

**New projects developing avionic systems and flight deck operations,  
and their contribution to Future Air Traffic Management**  
Brussels, 22<sup>nd</sup> of June 2010

- Introduction**
- Project Background**
- Example of displays relevant to ODICIS**
- Key requirements**
- Technology overview**
- Project overview**
  - Detailed objectives
  - Budget
  - Work Breakdown Structure
  - Schedule
- Achievements & Milestones**
- Next Steps**

## ❑ ODICIS aims at

- Developing the hardware for a single display with associated means of interaction
- Designing the associated control and display system
- Designing a concept of use associated with the single display
- Technology Readiness Level of 3/4

## ❑ Project key data

- Started in May 2009
- Duration 30 months
- Budget 5.6M€
- 9 partners from 7 countries
- Project coordinator: Thales

## ❑ Funding

- Supported by the European Commission's seventh framework programme (FP7)
- Partners

## Concorde (1975)



## Airbus A320 (1988)



Towards a more integrated cockpit with larger displays



## Future ATR 42-600



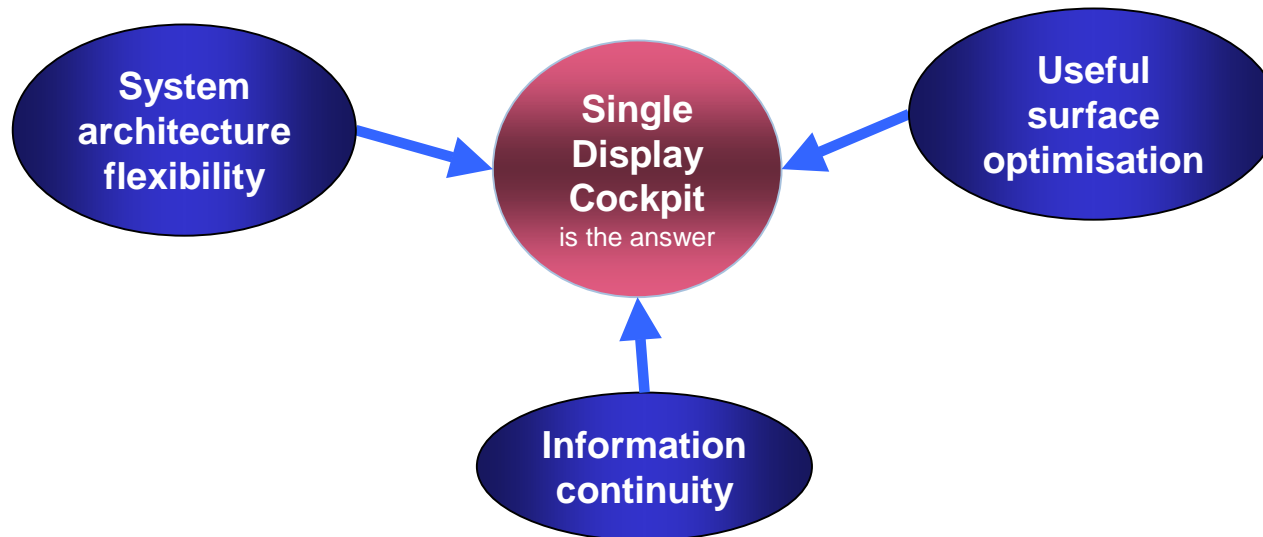
## Future A350

❑ **Next step**

- One large display surface replacing separated displays



© Dassault (Falcon 7X)

