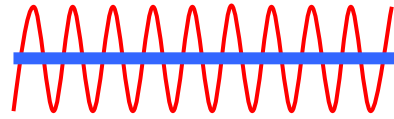


# TAUPE

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**Global Presentation of the Project  
April 2009**

<http://www.TAUPE-Project.eu>



1. Global presentation of the project
2. WP global presentation
3. Details regarding the Scope of Work
4. Organisation of the project Management
5. Dissemination

## **1. Global presentation of the project**

2. WP global presentation

3. Details regarding the Scope of Work

4. Organisation of the project Management

5. Dissemination

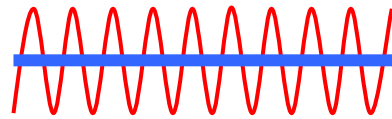


# Rationale of the project

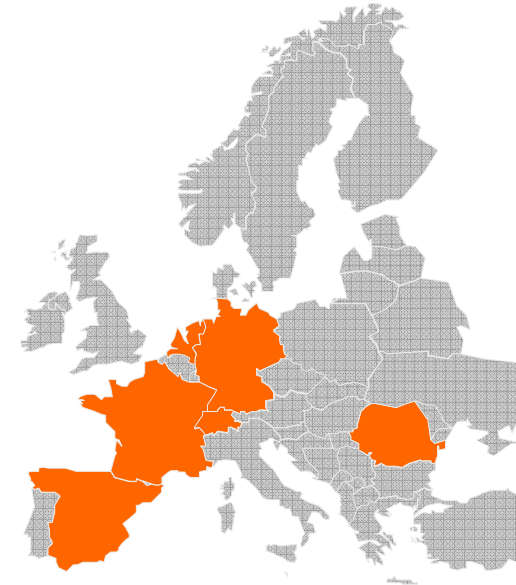
- 3 important tendencies in the aeronautic sector are:
    - The More Composite Aircraft
    - **The More (or even the All) Electric Aircraft**
    - **The Integrated Modular Avionics evolutions**
  - This evolution leads to several changes and innovation needs, especially:
    - Replacement of hydraulic and pneumatic energy sources by electrical ones, which leads to:
      - Higher electrical power
      - Changes in the voltage levels
      - **Increase in the wires mass**
    - Increase data communication exchanges on A/C which leads to:
      - **Increase in the wires number**
      - **Increase system complexity**
- Solutions has to be found to decrease the number of wires used & simplify the architectures of the systems

- **Merging of the power and communication networks using:**
  - **PowerLine Communication (PLC) technology**
  - **Power over Data (PoD) technologies**

# Project identity card



- Name: TAUPE (Transmissions in Aircraft on Unique Path wirEs)
- $T_0$ : September 1<sup>st</sup> 2008
- Duration: 3 years
- Number of partners: 17
- Number of nationalities represented: 6
- European framework: FP7  
Theme 7: Transport (including Aeronautics)
- Overall budget: 5 454 K€
- Overall financing by the European Commission: 3 630 K€



**TAUPE logo**

© Copyright TAUPE, 2009





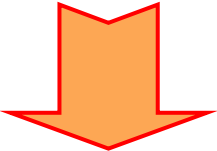
# Main objectives of the project

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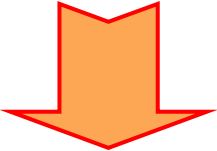
- Main objectives related to the ACARE SRA:
  - Weight reduction
  - Simplification of the cabling maintenance
  - Simplification of the cabling system
  - Cost effective retrofit
  - Strengthening competitiveness of European stakeholder
- Main project internal objectives:
  - Demonstrate a **TRL of 4**, using:
    - **2 SIB** (System Integration Benches): the Copper Bird, the Cabin Mock-up
    - **2 reference applications or systems**: the Cabin Lighting System (CLS) and the Cockpit Display System (CDS)
  - Provide **fully optimised avionic architecture** for power and data transmission in terms of topologies (PLC and PoD), EMC, security and integrity of data, etc

# TRL objective and means of the project

- **We are targeting a TRL of 4:**
  - ***Component and/or breadboard validation in laboratory environment***



- **2 System Integration Benches (SIB):**
  - The Cabin Mock-Up <EADS – IW>
  - The Copper Bird <HISPANO SUIZA>

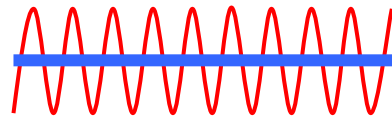


- **2 representative applications:**
  - Cockpit Display System (CDS) <THALES AVIONICS>
  - Cabin Lighting System (CLS): <DIEHL AEROSPACE>

## DoD TRL definitions

9	Actual system 'flight proven' through successful mission operations
8	Actual system completed and 'flight qualified' through test and demonstration
7	System prototype demonstration in an operational environment
6	System/subsystem model or prototype demonstration in a relevant environment
5	Component and/or breadboard validation in relevant environment
4	<b>Component and/or breadboard validation in laboratory environment</b>
3	Analytical and experimental critical function and/or characteristic proof of concept
2	Technology concept and/or application formulated
1	Basic principles observed and reported

