

# EXAELIA

Flying Testbeds for Novel Long-Range Aircraft

## European flying testbeds for future long-range aircraft Christoph Mertens (NLR)

UP Wing 2<sup>nd</sup> Thematic Workshop, Bremen, Germany  
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# EXAELIA – EXperimental Aircraft for European Leadership in Aviation

## Project overview

- Funded by Horizon Europe CL5, GA number 101191922
- Budget 16.2M €
- Project start date: 1<sup>st</sup> January 2025
- Duration: 42 months, until June 2028
- 23 European partners from RTO (9), Academia (9) and SME's (5)



# Experimental aircraft: a hot topic in 2025



eXtra Performance Wing/Airbus



X66 TTBW/Boeing-NASA (paused)



ecoDemonstrator/Boeing



JetZero BWB



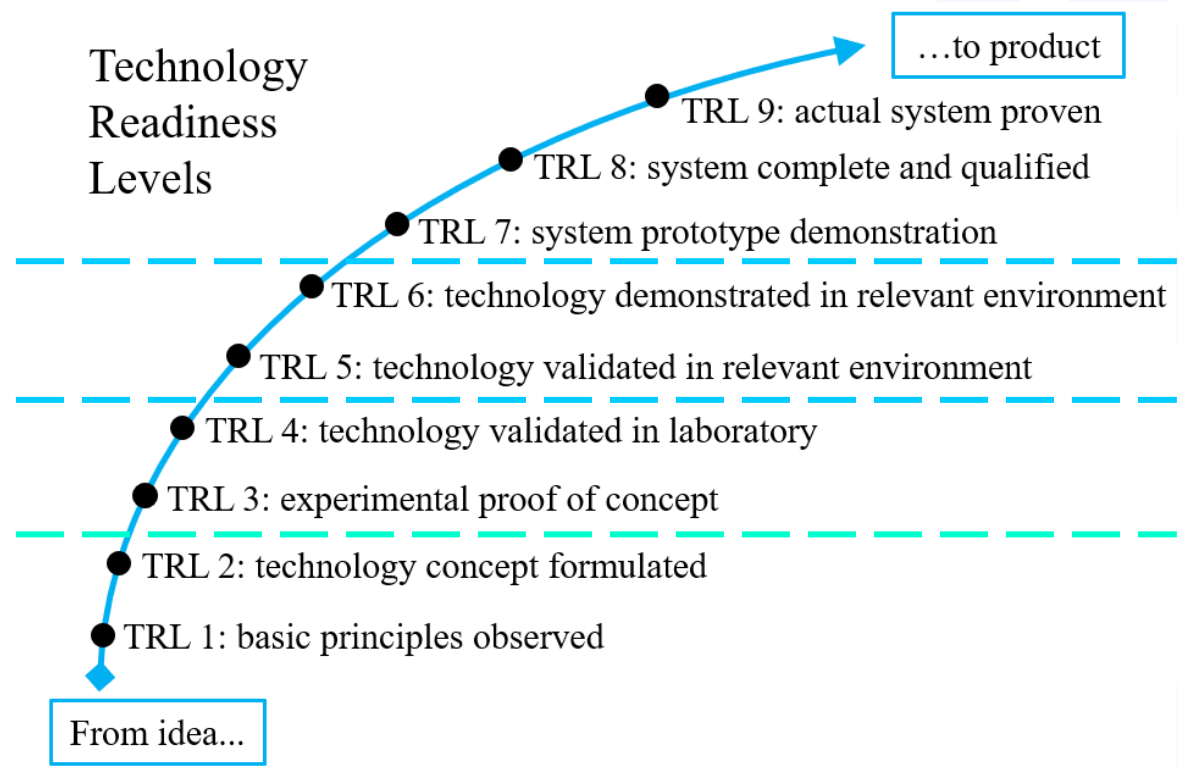
Boom Supersonic



Clean Aviation/Airbus

...and many more!

