

Managing & Accelerating Innovation with Open Source at the Edge

Bill Hunt, CTO - Dianomic

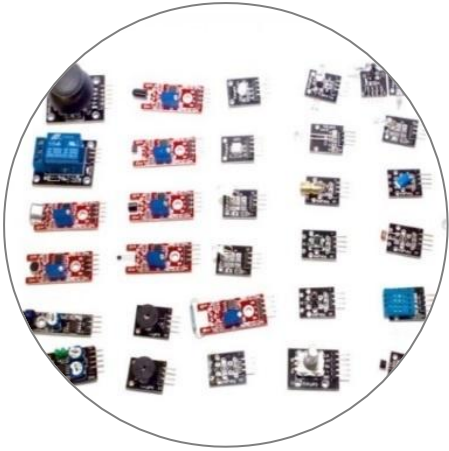




Welcome!

- The IIoT Opportunity
- Resolve Complexity & Fragmentation with FogLAMP
- Use case: Defense Contractor Aircraft Manufacturing
- Scalable Provisioning and Management with Arm Mbed
- Conclusion

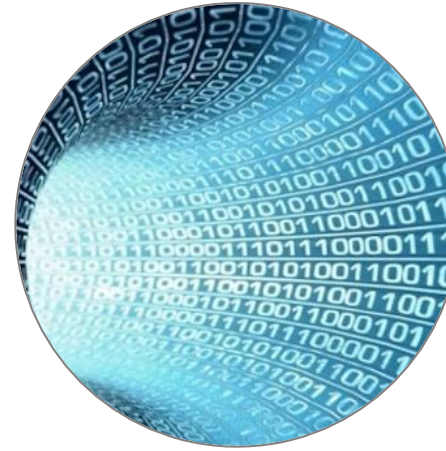
IIoT: The Opportunity



Cheap, and tiny
sensors



Decreasing compute
and storage costs



New abilities to
process and analyze
data



Ubiquitous
connectivity

Sensors on the Entire Supply Chain will Automate and
Transform Business

Open Source and Standards

- IIoT is Massively Complex and Fragmented
- Reducing Complexity/Fragmentation Requires
 - Open Standards
 - Open Source Platform
 - Open Community
- Dianomic
- FogLAMP
 - IEEE/OpenFog
 - Available on GitHub today. Licensed Apache 2