# Partners involved in TAUPE



Coordinator

WP Leaders

Labinal  
SAFRAN Group

AIRBUS

EADS

Lucerne University of Applied Sciences and Arts  
HOCHSCHULE  
LUZERN

NLR



Other partners

ARTTIC  
INTERNATIONAL MANAGEMENT SERVICES

DIEHL  
Aerospace

DS2

ONERA  
THE FRENCH AEROSPACE LAB

EPFL  
ÉCOLE POLYTECHNIQUE  
FÉDÉRALE DE LAUSANNE

heig-vd  
Haute Ecole d'Ingénierie et de Gestion  
du Canton de Vaud

Hispano-Suiza  
SAFRAN Group

Hortec  
ahead in innovation

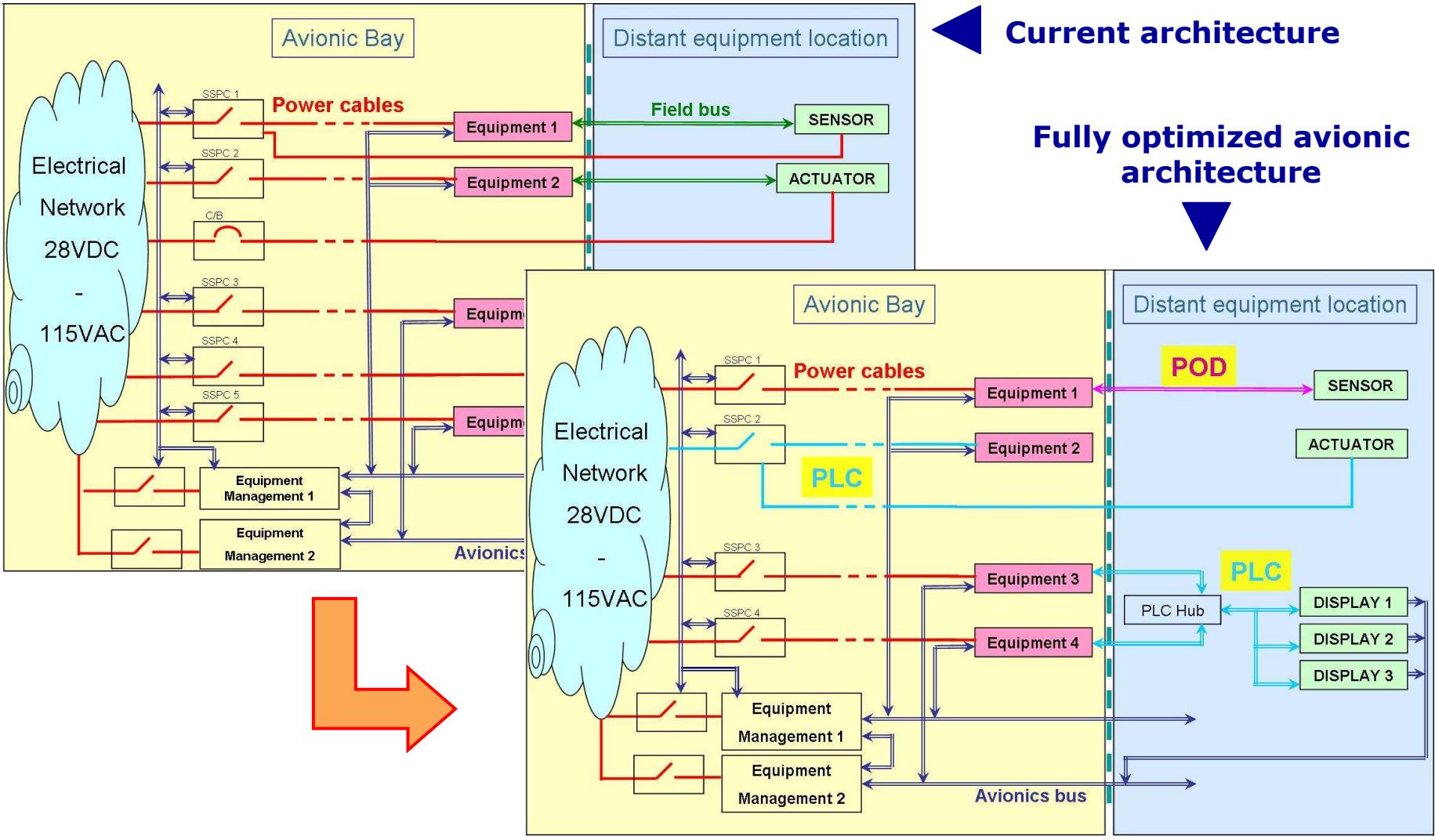
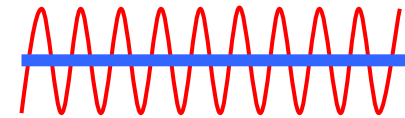
ekis

USTL

THALES

ascom

# Architecture evolution objective

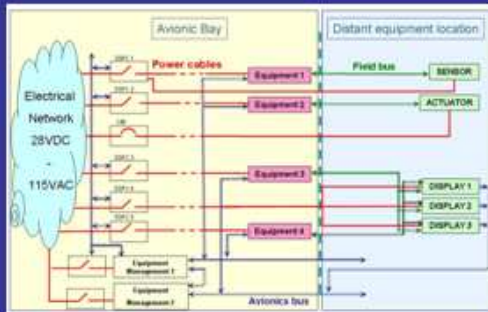


Current architecture

Fully optimized avionic architecture

# Global strategy of the project

## Current A/C global systems architecture



## Technologies (PoD ~ PLC)

Reference Applications to be used on a SIB for the proof of concept (Avionics Safety critical & High Speed)

## A/C Challenges

- **Networks** [Architecture + Transmission]
- **Environment** [EMI : Conducted and radiated]
- **Transmission means** [multipoint]

## TAUPE Project

### Criteria for TAUPE assessment & validation

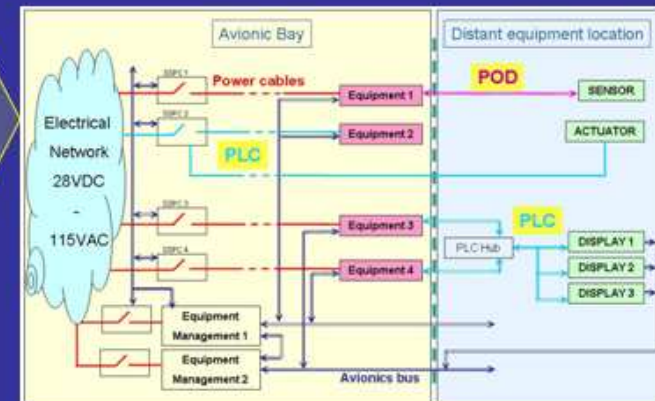
#### A/C Constraints

- **safety** (Certification),
- **Industrialization** (cost),
- **Functionality** (data transmission, equipment family).

- weight reduction,
- space allocation,
- time maintenance,
- Safety,
- Retrofitting,
- Industrialisation,
- Costs.

## TAUPE Results

# TRL4



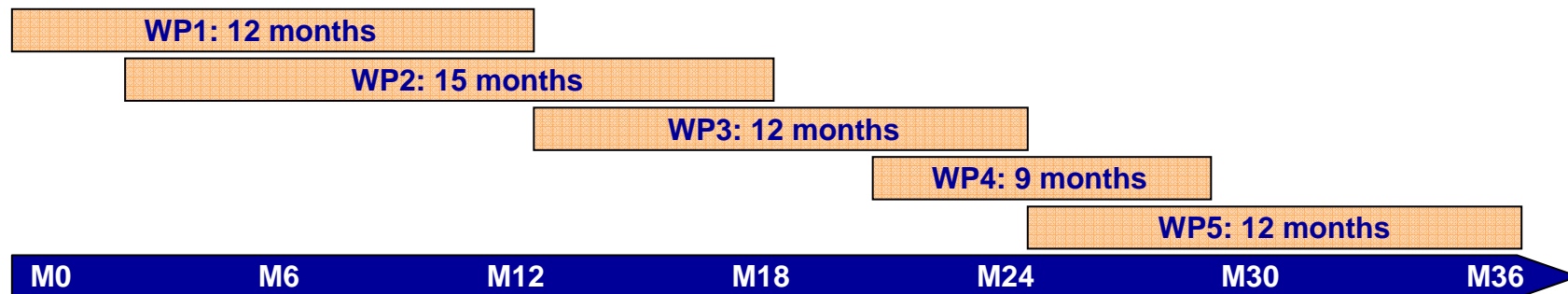
## TAUPE Full Avionic Architecture with

- Specifications (harness wiring & networks equipment)
- Systems qualification requirements

