



Radical Configuration - CleanSky Vision

(LPA-IADP WP1.6 Demonstration of Radical Aircraft Configurations)

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TCAD, Toulouse 25-Nov-2014

Innovation takes off

Content

- CleanSky2 context
 - Heritage
 - Location in CS2
- WBS, Timeline
- What could a Scaled Demonstrator be?
- Configuration studies required
- Context to national funded projects
- Open questions
- Conclusion

WP1.6 Heritage

NACRE (2006-2010)

New Aircraft configurations
in European Research

PROCON2030 (2013)

Proposed L2 project

CleanSky2

Work Package Overview

WP 1 – Storyboard

BHL

WP 2 – Aircraft Integration and Concepts

Airbus

WP 3 – Novel Energy & Powerplant

EADS-IW

WP 4 – Novel Operations

DLR

WP 5 – Capabilities & Processes

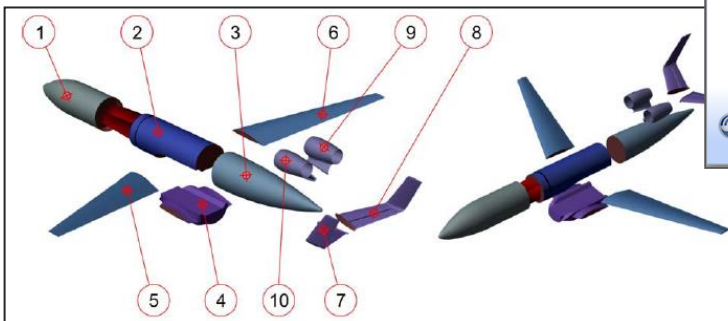
Tbd – Dassault?

