

EIMG L2 Proposal for FP7-Call5 E.BREAK-COMPS

Engine Breakthrough components and subsystems

FP7 Information Days for Transport 2011

18th of July 2011 in Brussels

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Engine Industry Management Group





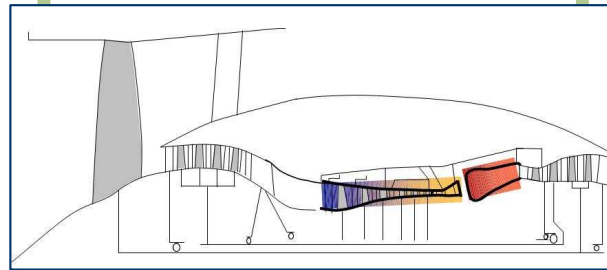
Improving gas turbine efficiency



- Next generation of gas turbine will have to reduce operating cost and environmental impact
 - Driven by the fuel consumption and CO₂/NO_x/noise emissions reduction (ACARE FlightPath 2050)
- Two drivers will improve global turbine's efficiency:

Improve **thermodynamic efficiency** of core engine by increasing the Overall Pressure Ratio (OPR)

➔ Technical constraints: more pressure, more temperature



Improve **propulsive efficiency** by increasing the By-Pass Ratio (BPR)

➔ Technical constraints: more mass

Technologies for higher OPR core engine:
Smaller core, higher pressures, higher temperature

E.Break
benefits

New materials for easier integration and better robustness

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E.Break objectives



E.Break intends to develop enabling technologies for subsystems and components to make integration and operability of new engines come true

Objectives are:

- **To develop generic technologies for subsystems or components with a special attention on Low Pressure parts**
 - **Sealing technologies, higher temperature components including abradables, lighter components, robust subsystems, more variable geometries, ...**

- **To ensure that these high performance future core engine also guaranty a high level operability, availability and maintainability**
 - **Robustness of material, reliability of subsystems, ...**

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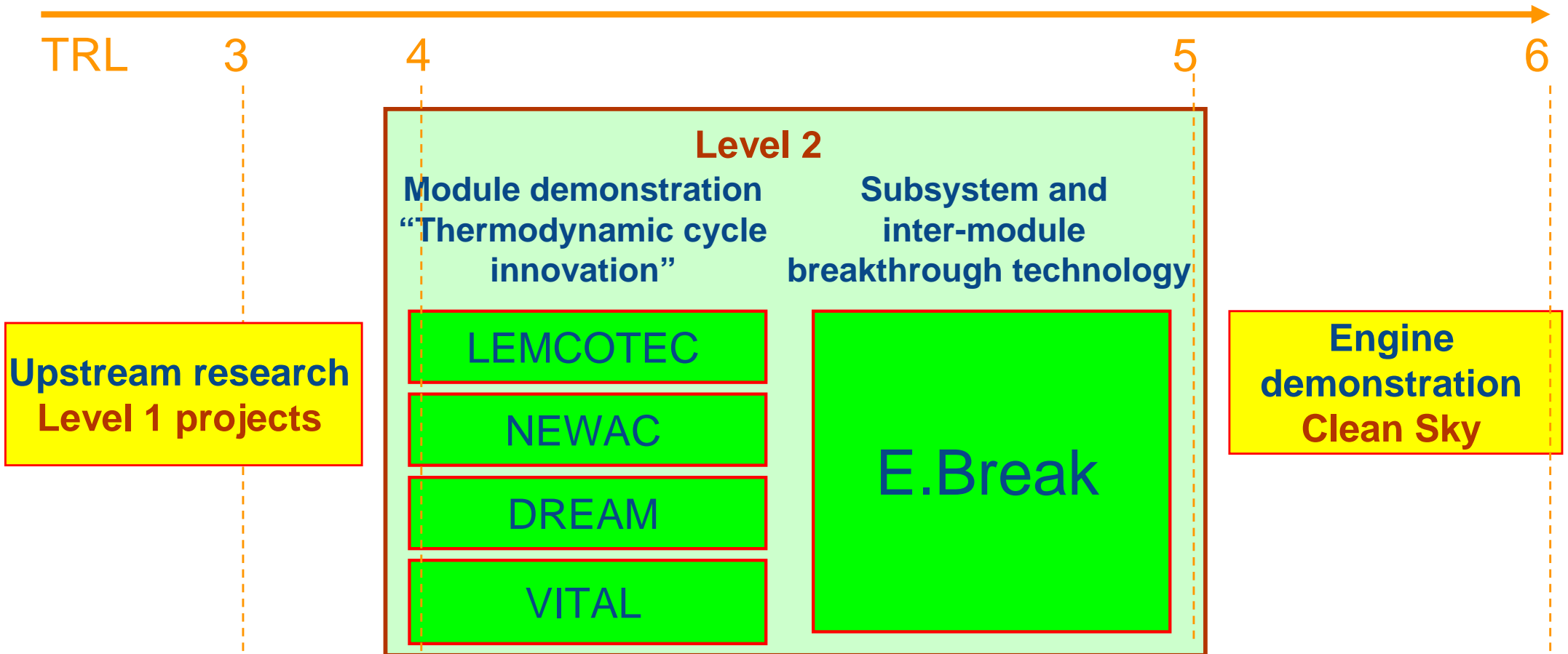




