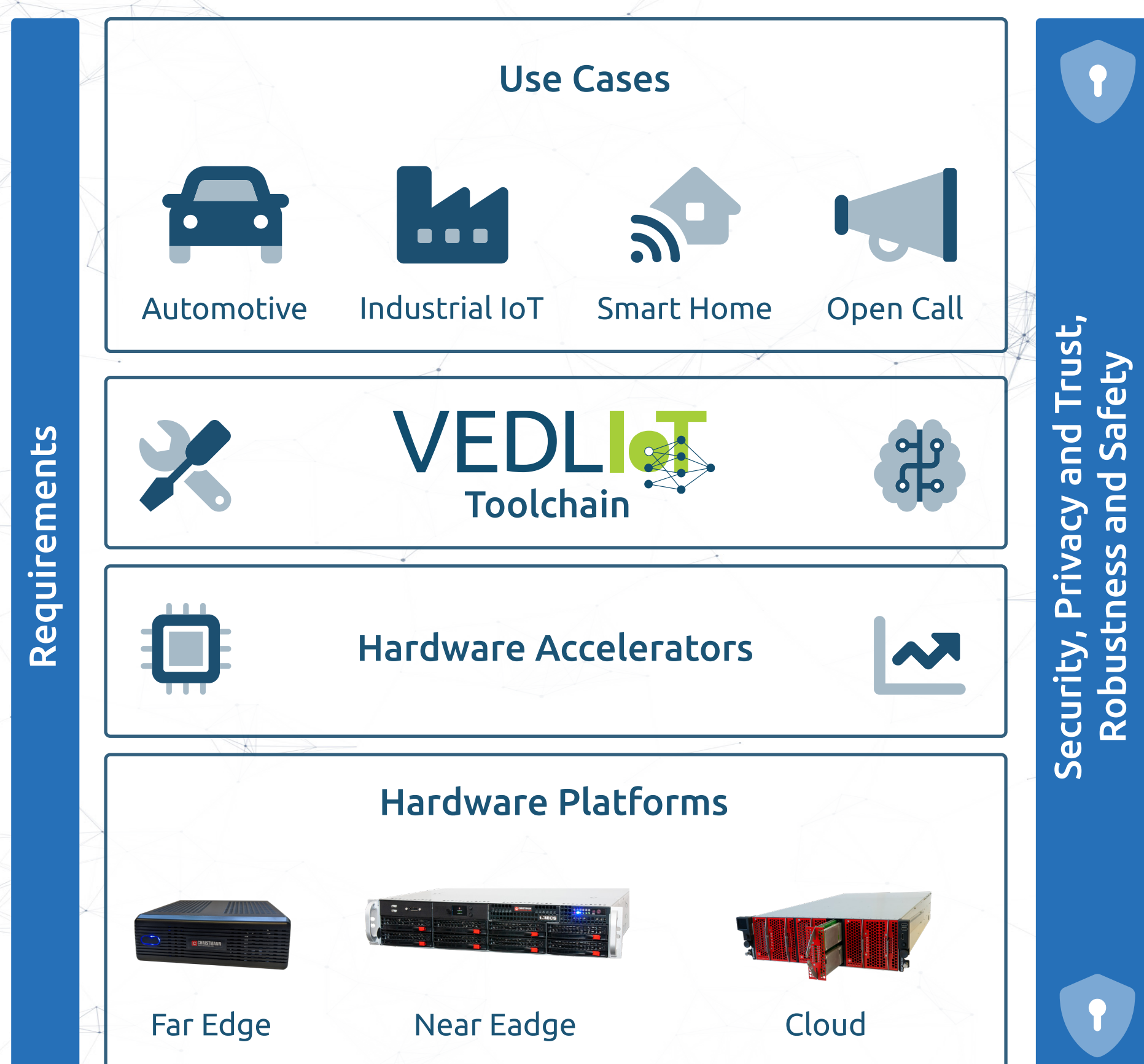# VEDLIoT

Very Efficient Deep Learning in IoT