WP 6 – Dissemination & Exploitation

Airbus

WP 7 – Project Management

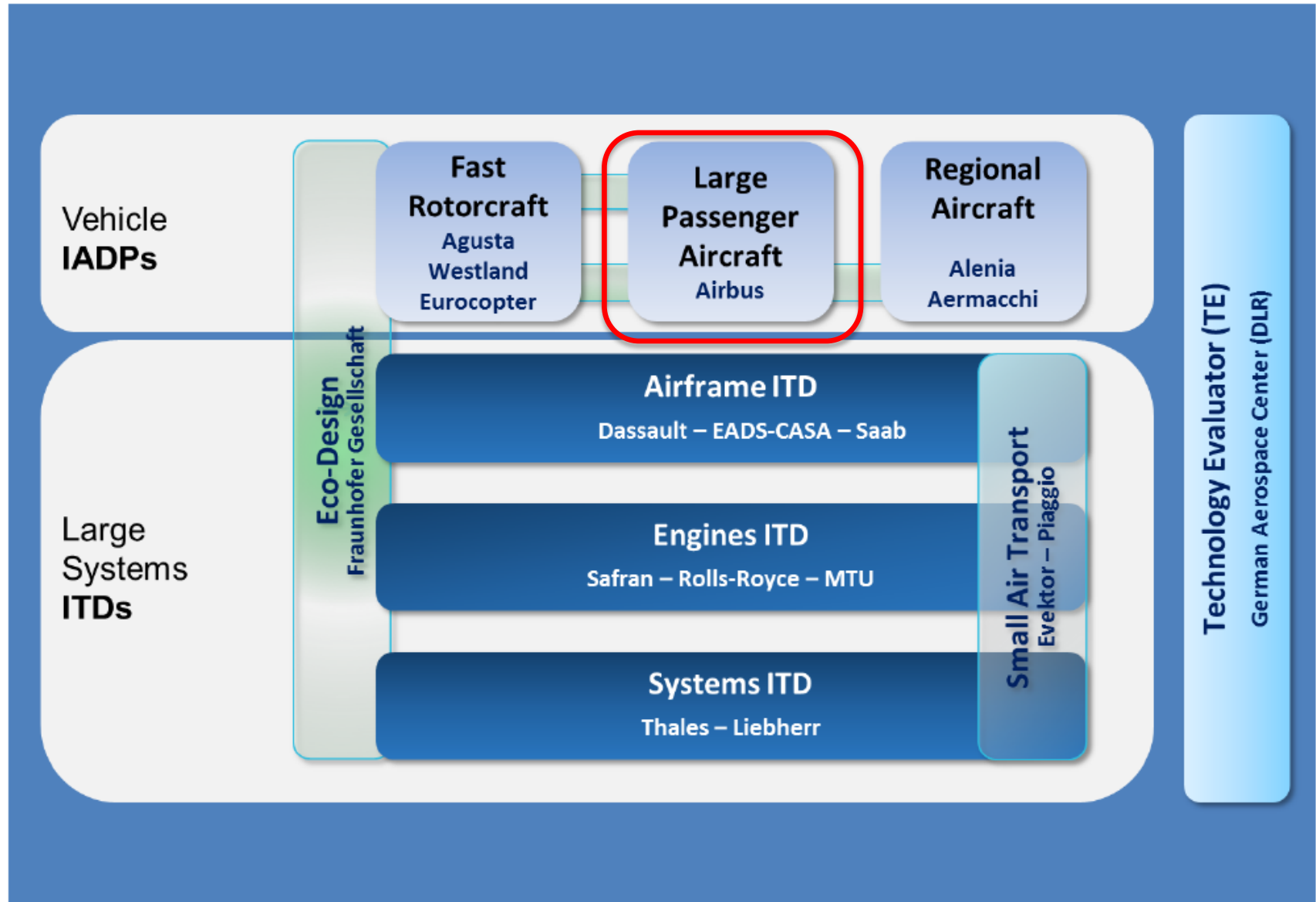
