

Saturn 2016

Internet of Things Reference Architecture & Case Studies

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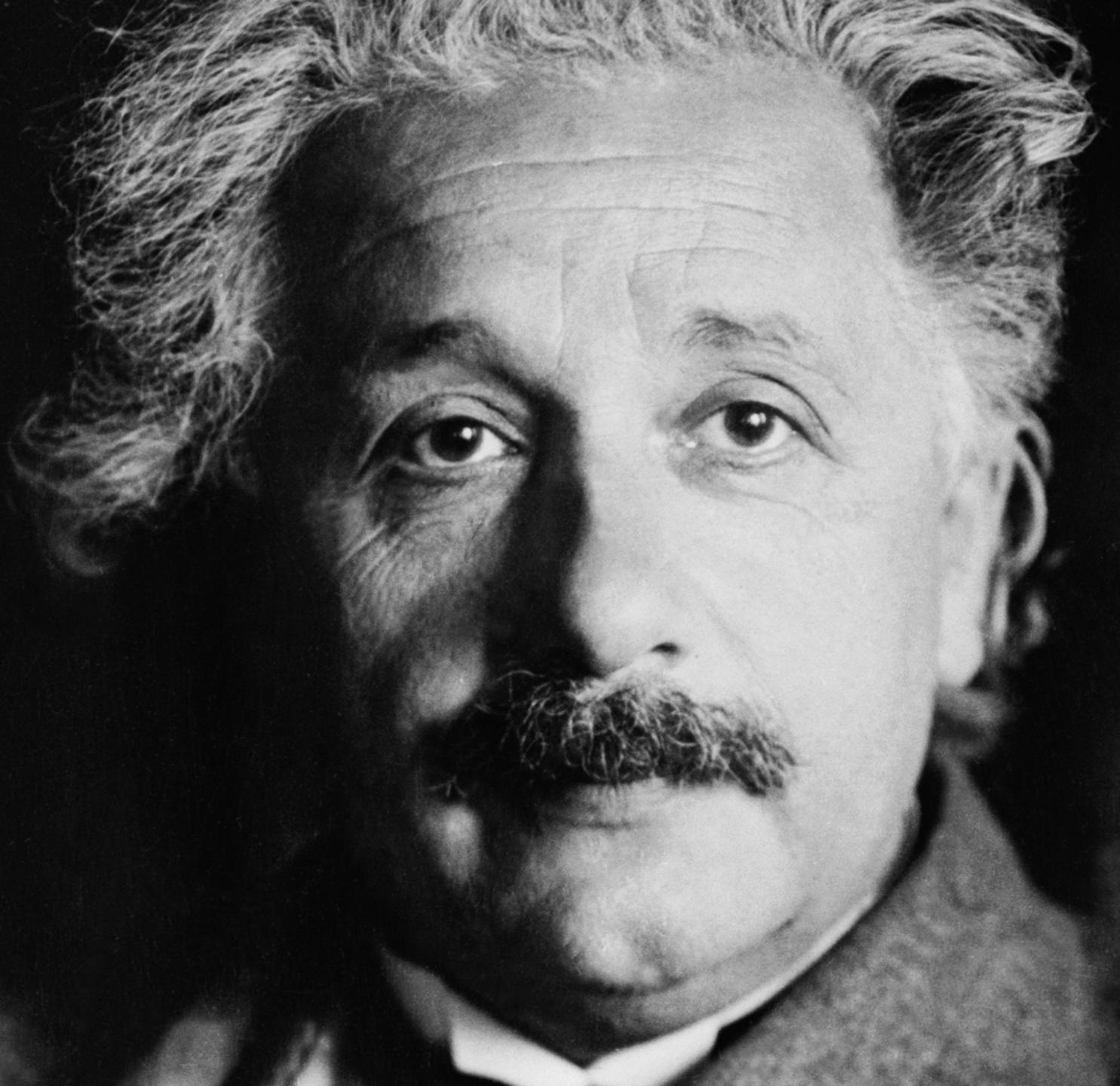


