#ArchitectingAviation

FUGA: Knowledge-based engineering framework for cabin design and fuselage integration

Optimization of the multidisciplinary workflow through the detailed structure and cabin design by integrating a knowledge-based methodology in the distributed integration environment RCE

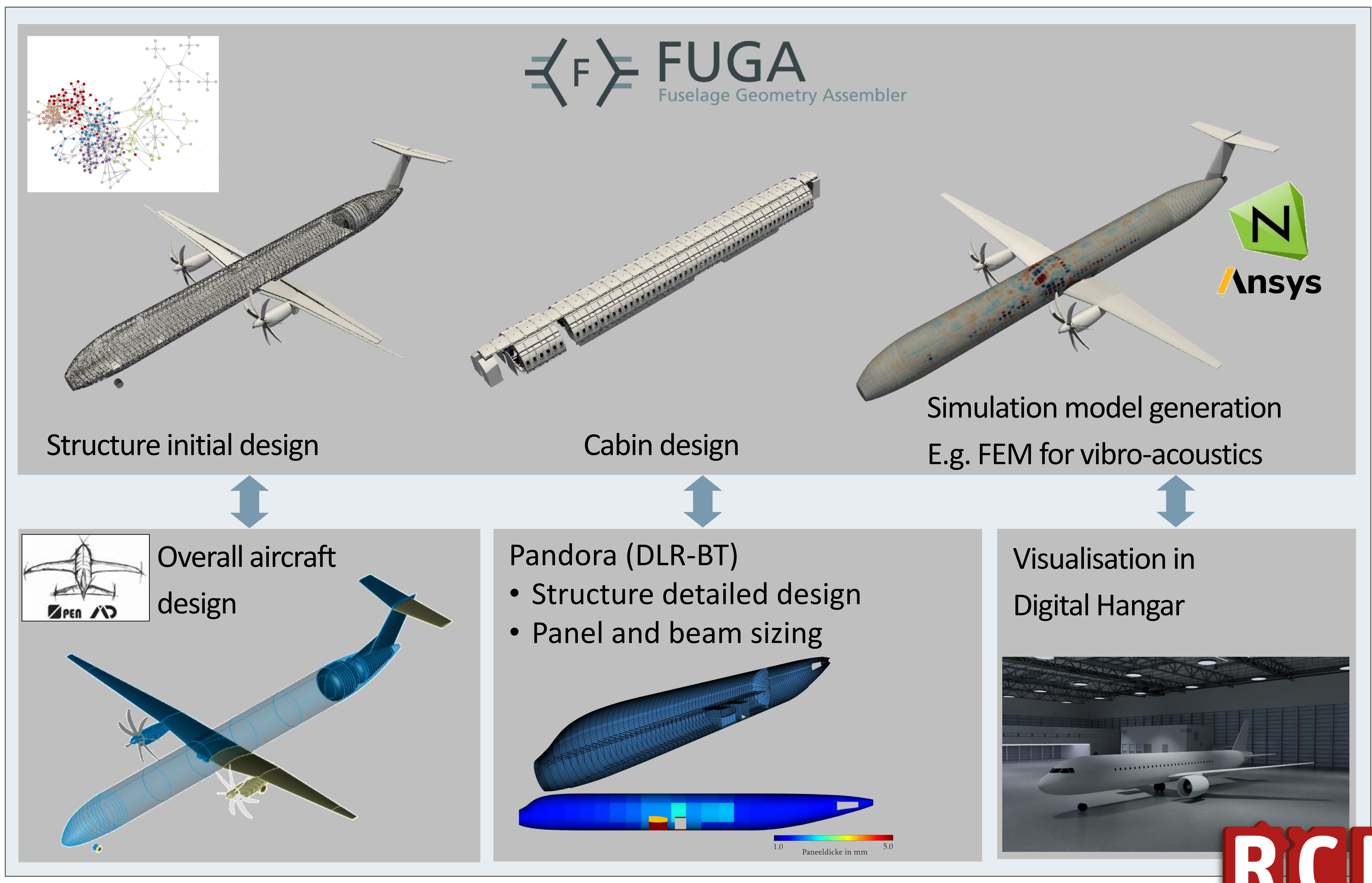

Fig: 1. The FUGA eco system for multi-fidelity aircraft models

The knowledge-based methodology in the EXACT project

- Graph-based KBE modelling engine in python with native support for lazy evaluation, caching and invalidation
- All rules are stored in a central repository that manages the relationships in the CPACS product data format
- Provides the initial design of the structure and the design of the cabin based on CPACS data (see Fig.1)
- Facilitates the rapid evaluation of novel aircraft configurations by automating the cabin and fuselage design process
- Provides geometric models at different levels of fidelity, tailored to the needs of disciplinary expert assessment (E.g. FEM for vibro-acoustics)

Implementation of a knowledge-based methodology in RCE

- Holistic aircraft design with the objective of a digital seamless design process
- FUGA has been implemented as a tool within the RCE framework for an initial structural and cabin design in a multi-disciplinary workflow to find the best design variants (see Fig.2 and Fig.4)
- This is the basis for the detailed structural design in PANDORA, which is used for parametric modelling and optimization of aircraft structures, especially for crash and ditching analyses (see Fig. 3).