Airbus



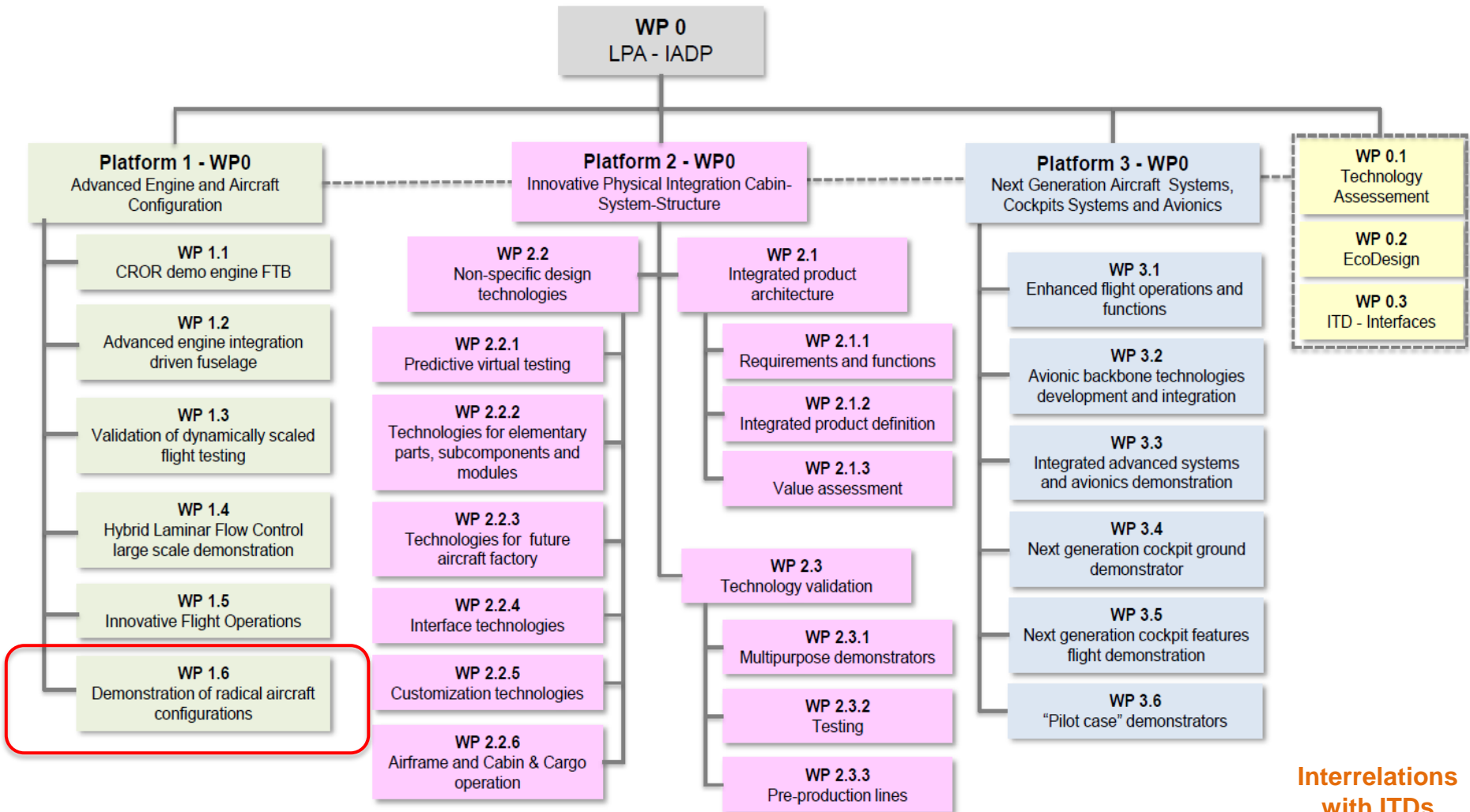
PROCON 2030 Communication Kit / Ref. D13037895 - Issue 1 / Nov 2013