Software Engineering Institute
Carnegie Mellon University

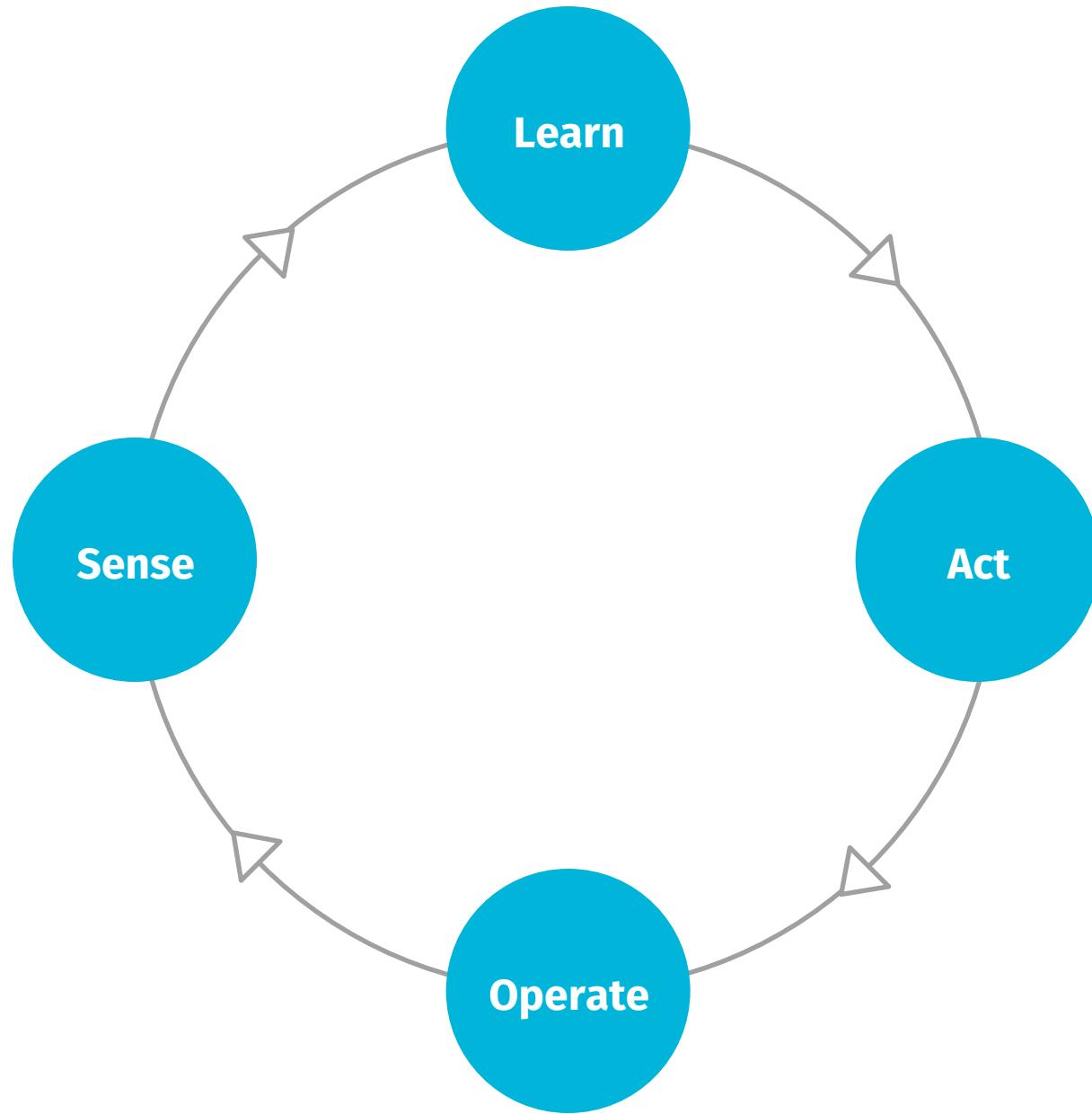
softserve experience matters

*“Look deep into nature,
and then
you will understand