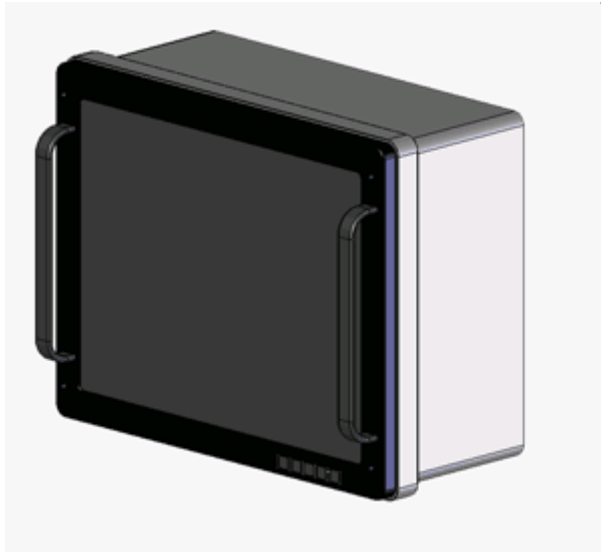


## □ Similar attempts

- US Aerospace experience
  - Rockwell Collins/Kaiser designed a large projection display for the Joint Strike Fighter that caught fire due to the use of arc lamp
  - L3COM: Large Area Avionics Display. LCD based, two tiled independent displays
  
- Immersive display from NEC (2008)
  - 4 tiled projectors on a curved screen
  - 40.8" x 12.8"
  - 2880 x 900 resolution
  - Now proposed by Ostendo



## ❑ Other projection systems in the Avionics domain



- [www.combatdisplays.com](http://www.combatdisplays.com)
  - Rugged LED driven 21" rear-projection display 1400x1050 pixel

- ❑ **Seamless display of information**
- ❑ **Curved surface**
  - For optimised viewing angles
- ❑ **Arbitrary shape**
  - One that adapts to the aircraft
- ❑ **Tactile**
  - For more intuitive interactions