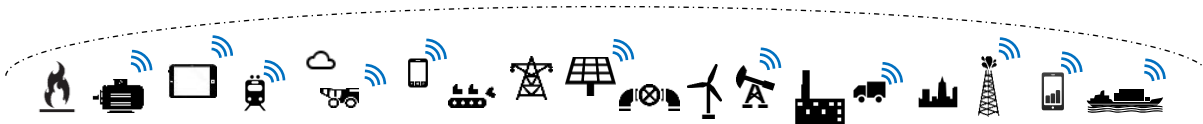
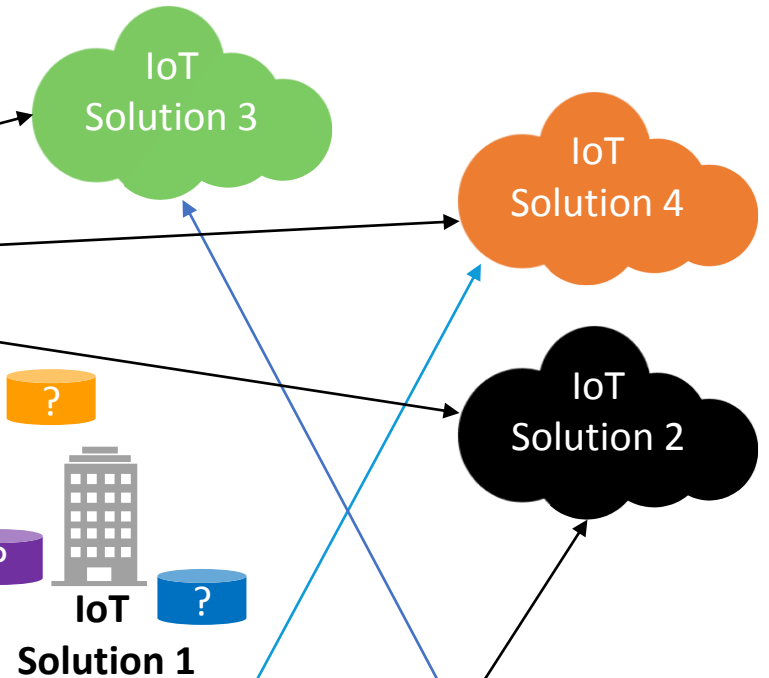
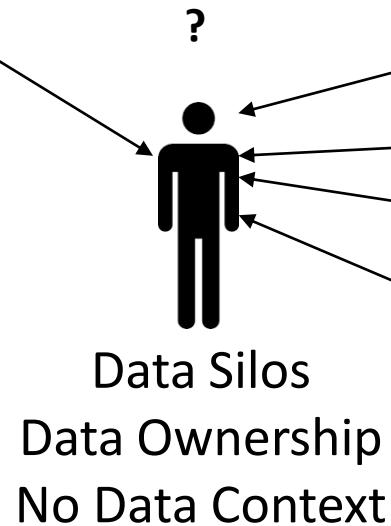
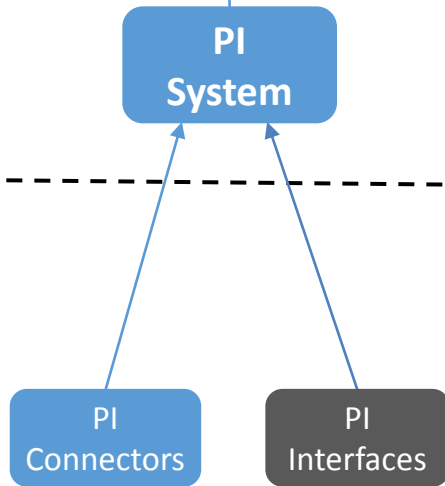
IIoT is Massively Complex & Fragmented



The Enterprise

Plant Operators

Edge



Current Devices through PLC or SCADA



New IIoT Smart Sensors and Devices



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Embrace & Extend w/ Open Source & Standards



The Enterprise



No Silos

Clear Ownership
Data in Context

Plant Operators

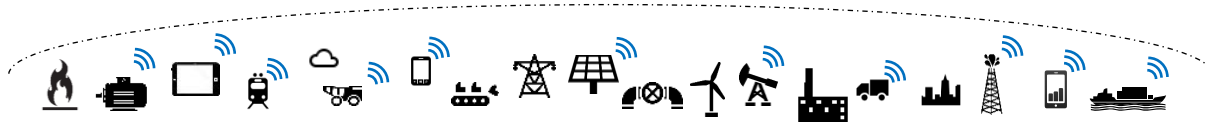
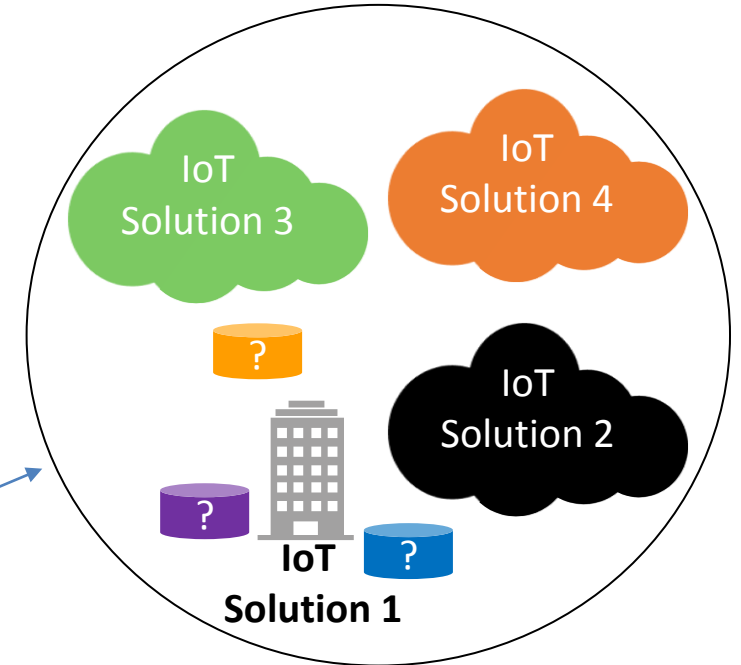
PI
System

