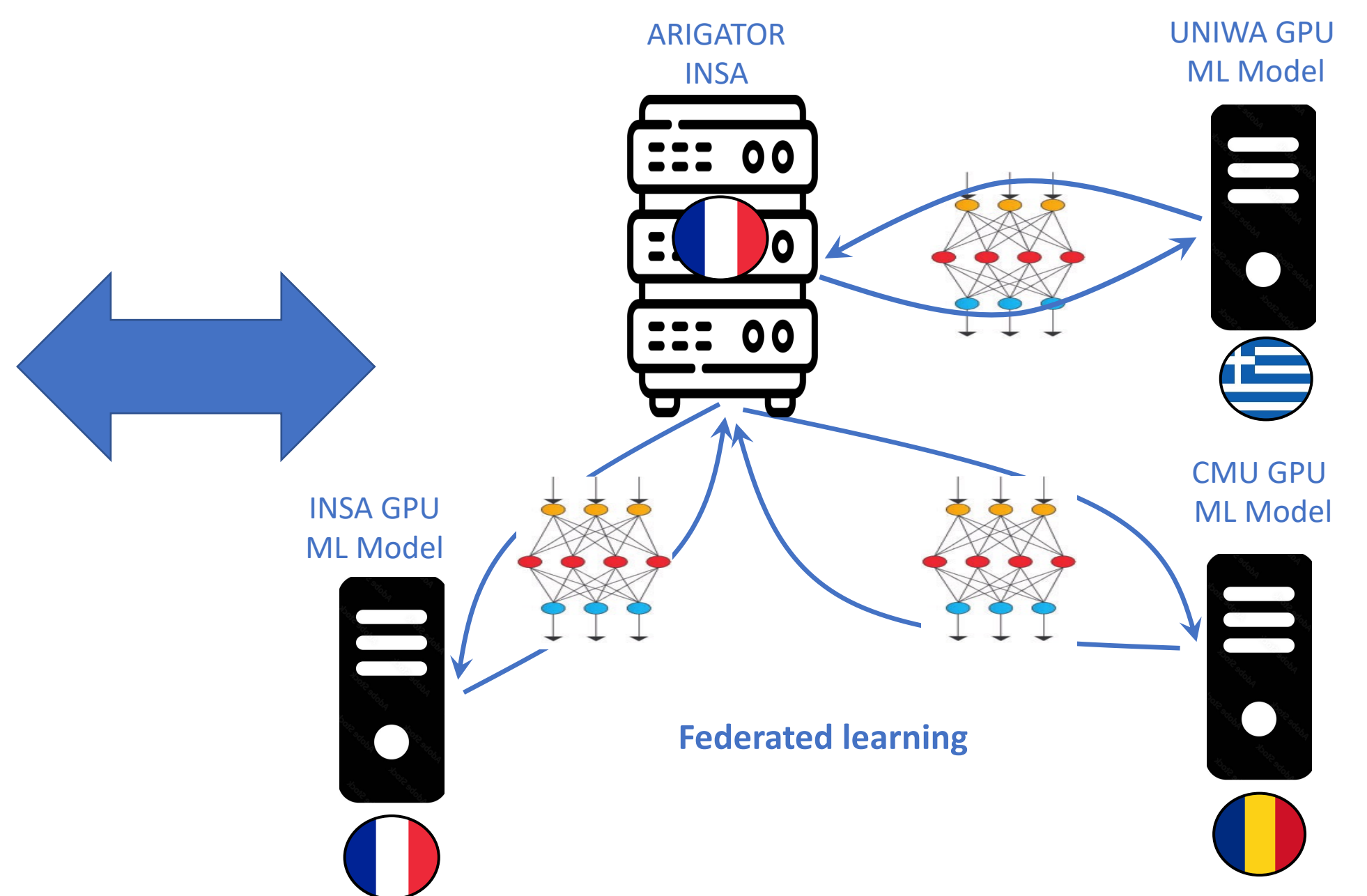
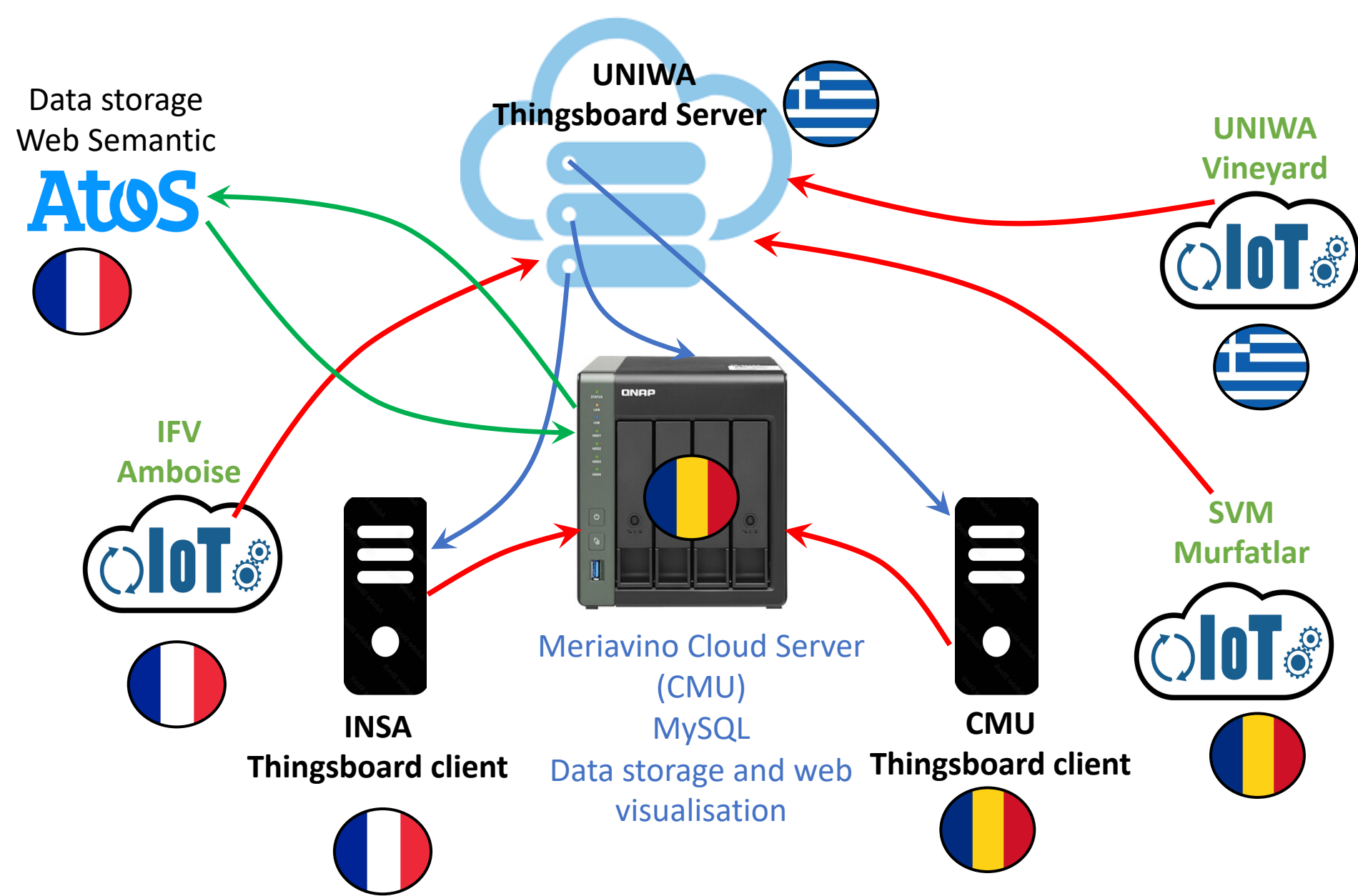