# TRL scale and experimental flight testing in EXAELIA



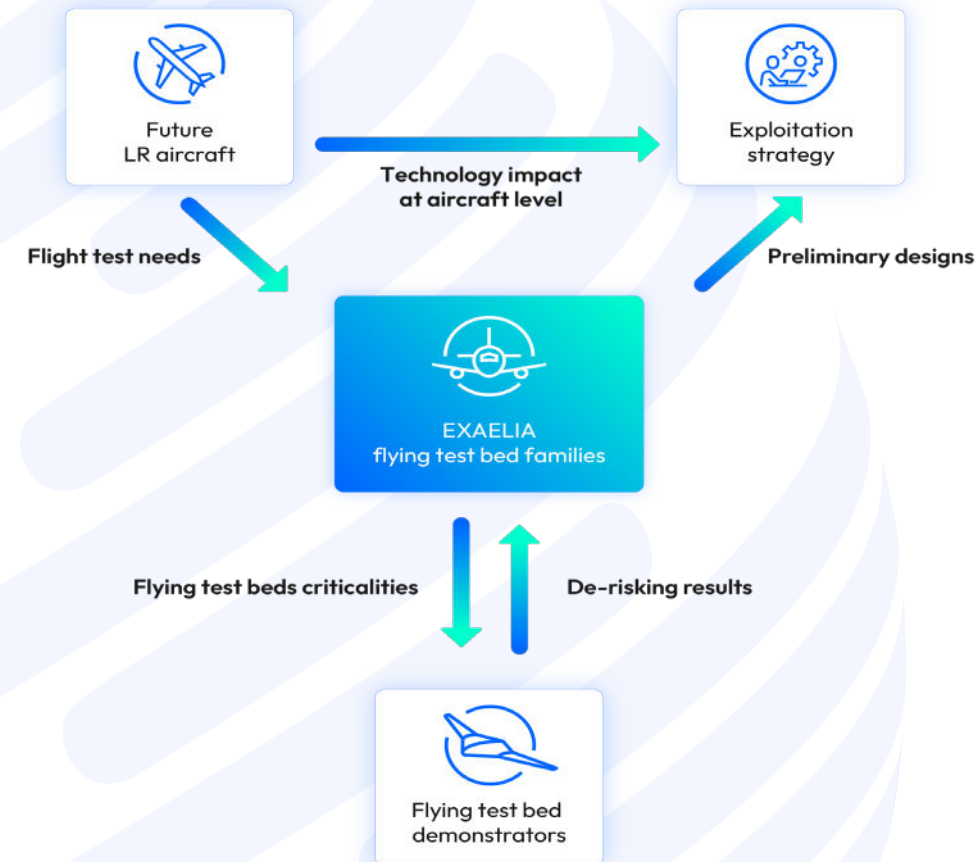
- Avoid entering the industry territory at TRL 7 to 9 – no integrated prototype
- Mature aircraft technologies in the relevant environment using experimental aircraft
- **EXAELIA: use experimental flight testing earlier for accelerated development**

**EXAELIA's specific ambition:**  
**“accelerate the entry-into-service by one aircraft generation for future long-range aircraft”**

# EXAELIA – EXperimental Aircraft for European Leadership in Aviation

## Project objectives

1. Concepts of promising, disruptive commercial aircraft configurations for long range missions (>9000 km)
2. Identify critical aspects of these aircraft configurations that need to be de-risked by flight testing
3. Mandatory innovative experimental aircraft defined for de-risking these critical aspects
4. Novel flying testbed families and flight tests predesigned with technology development plans
5. European exploitation strategy for the promising aircraft configuration concepts, including their radically new technologies, and the novel flying testbeds families



# EXAELIA's flying testbed family concept: the key to novelty and success

## EXAELIA's flying testbeds are more than a flying demonstrator:

- Multiple technologies can be demonstrated on one testbed
- Maximize testing flexibility and reusability from the start
- High relevance and resilience