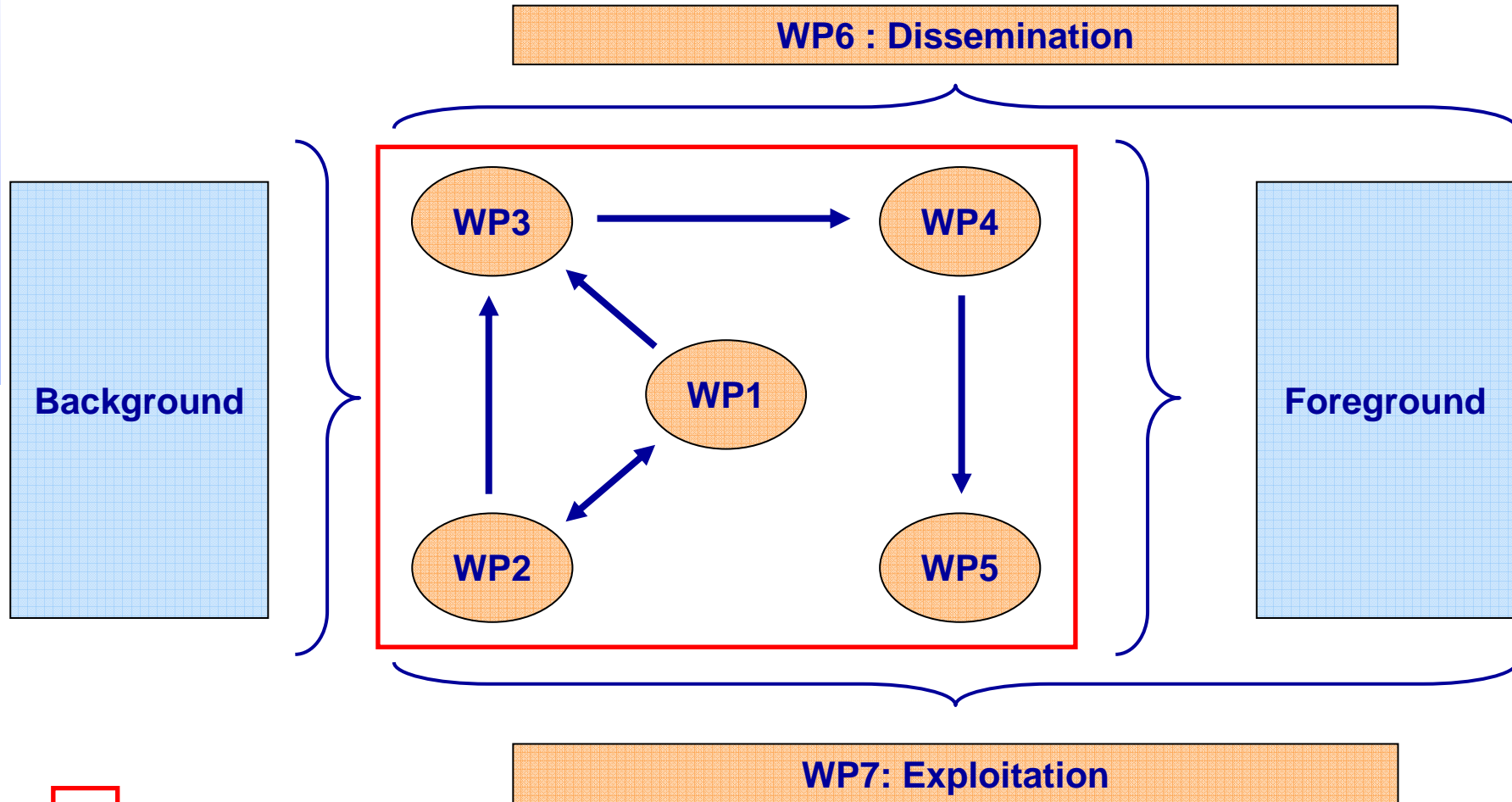
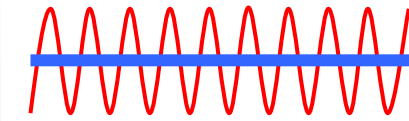
# Project Work Breakdown Structure

WP	WP title	WP Leader	Main Outcome
0	Project Management	LABINAL	<ul style="list-style-type: none"> <li>Coordination between the different WP</li> <li>Interface with the EC</li> </ul>
1	Requirements	AIRBUS-F	<ul style="list-style-type: none"> <li>Architecture concept rules and requirements</li> <li>V&amp;V test requirements</li> </ul>
2	Networks definition and simulation	LABINAL	<ul style="list-style-type: none"> <li>Numerical model of the future network using PLC or PoD</li> </ul>
3	Mock Up components design & adaptation	EADS – IW	<ul style="list-style-type: none"> <li>Adapted chipset integrated into specific modem</li> <li>Adaptation specifications for the existing SIB</li> </ul>
4	Mock Up integration	HSLU	<ul style="list-style-type: none"> <li>Adapted SIB integrating the PLC modem, ready for testing</li> </ul>
5	Verification & Validation tests	NLR	<ul style="list-style-type: none"> <li>V&amp;V of the adapted technology on the SIB</li> </ul>
6	Dissemination	LABINAL	<ul style="list-style-type: none"> <li>Dissemination events scheduled at M18 and M36</li> </ul>
7	Exploitation	LABINAL	<ul style="list-style-type: none"> <li>Collaboration with JTI CLEAN SKY</li> <li>IPR survey and management</li> </ul>

RTD WPS



# WP interactions



 RTD WPs

1. Global presentation of the project

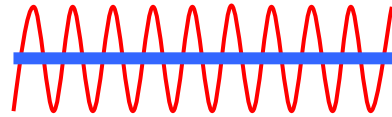
**2. WP global presentation**

3. Details regarding the Scope of Work

4. Organisation of the project Management

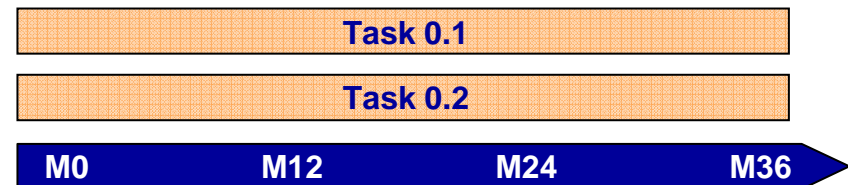
5. Dissemination

# WP 0: Project Management



- **Objectives:**

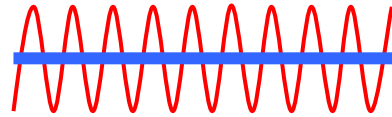
- Set up the management infrastructure
- Provide technical coordination of the project partners
- Provide financial and contractual management of the consortium



- **Tasks (*Leader*):**

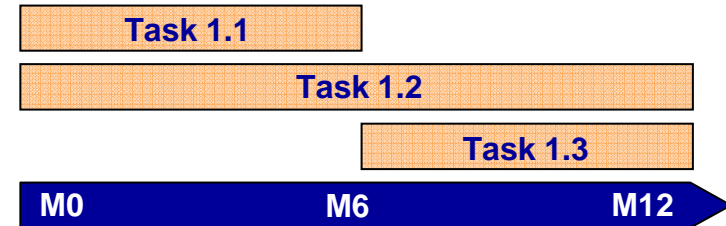
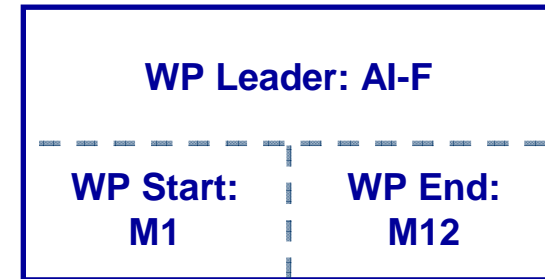
- Task 0.1: Consortium Management (*LAB*)
- Task 0.2: Strategic Coordination (*LAB*)

# WP 1: Requirements



## Objectives:

- Identify electrical and communication networks for current and future generations of A/C
- Define generic A/C architecture principles using PLC & PoD taking into account V&V strategy
- Validate the generic architecture using defined criteria on the CLS and CDS systems architecture
- Specify the requirements for the reference applications (CLS and CDS)



