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enabling battery-free IoT

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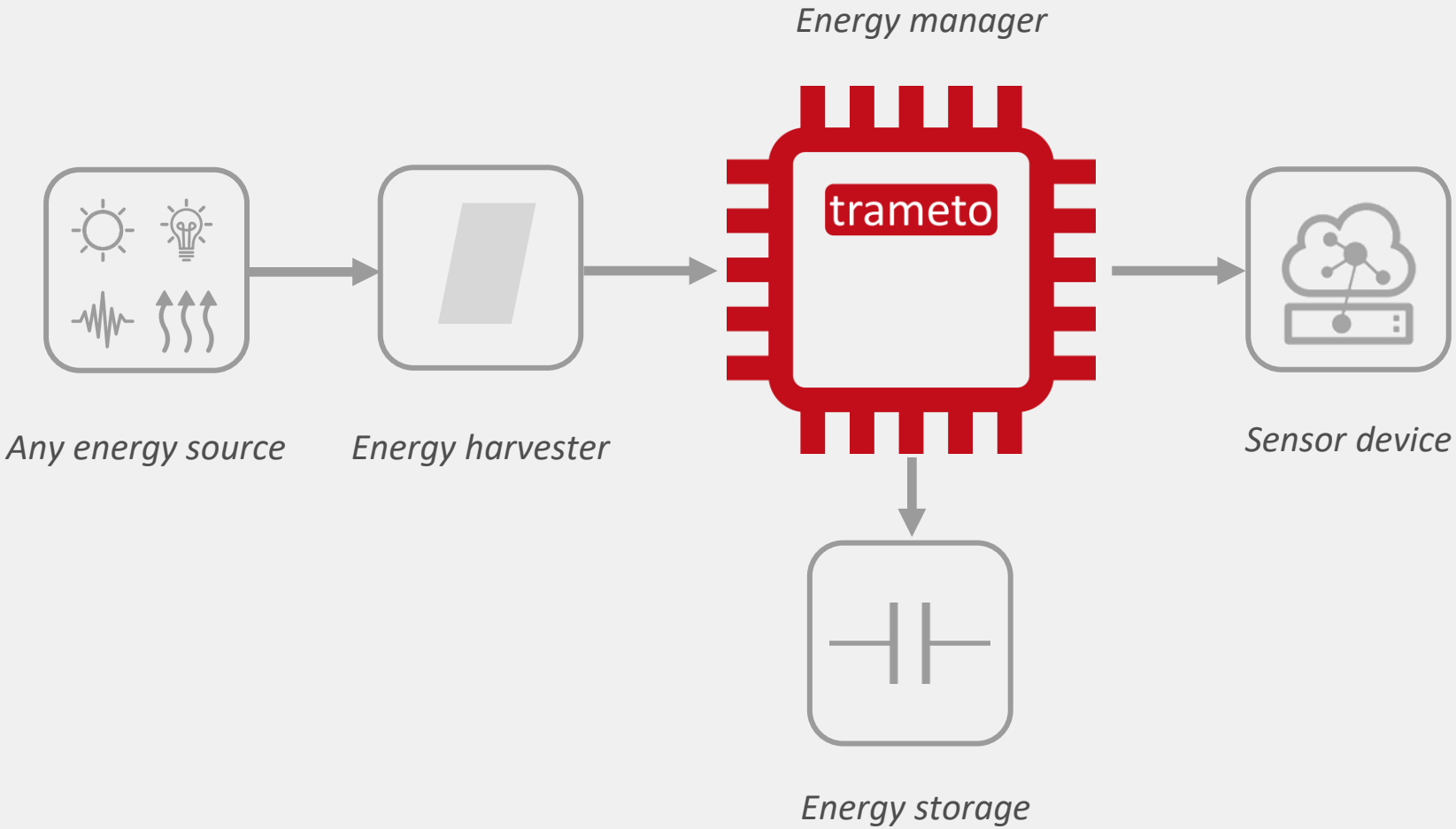
WWCA
Wireless Communications Alliance