Project Scope



- Develop component/subsystems technologies for future high OPR engines, with a specific concern on LP components



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E.Break consistency with others Level 2 project



- **NEWAC (FP6) and LEMCOTEC (FP7): Core thermal efficiency improvement (innovative technologies for flow path components)**
 - HP compression systems
 - Low NO_x technologies (combustion chamber + fuel system)
 - Intercooled, recuperated core engines

- **VITAL (FP6) and DREAM (FP7): Low pressure and propulsive efficiency improvement (fan, open rotor and LP components)**
 - Propulsive efficiency (Open rotor technologies)
 - Booster and Low pressure turbine innovative components
 - Alternative aeronautic fuel demonstration

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E.Break consistency with others Level 2 project



- **Previous FP6 and FP7 level 2 projects pushed the technologies of the flow path components (propulsion stage, LP and HP components)**
 - **Improve the global cycle efficiency**

- **FP6 and FP7 projects innovations can be enabled only if the current subsystem capabilities are significantly improved**

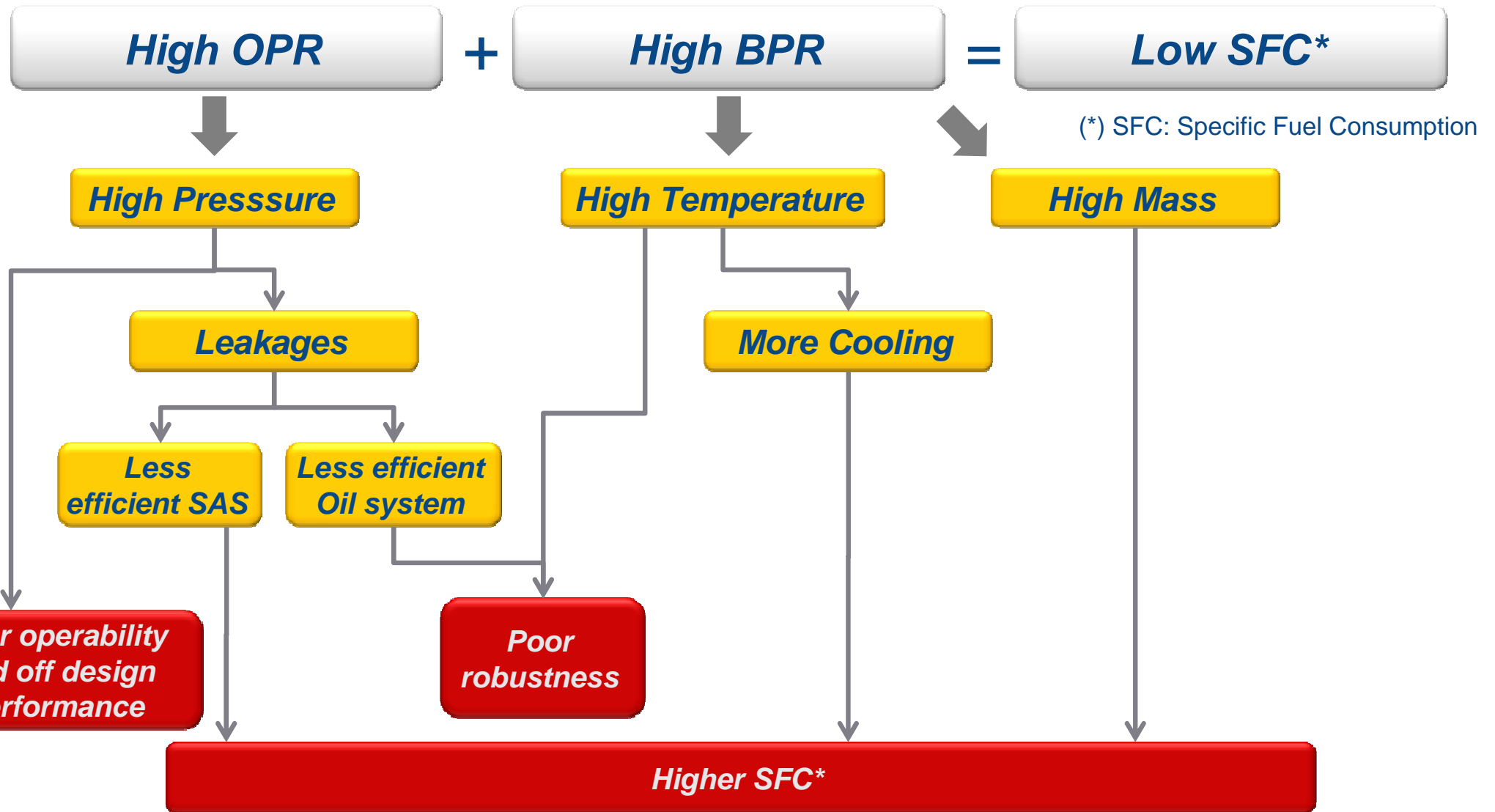
- **E.Break (FP7): Technologies for future engine subsystems (components outside the main flow path) and advanced materials**
 - **Advanced pressurisation, cooling, lubrication subsystem**
 - **Lightweight / higher temperature materials**

