NIPSE

Novel Integration of Powerplant System Equipment

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 636218

Facts & Figures

- An H2020 project awarded early 2015, started 1 June 2015
- 36 months
- 6.2MEU funding
- 10 partners from 5 EU member states
- Coordinated by Safran Nacelles

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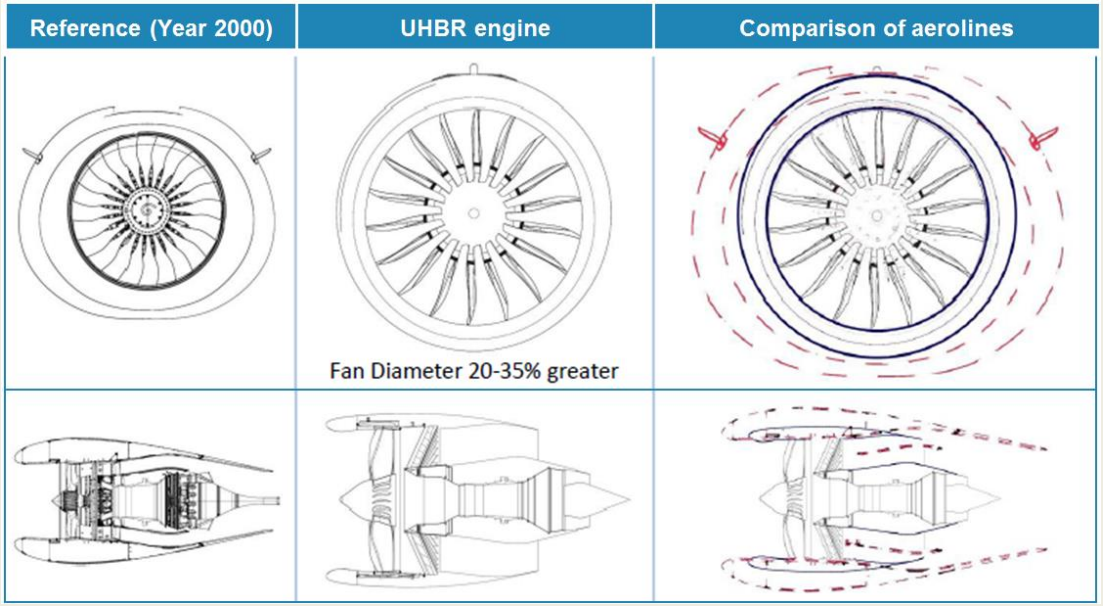
Overall context

- Fuel burn and emission reductions were assigned to aeronautical industry
- New A/C engine architecture emerge: Ultra High By-Pass Ratio (UHBR), with the following main characteristics:

Fan diameter 20-35% greater

Smaller and thinner nacelle (to minimize drag increase)

Entry Into Service (EIS): 2025-2030



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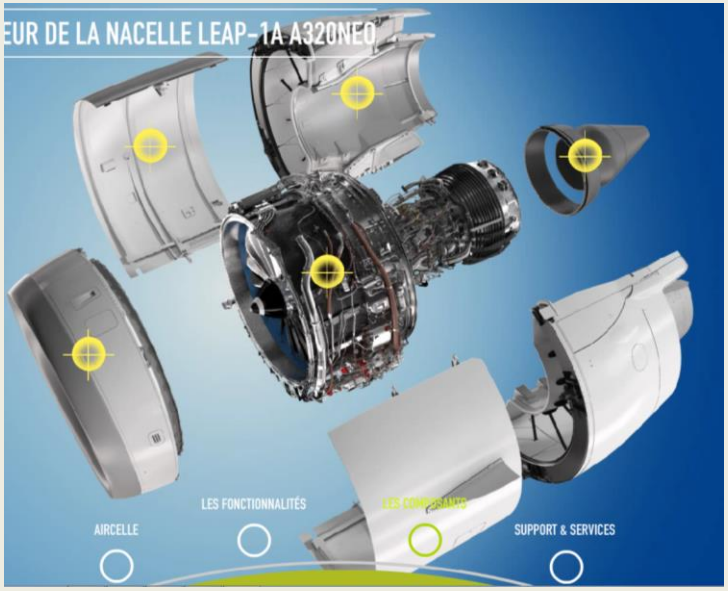
Overall context

- Today, IPPS equipment is:
  - Very complex – around 40 different sets of equipment: Engine Build Unit (EBU) and Buyer Furnished Equipment (BFE)
  - Highly driven by maintenance constraints
  - Manually integrated in the engine and nacelle



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Addressing the UHBR challenges

- Emerging Ultra High bypass Ratio (UHBR) engines, and other architectures,
  - make **installation of systems very difficult within the space** (thin nacelle, larger fan module)
  - **Requiring additional functions or provide extra thermal challenges** through additional equipment

- To achieve these new architectures, with a better solution, in a shorter development time is not evident and requires research.
- These engine architectures have **less ventilation capability** for engine and equipment zone due to lower volume
- Engine Build Unit (EBU) and Buyer Furnished Equipment (BFE) systems give **minimal opportunity for system level optimisation**

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- Addressing space, weight and temperature challenges linked to the integration of equipment for novel engine architectures in aircraft nacelles

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Example of an existing engine equipment installation

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Objectives & expected outcome

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Contribute to the reduction of development time of the future engine architectures such as the UHBR engine

through development of optimisation approaches for the assessment of system integration for the power plant system..