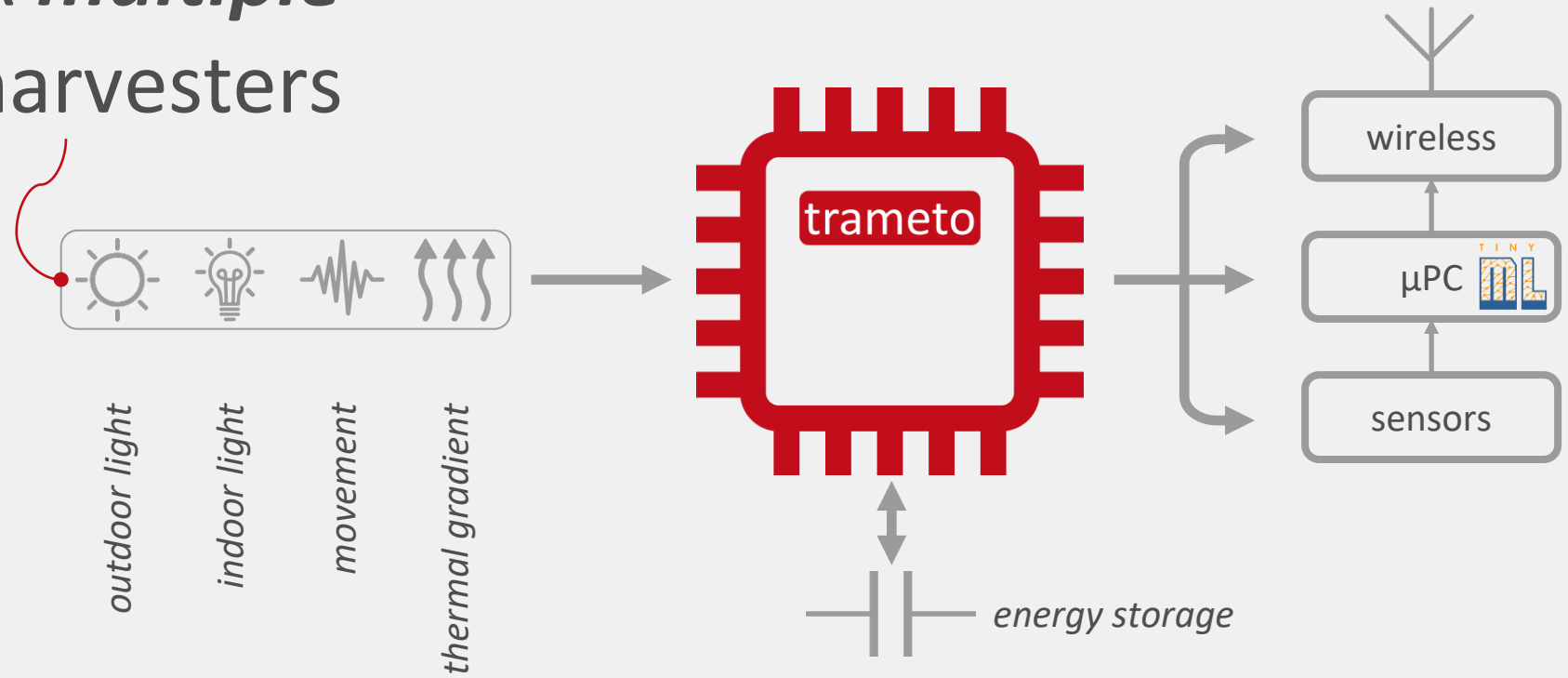
disruptive power management
to eliminate batteries
in trillions of ultra-low-power edge IoT systems

Context: power management & energy harvesting



Solution: *disruptive* power management

any OR ***many***
OR ***multiple***
harvesters



What is tinyML? – Pete Warden, Google

What is TinyML?

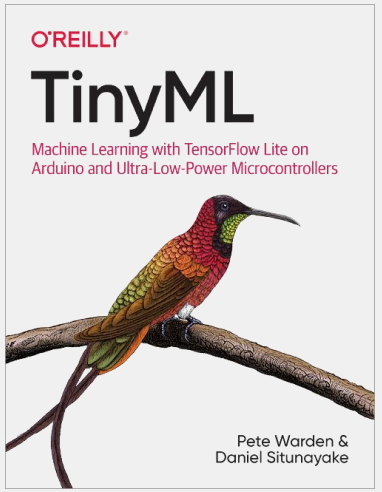
Running machine learning at less than one milliwatt

- Enables battery or energy-harvesting devices
- Power constraints mean we can't be connected most of the time
- Scales to trillions of cheap, independent sensors
- Requires code that can run with just kilobytes of memory