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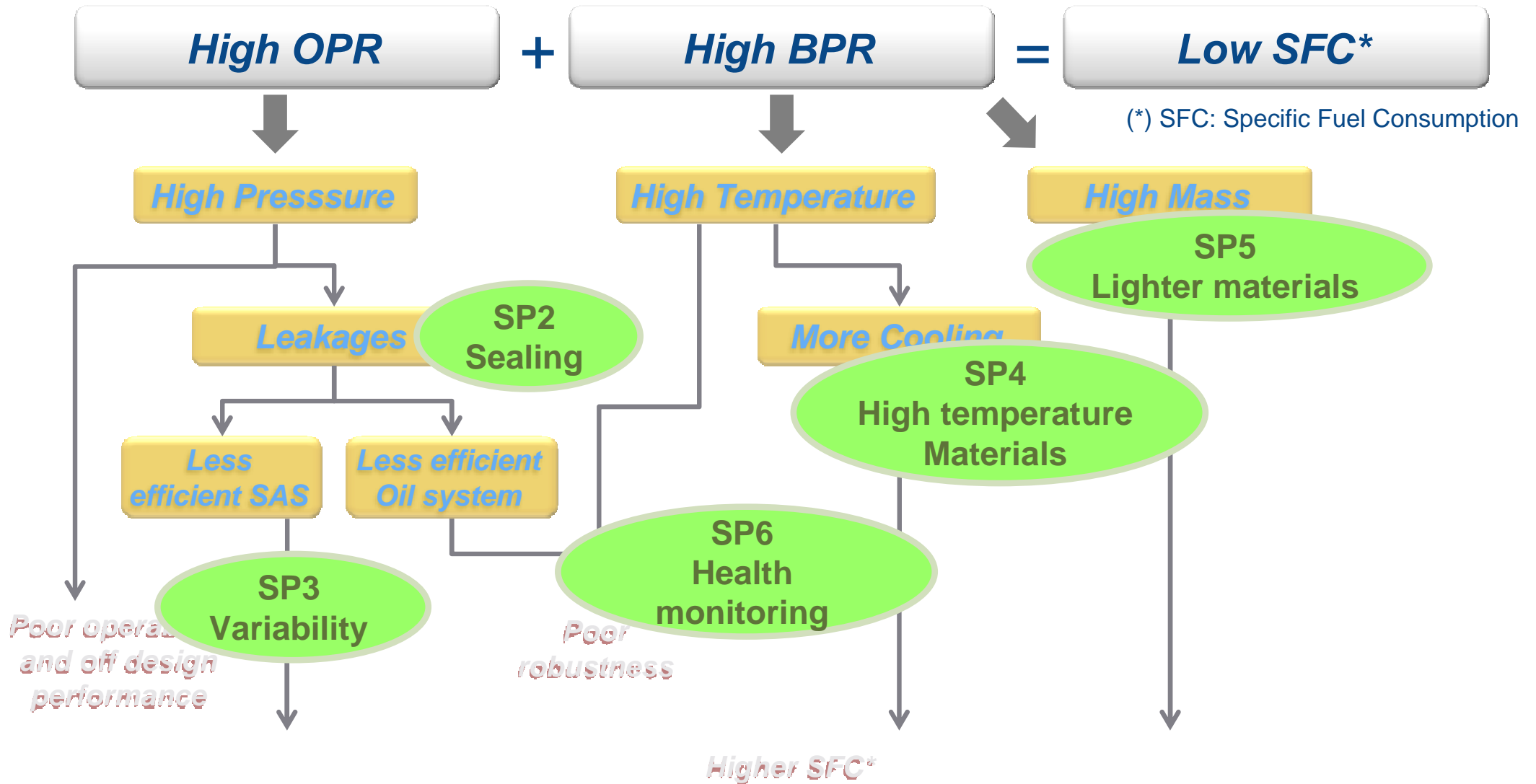
E.Break enablers for high OPR and BPR cycles