Reduce the volume required for the IPPS equipment and thermal management functions and reduce the associated weight of the system and connections

To reduce fuel burn.

Maintain the systems equipment maintenance access time within the engine

Reduce system downtime and cost of ground operations.

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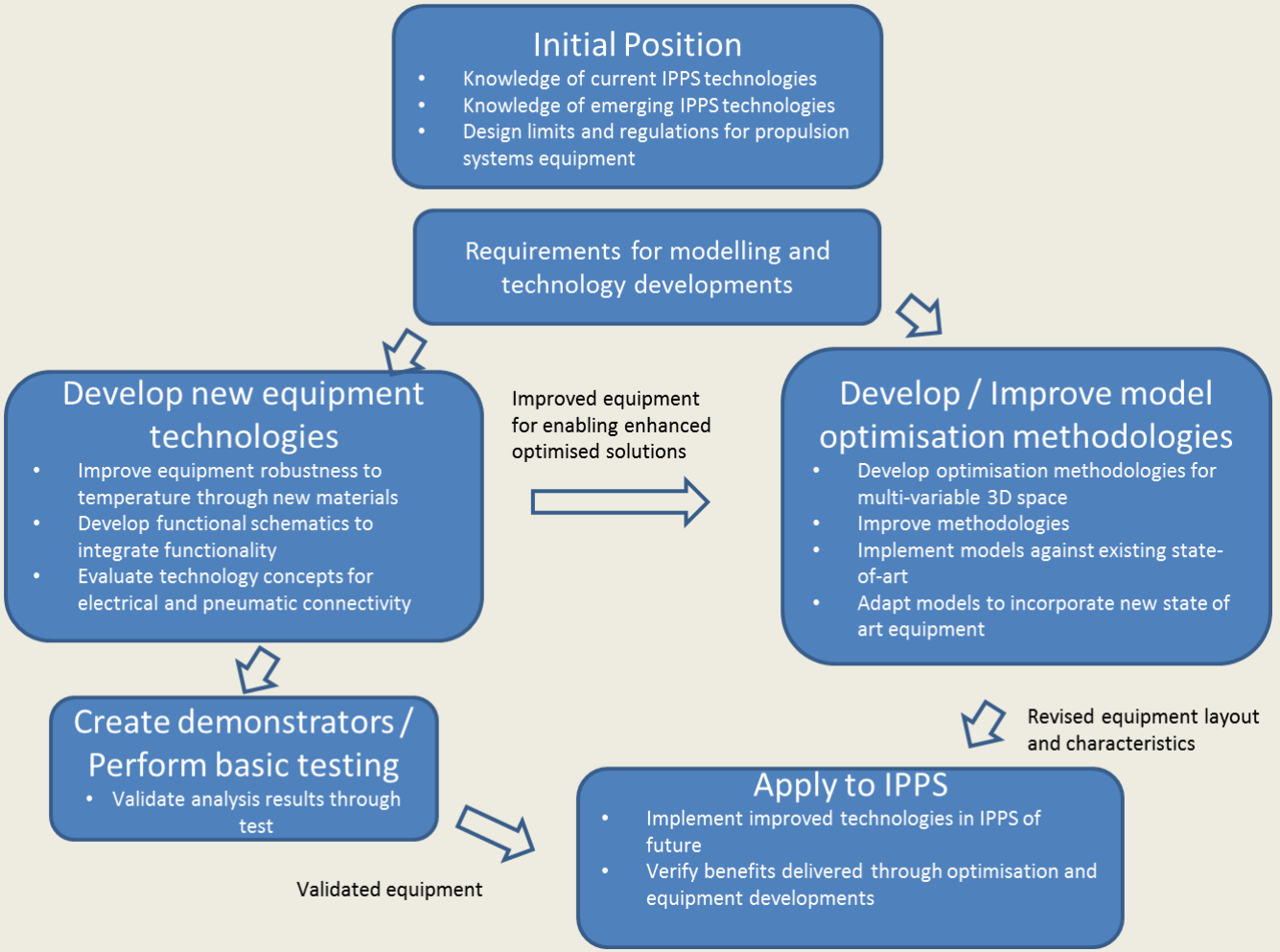
The NIPSE Scientific approach

- The NIPSE project is focussed on integrating and optimising the entire set of power plant systems.
- Tools and methods to aid the optimisation process (means and measurement) will be developed, as well as individual technologies to support the implementation and integration of the PowerPlant systems within the harsher environment and reduced volume of a future engine.



