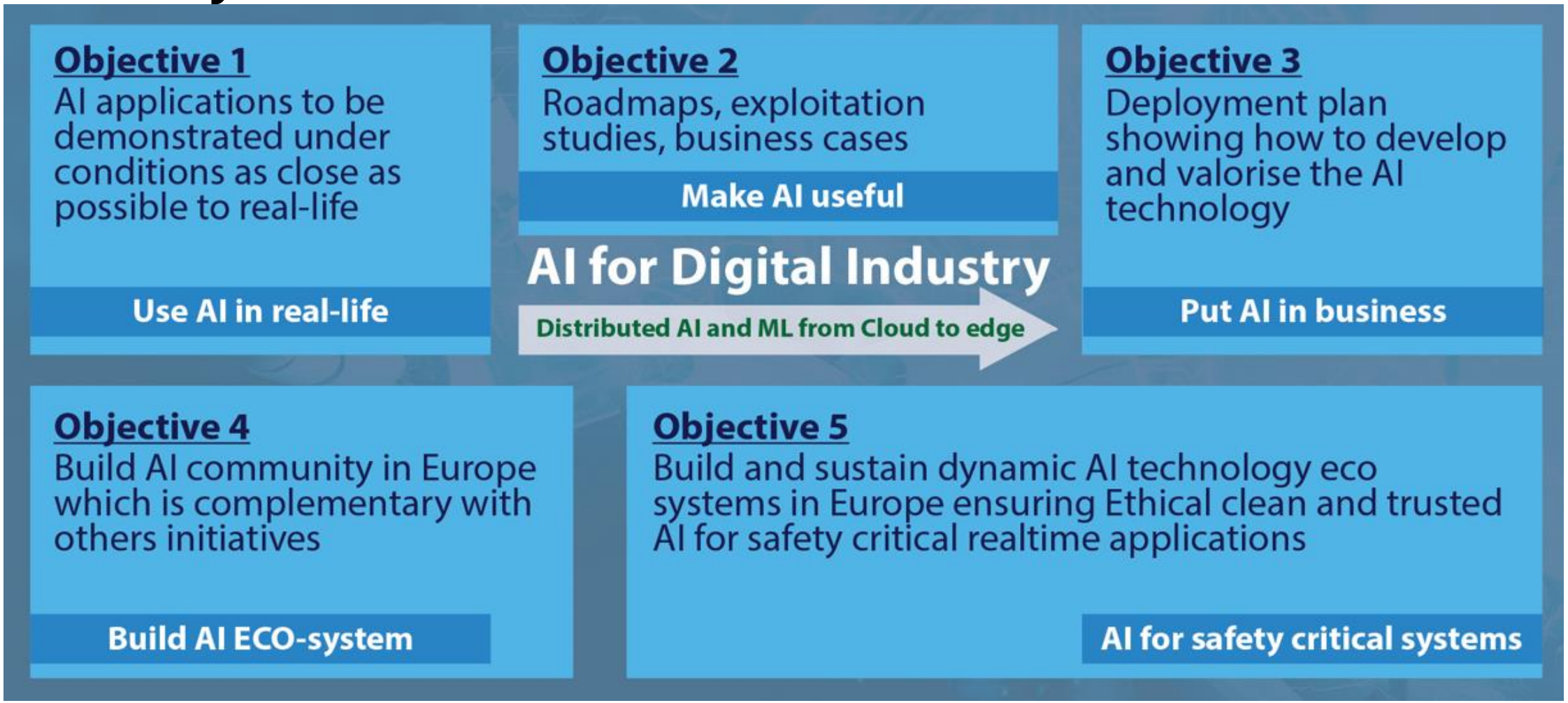
A Real-time Predictive Maintenance use case - AI4DI project

Dr. Francesca Flamigni

TTTech Industrial Automation AG

AI4DI – Artificial Intelligence for Digital Industry



https://ai4di.eu

Collaborative Requirements from 5 different industrial sectors

SC1.2 - Real time Predictive Maintenance

- **Partners:** AVL (Lead), Brno University of Technology, Graz Technical University, TTTech Industrial Automation
- **TRL Level:** 4
- **AI Methods:** Reinforcement learning, Model based reasoning based on physical damage models
- **AI Attributes:** Trustworthy, Secure, Reliable, Resilient, Transparent
- **Objectives and approach:** development of real-time predictive maintenance algorithms using an approach based on machine learning and AI rule-based paradigms