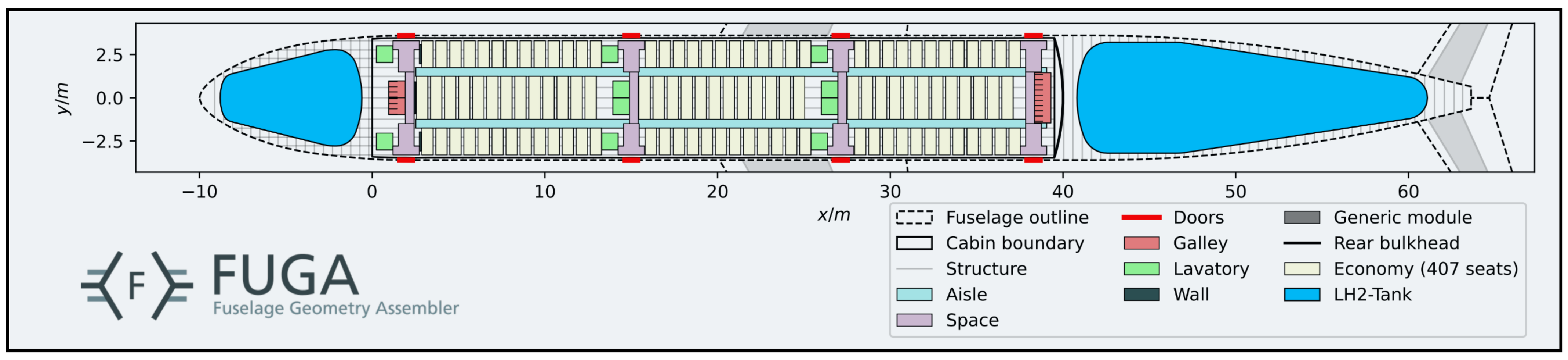

Fig: 2. D350-TFLH2-base designed through the interdisciplinary workflow in RCE

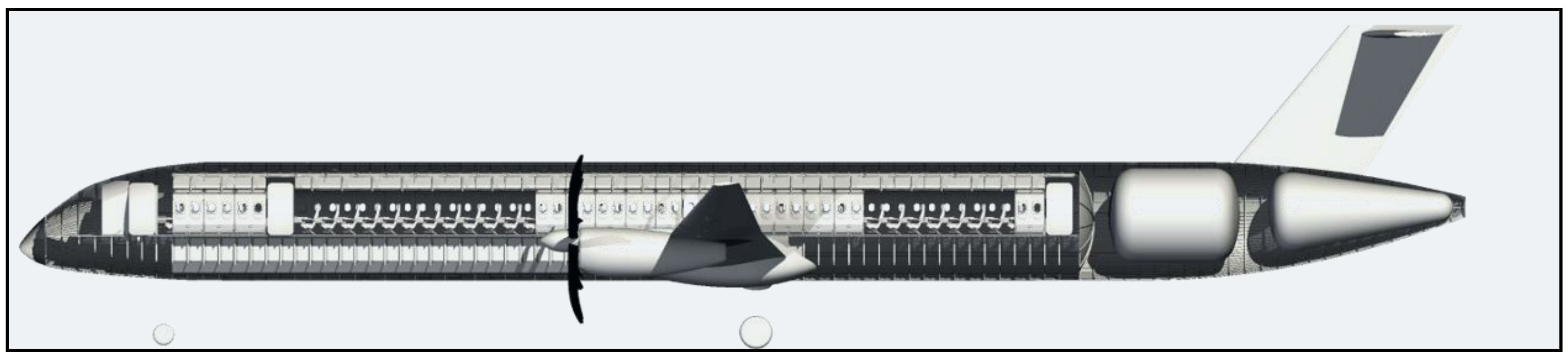

Fig: 3. D250-TPLH2-MHEP 3D-Model automatically generated from FUGA

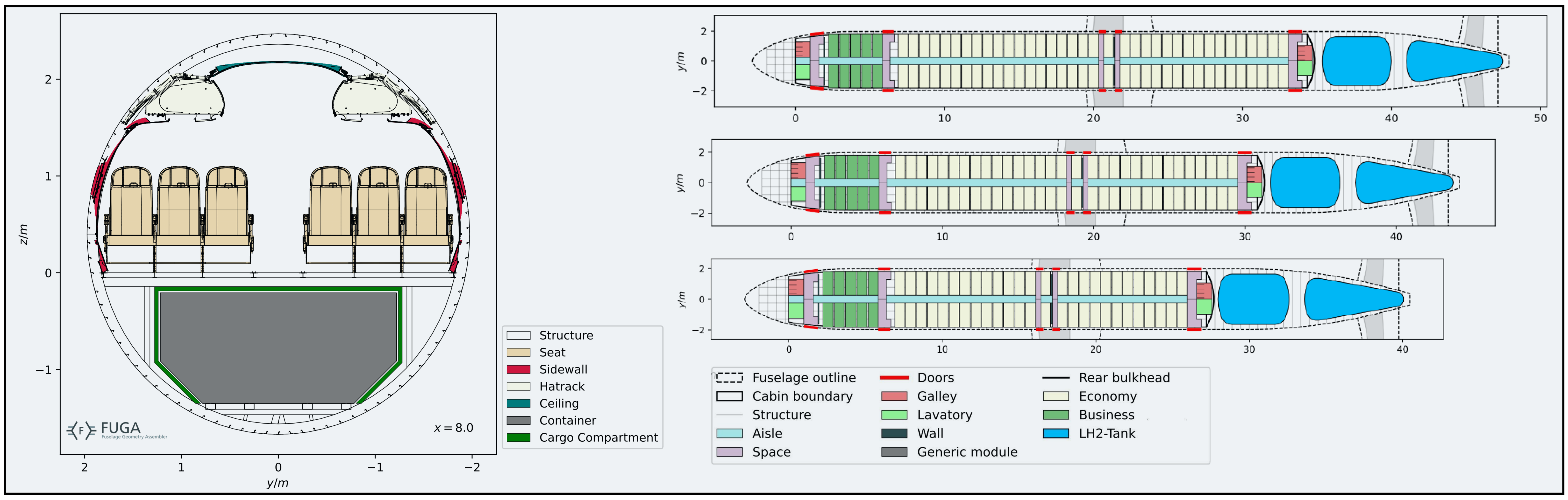

Fig: 4. D250-TPLH2-MHEP Single Aisle Aircraft including Family concept

Contact
Paul Zemke
Institute of System Architectures in Aeronautics
Paul.Zemke@dlr.de

Contact
Christian Hesse
Institute of System Architectures in Aeronautics
Christian.Hesse@dlr.de