## Tasks (Leader):

- Task 1.1: Aircraft architecture and Environment (*LAB*)
- Task 1.2: Optimal System architecture and requirements (*AI-F*)
- Task 1.3 – Safety approach (*EKIS*)

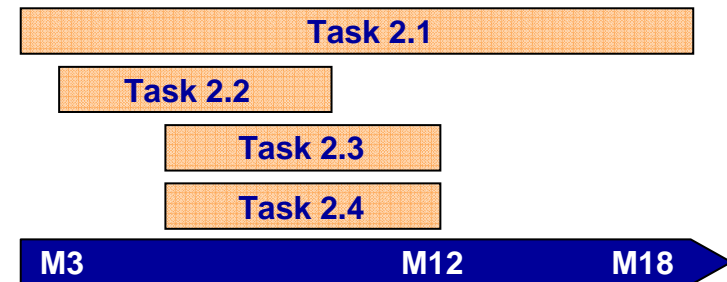
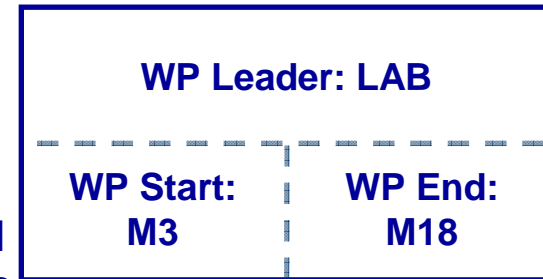
## WP 2: Networks definition & simulation

### Objectives:

- Provide a channel model enabling applications classification for PLC & PoD
- Provide a simulation tool to predict the feasibility and performance of PLC & PoD communications in terms of range, data rate and bit error rate
- Provide physical architecture, compliant with WP1 and permitting the Validation task to be carried out
- Provide EMC and electronic constraints on equipment due to the modem integration

### Tasks (*Leader*):

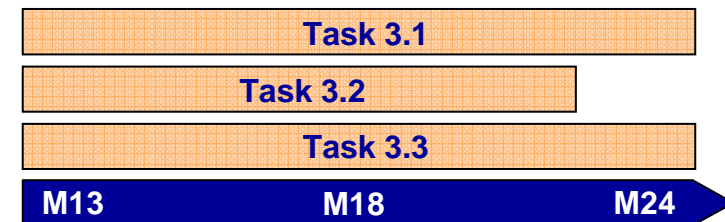
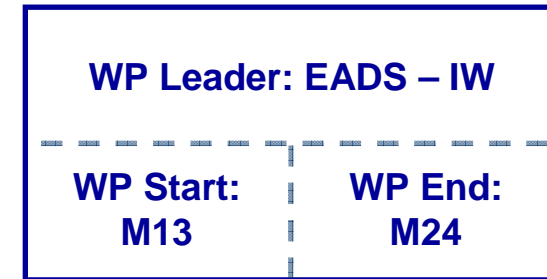
- Task 2.1: Assessment of existing networks (*USTL*)
- Task 2.2: Modeling of the targeted networks (*ONERA*)
- Task 2.3: Simulation for adapted networks architecture including consideration for the future (*LAB*)
- Task 2.4: Equipment integration and EMC constraints (*THAV*)



# WP 3: Mock Up components design & adaptation

## Objectives:

- Adapt the wiring networks of the Cabin Mock-Up and the Copper Bird to be compliant with WP4 integration and WP5 functional validation tests for the reference applications
- Adapt current PLC solutions to EMC and transmission objectives taking into account aeronautical standards (RTCA DO160, DO178 and DO254) and provide recommendations for future more adapted chipsets.
- Provide interfaces between reference A/C applications and the PLC modem targeting mock-up integration.



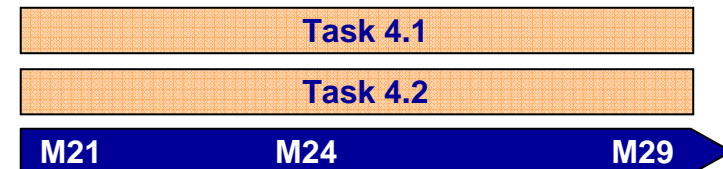
## Tasks (Leader):

- Task 3.1: Test Bench adaptation (*LAB*)
- Task 3.2: Optimization of Chipset (*DS2*)
- Task 3.3: User interface design (standardisation) (*HSLU*)

## WP 4: Mock Up integration

### Objectives:

- Provide components (power supply, powerline coupling and conditioning devices) needed for PLC & PoD subsystem integration
- Provide the bridges necessary to its implementation into the mock-up system
- Integrate the PLC modem subsystem and the interface adaptation modules developed in WP3 with equipment of the A/C applications according to the network functions (head end, terminal unit, repeater, and bridge) as specified in WP1.



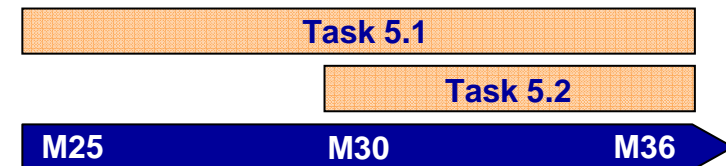
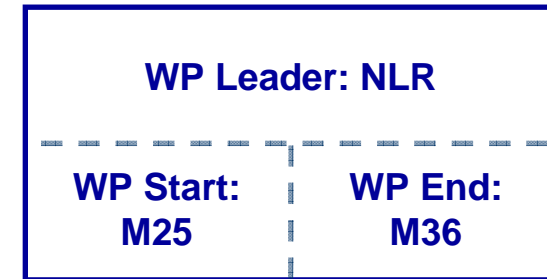
### Tasks (Leader):

- Task 4.1: PLC & PoD subsystem and applications equipment integration (*HSLU*)
- Task 4.2: Physical network for set up (including repeater, bridges, couplers...) (*LAB*)

## WP 5: Verification & Validation tests

### Objectives:

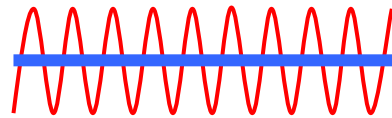
- Provide the Verification & Validation (V&V) test plan to be used for the PLC & PoD equipment (taking into account certification, safety issues, the functionalities and capabilities of the reference applications in order to guarantee a reliable assessment)
- Ensure validation of all mock-up/test-bench applications (developed in WP4) in the high-power wiring network A/C environment



### Tasks (Leader):

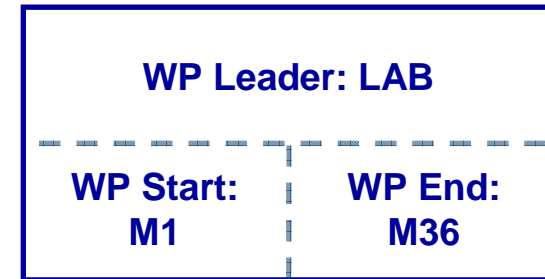
- Task 5.1: V&V Test plan (*NLR*)
- Task 5.2: Applications and capabilities (including transfer function, modem) (*EADS-IW*)