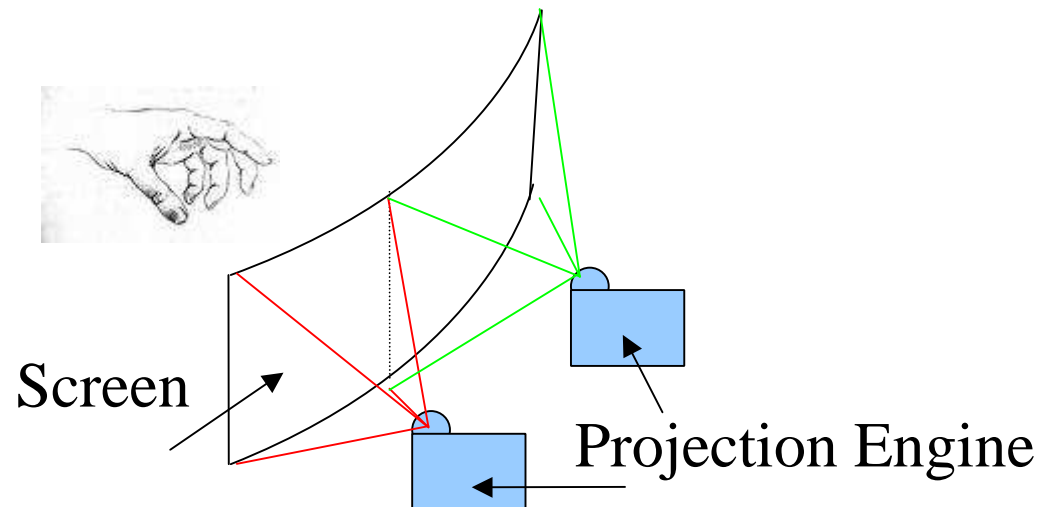


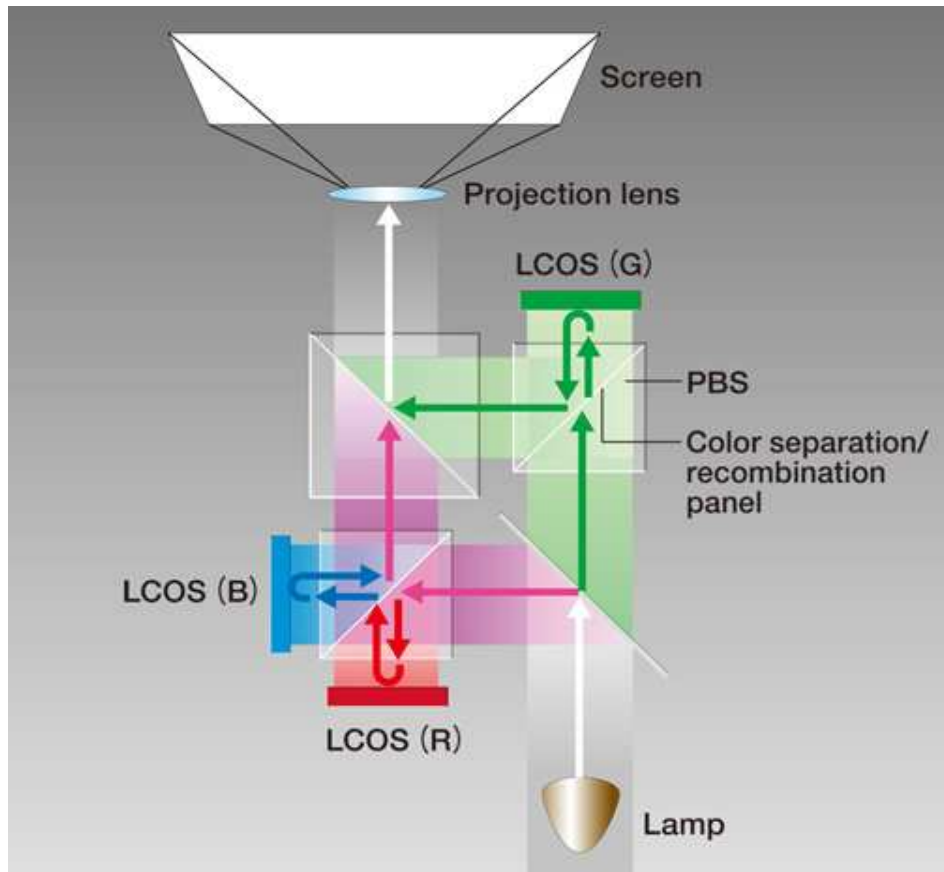
## □ Choice

- Flexible technology to address complex shapes and curved displays
- OLED and projection technology are candidates
- Projection is the most mature technology within the project timeframe

## □ Projection arrangement

- Multiple short throw projectors





- ❑ **LEDs as light sources**
  - Red, Green, Blue LEDs instead of a lamp
- ❑ **LCOS (Liquid Crystal on Silicon)**
  - Array of reflective liquid crystal modulators
- ❑ **Projection Optics**
  - Shortest distance between LCOS and Screen
- ❑ **Screen**
  - Key element to maximise contrast, viewing angles
  - Include micro-optical elements
  - AR coated

30 months and 5.6 million euros  
to go from an **innovative concept** to a **proven design**  
with **avionics constraints**

- ❑ **Rear-projection based system**
  - Most mature technology for the large display to be addressed
  - Complex display shapes can be achieved
  - Modern light sources (Laser, LED) performance has greatly improved
    - No need for an Arc Lamp
- ❑ **Multimodal Interaction means**
  - Including tactile input
- ❑ **Powerful graphic generation system**
  - Innovative architecture to meet the high processing power requirement