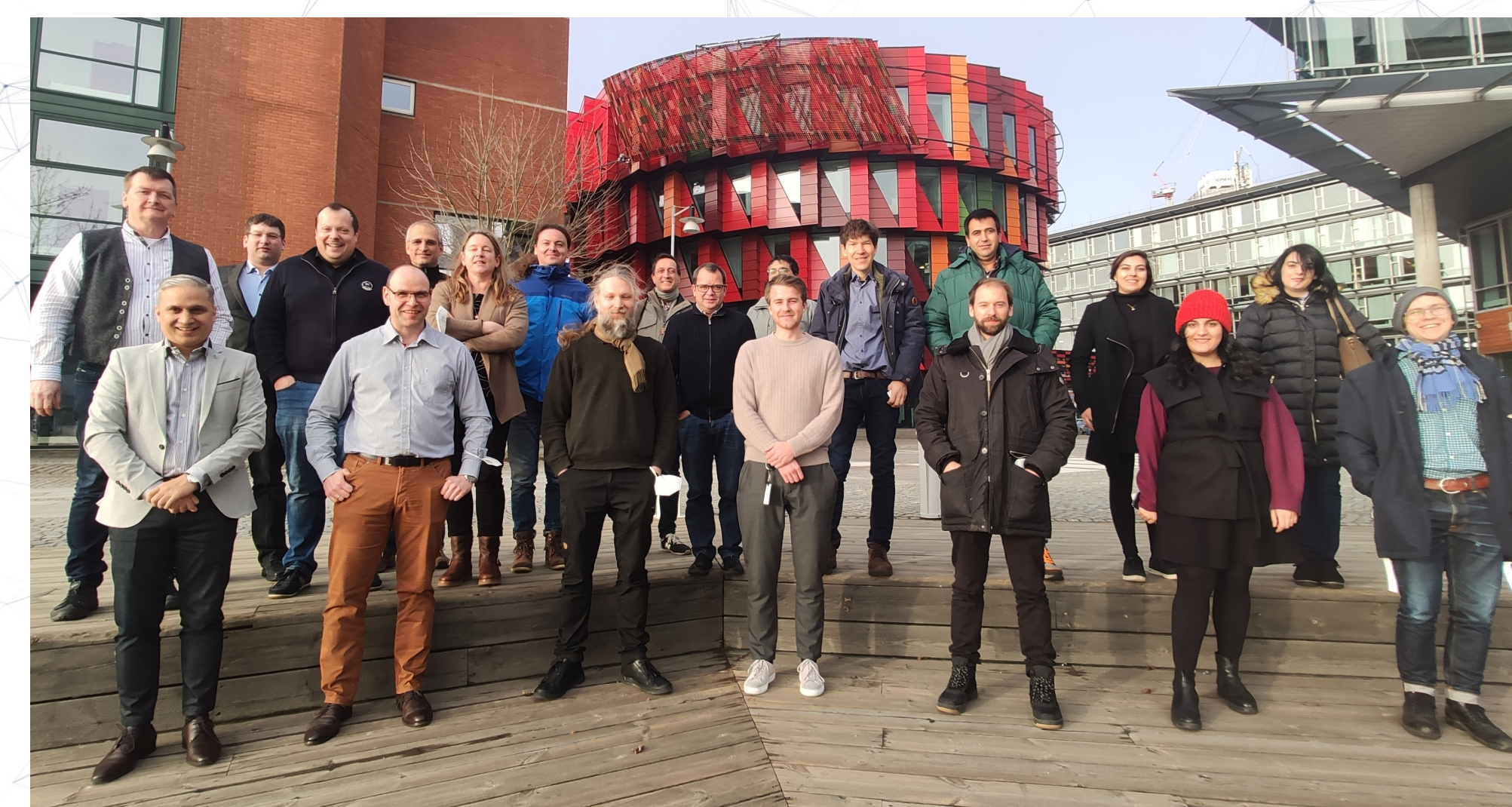# TEACHING THE INTERNET OF THINGS TO LEARN