## WP 6: Dissemination



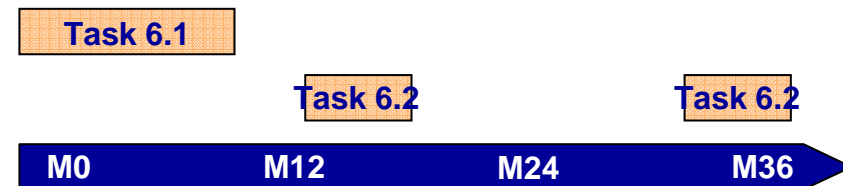
### ▪ Objectives:

- Provide the TAUPE dissemination material:
  - TAUPE public web site
  - TAUPE dissemination material
  - TAUPE dissemination events organisation

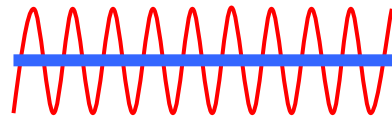


### ▪ Tasks (*Leader*):

- Task 6.1: Dissemination Material (*LAB*)
- Task 6.2: Organization of TAUPE Events (*LAB*)

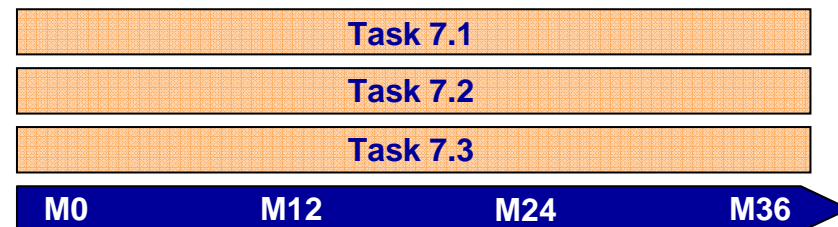
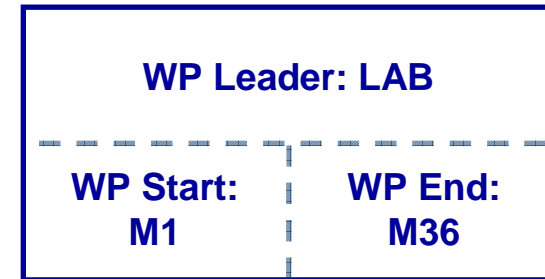


## WP 7: Exploitation



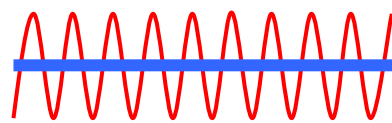
### Objectives:

- Ensure the exploitation of the TAUPE results by:
  - Collaboration with the JTI CLEAN SKY system for green operations ITD for incorporation of the TAUPE technology in the JTI
  - Refinement of individual exploitation plans
  - Management of the TAUPE IPRs

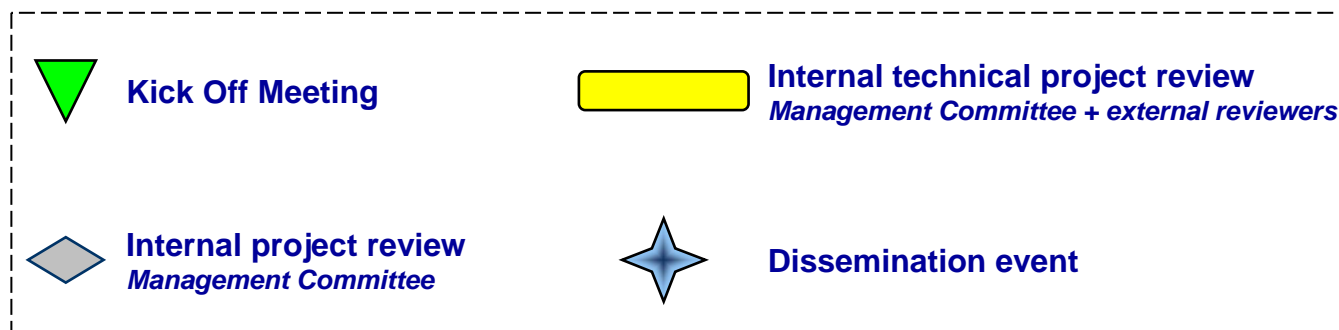
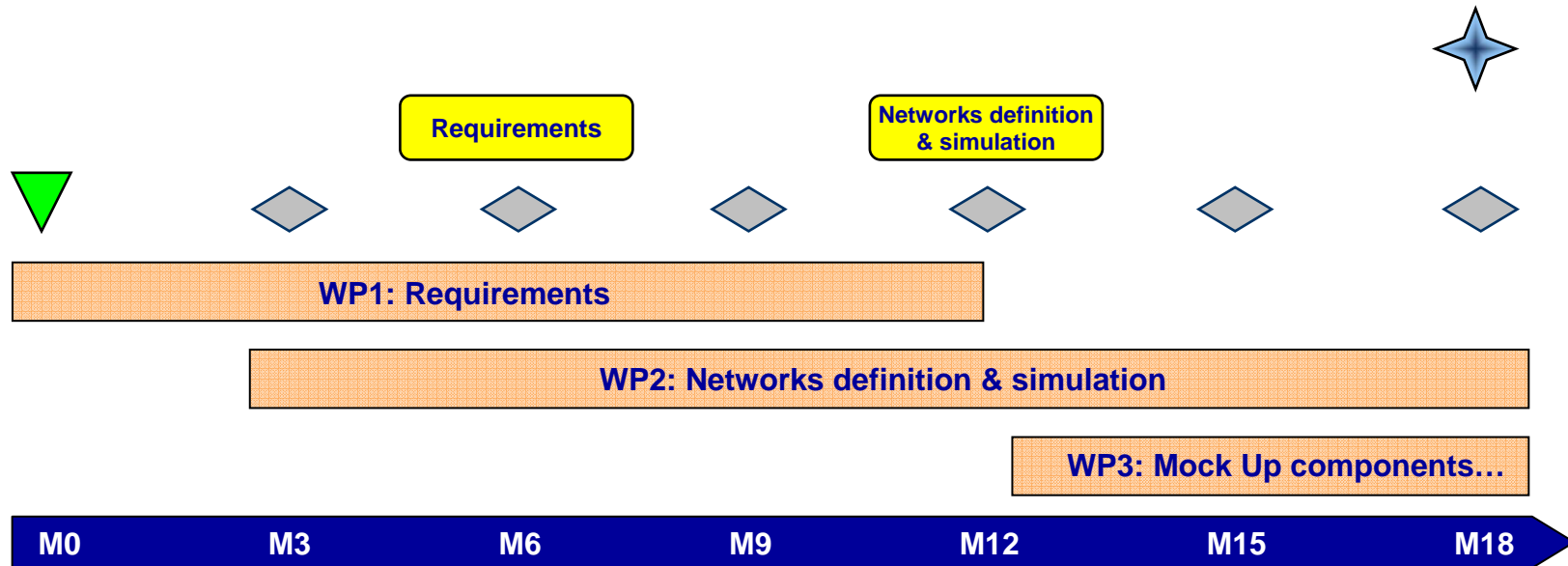


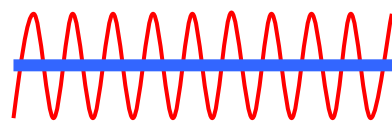
### Tasks (*Leader*):

- Task 7.1: Collaboration with the JTI CLEAN SKY (*LAB*)
- Task 7.2: IPR Survey (*LAB*)
- Task 7.3: IPR Management (*LAB*)