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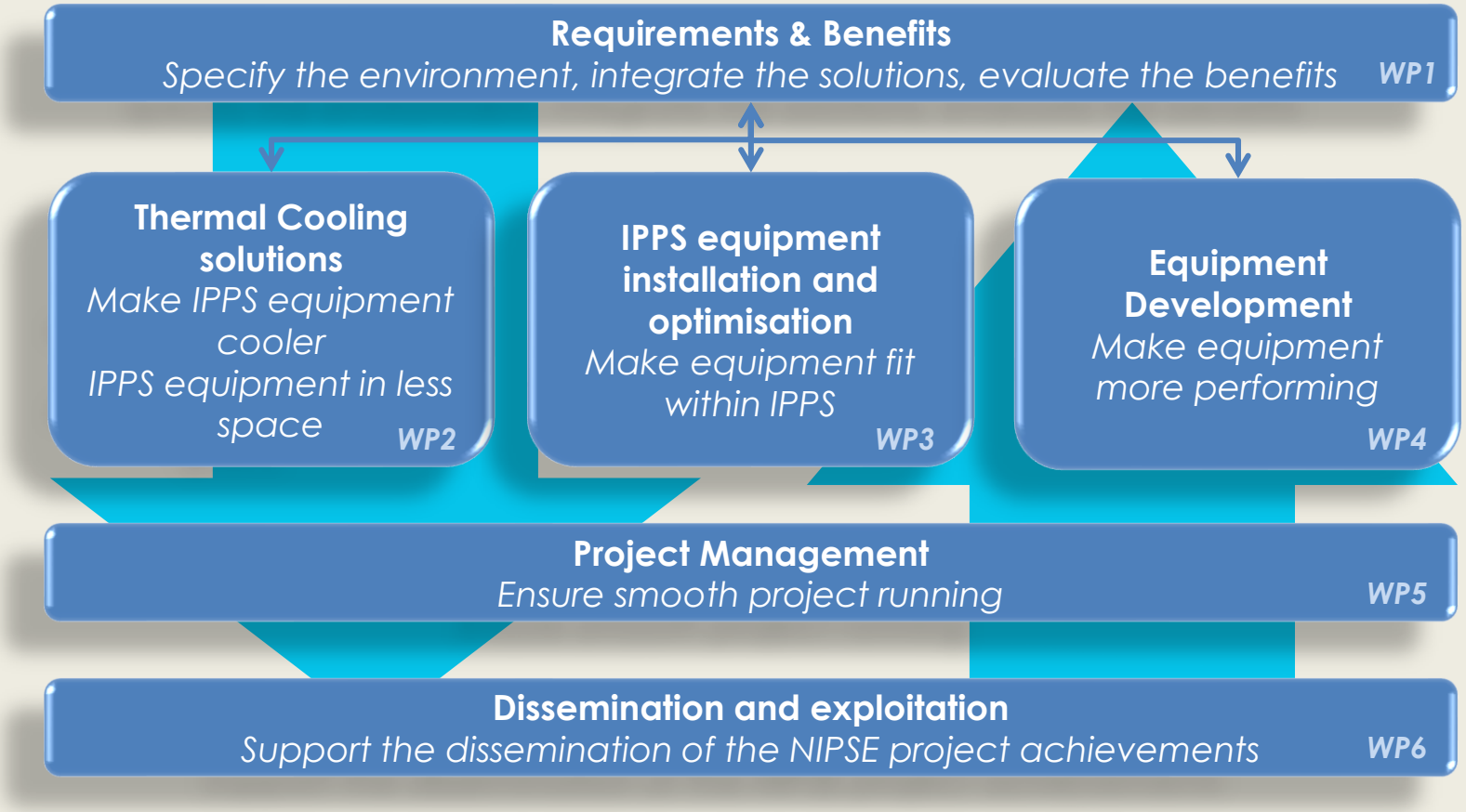
Structure of the workplan



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- The solutions developed within NIPSE are based on the UHBR technology and take into account the whole life cycle of UHBR engines: design, production, repair, maintenance, overhaul and retrofit.
- Running from 1 June 2015 to 31 May 2018
- 10 partners:
- Safran Nacelles – Safran Aircraft Engines – Safran Electrical & Power – BAE Systems – Thermocoax – Archimedes – MEGGITT –Netherlands Aerospace Center NLR – CESA – ARTTIC

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- Project is finalising its overall savings during these final months
- Key results are already available from certain elements
  - Optimisation Tool shown to save up to 80% time versus manual operation in certain tasks
  - Access time to engine via nacelle improved, alongside weight and volume benefit internally through innovative actuation approach
  - Weight Reductions seen in pneumatic equipment through novel manufacturing approaches
  - Additional functionality of overheat sensing achieved through development of existing equipment
- A selection of these will be discussed further during the workshop presentations from NLR, CESA and Thermocoax

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Objectives & expected outcome

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Contribute to the reduction of development time of the future engine architectures such as the UHBR engine

through development of optimisation approaches for the assessment of syst… integratio… power…

Tool developed, validation complete
Time saving of around 60%

Reduce the volume required for the IPPS equipment and thermal management functions and reduce the associated weight of the system and connections

To reduce…

Novel equipment technologies
Assessed and tested. Weight and volume savings achieved up to 10%

Maintain the systems equipment maintenance access time within the engine

Reduce system downtime and c… ground op…

Novel approach tested saving
Access time and improving safety

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