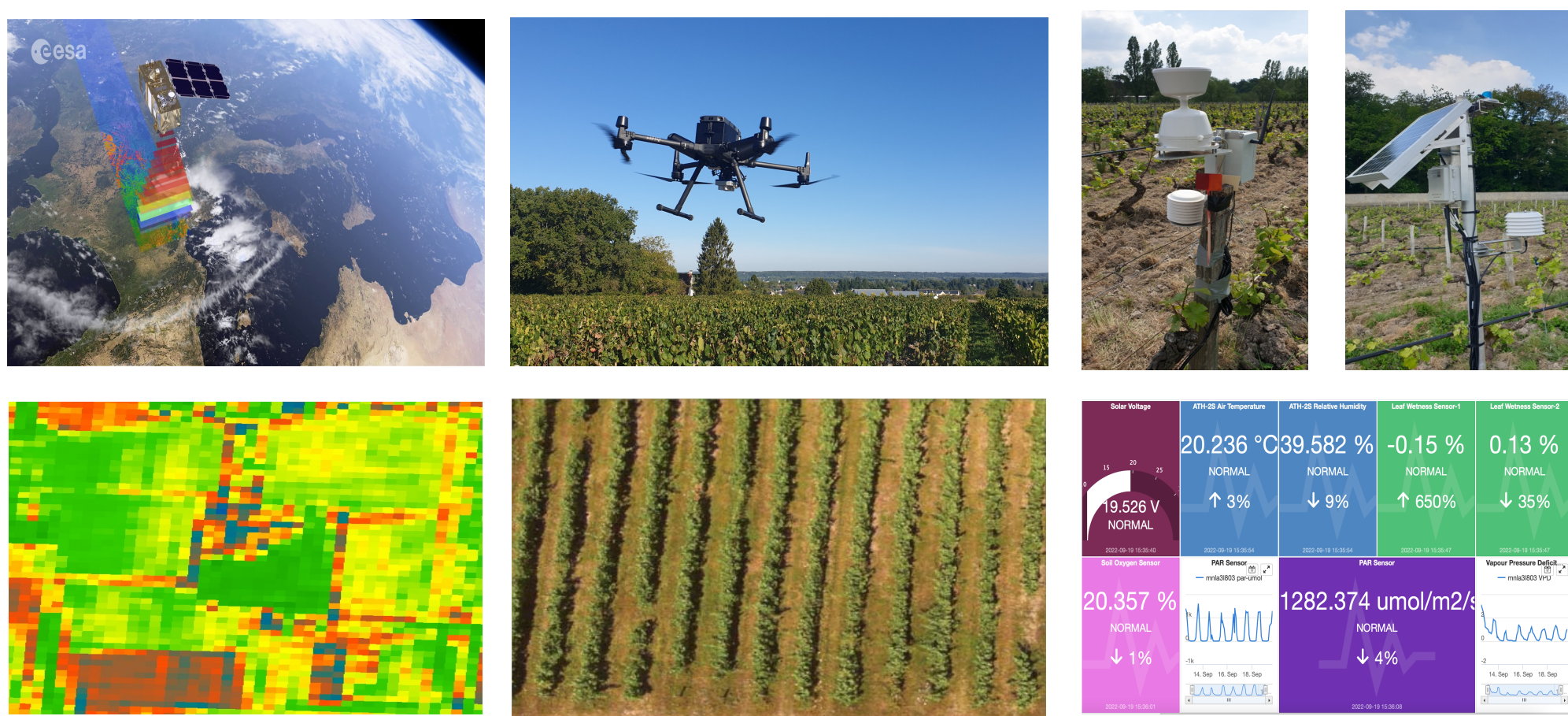