**A new tool will be available...**

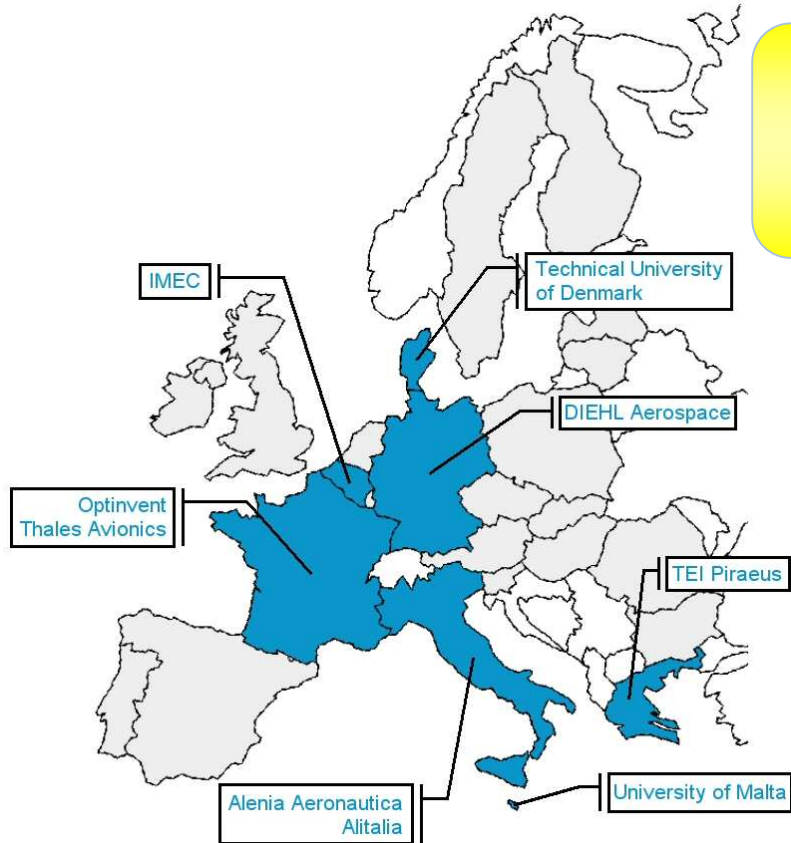
## ❑ Cockpit concept investigation

- No longer constrained by lost space between displays
- Task oriented cockpit more easily implemented for better workload repartition between Pilot Flying and Non Flying (asymmetric cockpit)
- More easily reconfigured during the various flight phases

## ❑ Operational investigation

- Pilots
- Human Factor specialists

A balanced consortium in terms of technical competencies, European representation and kind of involved institutions