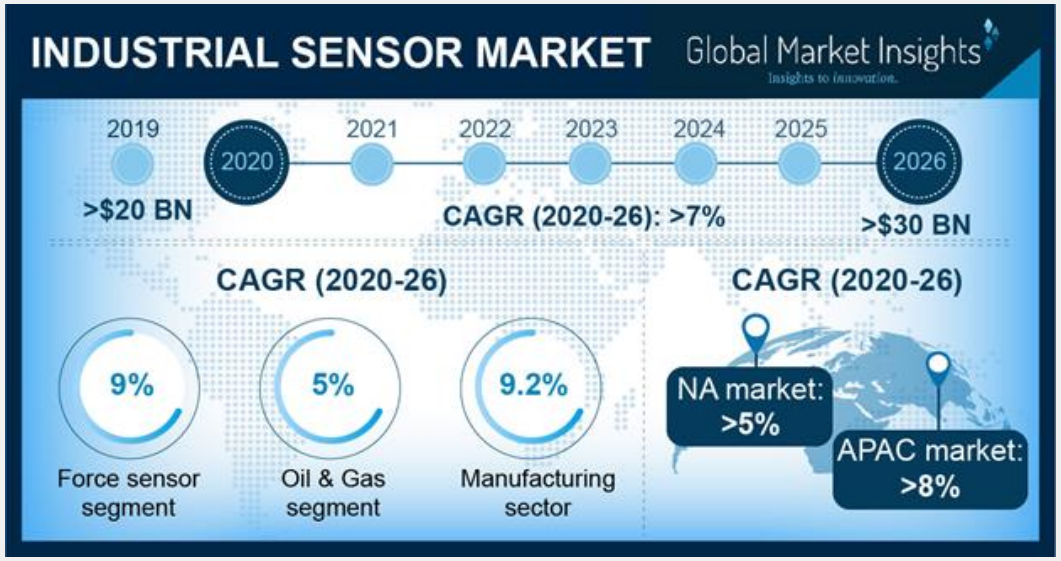
SAMSUNG

Google Microsoft

arm Qualcomm



Market opportunity driven by industrial IoT



Ultra-low-power microcontroller market $13 billion by 2024, at CAGR of 24%

MARKETSANDMARKETS

Solid state battery market $1.4 billion by 2025, growing at CAGR of 49%

Allied Market Research

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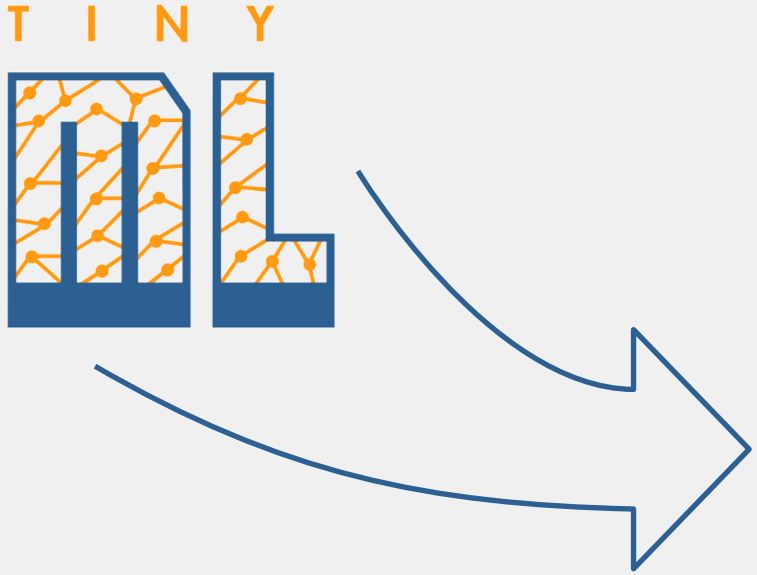
Market: industrial IoT