Edge

PI
Connectors

PI
Interfaces

FOGLAMP



Current Devices through PLC or SCADA



New IIoT Smart Sensors and Devices



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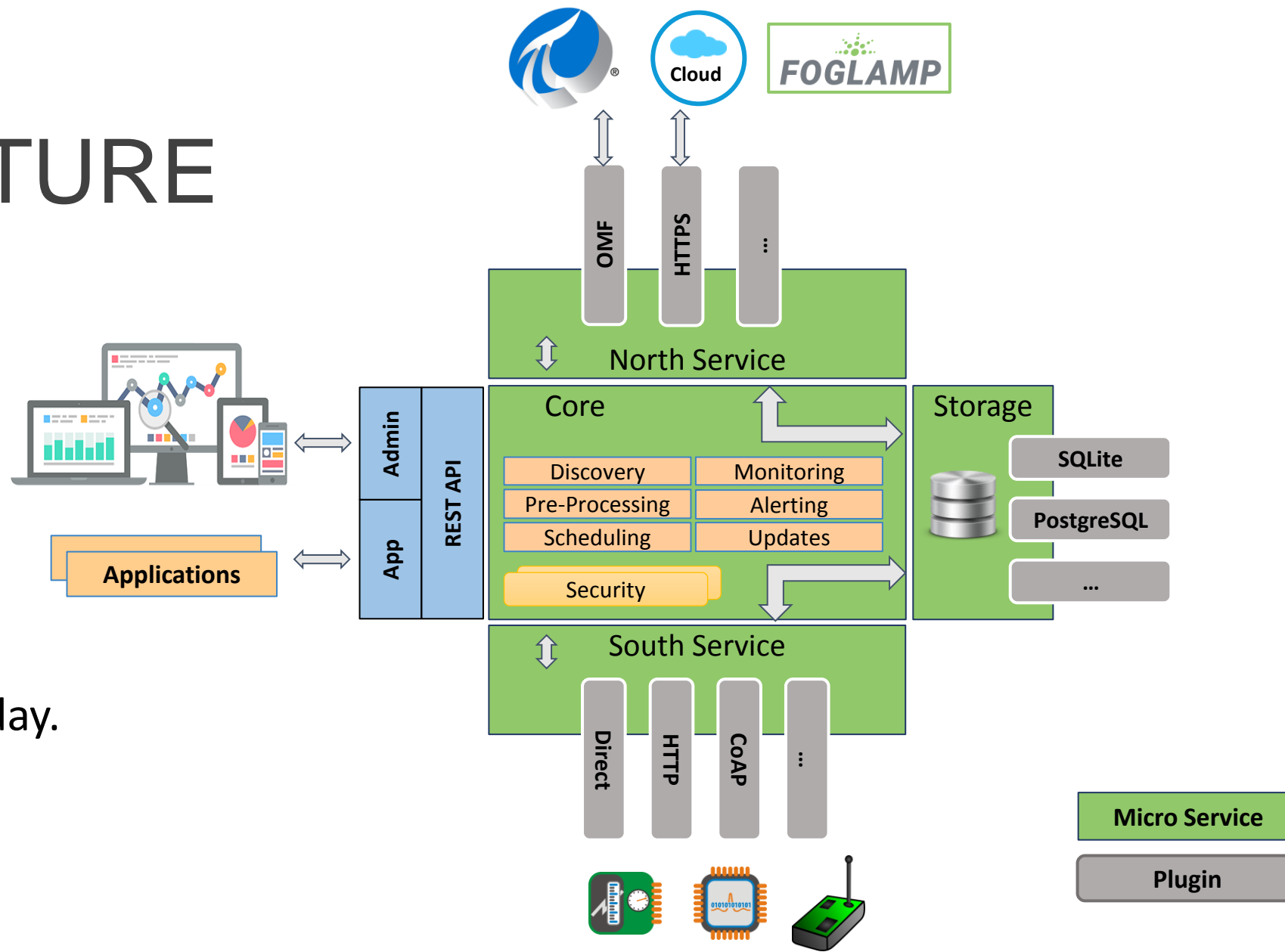
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FOGLAMP