everything better.”*

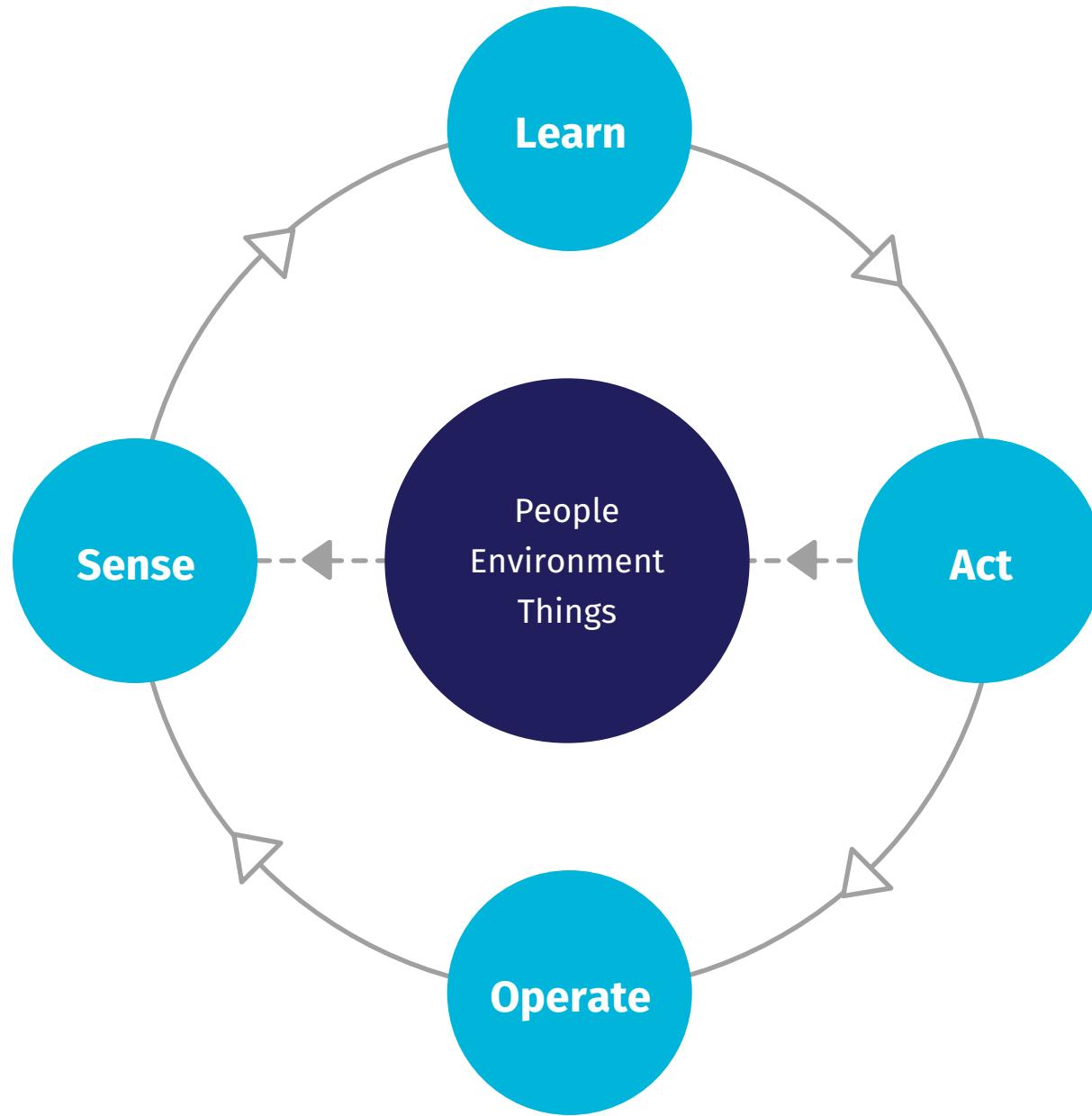
~ Albert Einstein



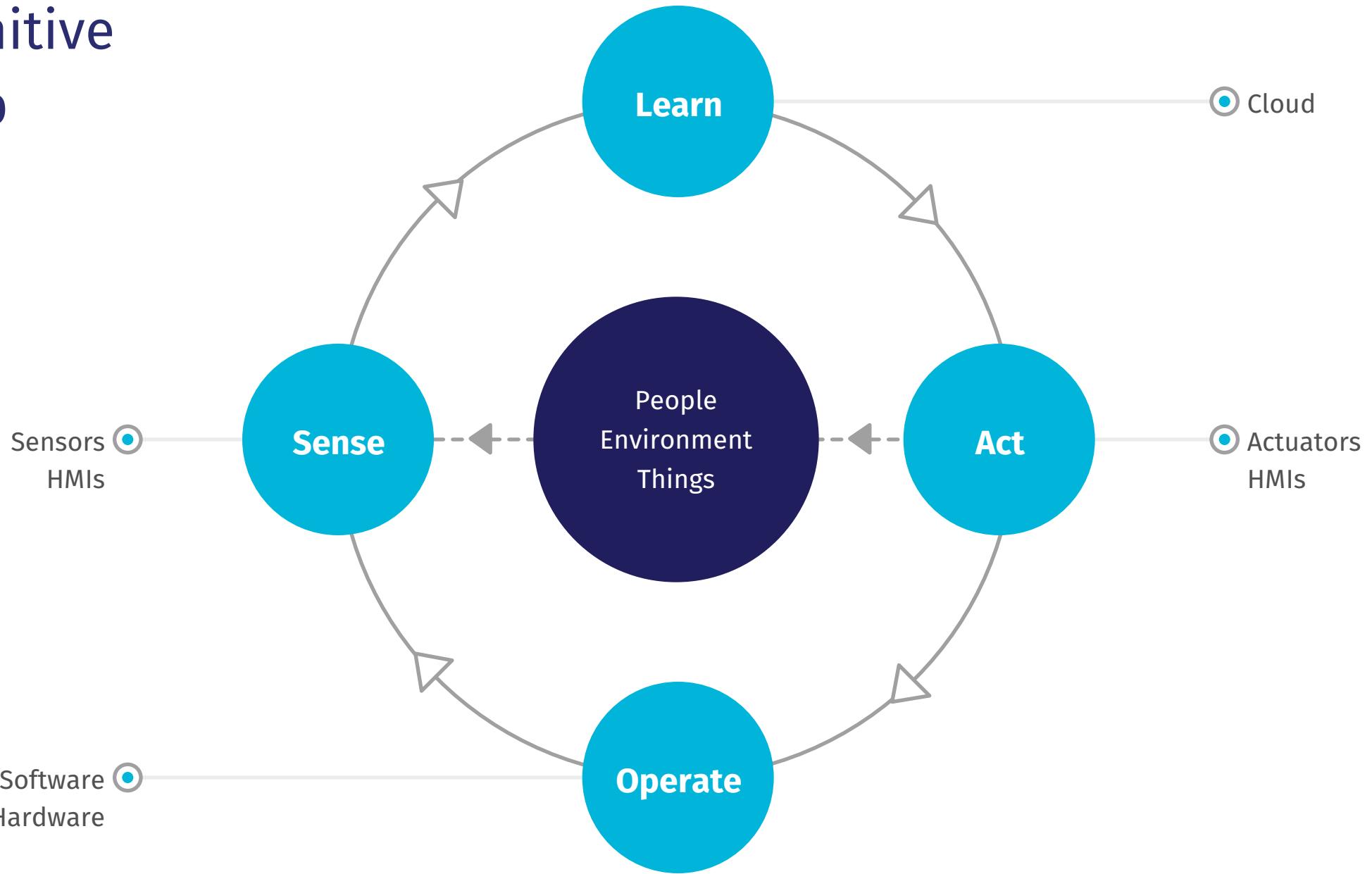
Cognitive Loop



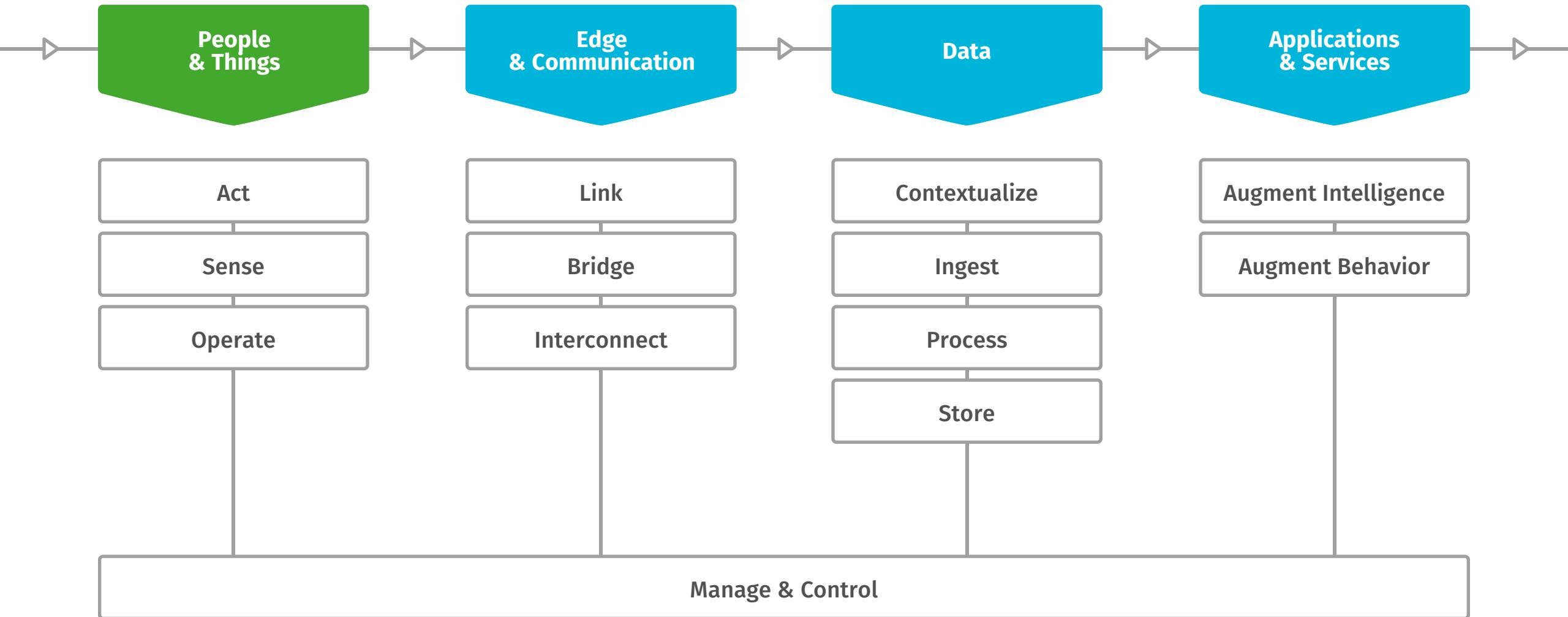
Cognitive Loop