PROCON 2030

Overall Structure of Clean Sky 2 (2014 - 2023)



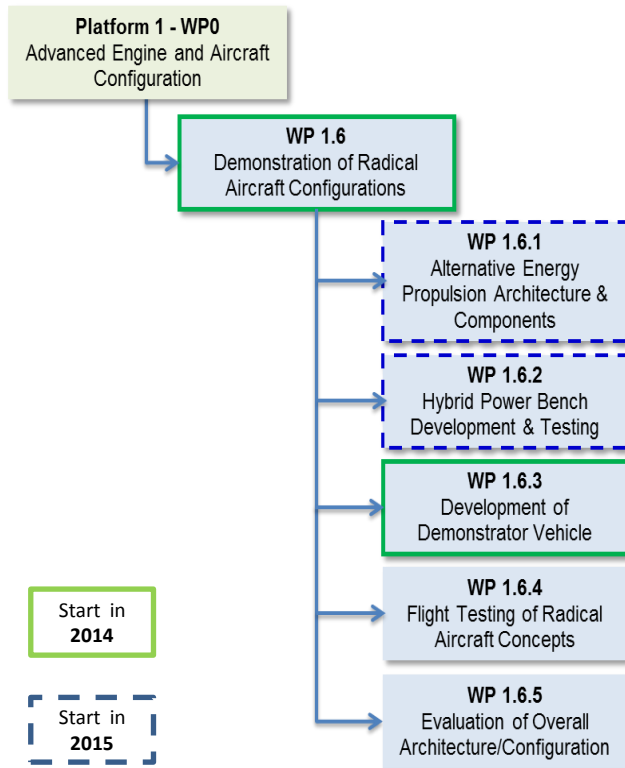
LPA-IADP Work Breakdown Structure



Interrelations
with ITDs

ITDs

WP1.6 Demonstration of Radical Aircraft Configurations



Gross budget: 98M€

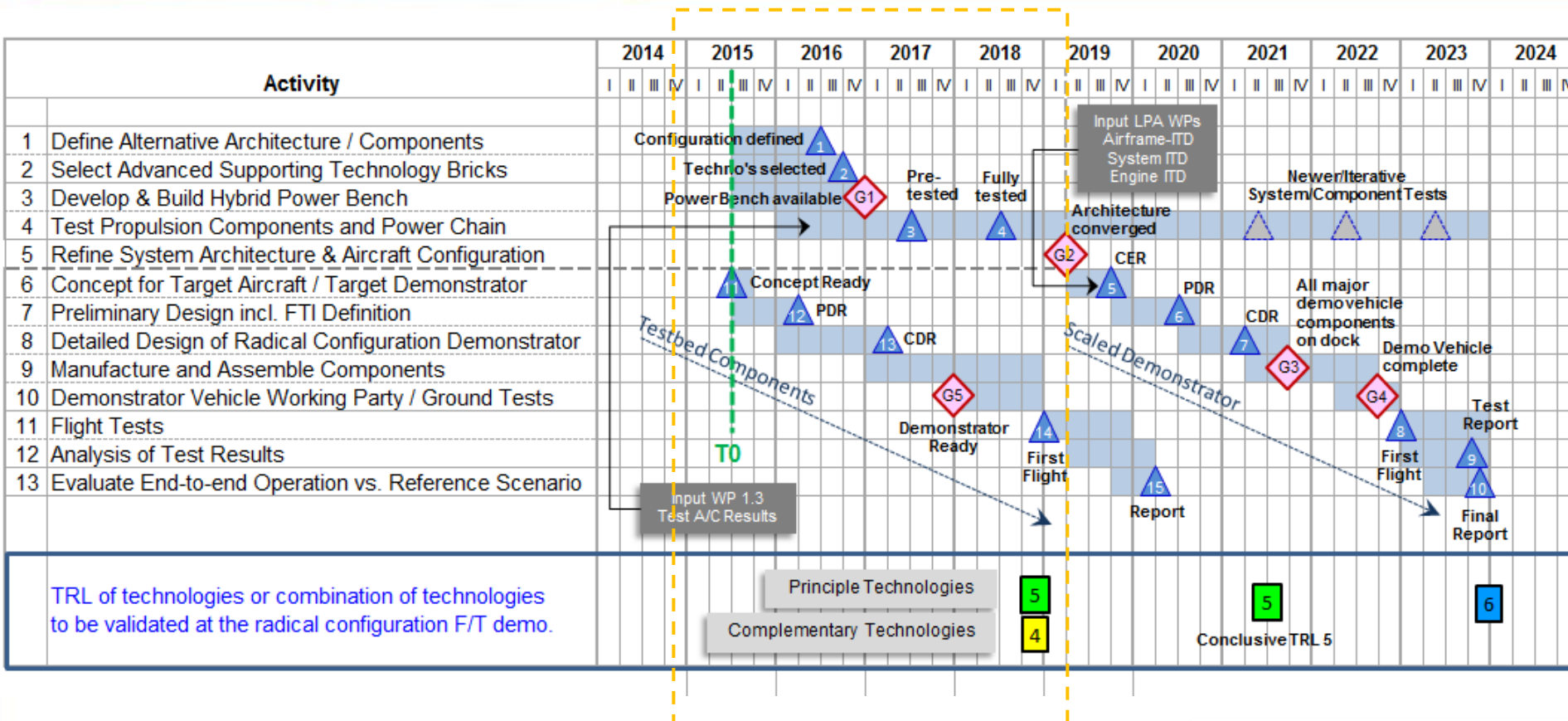
Timescale: Q4 2014 – Q4 2024

Top objectives

- Development of advanced aircraft concepts (airframe, systems architecture, propulsion concept) with an integrated design approach.
- In particular development of hybrid propulsion concepts.
- Testing of developed technologies and airframe components by means of adaptable and rapid test means such as scaled flight testing.