Multiscale Sensing for Disease Monitoring in Vineyard Production

Introduction Vine disease is a major risk for viticulture, involving economic loss, yield quality reduction and environmental impact when using chemicals for treatment. MERIAVINO project advocates a multidisciplinary approach, which is based on several scientific fields to address the problem of disease detection and vineyard monitoring for sustainable viticulture.

Objective/research hypothesis Enhance production efficiency and reduce operating costs through the implementation of robust acquisition systems and intelligent data processing. Utilizing a Machine Learning approach to achieve early detection of vine diseases and enable swift intervention to minimize the use of phytosanitary chemicals.

Method Multiscale sensing and AI for vineyard monitoring in three European countries



Results Deploying IoT systems in three countries—Amboise (France), Athens (Greece), and Murfatlar (Romania), with real-time data acquisition. Correlation between ground truth and IoT insights, adhering to agronomical and microbiological protocols. Integrating multispectral and hyperspectral imaging with drone systems for vineyard sensing. AI-driven methods include disease detection using images and IoT, a data fusion approach for downy mildew detection, and a federated learning approach that aggregates machine learning models. High success rates for disease detection in experimental data.

Conclusion/Future research activities This project has created synergies between research teams in European countries proposing new hardware and software solutions. The study spans diverse vineyard environments has significantly enhanced our collective knowledge and expertise. The agronomic feedback was included in the development process. Future endeavors will prioritize further development in new sensors and data fusion with the correlation of information across varied sites. This emphasis aims to advance early disease identification and prediction, with a focus on rigorous evaluation and practical demonstrations.