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E.Break enablers for high OPR and BPR cycles



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Project Structure Overview



SP0 : Project Management

SP1 : Engine Assessment

Benefit of the technology insertion at the engine level

SP2 : Advanced Sealing systems

WP 2.1 : Secondary Air system

WP 2.2 : Oil system

SP3 : Engine variability and thermomechanical behaviour

WP 3.1 : Variables mechanical systems

WP 3.2 : Tip clearance control

WP 3.3 : Thermomechanical behaviour of main structures

SP4 : Higher temperature material for breakthrough components

WP 4.1 : High temperature abrasives

WP 4.2 : High temperature static components materials

SP5 : Lightweight materials for breakthrough components

WP 5.1 : TiAl intermetallic alloys

SP6 : Health monitoring

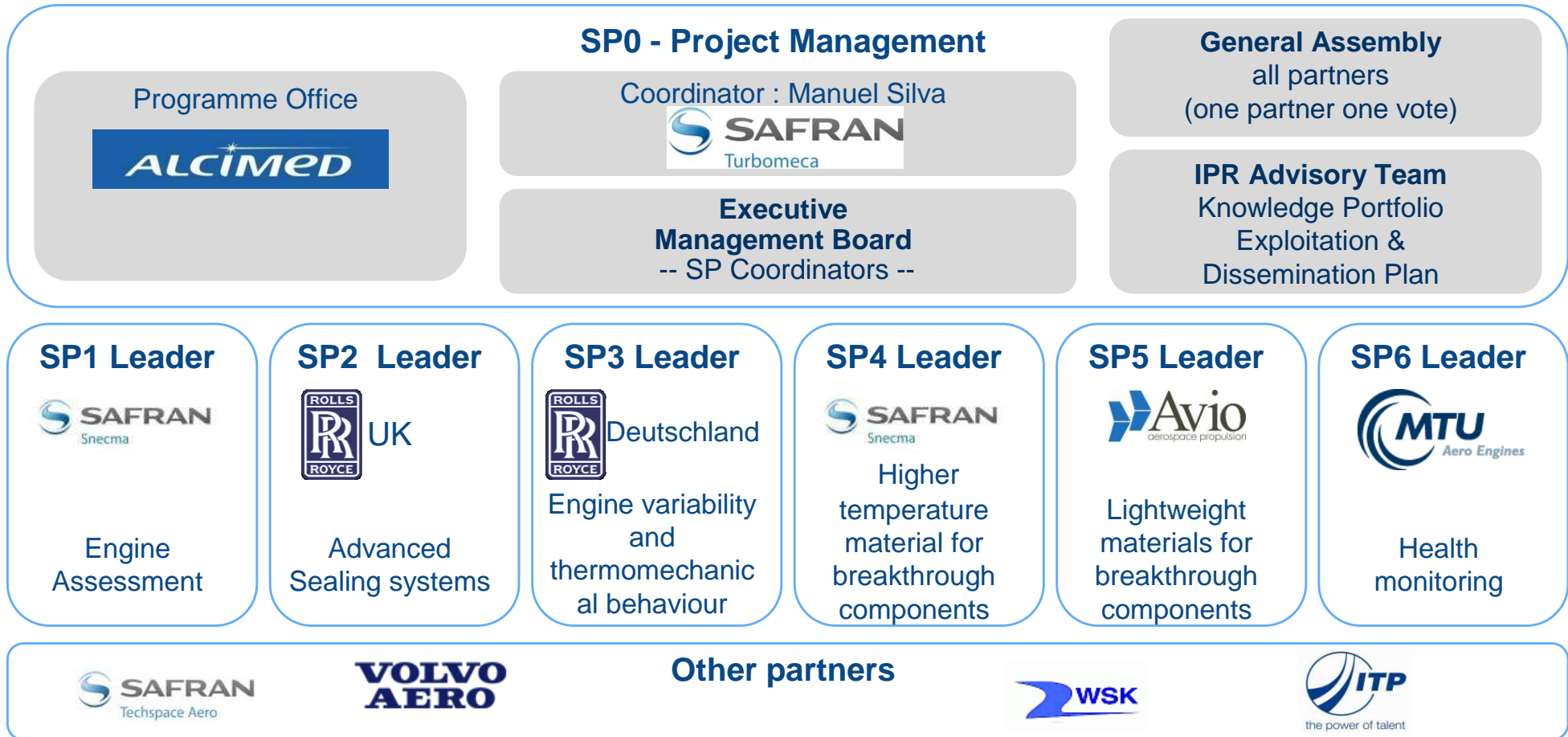
WP 6.1 : Whole engine health monitoring system