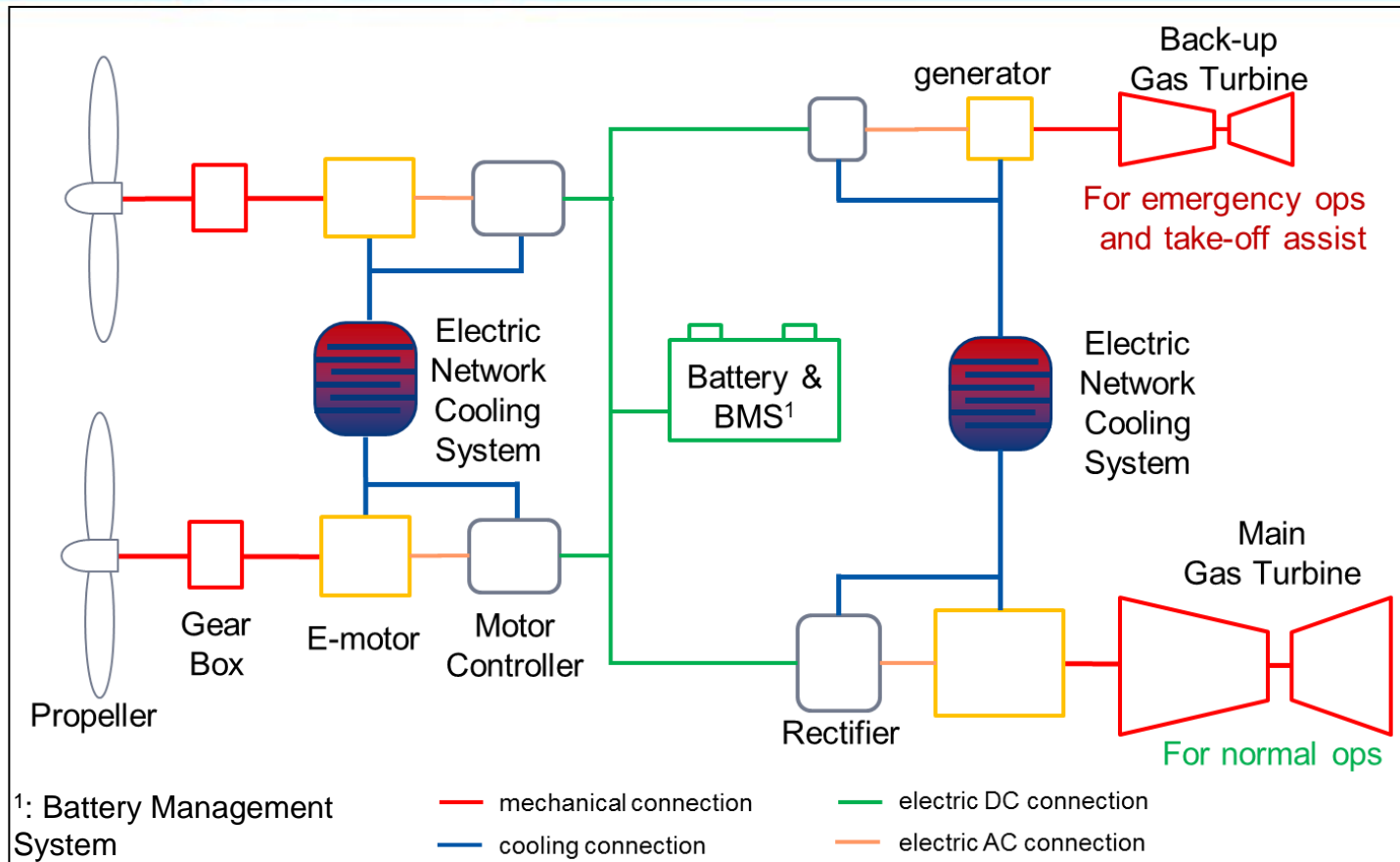
WP1.6 Time Schedule



Content:

- **Hybrid Ground Demonstrator** test bench and some Configuration studies
- **Scaled Demonstrator** – it *could* be something Hybrid Electric
 - Remote or manned
- Part of RR **UltraFan** Flight Test

Focus Technology: *Hybrid Electric Propulsion*



Baseline Propulsion Architecture

Hybrid Electric Propulsion

- Opening up of design space (Boundary Layer Ingestion, Distributed Propulsion)
- Load management for critical flight phases

Scaled Demonstrator - what could it be?

Lockheed X-55 ACCA (2009)

- **Objective:** low manufacturing cost demonstrator
- **Means:**
 - new composite fuselage for Do328 aircraft
 - Out-of autoclave
 - Quick build: 20 month from contract
- **50M\$**



Flying Testbeds

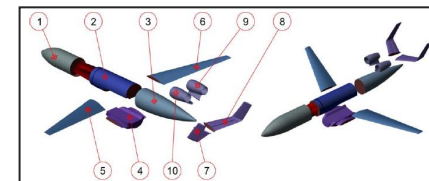
- X-3
- ATTRA
- SOFIA
- BLADE
- ...

STV (Subscale Testbed Vehicle) (Study 2012)