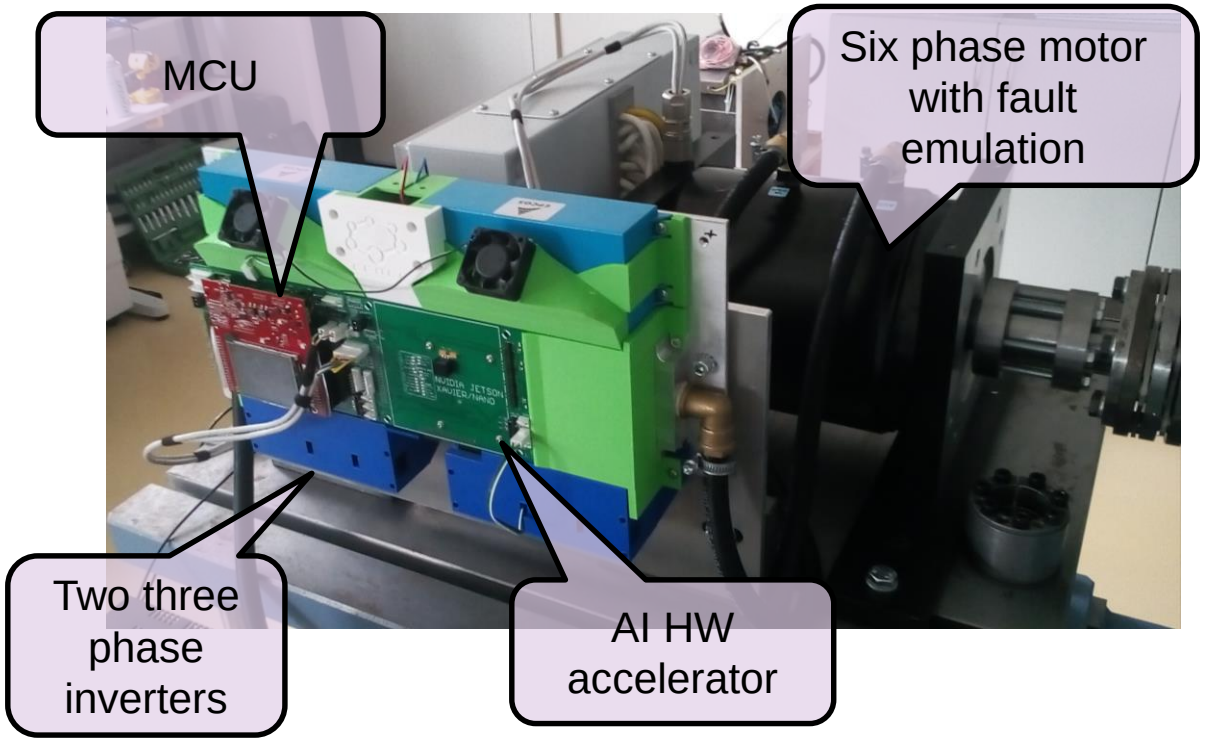
SC1.2 - Real time Predictive Maintenance

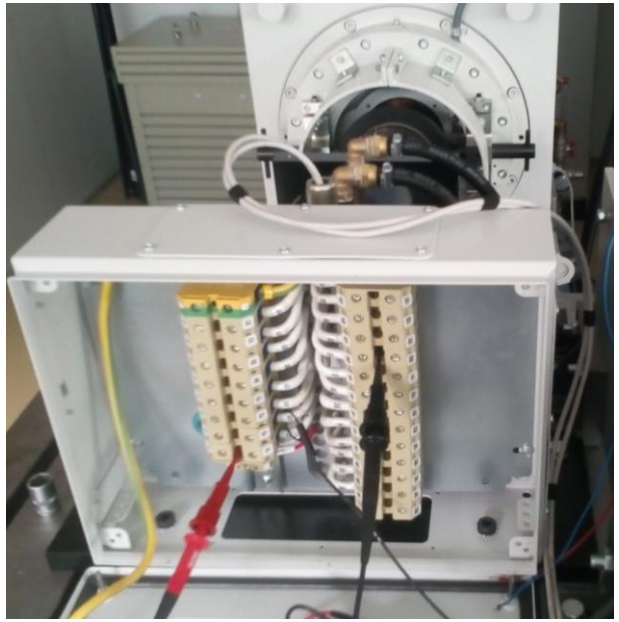
What	Development of a real-time predictive maintenance framework using an approach based on machine learning and AI rule-based paradigms.
How	The demonstrator is implemented on a test rig to demonstrate real-time processing of operation data **on the edge** for failure detection and prediction.
Why	Real-time failure detection and handling increases system availability and safety. In contrast to fixed maintenance intervals, RPM provides cost saving potential e.g., on unnecessary repairs or unexpected system breakdown.
Results	The capabilities for real-time failure detection and handling are demonstrated on an e-motor suitable for failure injection.

