ITEA3

Project Profile

DEFAINE

Advanced exploration in early design phases

To meet market and sustainability demands in the aerospace domain, the ITEA project DEFAINE (Design Exploration Framework based on AI for froNt-loaded Engineering) will deliver an advanced design exploration framework which reduces recurring design costs and lead times for design updates.
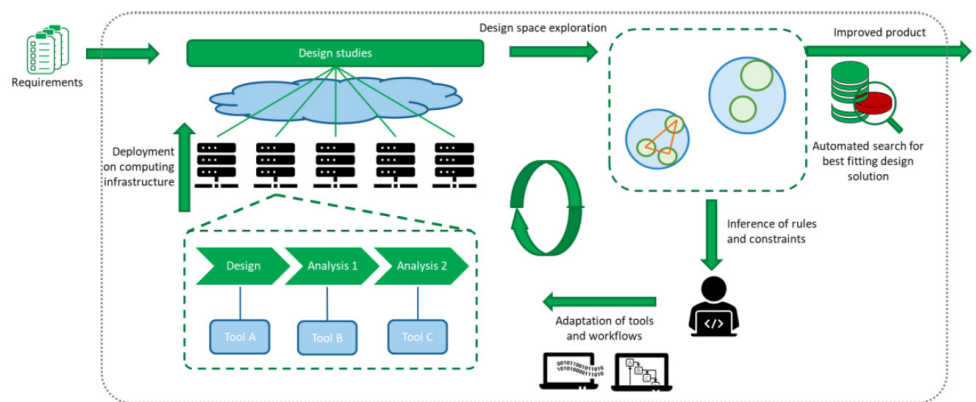
ADDRESSING THE CHALLENGE

Demand for air transportation is expected to grow by 50% over the next 15 years. How can European players remain competitive in this global aerospace market while satisfying stringent environmental constraints? Collaborative product development approaches can drastically reduce lead times, but difficulties remain in accessing data, tracing requirements and assessing the effects of design decisions. Potentially powerful hybrid workflows also suffer from time-consuming simulation set-up and the need for specialised knowledge on scalable computing solutions.

AI-augmented frontloaded design process

PROPOSED SOLUTIONS

With a focus on aircraft systems, DEFAINE will create a framework for the large-scale exploration of designs, data analysis and artificial intelligence/machine learning capabilities. By infusing engineering applications and processes with new knowledge, this should enable the design of improved solutions in a project's early stages. The following innovations make up this framework:

- A knowledge-based engineering (KBE) development methodology to model knowledge and accelerate design automation solutions that can be adjusted during a design study.
- A methodology for the automatic (re)formulation of multidisciplinary engineering workflows.
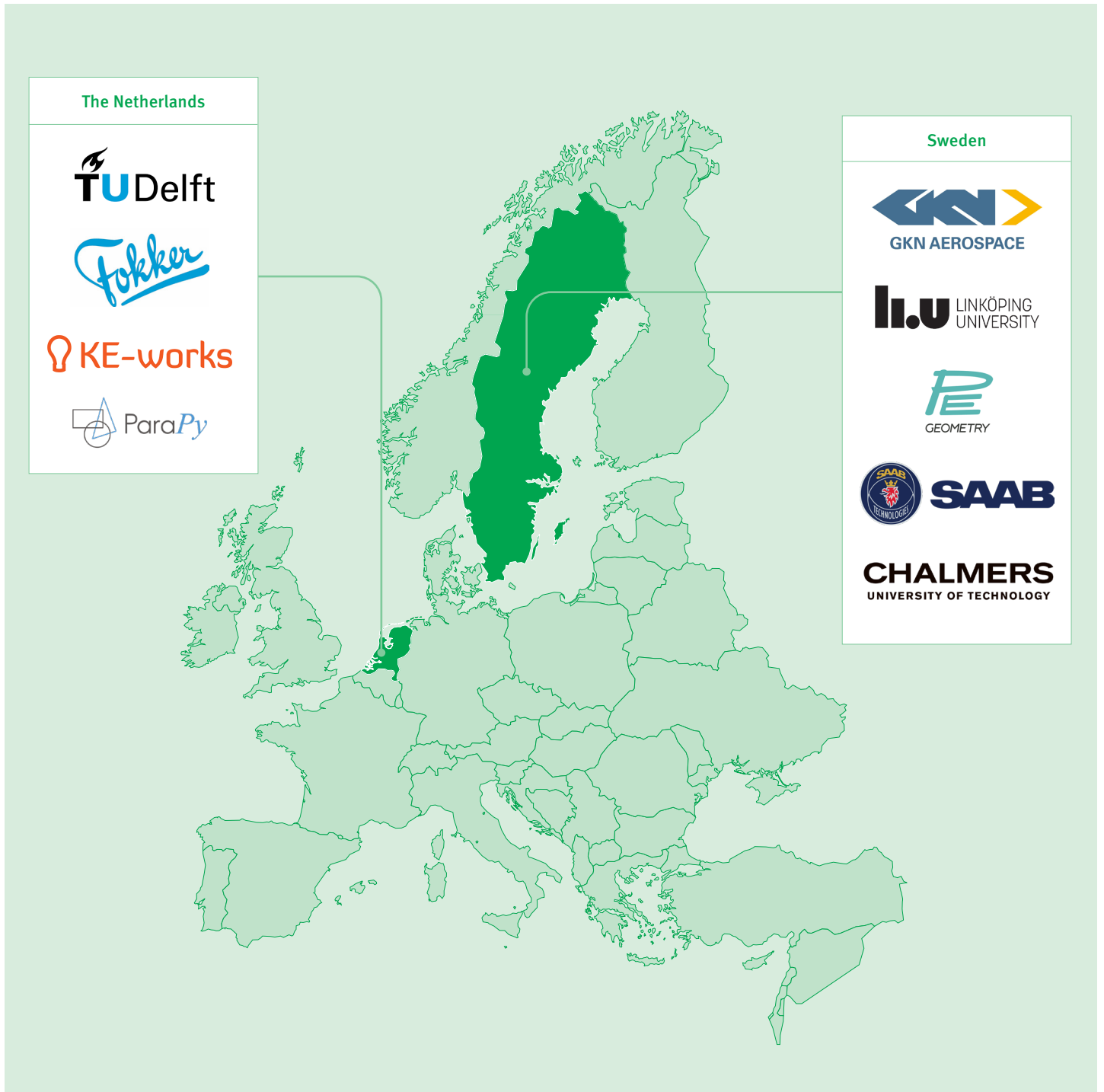
- A smart, scalable and cost-efficient computing infrastructure based on virtualisation and containerisation technology.
- A methodology based on automated data analysis techniques and machine learning algorithms to identify trends and relations in large sets of design data and support machine-driven knowledge discovery.

The project will demonstrate this through four use-case demonstrators and an integral demonstrator combining the competences of multiple partners from the aerospace domain.

PROJECTED RESULTS AND IMPACT

DEFAINE has clear goals for this framework: a 10% reduction of recurring costs in aircraft system design and a 50% reduction in lead time for design updates. The automatic (re)formulation methodology, for instance, will cut set-up/execution time and ease adaptation to resources and insights during execution, while the computing infrastructure will enable design space exploration without specialised knowledge. Overall, this will allow European companies to provide better designs faster and at a lower design cost, thereby strengthening their competitiveness.

DEFAINE

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The Netherlands

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ParaPy

Sweden

GKN AEROSPACE

Li.U LINKÖPING UNIVERSITY

PE GEOMETRY

SAAB TECHNOLOGIES · SAAB

CHALMERS UNIVERSITY OF TECHNOLOGY

Project start
October 2020

Project end
January 2024

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ITEA is a transnational and industry-driven R&D&I programme in the domain of software innovation. ITEA is a EUREKA Cluster programme, enabling a global and knowledgeable community of large industry, SMEs, start-ups, academia and customer organisations, to collaborate in funded projects that turn innovative ideas into new businesses, jobs, economic growth and benefits for society.

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