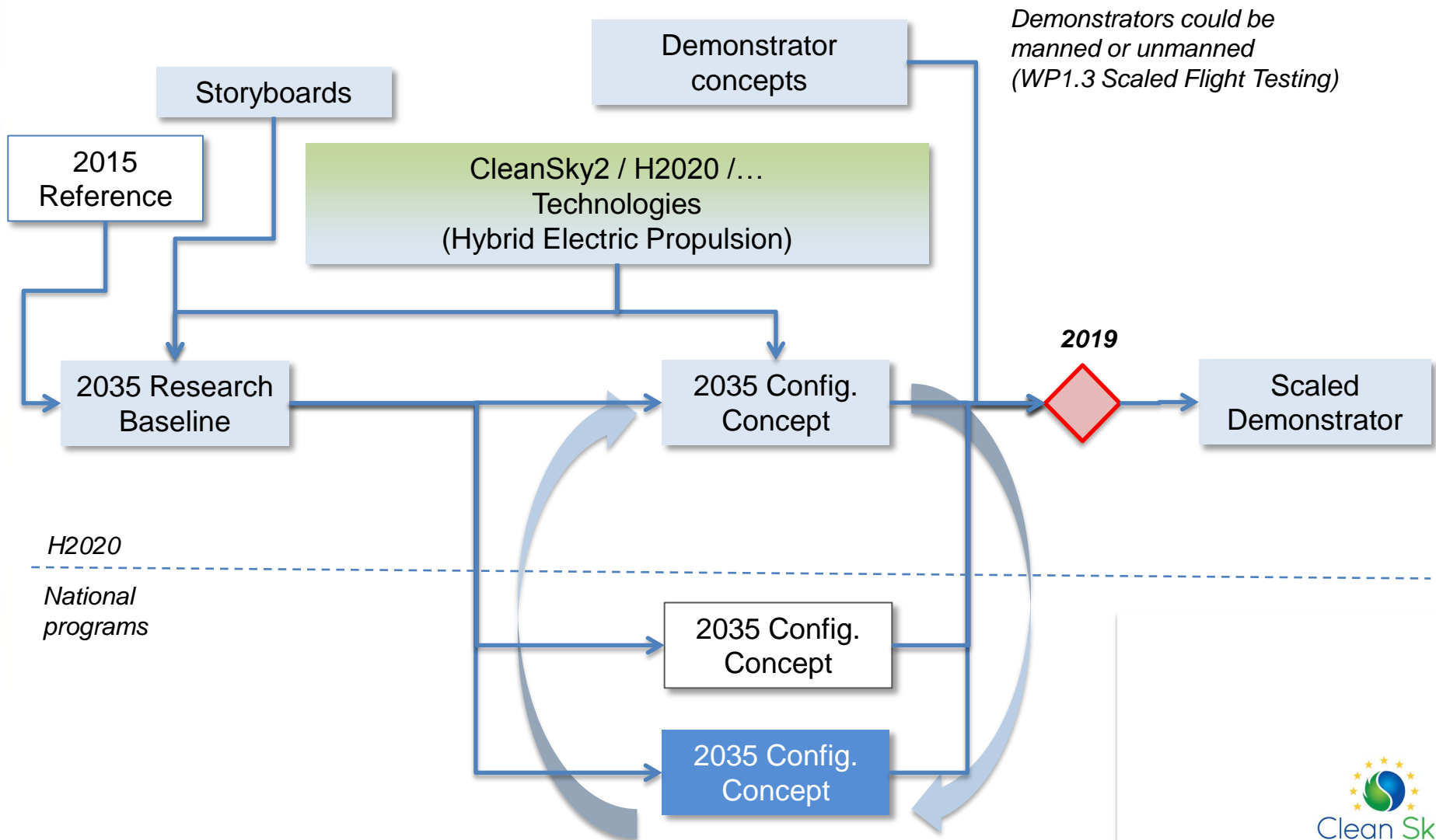
- N+2, EIS 2025, 225 Pax LR
- Three design teams
 - Boeing, Lockheed, NorthropGrumman
- EIS 2025 designs
- Demonstrator concepts
 - Manned
 - 70% scale
- **700M\$ for vehicle estimated**