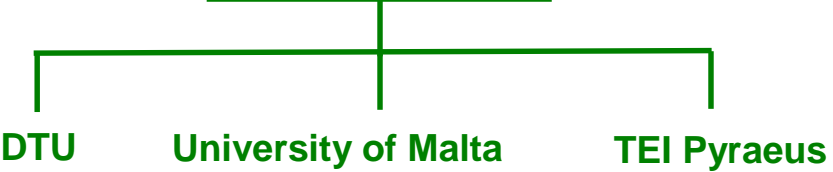
**SME RESEARCH CENTRES**

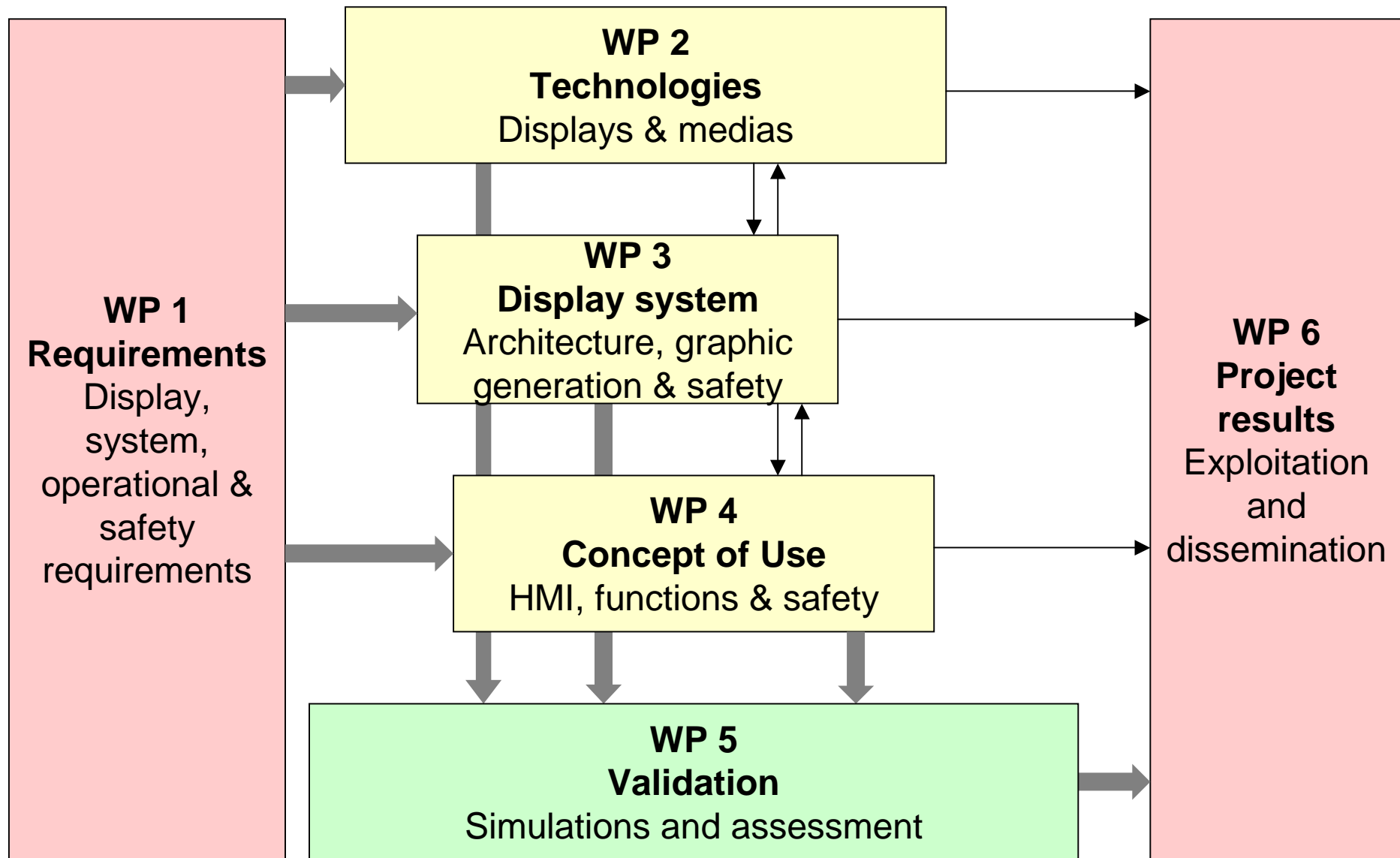
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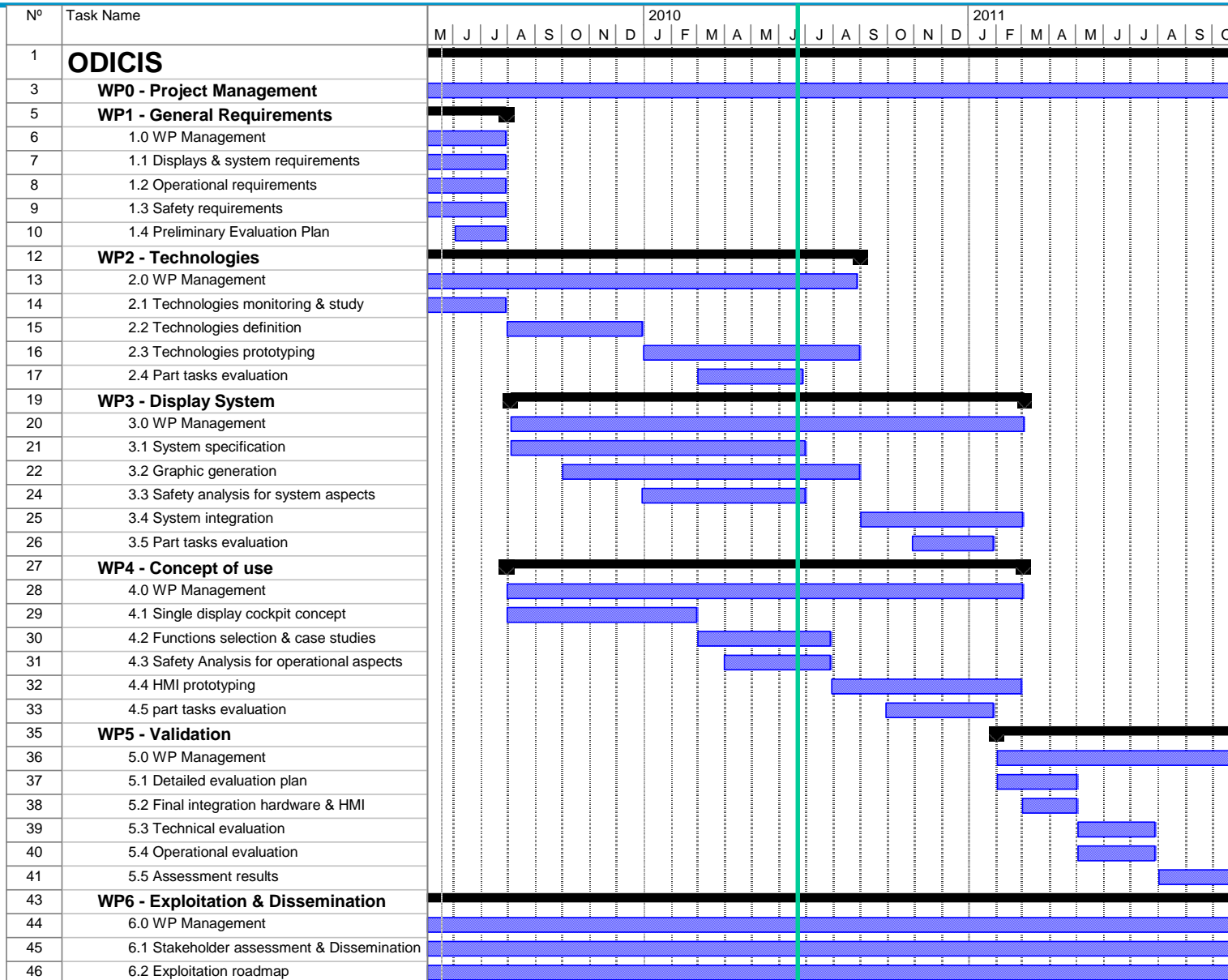
**AERONAUTICS INDUSTRIES**