TOSHIBA

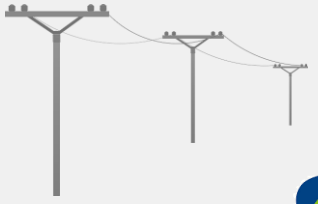
Machine condition

Google

Asset tracking

TDK

Automotive



SSE

Smart infrastructure

NetworkRail

Transport

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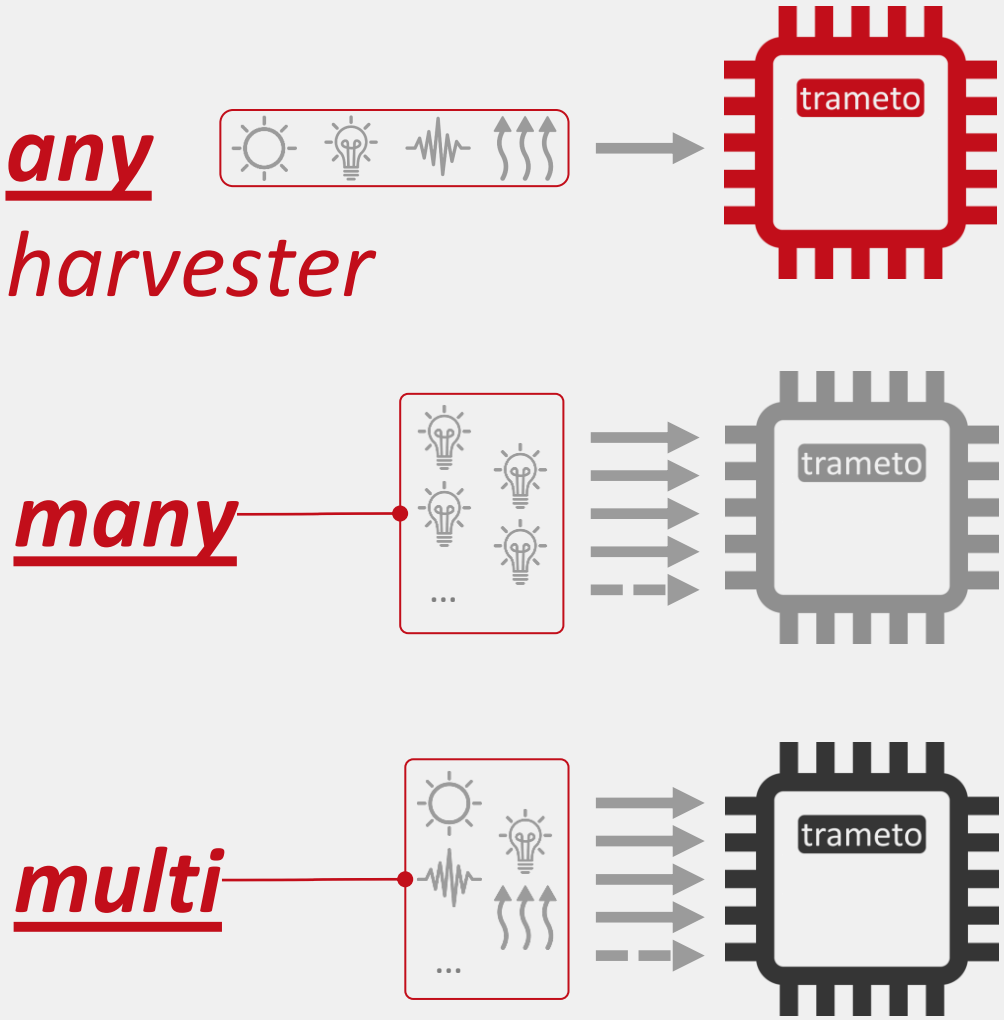
Products: portfolio of devices