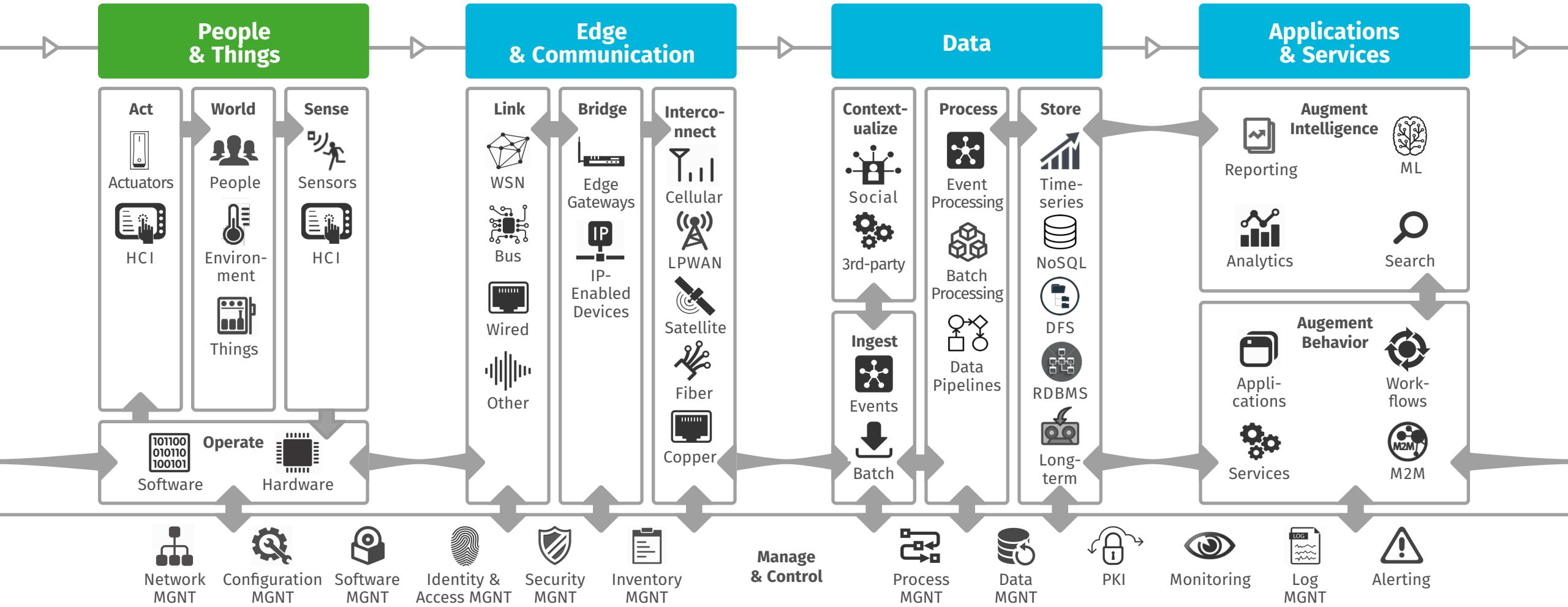
Cognitive Loop



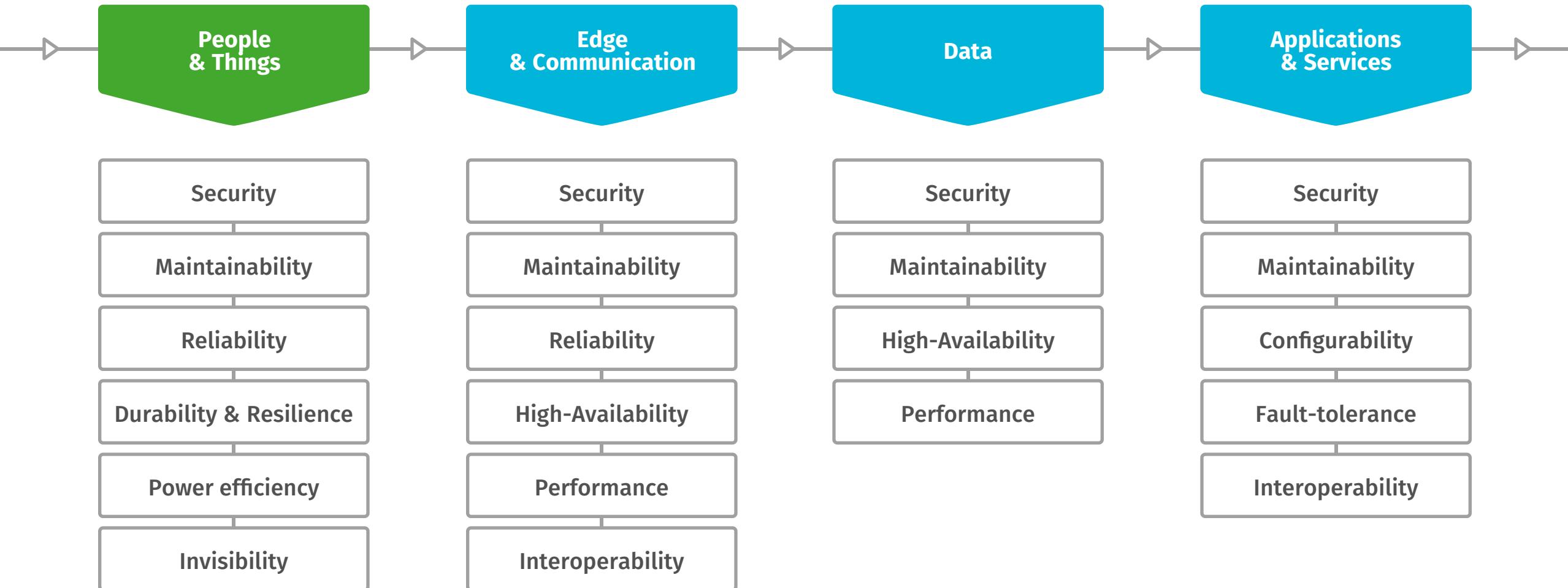
Reference Model



Implementation View



Quality Attributes



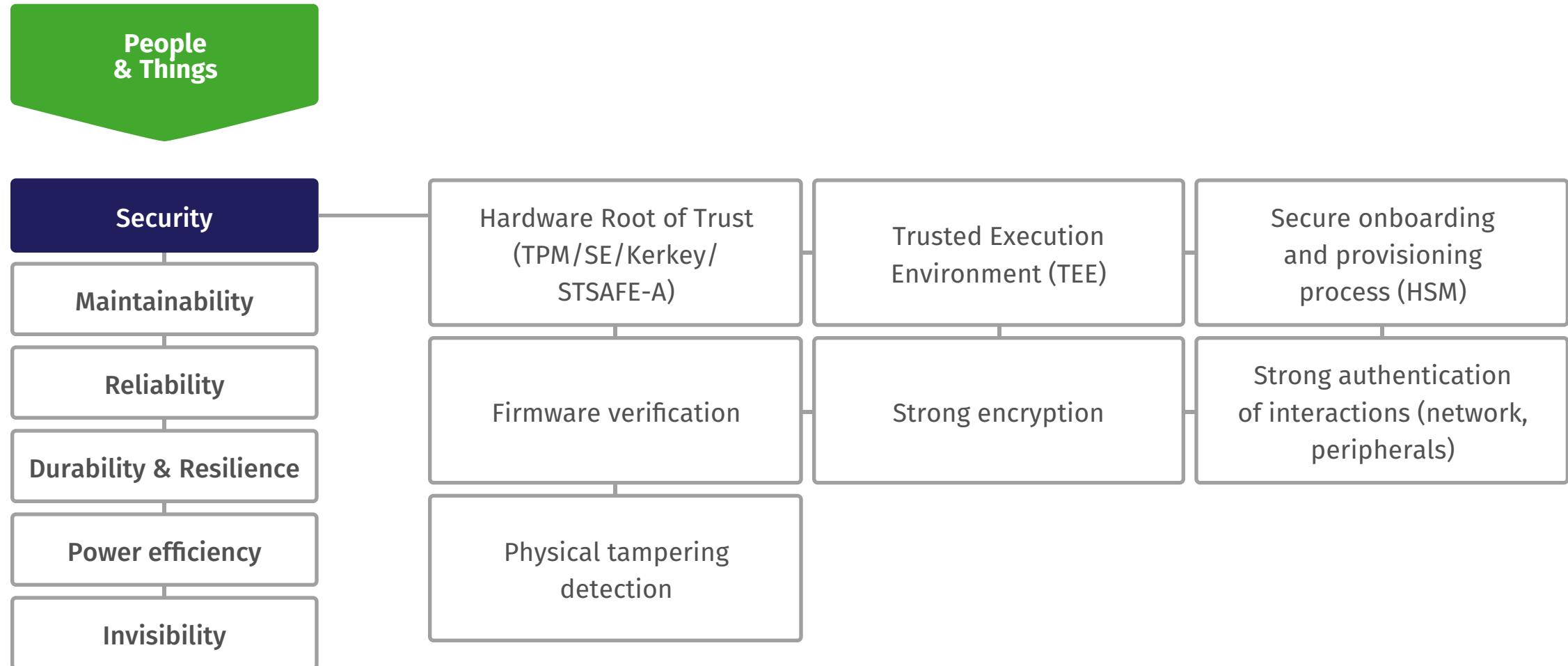


Known Vulnerabilities That Ship With New Devices



- Cleartext Local API
- Cleartext Cloud API
- Unencrypted Storage
- Remote Shell Access
- Backdoor Accounts
- UART Access