GOALS

10x improvements in performance and energy-efficiency for AIoT

- ✓ Reconfigurable hardware platform
- ✓ Co-designed accelerators
- ✓ Optimising toolchain for Machine Learning
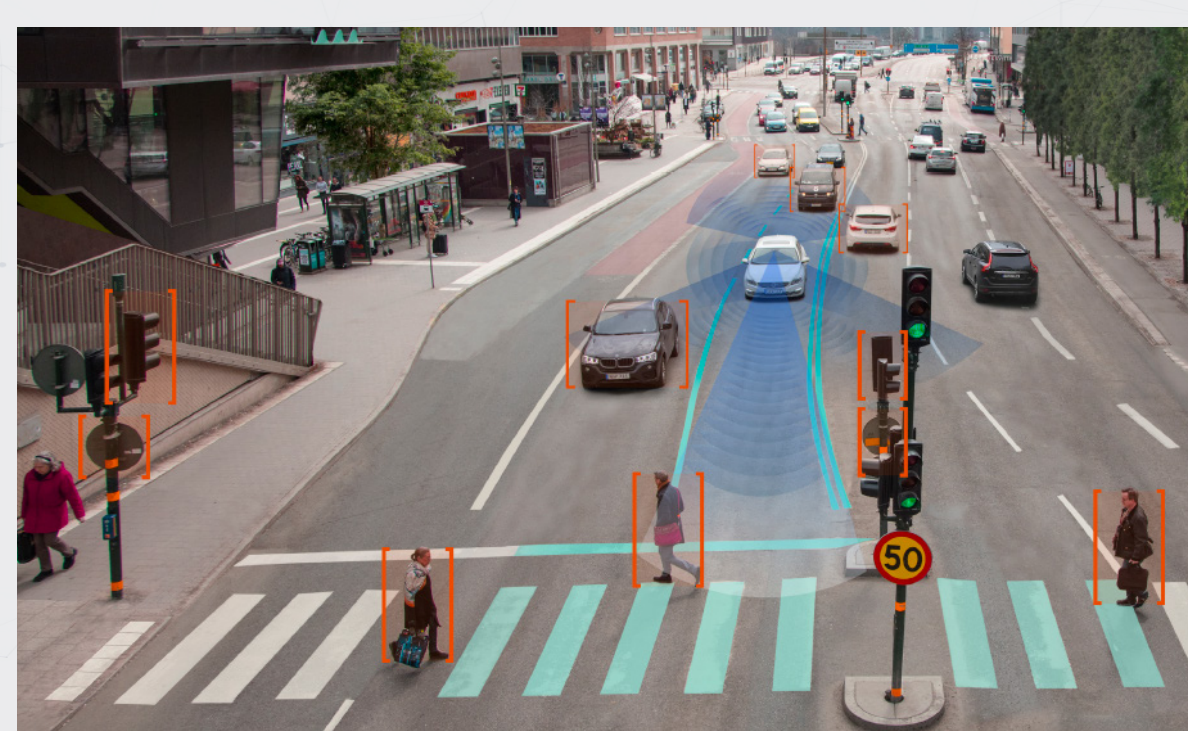- ✓ Harden AIoT systems: Increase security, safety and robustness

Use Cases

Automotive | Industrial IoT | Smart Home | Open Call

VEDLIoT Toolchain

Hardware Accelerators

Hardware Platforms

Far Edge | Near Eadge | Cloud

Requirements

Security, Privacy and Trust, Robustness and Safety

TEAM

USE CASES

Automotive

- Pedestrian Detection for autonomous emergency braking
- Dynamically distributed computation on far edge, near edge and cloud hardware at run-time
- Energy-efficiency and safety as key objectives