Remote vehicles

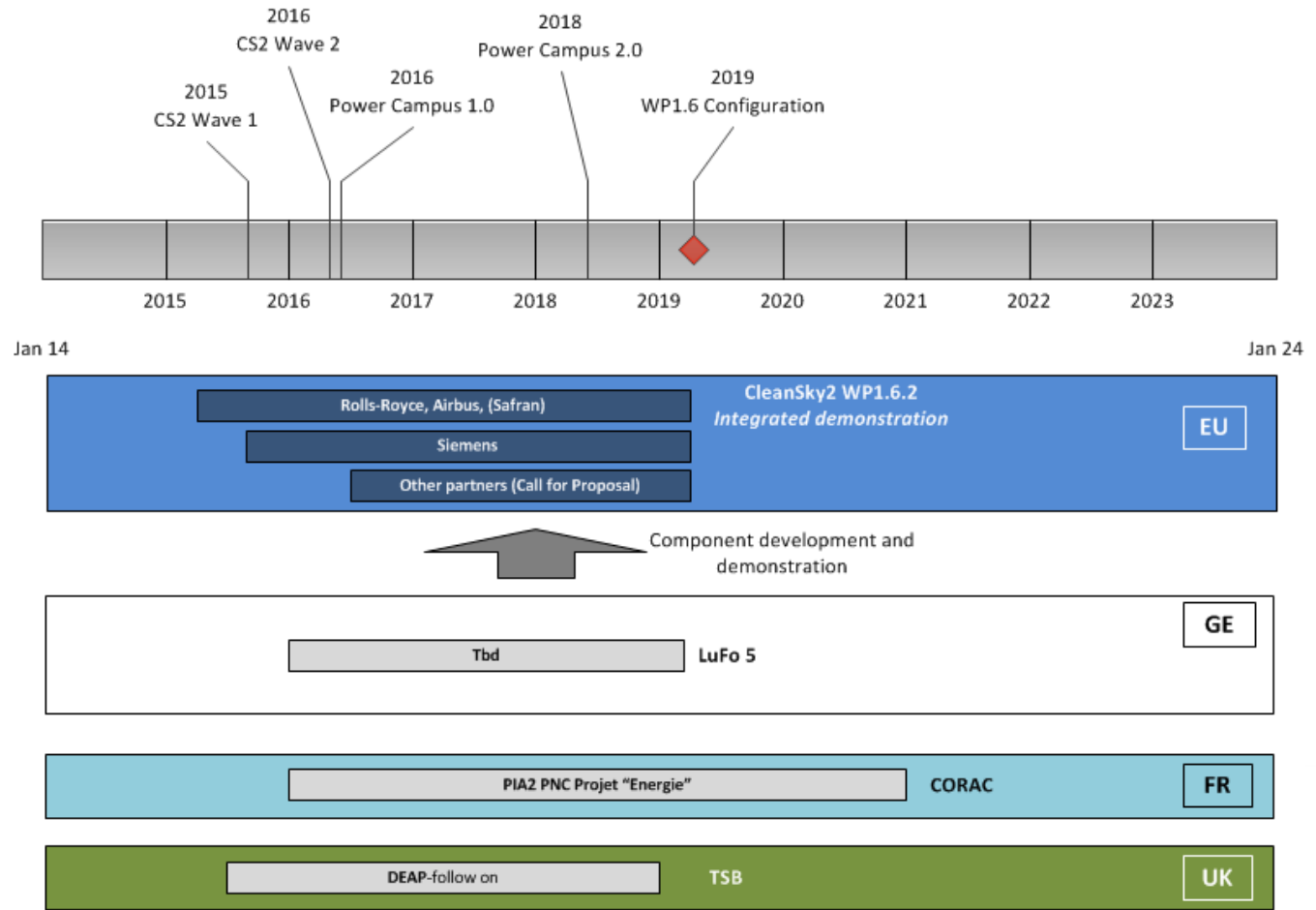
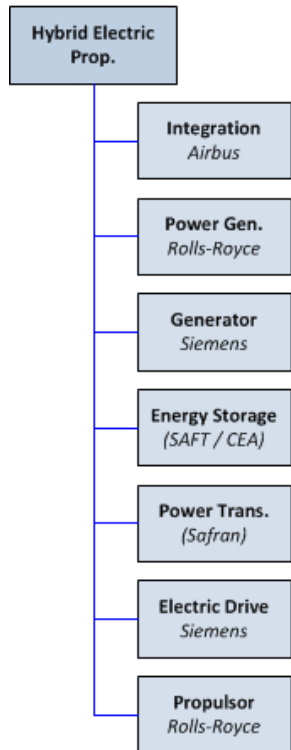