NEW

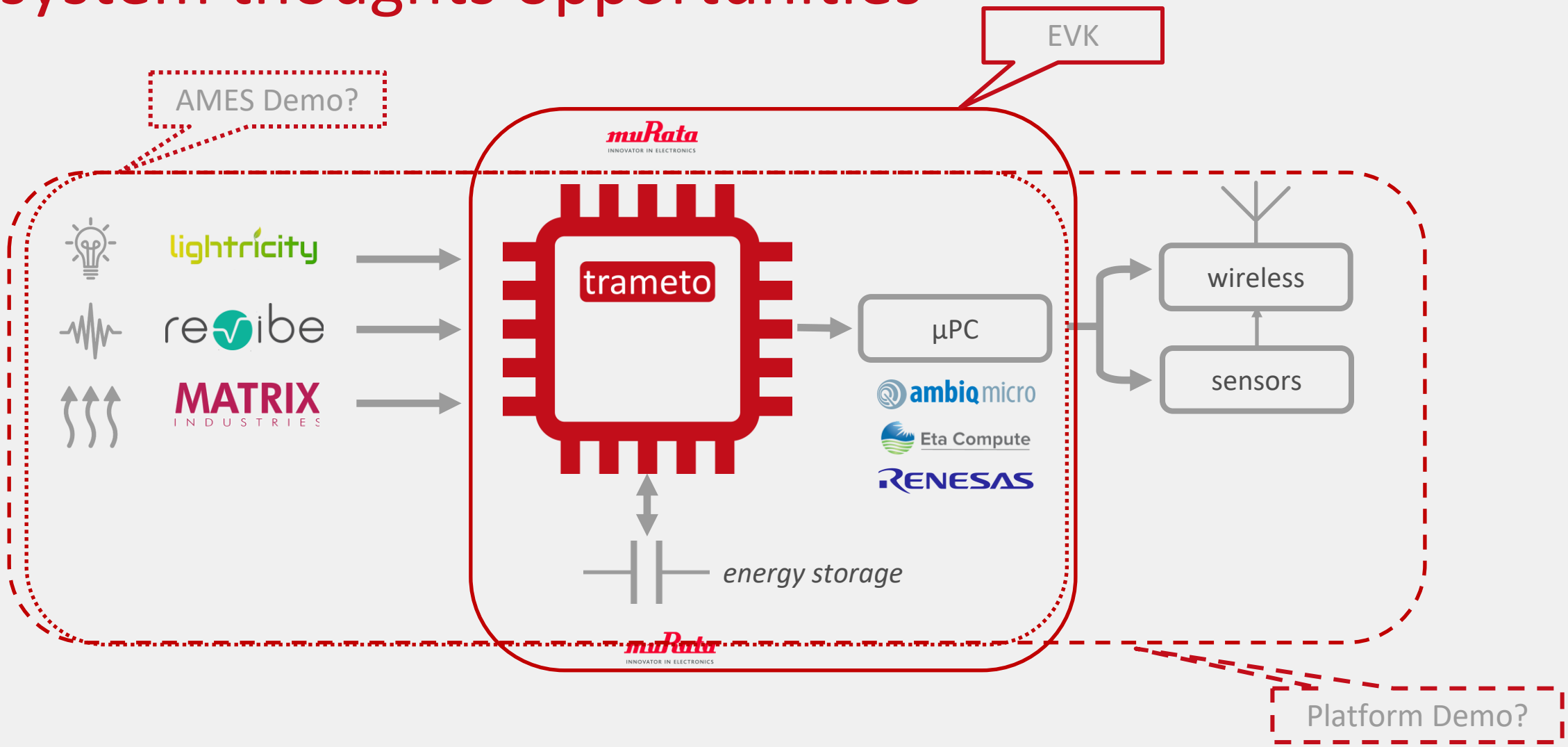
Effective harvesting
"self-sustaining" e.g. tinyML

Autonomous
simplifies design

Reduced components
lowers BoM

Industry-leading cold start
quickly activates harvesting

Ecosystem thoughts opportunities



Ready for talks with collaborators & partners

Energy harvesting

Sensors

Ultra low power µPC

Energy storage

Wireless communications

Directed development – ***Link*** program

- Trameto planning to build EVK systems for each of US | Eur | Japan
- Into key markets of Asset tracking | Machine monitoring | Transport
- Early access to breakthrough tech & grow energy harvesting awareness
- Partners drive specification of EVK, e.g. support for SSB
- Early push into tinyML market space
- Partners receive phased deliveries on commercial terms

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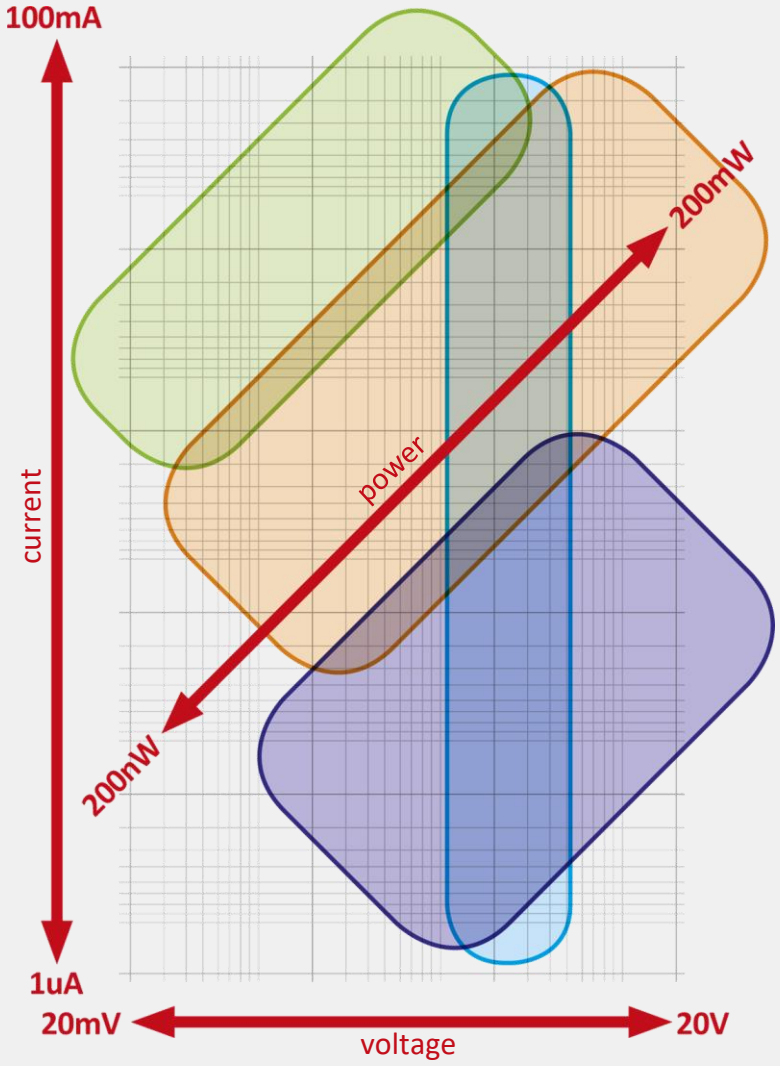
Technology partners