People & Things: Tactics





Case Study: Smart Fridges Solution

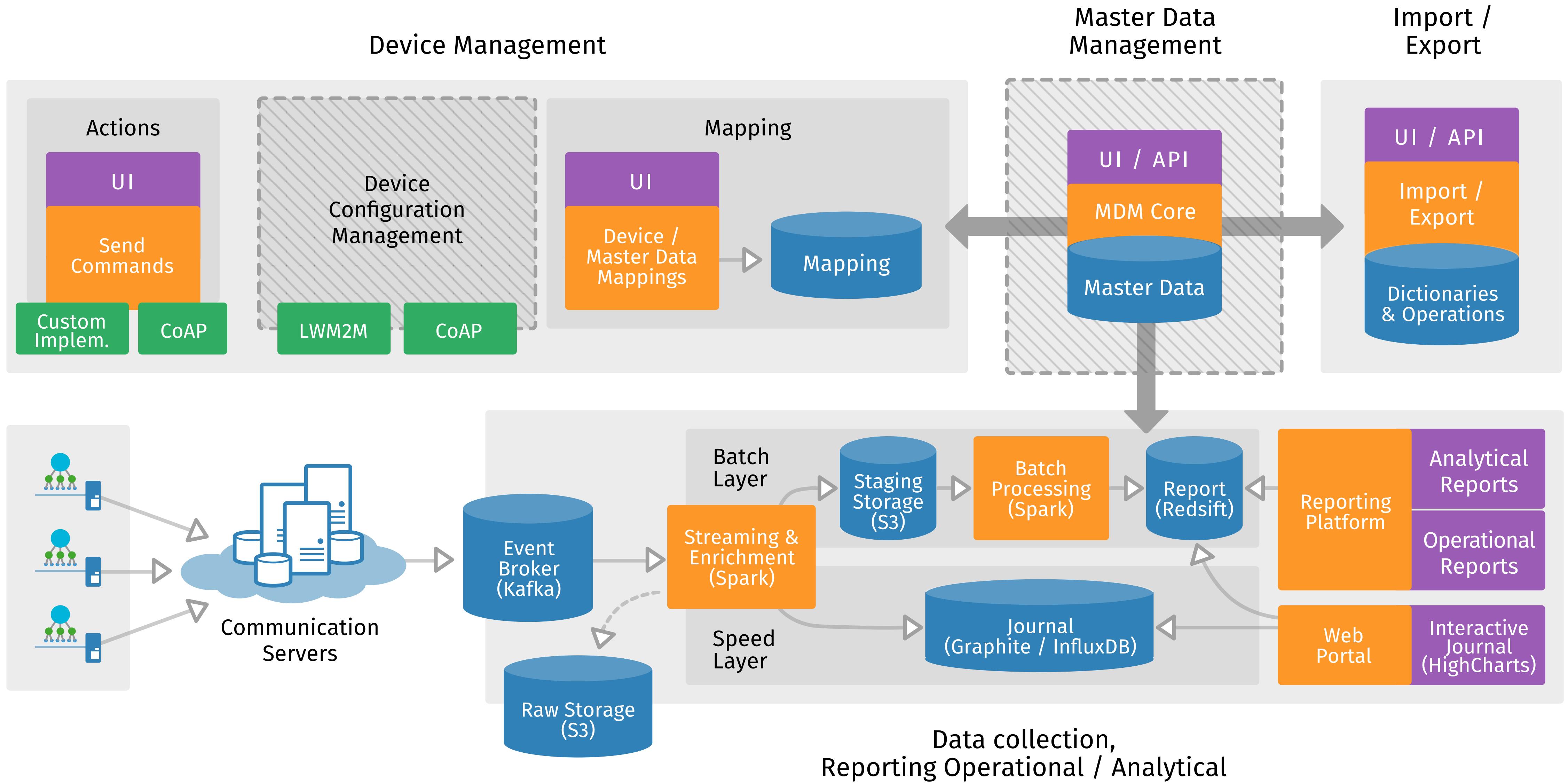
Designed to scale up to hundreds
thousands devices

Freezers and fridges monitoring and management solution.
Cloud based services allowing bidirectional communication to hundreds
thousands sensors/actuators for data collection/remote assets
management and analytics.