- Data collection, aggregation, pre-processing, buffering & analysis
- Runs on various hardware and operating systems
- Low effort provisioning and maintenance
- Resilient and highly available
- Modular / Pluggable / External Applications
- Certified connectivity to OSIsoft PI and OCS
- Standards Based (IEEE/OpenFog)
- Open Source - Available on GitHub today

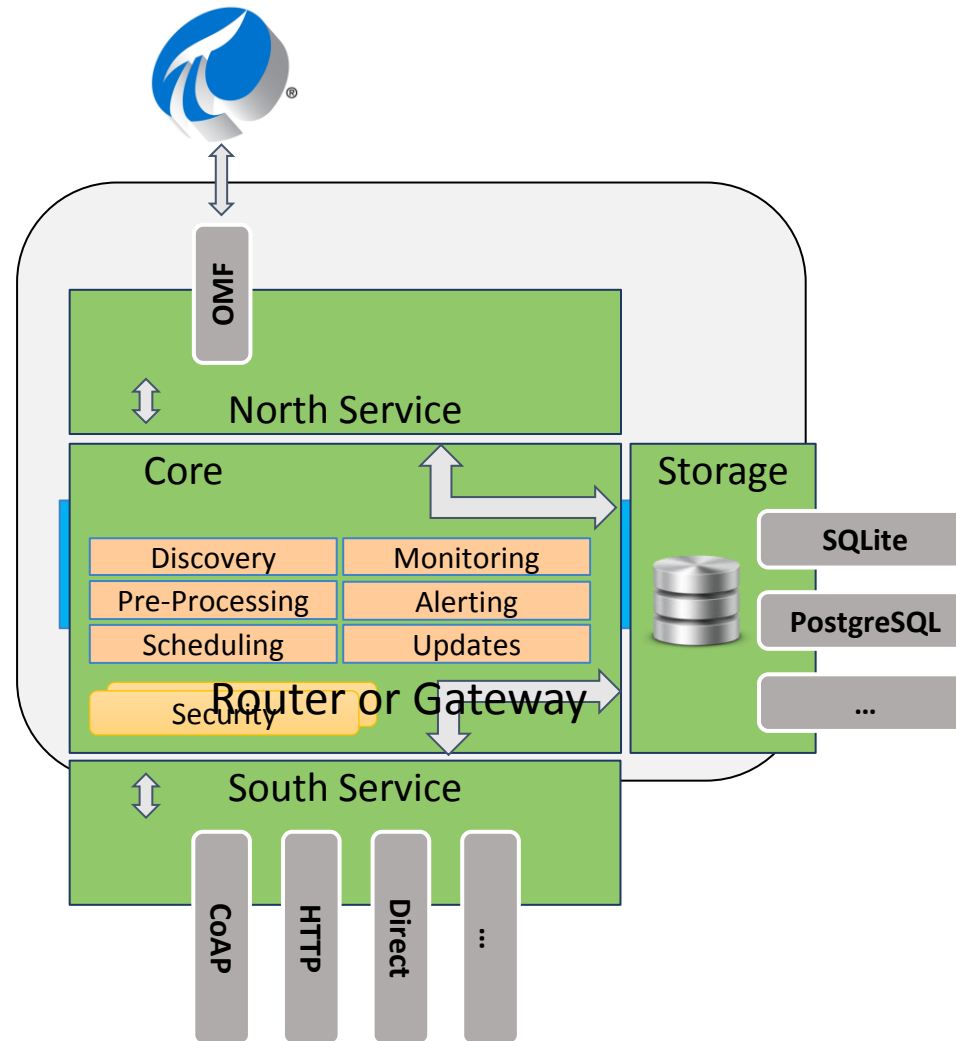
FOGLAMP ARCHITECTURE



Available on GitHub today.
Licensed Apache 2

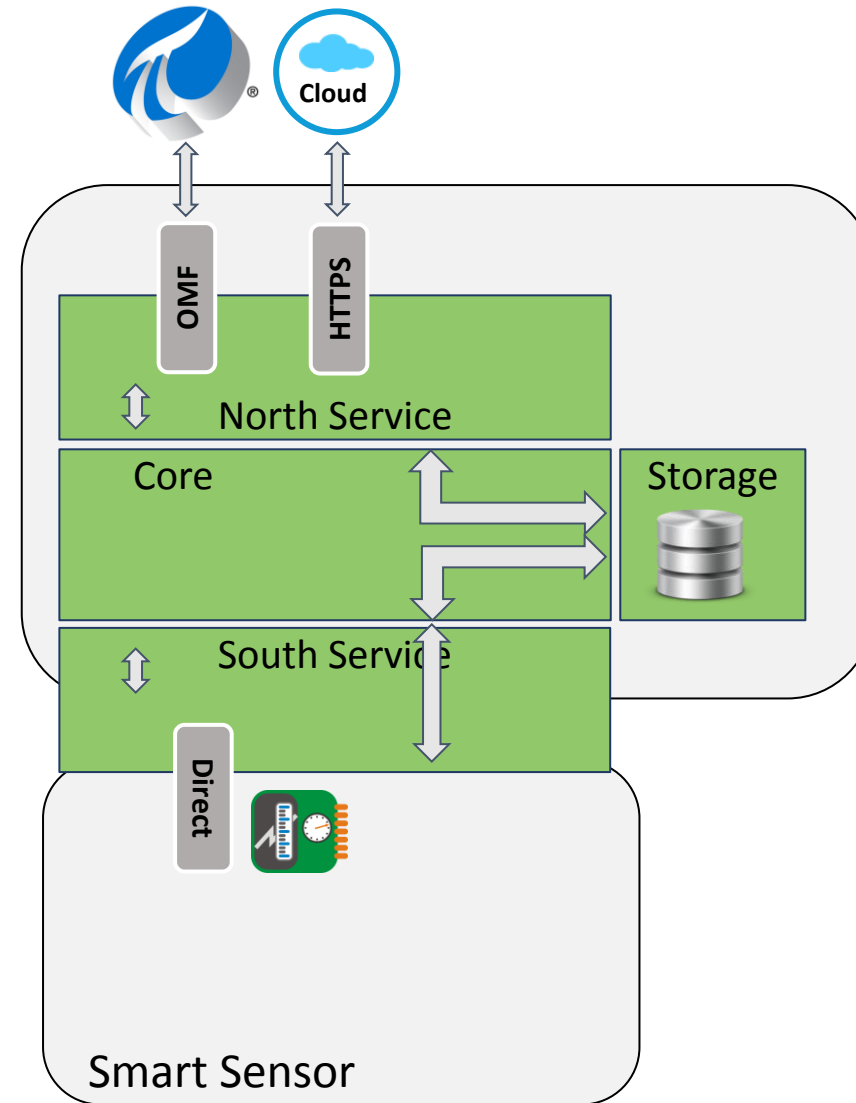
Scaling Down

North Service can