EXAELIA



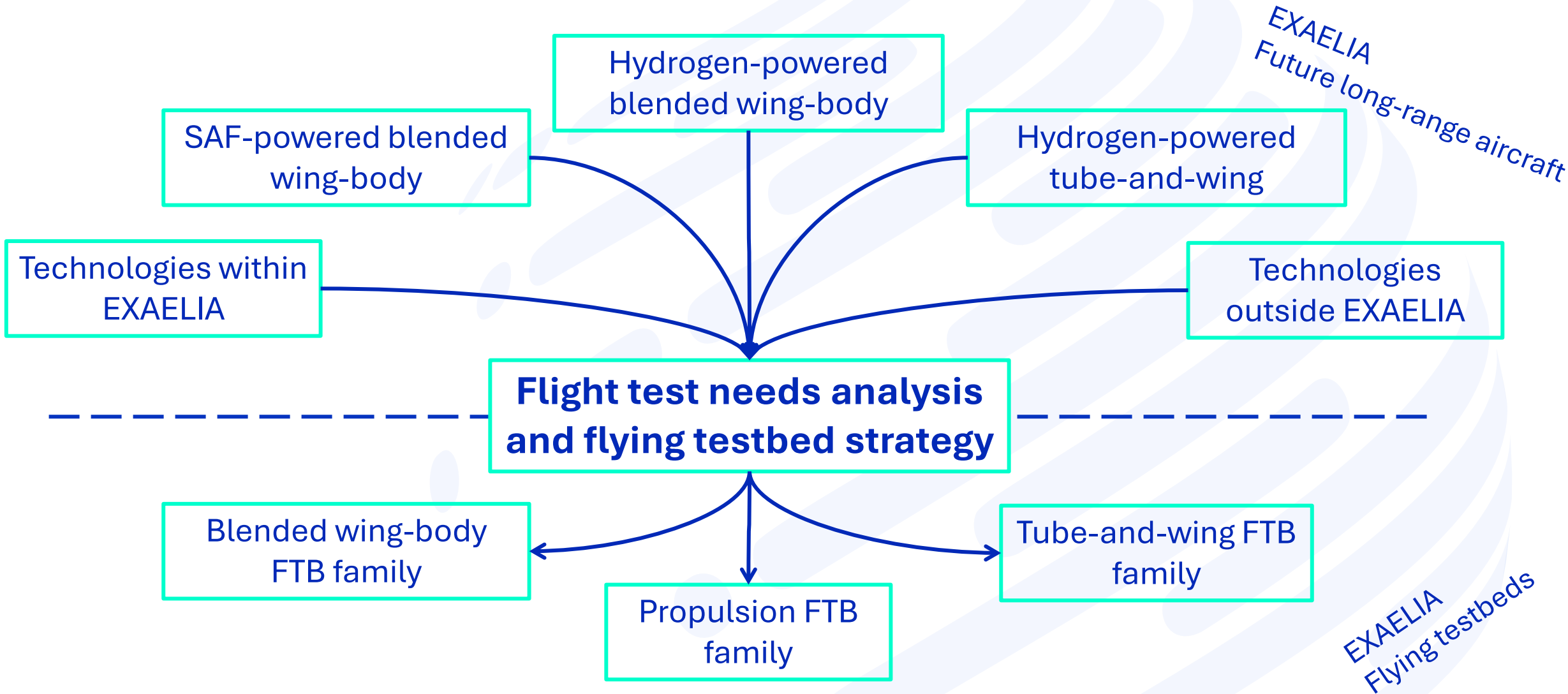
## EXAELIA's flying testbeds are an addition to the European research infrastructure:

- Test platforms for collaborative research
- Towards sharing of experience, infrastructure and results
- Digital twin development in parallel to the hardware

## EXAELIA's flying testbeds are part of a holistic strategy towards impact:

- Targeting disruptive aircraft concepts that need technological breakthroughs
- Capabilities for simulation and experiments to validate disruptive designs accurately
- Focus on reducing climate impact of future long-range aircraft (EIS 2045-50)

# Approach in EXAELIA: FTBs for future long-range aircraft





# EXAELIA's action plan

## Schedule for the upcoming months

- Relevant achievements so far:
  - Literature review of flying testbed landscape (EU+world)
  - Technology maturation for novel technologies
  - 3 aircraft conceptual designs, first loop ongoing
- Immediate next steps:
  - Analysis of flight test needs
  - Concepts for the 3 flying testbed families
  - Flying testbed general strategy and infrastructure
- Project goals:
  - Conceptual design of the prioritized testbeds, with steps towards preliminary design
  - Roadmaps for future long range aircraft development accelerated by the flying testbeds, from 2028 towards EIS before 2050

# Our main challenges and open question for discussion

Conceptual: we want to fill a gap in the European technology infrastructure

- Middle ground for minimal overlap with existing projects
- Make progress on European level in common effort
- Roles of RTO's, universities and industry, ensure involvement of all
- Finding the right test objectives to keep long-term momentum

Technological: we want to enable disruptive concepts for the long-range H2 tube & wing aircraft:

- Truss-braced? Active load control? Both?
- Speed and scale for testing, sweet spot or jump from drone to donor?
- Different scales for different topics? Aeroelasticity, flight dynamics, controls, acoustics...
- Modularity and reusability are effectively a function of scale

# Thank you!

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## Contact points for any question:

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