



## Project Profile

# FAMILIAR

## Decentralising federated machine learning in industry

The AI Call 2021 project FAMILIAR (Holistic Federated AI Development for Mixed-Reality Applications in Europe) will accelerate the use of federated machine learning (FedML) in industry by combining a decentralised approach with cross reality (XR) glasses for data acquisition and labelling.

### Addressing the challenge

FedML trains algorithms across multiple decentralised edge devices or servers, holding local data samples without exchanging them. However, FedML is rarely used in industry, mainly due to its novelty and complexity of integration. The technology is still rapidly innovating dating the first movers of federated averaging (federated machine learning with a central control unit) in 2018. Federated Machine Learning without central control units being published even more recently. A further obstacle to FedML lies in the difficulty of acquiring and labelling high-quality data. If these issues were overcome, however, FedML could offer the efficient, collaborative creation of machine learning models in many domains.

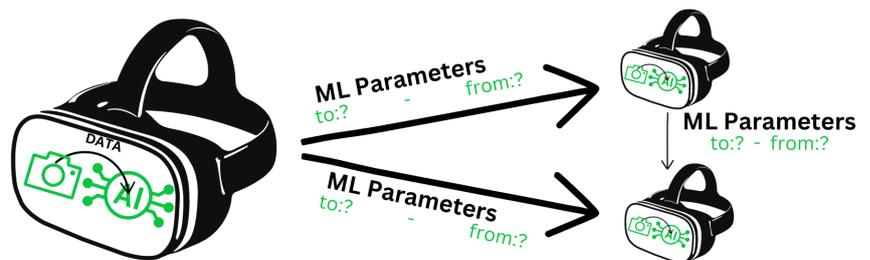
### Proposed solutions

FAMILIAR proposes decentralisation by replacing the central controller with a gossip approach for parametrised FedML. This will extend the existing FedML Toolbox, allowing model parameters to be passed on in a peer-to-peer network after each participant has trained the model using its local database. Encryption and multiple hops will ensure that receivers and senders cannot identify one another. The project's second novelty is to connect FedML with XR glasses, enabling the acquisition and labelling of high-quality data (such as video, images, sound, time series, gestures, gaze tracking and biometrics) while providing the ideal parameters to the FedML model and assistance to wearers. This process of collecting data over a

long period with many participants will detect patterns that elude humans and FAMILIAR's unique combination of FedML and XR will be applied to use-cases on immersive driving data simulation, set-up assistance for industrial 3D printing robots and extended failure prediction in finite element method (FEM) simulation software.

processes can be reduced by 30% and process robots can see a 20% and 40% reduction in downtime and retooling time respectively. Additionally, FedML is an emerging market which is expected to be worth USD 201 million in 2028 with a compound annual growth rate of 11.4%.

As early uptakers, FAMILIAR partners will be well-positioned for a strong competitive position – including SMEs, which make up half of the consortium. Finally, FAMILIAR boosts sustainability due to less waste (via less physical testing) and fewer emissions (via stronger front-loading approaches). The project

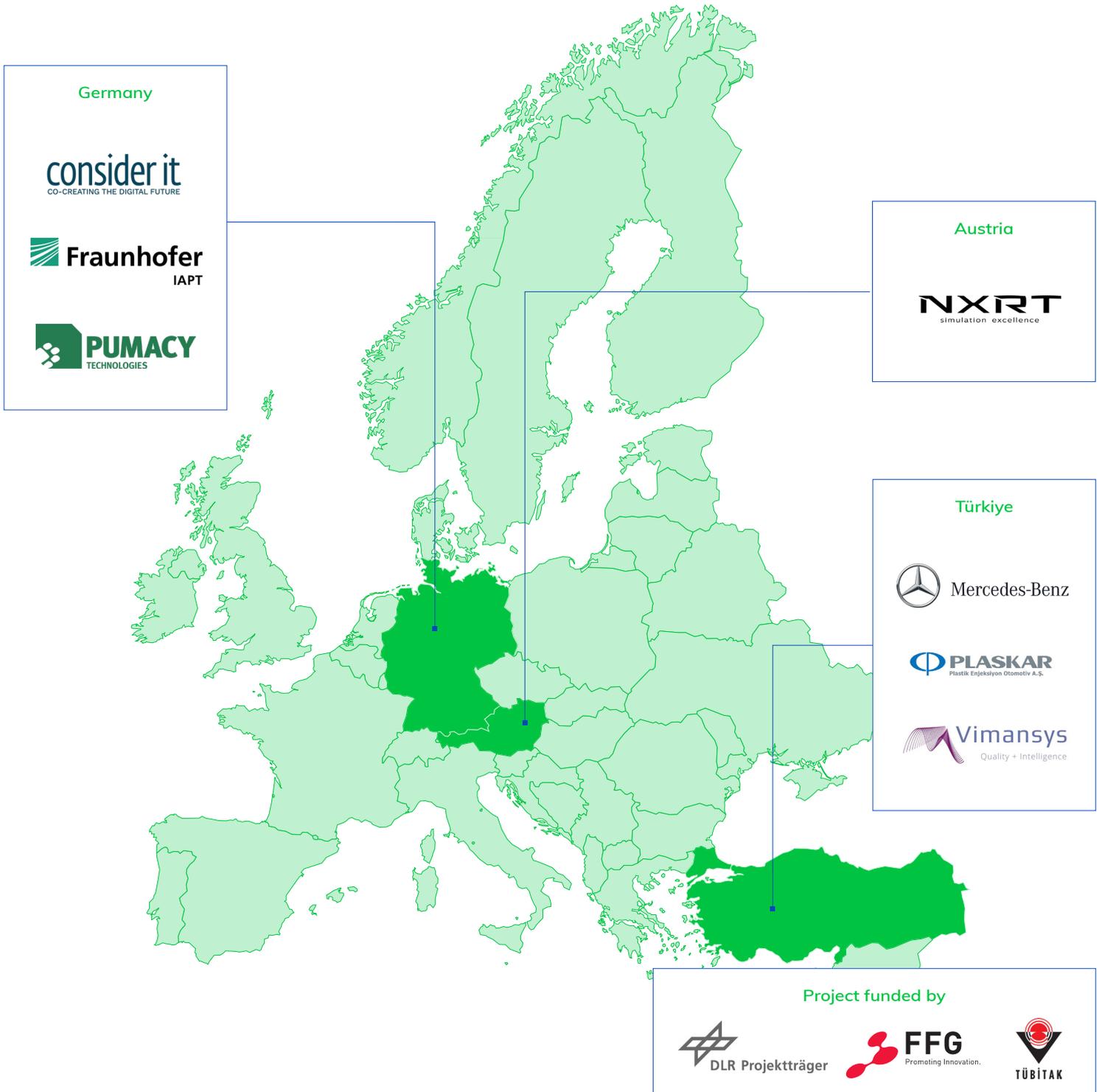


^ Concept of the FAMILIAR system – indicating the ML models utilized for XR applications being trained federated in a P2P-network.

### Projected results and impact

One of the key outcomes of FAMILIAR will be the combination of different forms of labelling, allowing labelling as a whole to take place up to 50% more efficiently. In combination with the collaborative training of models, this offers benefits across industry: inefficient process steps can be drastically reduced to lower the costs of complex additively manufactured parts by 50%, critical incidents in mobility-related engineering

will therefore have significant long-term benefits as it helps introduce FedML to the wider world.



**Project start**  
June 2022

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**Project website**  
<https://familiar-project.eu/>

**Project end**  
May 2025

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