Smart Home

- Smart Mirror as an intuitive interacion interface for AI-assisted living
- Multiple neural networks work in parallel for gesture, object detection and face recognition
- Integrated voice assistant including Natural Language Processing (NLP)
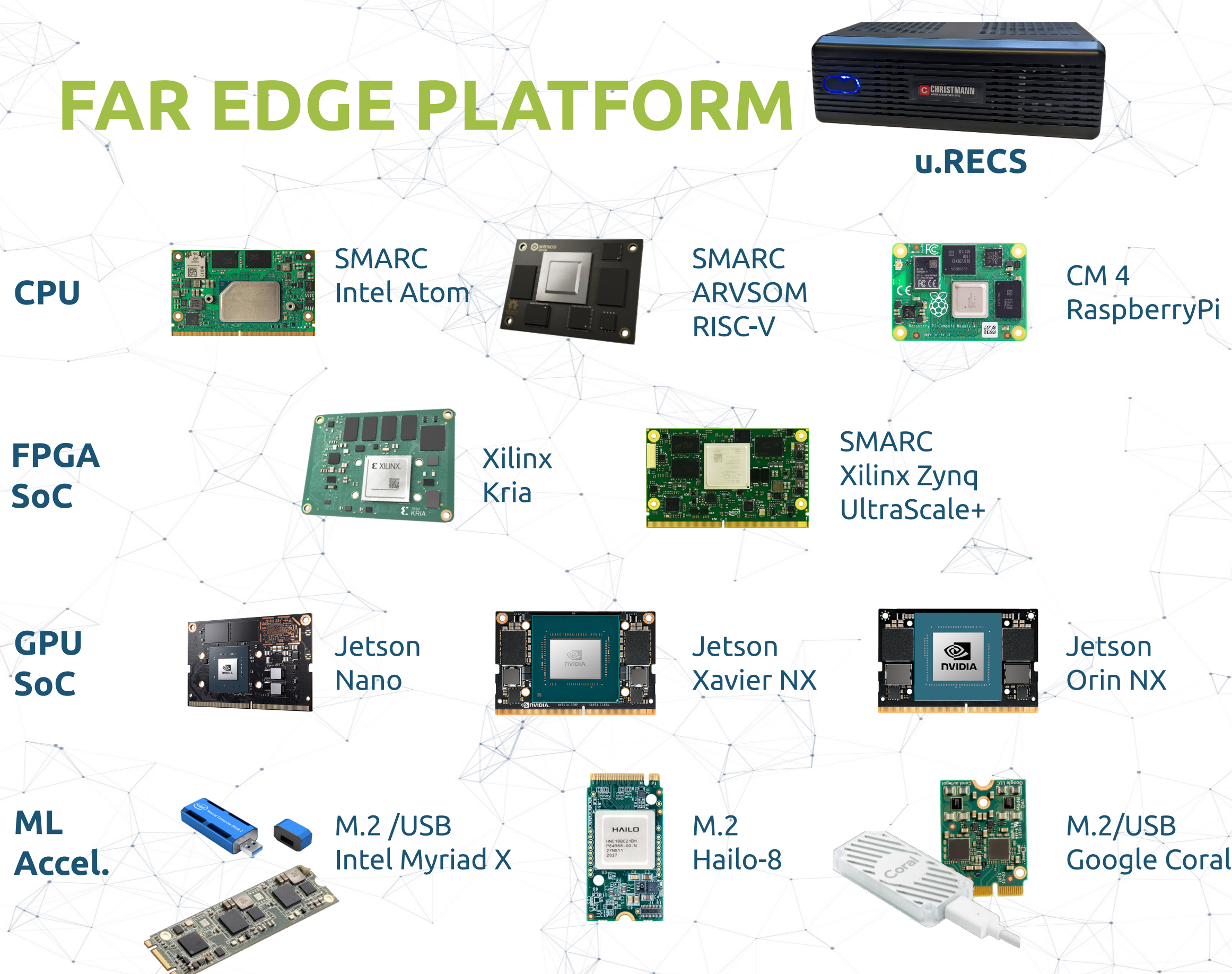- Privacy and efficiency are key objectives