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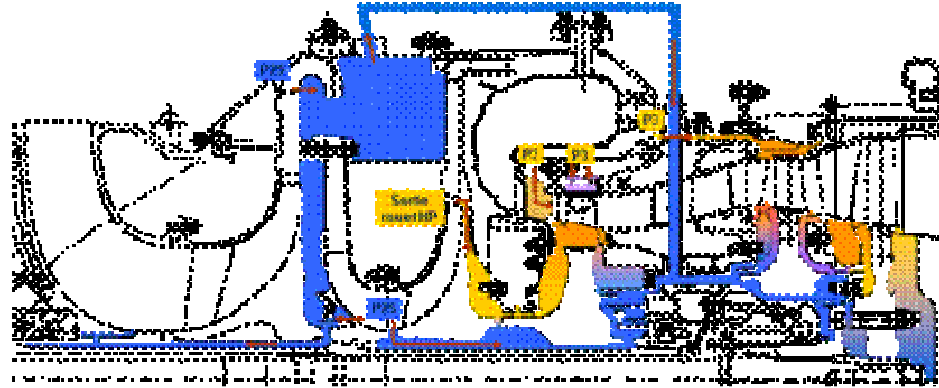
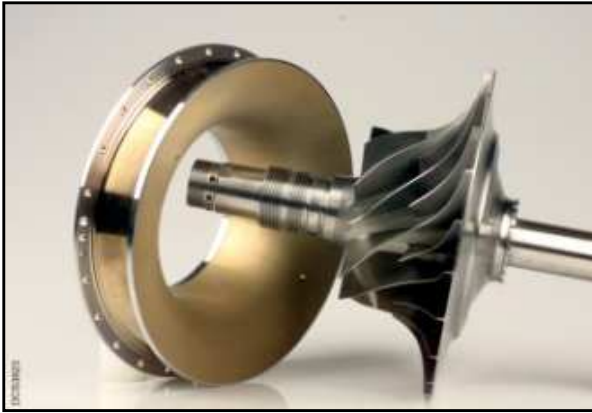
E.Break Organisation and Budget



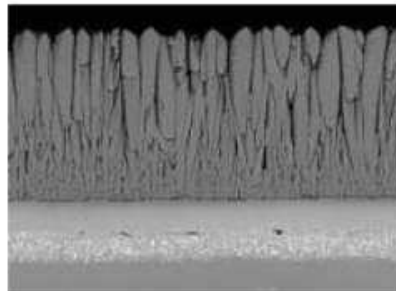
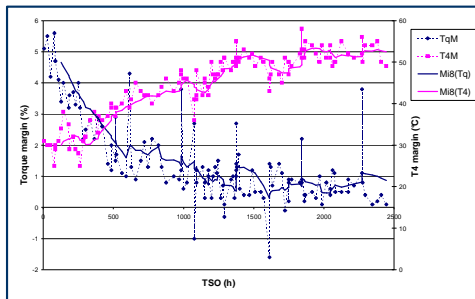
E.Break budget is 30M€ (18 M€ funding required) over 36 months from mid 2012 to mid 2015

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Thank you



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