracy and integrity techniques for up to Cat 3 landing and gate-to-gate operations (SMGCS)**
- **Technological design of low cost navigation systems components:**
  - **Technological design of new receiver and antennas**
  - **Technological design of MEMS based lower cost hybridised systems**

## SP 4 Objectives

- 1.
  - To design, implement and demonstrate a prototype of an affordable aeronautical SATCOM system that will meet evolving European ATM requirements such as using satellites to complement the congested VHF spectrum.
  - It shall be based on current or planned space segment and shall have maximum synergy with existing and planned non-ATM aeronautical SATCOM systems
  
- 2.
  - To carry out research into higher bandwidth services, systems and airborne equipment to meet future SATCOM requirements in ATM such as delivering weather maps and electronic flight bag data.
  - This work will concentrate on synergies with revenue-generating passenger use, and antenna issues (dual band conformal antenna)

## SP 5 Objectives

- **To assess the performances of key satellite Navigation and Communication technologies in actual environment**
  - **Characterization and modelling of the environment**
  - **Flight trials**
  - **Data analysis**

## SP 6 Objectives

### ■ Contribution to standards and dissemination of the results

- Use of the ANASTASIA results in a way which will allow future regulations to take into account the future generation of satellite based NAV and COM receivers

ANASTASIA results will be presented to ICAO, RTCA, EUROCAE, ARINC,..

- Dissemination of the results through patents, papers, conferences.

## Where we are (T0+12):

- **SP2 : Needs**
  - Jan 10-11 : User forum at Toulouse
  - T0+12 D2.1 «Future CNS requirements for use of space based Com and Nav subsystems on civil aviation »
- **SP3 :Navigation**
  - T0 + 8 D3.1 «Analysis of existing techniques for space base navigation»
  - T0+12 D3.2.1.1 «Interference and multipath mitigation study report»
- **SP4 communication**
  - T0+12 D4.1 « Analysis of requirements and technologies »
  - T0+12 D4.3.1 «Aircraft terminal technology assessment report »
- **SP5 Operational characterisation and evaluation**
  - T0+16 D5.1 «Characterisation of critical environment»
- **SP6 Dissemination**
  - Leaflet
  - [www.anastasia-fp6.org](http://www.anastasia-fp6.org)
  - A number of papers and presentations

## More information?

- **Web site :** [WWW.Anastasia-FP6.org](http://WWW.Anastasia-FP6.org)

### Coordinator

Jean-Yves CATROS

Thales-avionics 105 Av du Gal. Eisenhower Toulouse

E-mail : [jean-yves.catros@fr.thalesgroup.com](mailto:jean-yves.catros@fr.thalesgroup.com)  
Tel: +33 (0)5 61 19 75 03 - Fax: +33 (0)5 61 19 67 50

### Research Programme Officer

Jean-Luc MARCHAND

European Commission - DG Research H.3 -Aeronautics

E-mail : [jean-luc.marchand@ec.europa.eu](mailto:jean-luc.marchand@ec.europa.eu)  
Tel: +32 (0)2 298 66 19 - Fax: +32 (0)2 296 67 57

# ANASTASIA PROJECT

Airborne New Advanced Satellite techniques and Technologies in A System Integrated Approach

INMARSAT 4

New Aeronautical  
Communication for  
ATC~AOC~AAC

GPS

New Satellite  
Navigation Systems

GALILEO

New On-board  
Technologies

The New on board Satellite based  
Navigation, Communication Systems and Technologies



EUROPEAN COMMISSION PROJECT  
6th FRAMEWORK PROGRAMME (2002~2006)