be Integrated into a
Router or Gateway

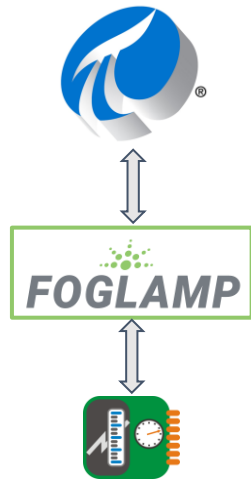


Scaling Down

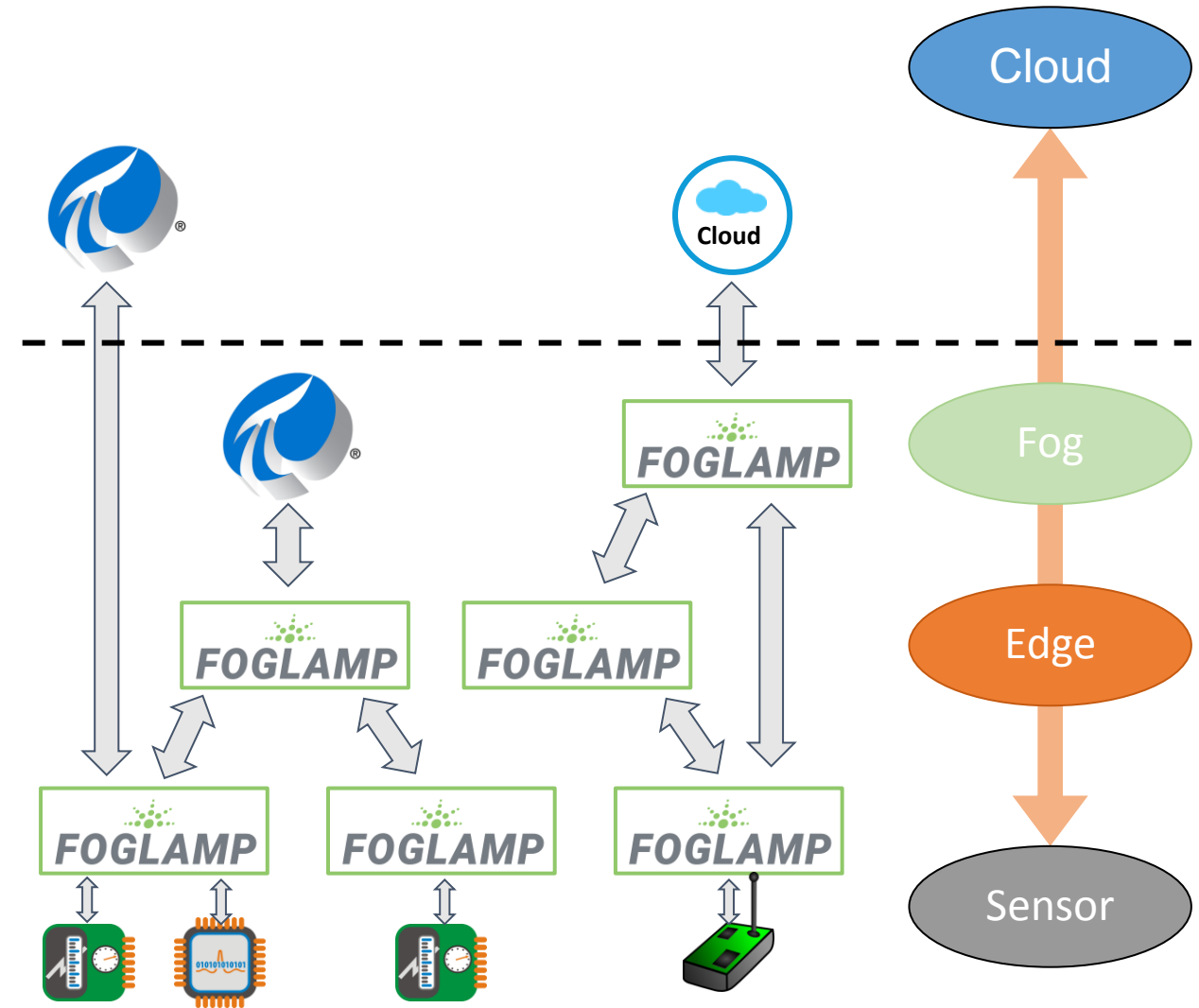
South Service can be
built into
Sensor with Pico
Footprint (50k)



Scaling Up



FogLAMP is a single device solution or...