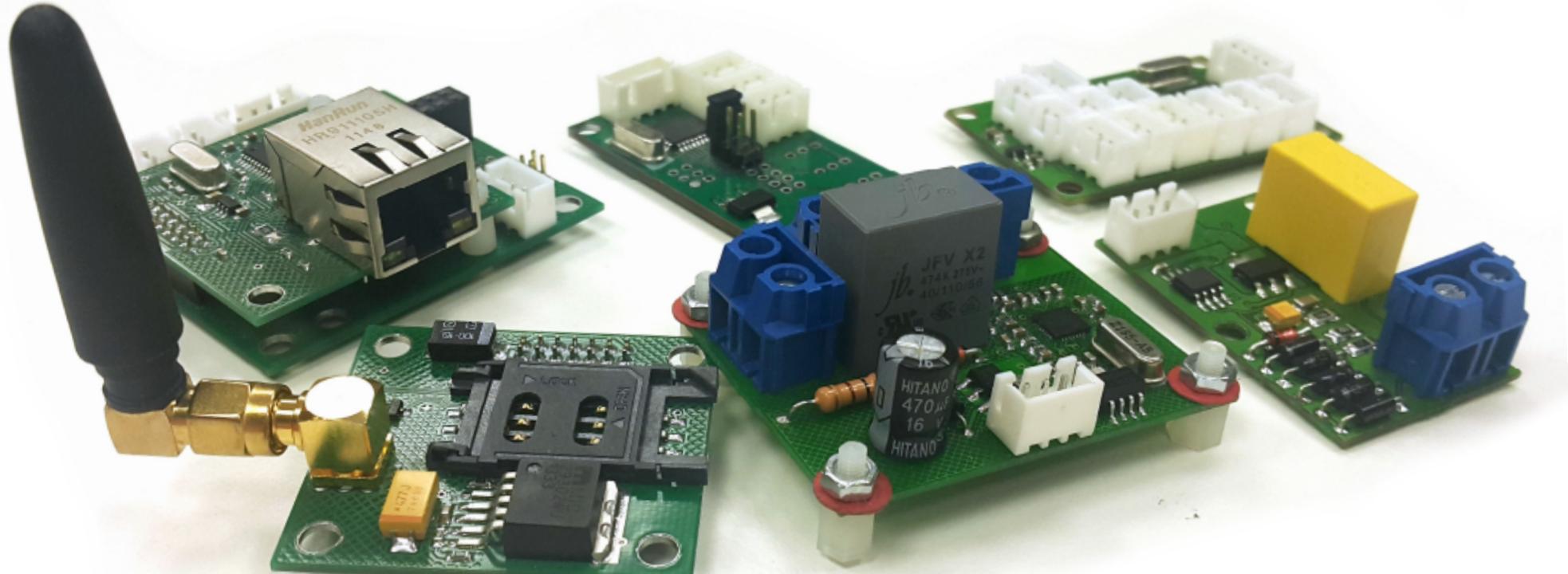
Business Value

- Operational expenses optimization
- Marketing insights based on user behavior analytics
- Improved supply chain and logistics