Industrial IoT
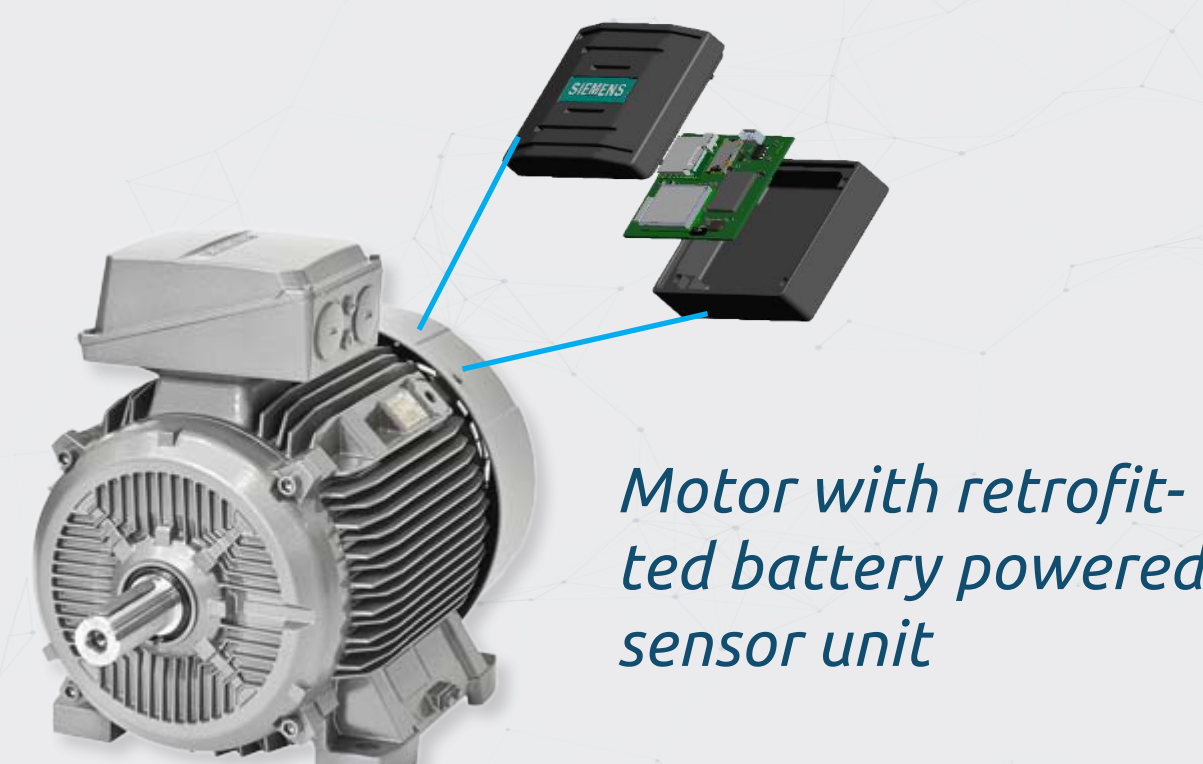
- Predictive maintenance for direct driven motors
- AI-based sensor fusion for improved predicion accuracy
- Key objective is energy-efficiency for longer battery livetime

