ACASIAS

Project overview

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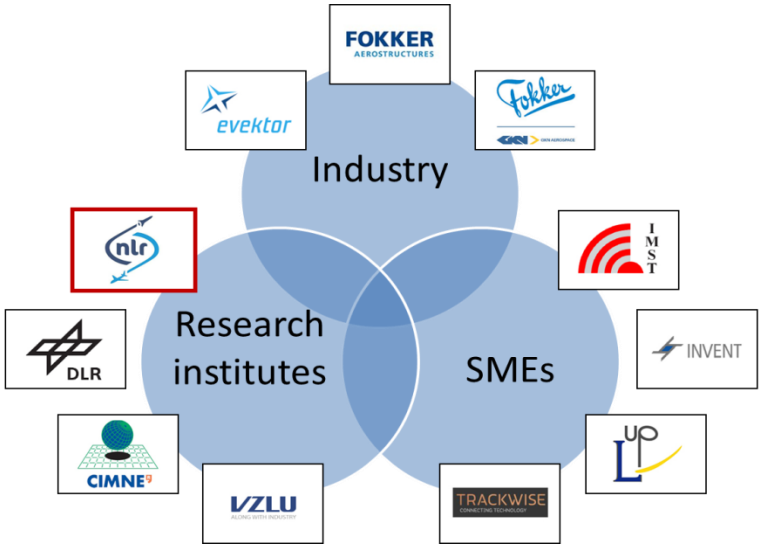
Project overview

- **ACASIAS:** Advanced Concepts for Aero-Structures with Integrated Antennas and Sensors
  - H2020 Research & Innovation Actions
  - Societal Challenge: Smart, Green& Integrated Transport
  - Topic: Reducing energy consumption and environmental impact of aviation
  - 01/06/2017-31/05/2020
  - EU contribution €5,836,430
- Involved disciplines
  - Mechanical engineering
  - Structural manufacturing
  - Antenna engineering
  - Aero-acoustics & noise control
  - Aeronautical engineering
  - Thermal engineering
  - Aerodynamics



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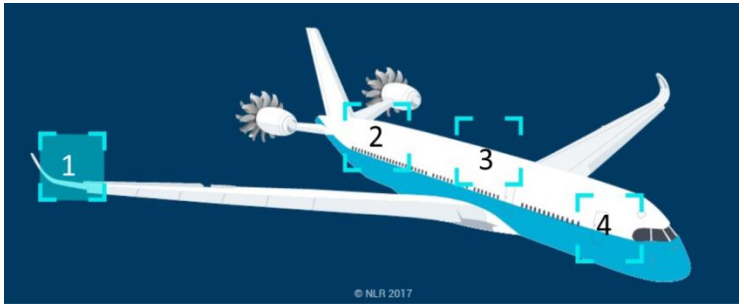
Objectives and challenges

- **Overall objective:** contribute to reduction of energy consumption of future aircraft by improving aerodynamic performance and facilitating the integration of novel efficient propulsion systems such as CROR engines

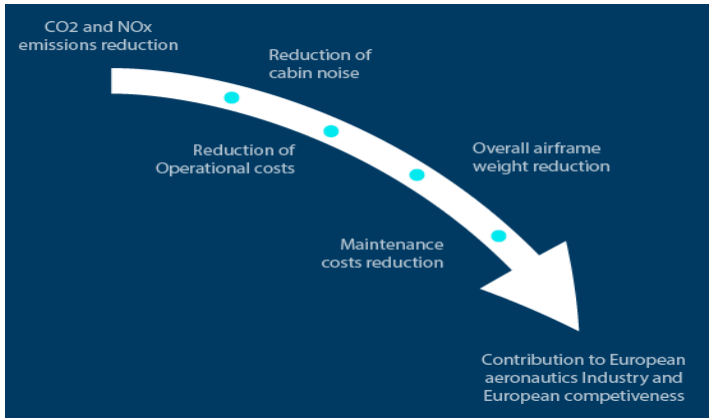


- **Challenges:** develop aero-structures with integrated systems (TRL 4/5)

1. Stiffened skin for integration of Ku-band antenna tiles
2. Stiffened composite panel structure with integrated sensors, actuators and wiring
3. Smart winglet (Integration of blade antenna in composite structure)
4. Smart FML panel (Integration of VHF and GNSS antennas in GLARE-like fuselage panel)

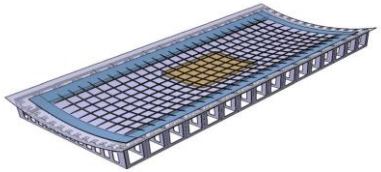
Impact

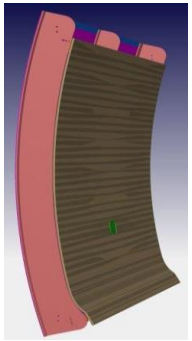
- Reduction of CO_2 and NO_x emissions by increased aerodynamic performance
- Reduction in the overall airframe weight by:
  - eliminating structural build-ups and support structures for conventional antennas
  - integrating and miniaturising sensors and actuators
- Reduction in maintenance costs and operational delays through:
  - increased robustness of integrated antennas/sensors/wiring
  - avoiding collisions with airport cargo cars (as with external antennas)
  - systems integrated in fuselage panels with access from the cabin

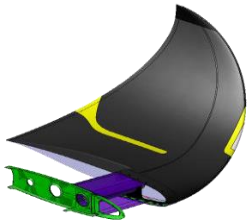


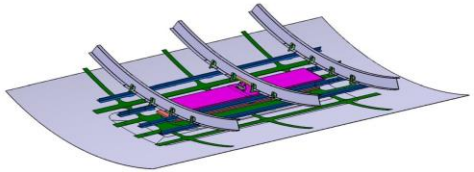
First results

- Full-scale panel with stiffened RF transparent skin for integration of Ku-band antenna array
- PCB with integrated cooling for active Ku-band Satcom antenna arrays
- Sandwich lining panel with integrated sensors, actuators and wiring for CROR noise reduction
- Aerodynamically optimized winglet for EV-55
- VHF notch antenna for winglet
- Classically stiffened Fiber Metal Laminate (FML) panel with integrated VHF slot antenna
- FML skin with conformal integrated patch antenna for GNSS









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Assessment of achievements

- Assessment of:
  - Structural and electromagnetic properties and performance
  - Aerodynamic properties with regard to their benefits against common solutions and weight reduction
  - Maintenance and repair
  - Possible certification and integration bottlenecks
  - Economic benefits resulting from their usage
  - TRL target: TRL4-TRL5
- Supported by Industrial Advisory Board (ADS, Lufthansa Technik, EASA, Diehl Aviation, Aerodata)

IMST's COMPETENCE AT A GLANCE

IMST

- **Development:**
  Hard- and Software for Radio Solutions // Antennas // Modules and Components for Radio Systems // RF & Microwave Circuits in CMOS, GaAs, SiGe // LTCC- and Hybrid Circuits

- **Research:**
  Public funded research at regional, national and European level // Applied Research // Know-How Acquisition

- **Products:**
  EDA design tools: EMPIRE XPU™, SpurSim™ // LoRa® - Long range radio solutions // WiMOD™ - Wireless M-Bus and ISM band radio solutions // LTCC modules // Sentire™ Radar solutions

- **Services:**
  Accredited test centre for electromagnetic compatibility (EMC) // Specific Absorption Rate (SAR testing for terminal equipment // Antenna testing // Radio testing (ERM) // Rapid prototyping // Sampling and manufacturing of electronics

Thank you for your attention!

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