Radical Configuration Studies



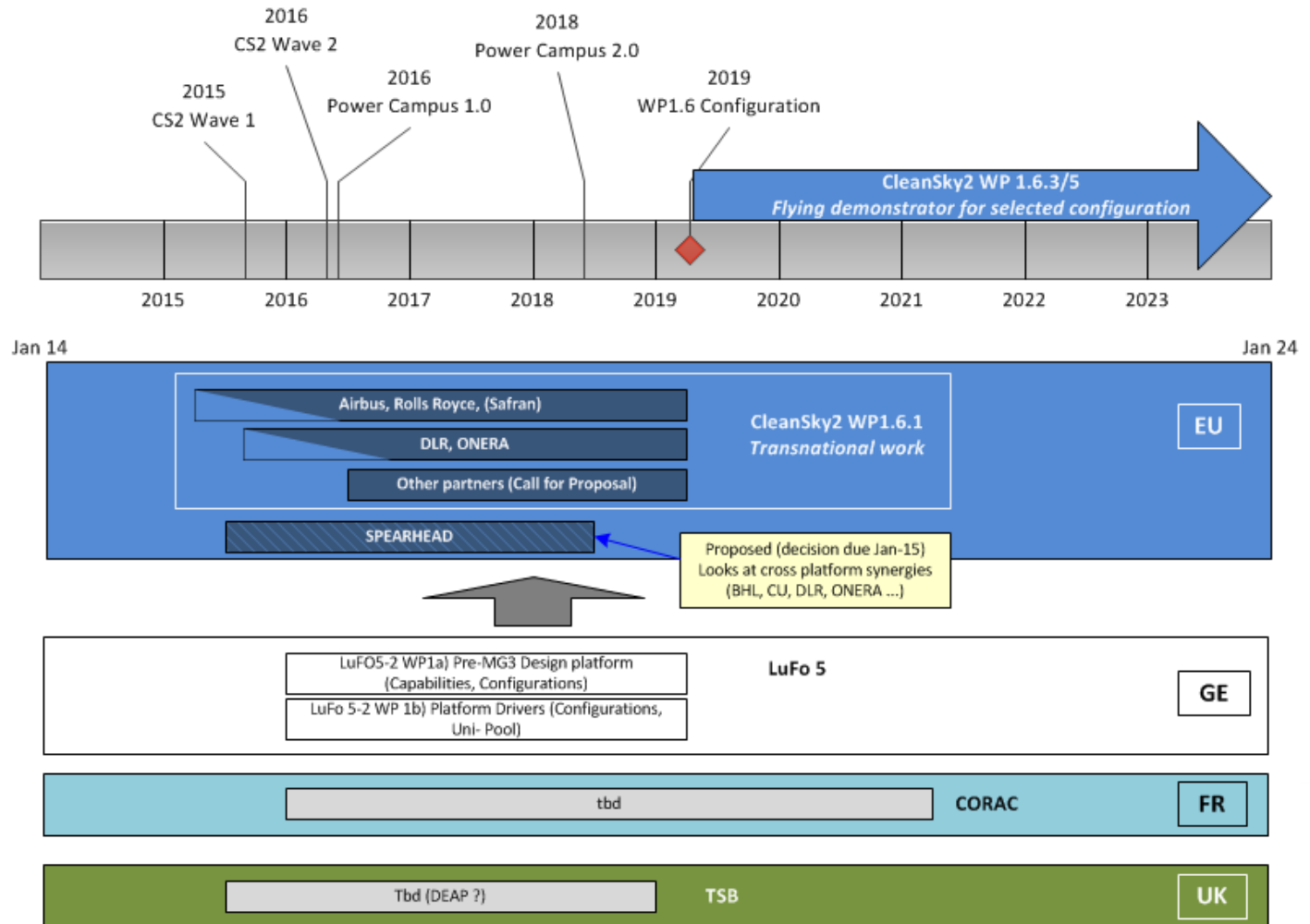
Context with other European Research projects 1/2

Hybrid Electric Propulsion



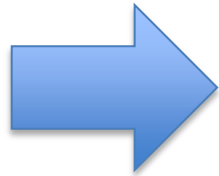
Context with other European Research projects 2/2

Aircraft Configurations



Open questions

- Common reference and baseline
- Parallel design exercises
 - These could also come from national frameworks
 - No restriction on team composition
- Collaboration between exercises
- Common capability support
- Consecutive design cycles as required
- Downselection of promising design



?	Comment
Team composition?	<ul style="list-style-type: none">• Depends on national exercises
Common data format?	CPACS could be a candidate
Common platform?	<ul style="list-style-type: none">• Not mandatory• Should link airframe, propulsion and systems• Could be a result• Not a dedicated capability project
Supporting capabilities?	<ul style="list-style-type: none">• List of capabilities/ranking required (mapping)• We could have a support topic

Conclusion

- WP1.6 will be a key demonstration activity in CleanSky2
- Main elements:
 - **Hybrid Electric Propulsion** as a key enabler for new configurations
 - **Scaled Demonstrator** for radical configuration
 - **Ultra High Bypass Engine** configuration demonstration
- For the **Scaled Demonstrator** a configuration exercise would be required, to be coordinated with national exercises
- The **Scaled Demonstrator** could serve as a target application for research
- WP1.6 could serve to demonstrate new approaches
- A capability mapping would be helpful
- The project depends on the support of partners