Automotive

Predictive health-monitoring system for machines – Test setup

The test setup is composed from 50 kW dynamometer, 30 kW six phase motor with the possibility to emulate different kinds of short circuit faults, two three-phase inverters controlled by high-performance MCU linked with embedded nVIDIA hardware (Jetson Nano/Xavier) by SPI/Ethernet connection.
The aim is to implement real-time diagnostics using pre-trained AI NN.





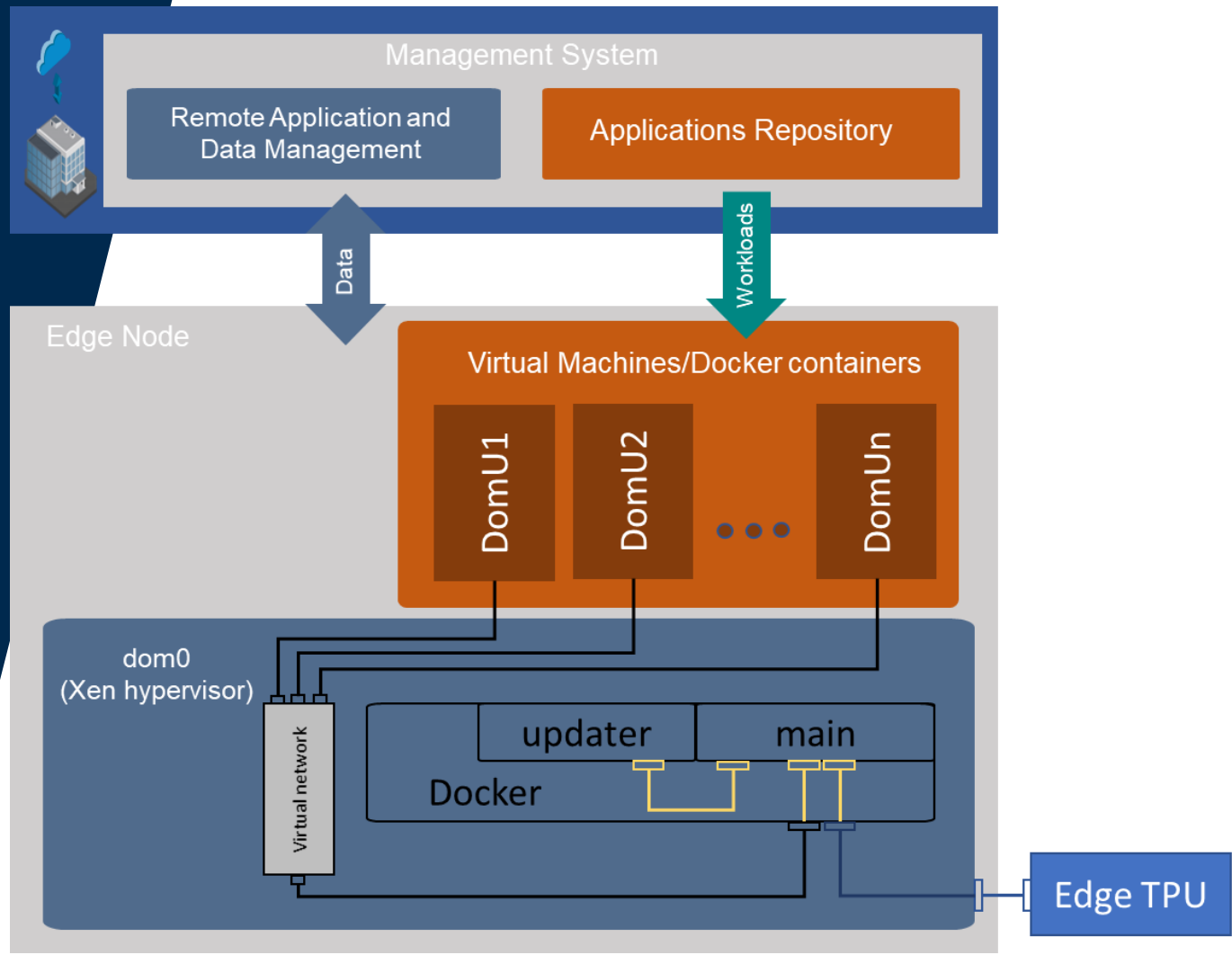
Edge/Cloud platform

AI application

- Virtualisation of AI/ML acceleration hardware based on client/server model. The application can service multiple client requests for accelerated execution of AI/ML model and shall be able to switch between models during runtime and support update of its default model.