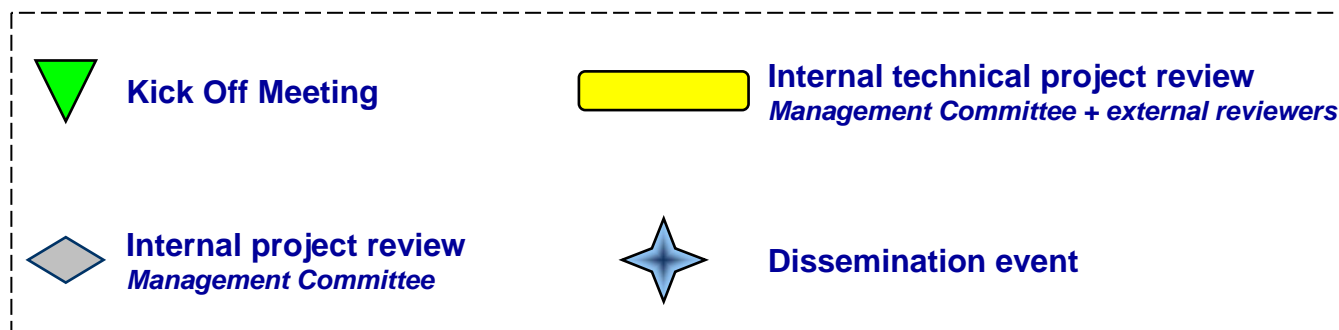
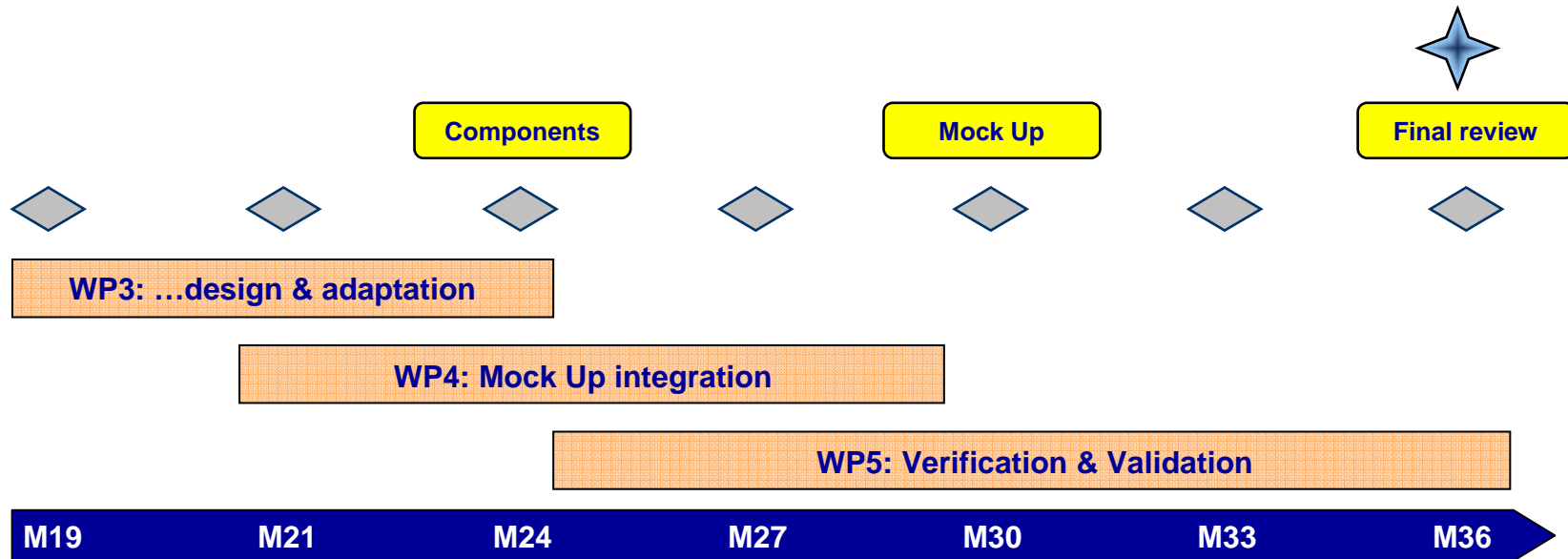


# RTD planning & key milestones: M1 → M18

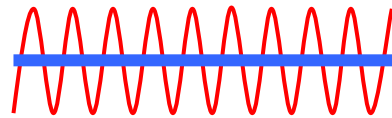




# RTD planning & key milestones: M19 → M36



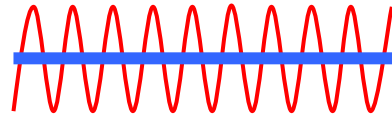
1. Global presentation of the project
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- The project can be seen as a feasibility demonstration taking into account aeronautic constraints
- The objective is to reach a TRL of 4
- 2 reference applications are considered for the demonstration: CLS & CDS. No other application will be considered for the demonstration
- 2 technologies are considered: PLC and PoD
- 3 benches will be used to demonstrate the feasibility:
  - Copper Bird (Hispano Suiza)
  - Cabin Mock-up (EADS-IW)
  - Low power bench (Labinal)
- In terms of opportunity the targets are both new programs & retrofits
- Regarding modem and chipset, there will not be a specific development: COTS products will be used and fine-tuned



# SoW - Applications

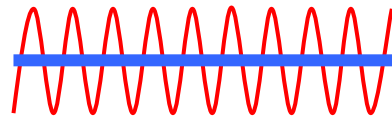


- 2 reference applications are considered for the project:
  - CDS (Cockpit Display System), mastered by THALES AVIONICS
  - CLS (Cabin Lighting System), mastered by DIEHL AEROSPACE
- Regarding CLS application, it was decided to include part of the CIDS (Cabin Interconnect Data System)
- Those 2 applications will be used for the feasibility demonstration and especially for:
  - Defining the requirements
  - Defining new architectures (so related to the 2 reference applications only)
  - Establishing showstoppers
  - Performing the feasibility demonstration in itself
- Other applications won't be considered for the feasibility demonstration
- A broader study will be done in WP2 to extend the technologies considered to other systems in the aircraft: this will only be a paper study

**THALES**

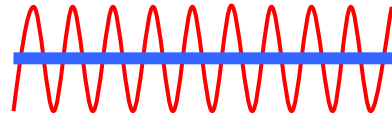
**DIEHL**  
Aerospace

## SoW - Environment



- TAUPE is targeting a TRL of 4 which means: “Component and/or breadboard validation in laboratory environment”
- As a consequence, the environment will be a laboratory environment
- Regarding the voltage level of the main network, tests will be carried out on 115VAC and 28VDC networks
- The architectures are based on the A380 architectures, to have the most recent kind of architectures