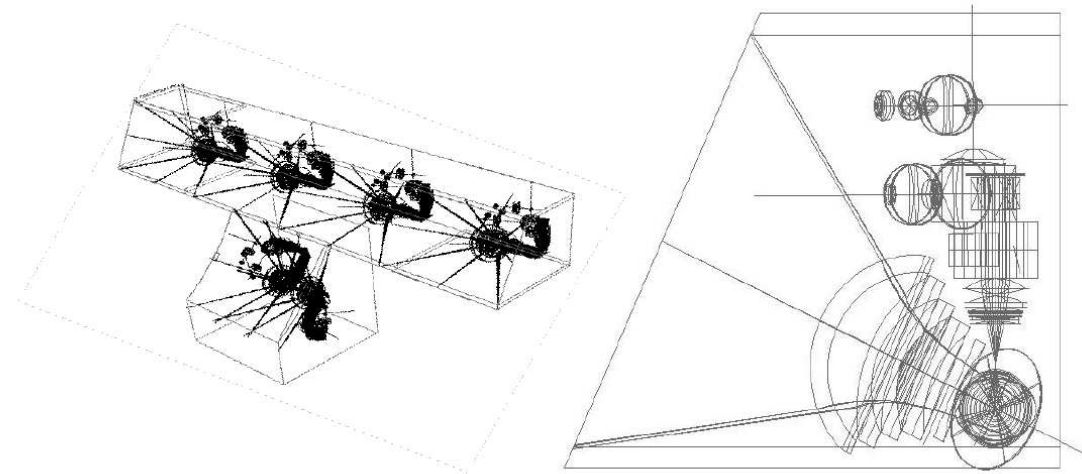
**UNIVERSITIES**







- ❑ Requirements established
- ❑ Technological building blocks have been identified
  - Use as much as possible off the shelf components
  - Focus design efforts on items specific to ODICIS
    - Wide angle projection optics



- High power LED lighting
- Multi-touch Tactile architecture
- Simulate the display system architecture

### ❑ Hardware prototyping phase

- A very tricky one where cost and performance trade-offs are key
- Two to three months delay to finalise the detailed design