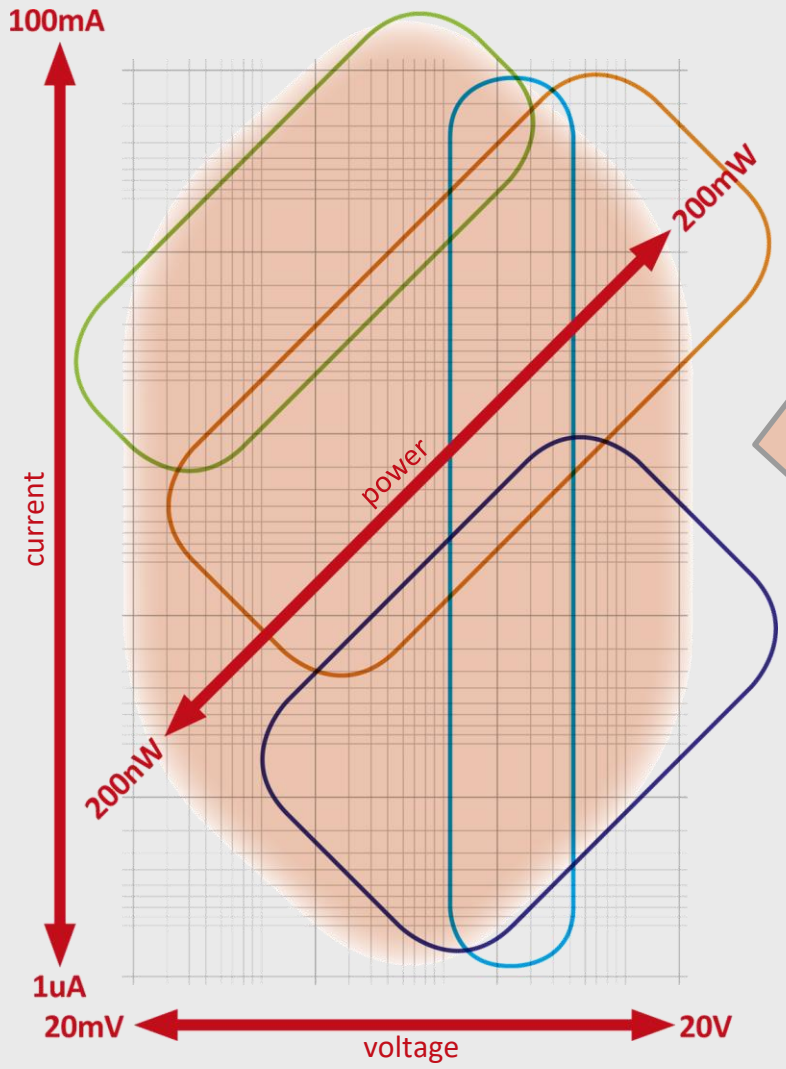
Technical challenge: Any OR many OR multi difficult



Wide range of electrical characteristics

- Thermoelectric
- Electrodynamic
- Photoelectric
- Piezoelectric

Technical challenge



Thermoelectric

Electrodynamic

Photoelectric

Piezoelectric

maximises effective operating area

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