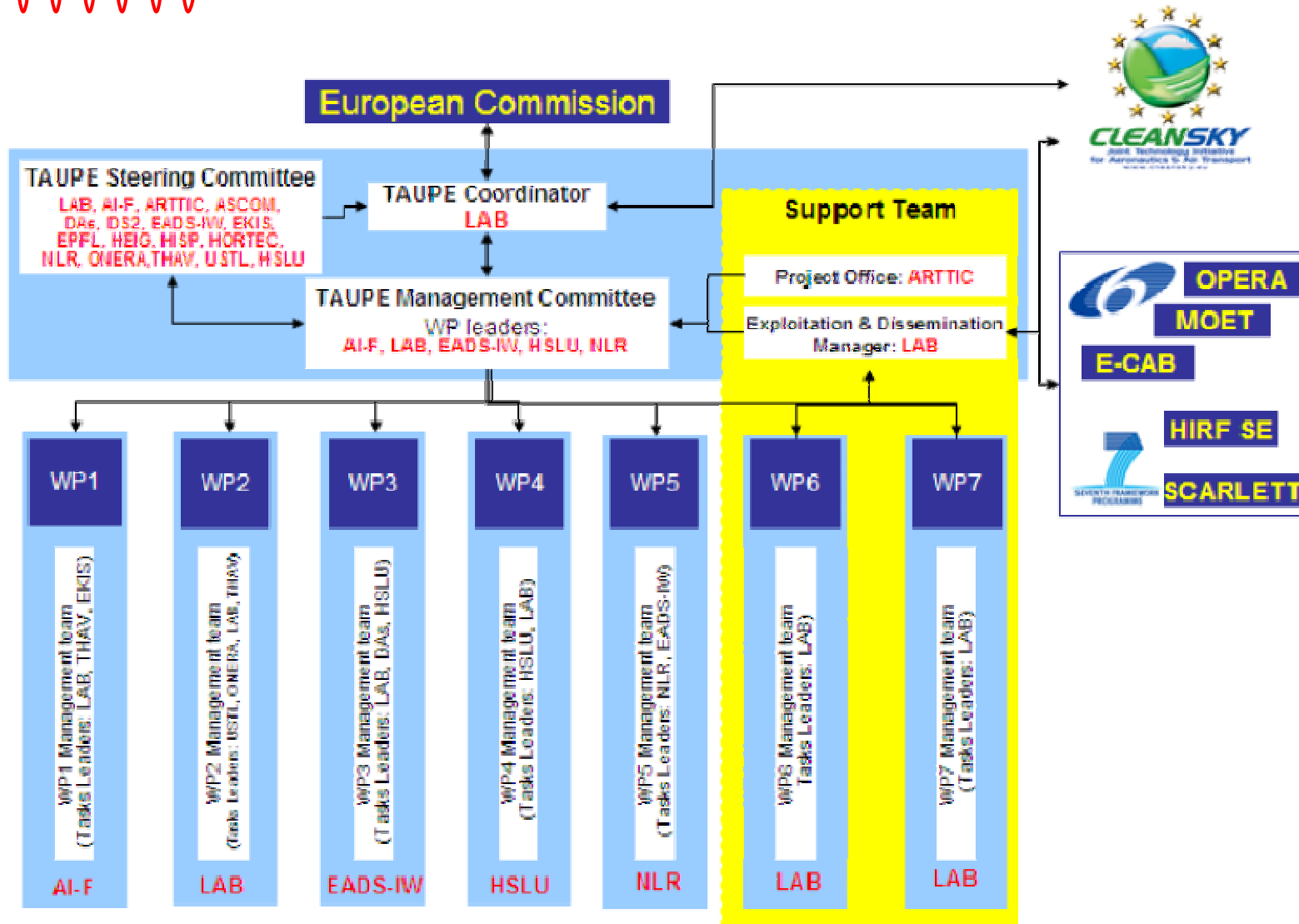




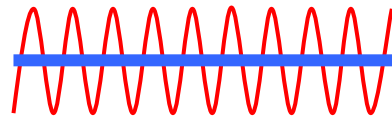
- The project can be split into 2 parts:
  - WP1 + WP2:
    - The requirements are established, the architectures defined and the solutions modeled and simulated
    - Regarding the modeling and simulation activities, 2 aspects are considered:
      - The noise aspect
      - The propagation channel performance
    - Measurements are foreseen on benches and aircraft
  - WP3 + WP4 + WP5:
    - This part is focused towards the actual demonstration of the feasibility
    - The COTS components and the benches will be adapted in WP3; specific interfaces will also be developed
    - In WP4 additional components for benches integrations will be developed
    - WP5 will develop the V&V test plan and tests will be performed on the benches

1. Global presentation of the project
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# Organisation of the project management

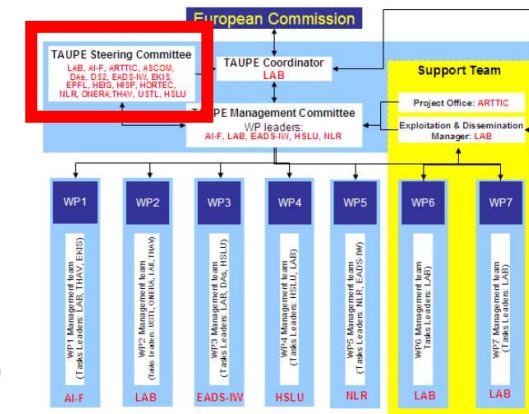


# Steering Committee

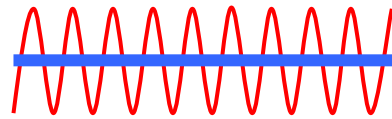


## DECISIONS MAKING ENTITY

- Content, finances and IPR
  - Changes to Annex I (DoW)
  - Changes to Consortium Plan (including Budget)
  - Determining information required by partners and frequency (reporting)
  - Withdrawals/addition to Background, Affiliates and third parties
  - Validation of Public communication
- Consortium Evolution
  - Withdrawal/Entry of partners
  - Declaration of party to be a defaulting party and related remedies (including termination)
  - Proposal to the EC for a change of Coordinator
  - Suspension or termination of all or part of the project



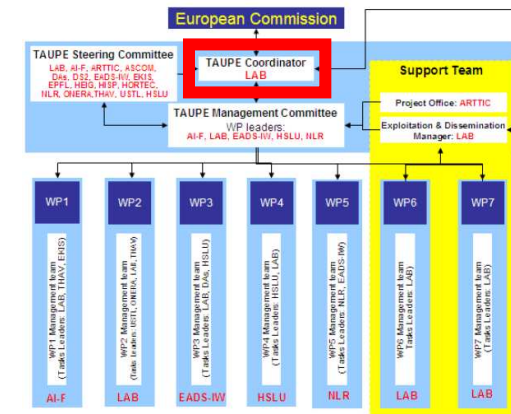
# Coordinator



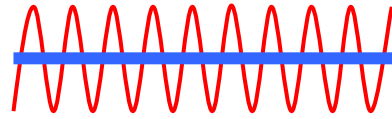
## OPERATIONAL ENTITY

All aspects of project management and all aspects of the interface between the project and the EC

- Monitoring the compliance by parties with obligations
- Submission of Reports and Deliverables to the Commission
- Administration of the Steering Committee and Management Committee
- Follow-up on Steering Committee decisions
- Information exchange between WPs
- Transferring funds allocated with the Project to and between WPs and Partners
- Risk Supervision
- Deliverables validation (content and form)