### ❑ Concept of Use

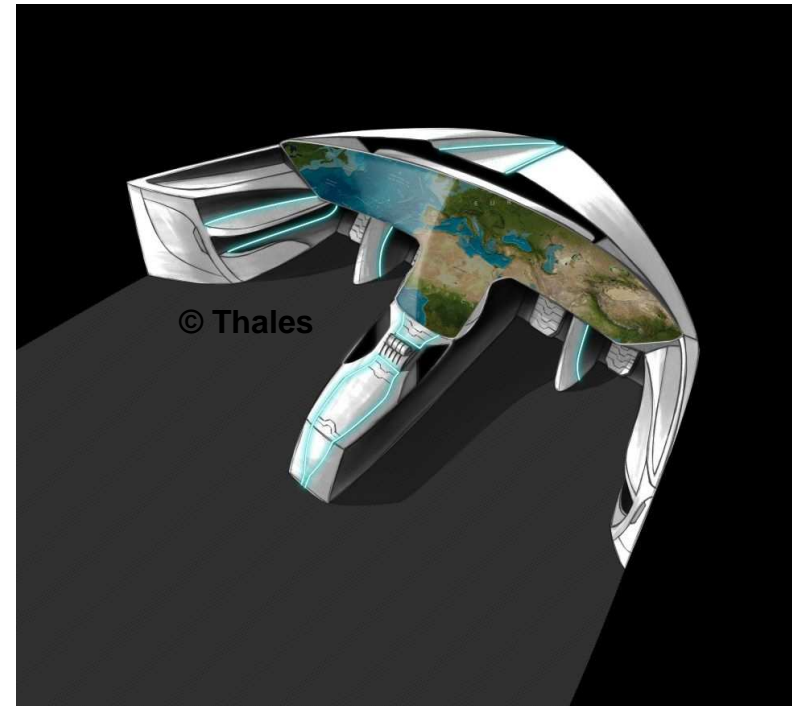
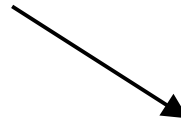
- Cockpit concept defined
- No deep redesign of fundamental formats (Primary flight display, Navigation Display, etc...)
  - ODICIS is mainly technology oriented
- Future trends coming from other European projects will be illustrated as much as possible (e.g. from SESAR: wake vortex, VHF Data Link, etc...)

### ❑ Patents

- 3 patents being written

**Mock-up Hardware integration**

- End 2010
- Less futuristic than this



**Operational Evaluations**

- Mid 2011

**Dissemination Events**

- Through an External Experts Advisory Group
  - July 2010
  - June 2011

- ❑ **Mock-up will mainly display still images**
  - Some interactivity considered to evaluate tactile interactions
  - Flight simulator to be considered in the future
- ❑ **Tactile interaction**
  - First approach of interaction on a large screen
  - Will require additional intensive operational evaluations
    - Especially for use under turbulences
- ❑ **Display System mock-up with Avionics components**
  - Avionics System hardware modelled
  - Mock-up will feature off-the-shelf component
- ❑ **Display anti-reflection coating**
  - Stringent AR coating specifications
  - “Easily” met on small surfaces
  - Avionics grade AR coating on large surfaces will probably require some further development

## ❑ **SESAR**

- The single display will offer more space and a larger adaptability to display new functions required by SESAR (4D trajectory, wake vortex, VHF Data Link,...)

## ❑ **ALICIA**

- Recommendations from the ALICIA cockpit concept could be implemented

## ❑ **SCARLETT**

- Modular avionics will be an enabler of a resilient and reconfigurable control and display system

## ❑ **DAPHNE**

- Can be used to transmit the high amount of data required by formats on the single display

### Project Coordinator

Loïc Bécouarn

Thales Avionics

[loic.becouarn@fr.thalesgroup.com](mailto:loic.becouarn@fr.thalesgroup.com)

### Dissemination Manager

- Johanna Dominici

- Thales Avionics

- [Johanna.dominici@fr.thalesgroup.com](mailto:Johanna.dominici@fr.thalesgroup.com)

### Project Web Site

<https://www.odicis.org/>



**Thank you !**



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