Client/Server approach

- Processing the inferencing requests from clients using the AI accelerator
- Updating of default AI model after any active inference process
- Results are sent back to clients for visualization/decision making



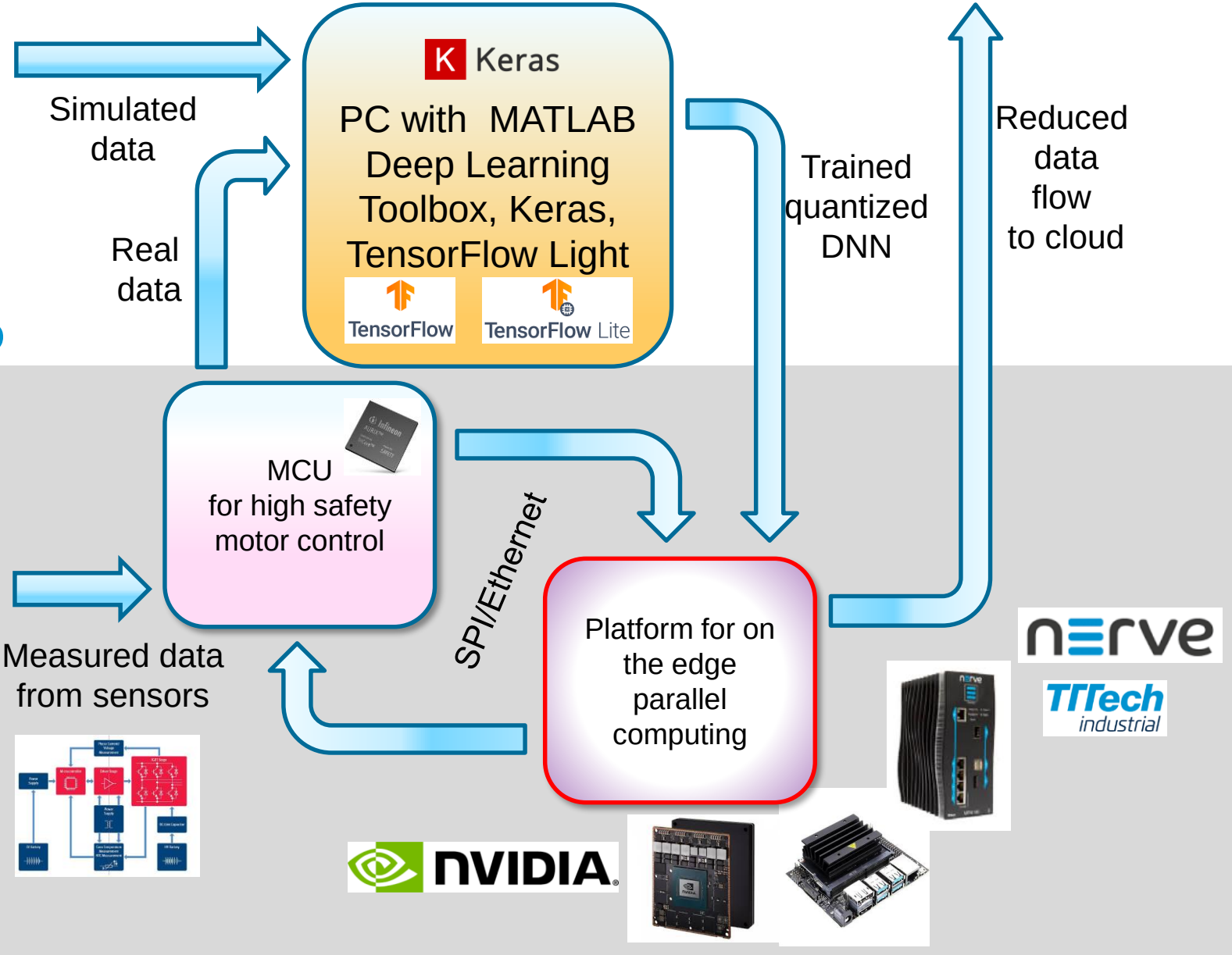
Architecture

Big-Data analytics
Software management

CLOUD

EDGE

Asset management
Edge applications



Thank you!

Francesca Flamigni
Innovation Projects & Funding Manager

Email:
francesca.flamigni@tttech.com

Phone:
+43 - 676 849372 - 4148

www.tttech-industrial.com