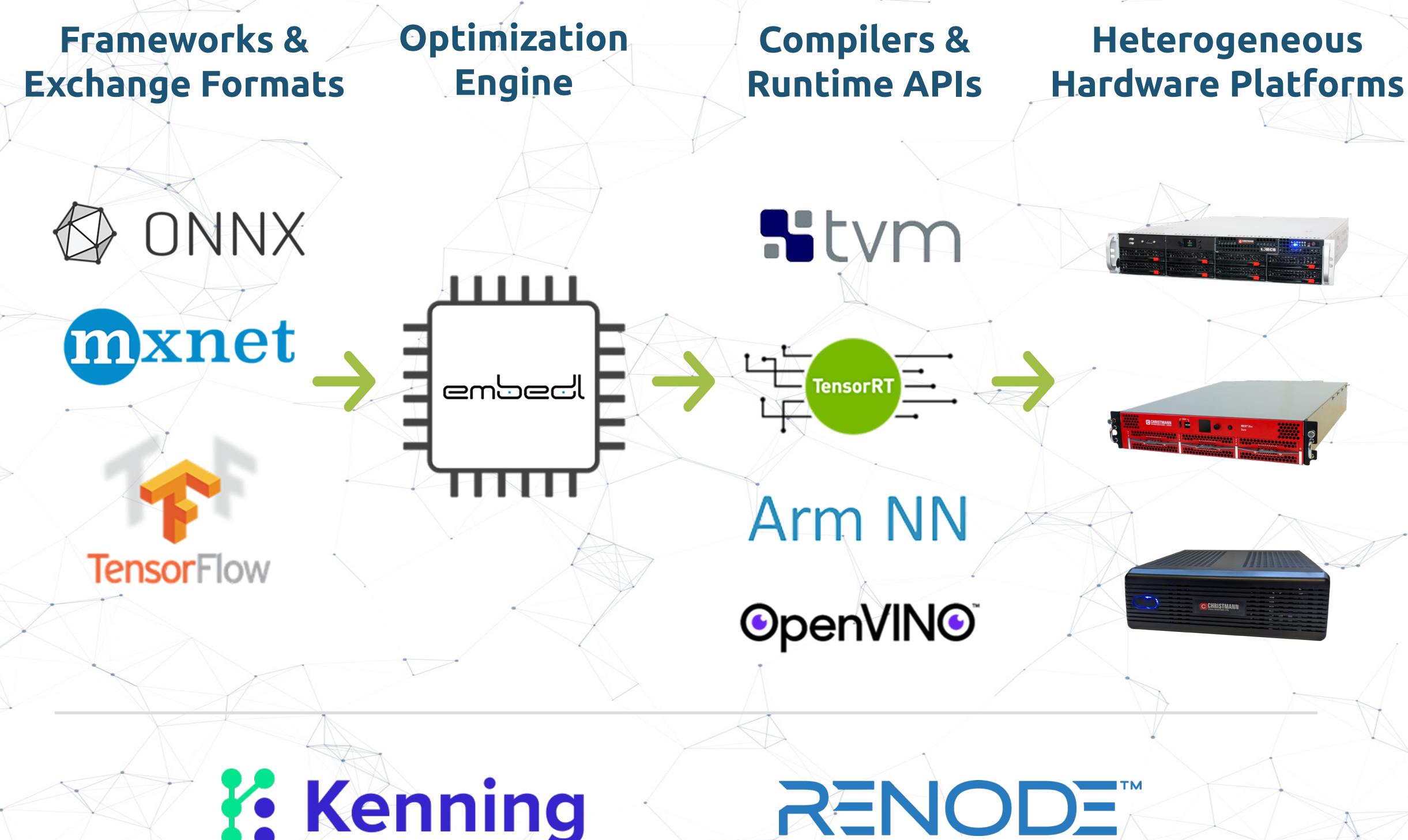*Motor with retrofitted battery powered sensor unit*

OPEN CALL

- 10 out of 30 proposed projects selected in Open Call (OC)
- Selected projects cover additional IoT domains such as Agriculture, Medical, Life Science, Manufacturing and Healthcare
- OC projects get early access to **VEDLIoT** hardware platforms and toolchain

FAR EDGE PLATFORM

u.RECS

CPU	SMARC Intel Atom	SMARC ARVSOM RISC-V	CM 4 RaspberryPi
FPGA SoC	Xilinx Kria	SMARC Xilinx Zynq UltraScale+	
GPU SoC	Jetson Nano	Jetson Xavier NX	Jetson Orin NX
ML Accel.	M.2 /USB Intel Myriad X	M.2 Hailo-8	M.2/USB Google Coral

TOOLCHAIN

- Optimisation of Deep Neural Networks using the EmbeDL technology
- Target heterogeneous hardware to boost performance and energy-efficiency
- Easy-to-use deployment flow with Kenning framework
- Hardware/software co-development with Renode
- Secure IoT platforms by remote attestation

Frameworks & Exchange Formats: ONNX, mxnet, TensorFlow

Optimization Engine: embedl

Compilers & Runtime APIs: tvm, TensorRT, Arm NN, OpenVINO

Heterogeneous Hardware Platforms

Kenning | RENODE

CONTACT

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