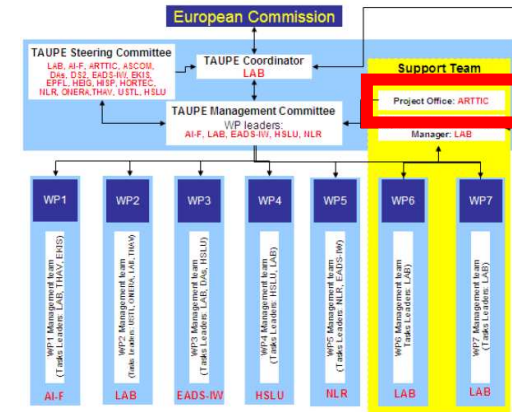


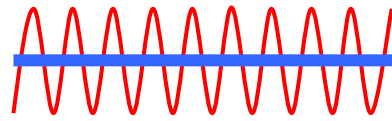
# Project Office



## OPERATIONAL ENTITY

- Supporting the Coordinator in day-to-day operational management of the project and coordination
- Supporting TAUPE partners in Contractual and Administrative aspects
  - Project administration (archives, Reviews minutes) and contractual reporting production from information provided by partners (financial reporting) and WP leaders (technical reporting)
  - Helpdesk and enquiry centre for partners concerning contractual and administrative aspects
  - Communication facilities (TAUPE Collaborative Website)
  - Event and support for external communication (Reviews and Forum)



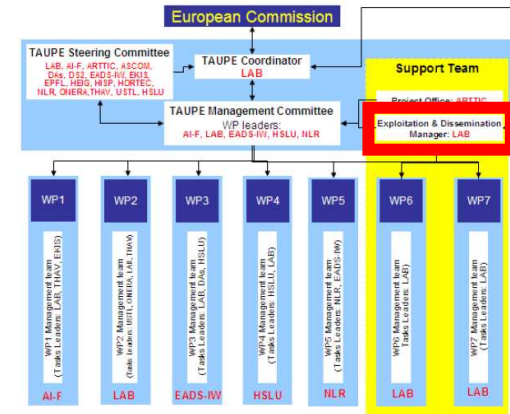


# Dissemination & Exploitation Manager

## OPERATIONAL ENTITY

Ensuring the planned project dissemination and exploitation activities are performed

- Press campaigns
- Forum
- Workshops
- Synergies with other projects and JTI
- Public website
- Communication material
- IPR (with Safran Support)
  - Management of the IPR Portfolio
  - Background and foreground protection through validation of public communications
  - Helping partners solving potential IPR conflicts

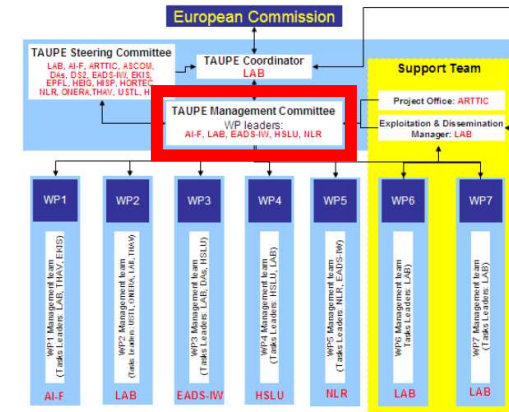


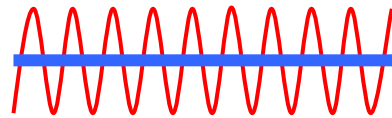
# Management Committee

## OPERATIONAL ENTITY

Supporting the Coordinator by managing the technical activities of the Project

- Proposals to the SC
- Technical roadmaps for the project
- Selection of subcontractors
- Supporting the Coordinator (meetings with the Commission and related data and deliverables)



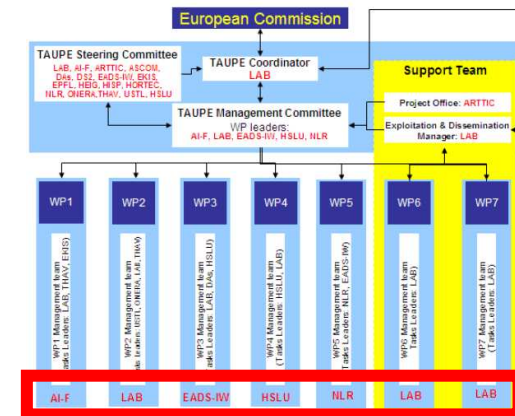


# WP Leader

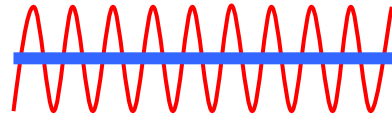
## OPERATIONAL ENTITY

### Operational management of the WP

- Technical work and progress coordination and monitoring
- Follow-up of Steering Committee decisions
- Information exchange within the WP or to related WP
- Provision of technical current awareness to the WP and the Project
- Transmission of documents, reports and deliverables to the Coordinator
- Production of technical reports and synthesis
- Review and validation of Deliverables (content)
- Risk Management: Consolidation and analysis of risks reported by tasks leaders



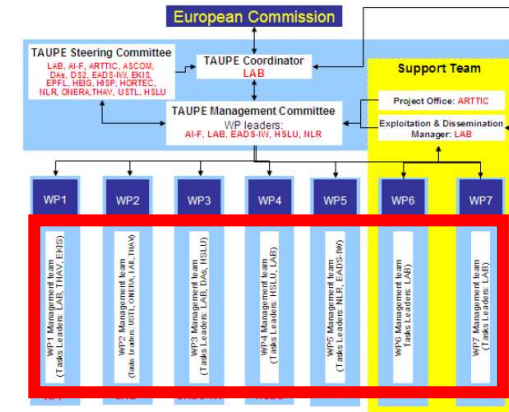
# Task Leader



## OPERATIONAL ENTITY

Managing technical activities within the task

- Technical work and progress coordination
- Information exchange within the task
- Transmission of documents, reports and deliverables to the WP Leader
- Follow-up of Deliverables Contributors
- Reporting on Risk issues



1. Global presentation of the project
2. WP global presentation
3. Details regarding the Scope of Work
4. Organisation of the project Management
- 5. Dissemination**

- Main objectives of the dissemination activities:
  - Ensure that TAUPE resulting technology will reach TRL 6-7 as part of the project exploitation
  - Strengthen competitiveness of European Aero-system industry and its supply chain by integrating new technologies in products
  - Strengthen academics and Research centres awareness, knowledge and efforts to support the aero-systems sector in future programs
- ➔ **Dissemination is part of the project and is of cardinal significance**
- Inside the project, dissemination is mainly secured through WP6
  - Task 6.1: Dissemination material
    - Project communication strategy and plans
    - Support participation in public events
    - Press release and press portfolio
    - Public web site to become visible on the Internet
  - Task 6.2: Organisation of TAUPE events
    - 2 events to be held during the project: M18 & M36

- Many tools will enable us to have an efficient dissemination activity:
  - **Exchanges** with stakeholders for standardisation purposes
  - **Exchanges** with stakeholders to disseminate TAUPE results and complement knowledge
  - **TAUPE dissemination events:**
    - At M18
    - At M36
  - **Scientific publications** and presentations in key journals and aeronautic conferences
  - Participation to **workshops** organised by other European project (OPERA, MOET, e-CAB, SCARLETT, HIRF SE), when relevant
  - Participation to European and International **conferences** when relevant
  - **TAUPE public web site:** <http://www.TAUPE-Project.eu>
  - **Communication materials** prepared for dissemination in workshops

# TAUPE

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**Global Presentation of the Project  
April 2009**

<http://www.TAUPE-Project.eu>