Cloud Architecture

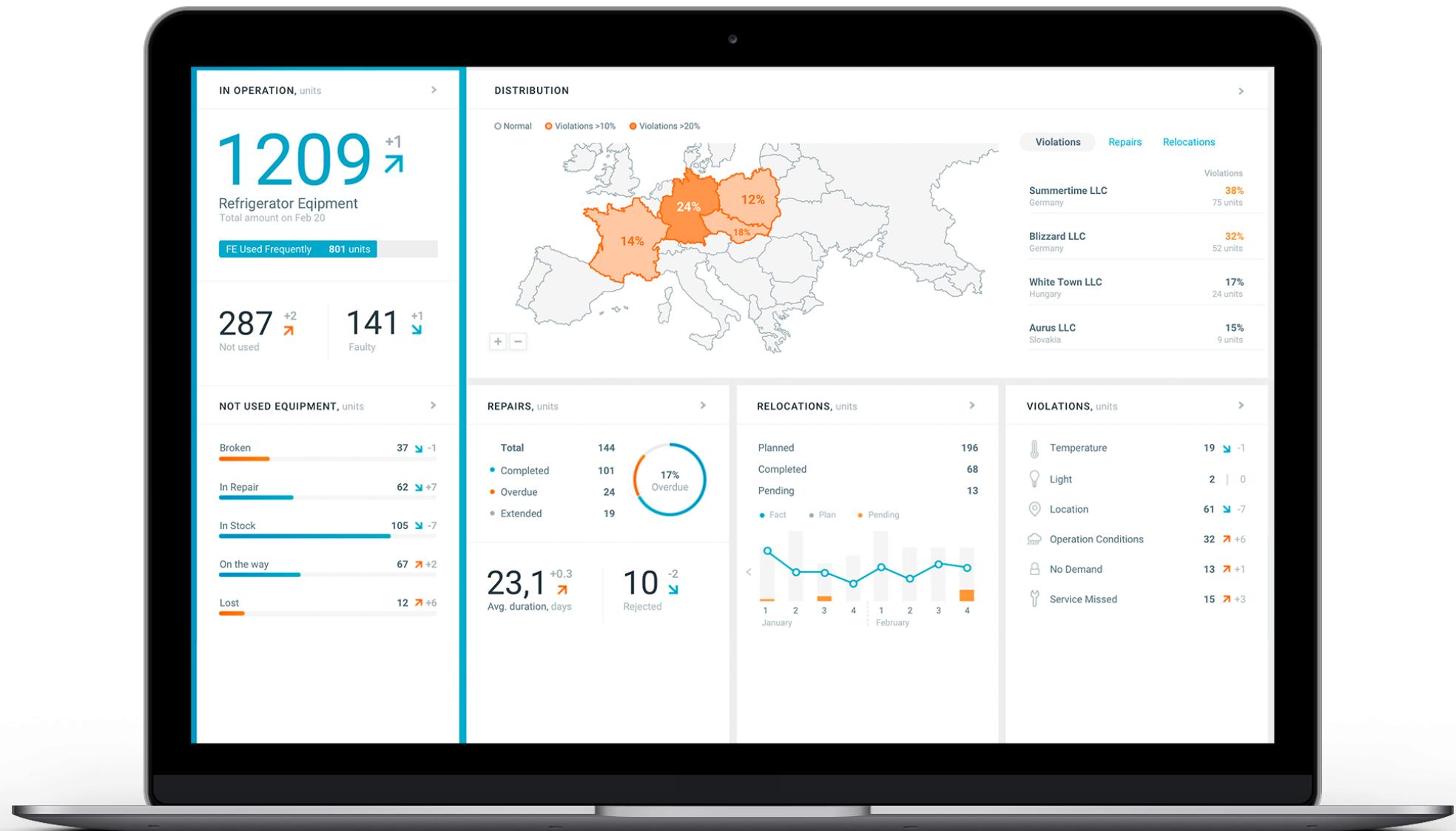


Sensors Hardware



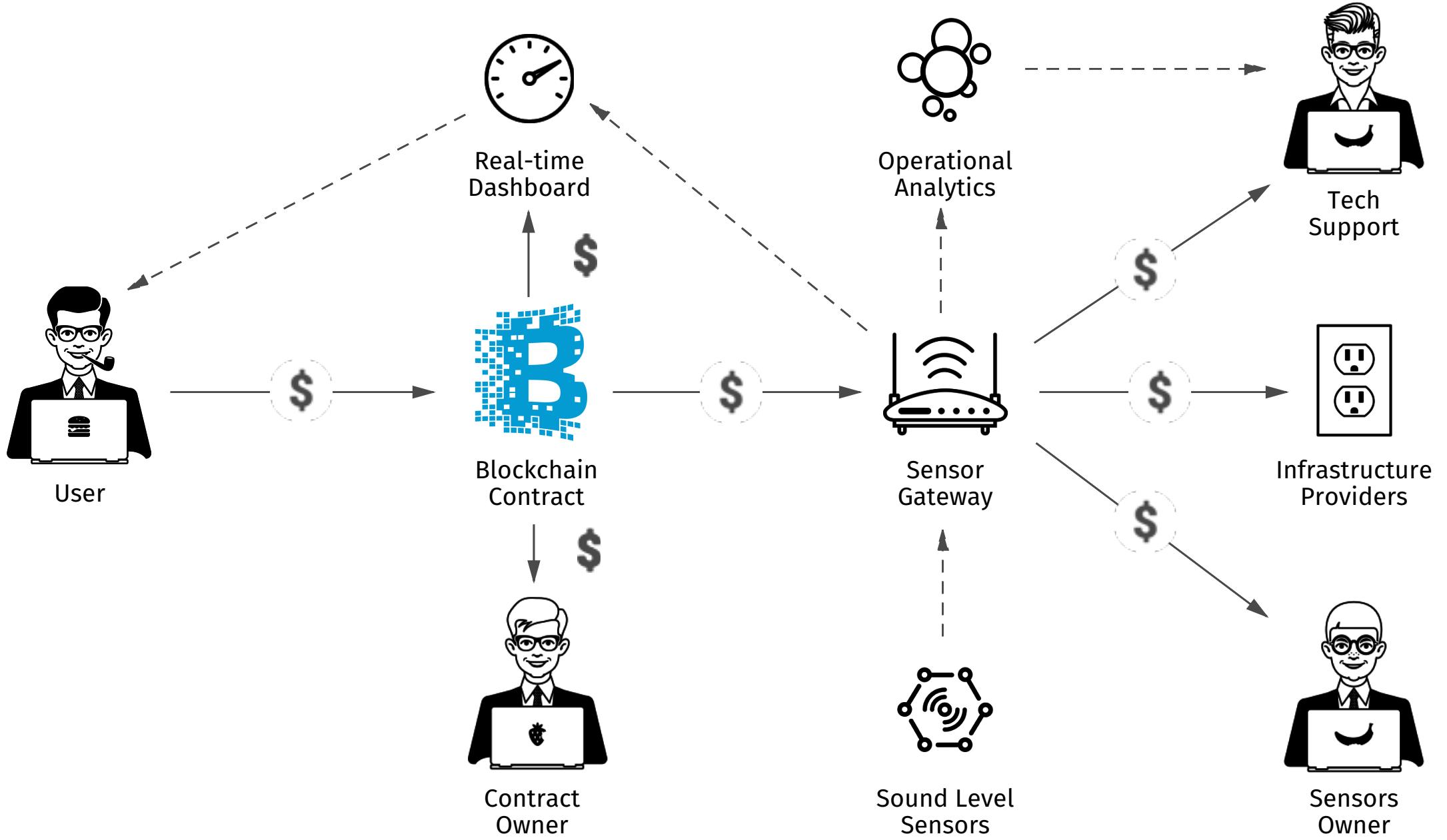
- WAN: GSM
- Gateway nodes: ARM8
- Leaf nodes: ARM Cortex M4
- Sensor Network: I²C, RF
- Sensors: Light, temperature, AC/DC, camera, weight, other

Analytics Dashboard



The background of the image is a dark blue color, featuring a complex, glowing network graph. This graph consists of numerous small, glowing orange and yellow dots (nodes) connected by thin, translucent grey lines (edges). The nodes are more densely packed in the center and become more sparse towards the edges of the frame, creating a sense of depth and connectivity.

DEMO
cratic
IoT



Summary

- Back to the nature: IoT systems resemble Human as an organism and Human society as an organization of services and devices
- SEI Architectural methods such as ATAM and ADD are well applicable to IoT domain - Quality Attributes and Tactics help design and evaluate complex IoT solutions
- Security is a significant challenge in IoT adoption, but most vendors have started realizing it and we will see improvements soon

Questions