Deploy as hierarchy or mesh,
Pre-process & buffer data all layers

FOGLAMP Community – Join Us!



OSIsoft®


DIANOMIC

Sprint



TOSHIBA

ARROW
ARROW ELECTRONICS, INC.

arm



Beyond The Edge
Networks

PANDUIT®

And You!

Use Case

- Customer
 - Military Aircraft Manufacturer
 - Massive factory with many opportunities for optimization via new sensor deployments
- Goals
 - Gain efficiencies
 - Elevate production quality
 - Increase asset health and uptime
 - Manage safety compliance
- Key Requirements
 - Security
 - Manageability
 - Scalability



Proof of Concept – Paint-booth Temperature



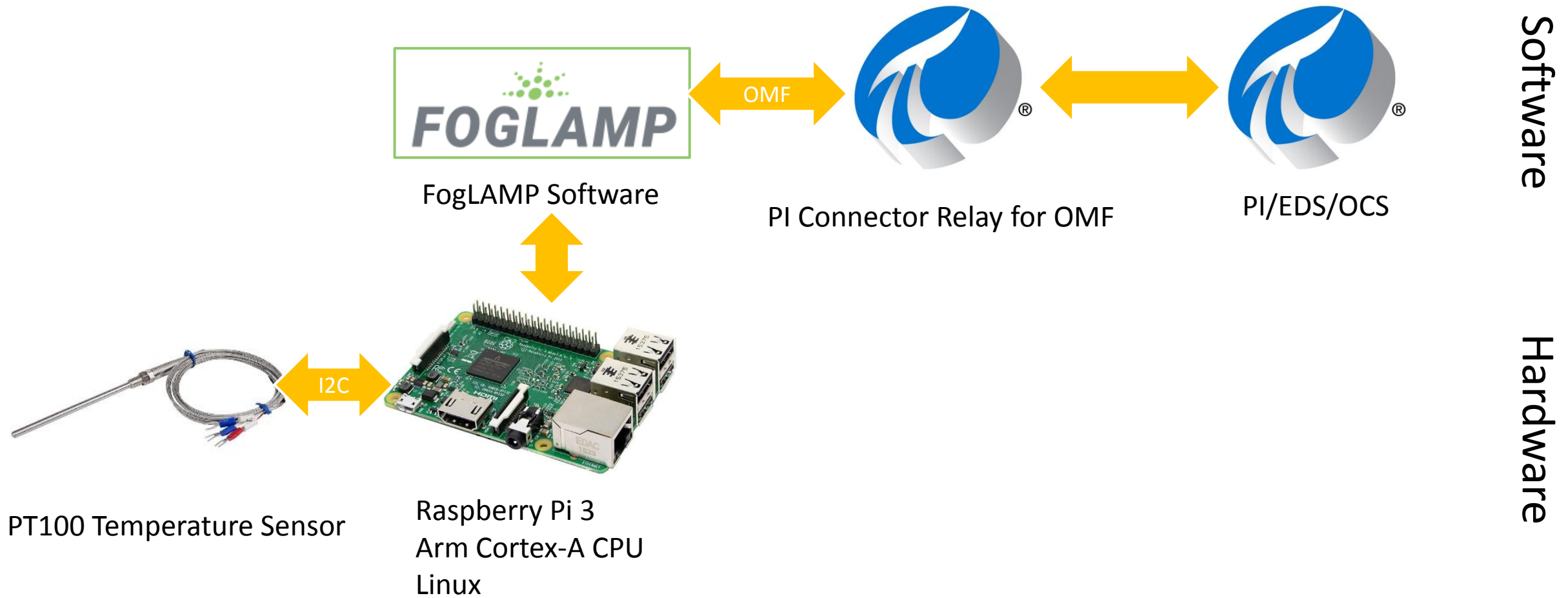
Problem

- Temperature can't be monitored in real-time
- Can lead to expensive flaws in manufacturing, delaying delivery dates

Solution

- Quick win with focused scope
- Install with limited/zero impact on security and operations

Solution Architecture



A Thousand of Anything is Hard



Complex to Provision

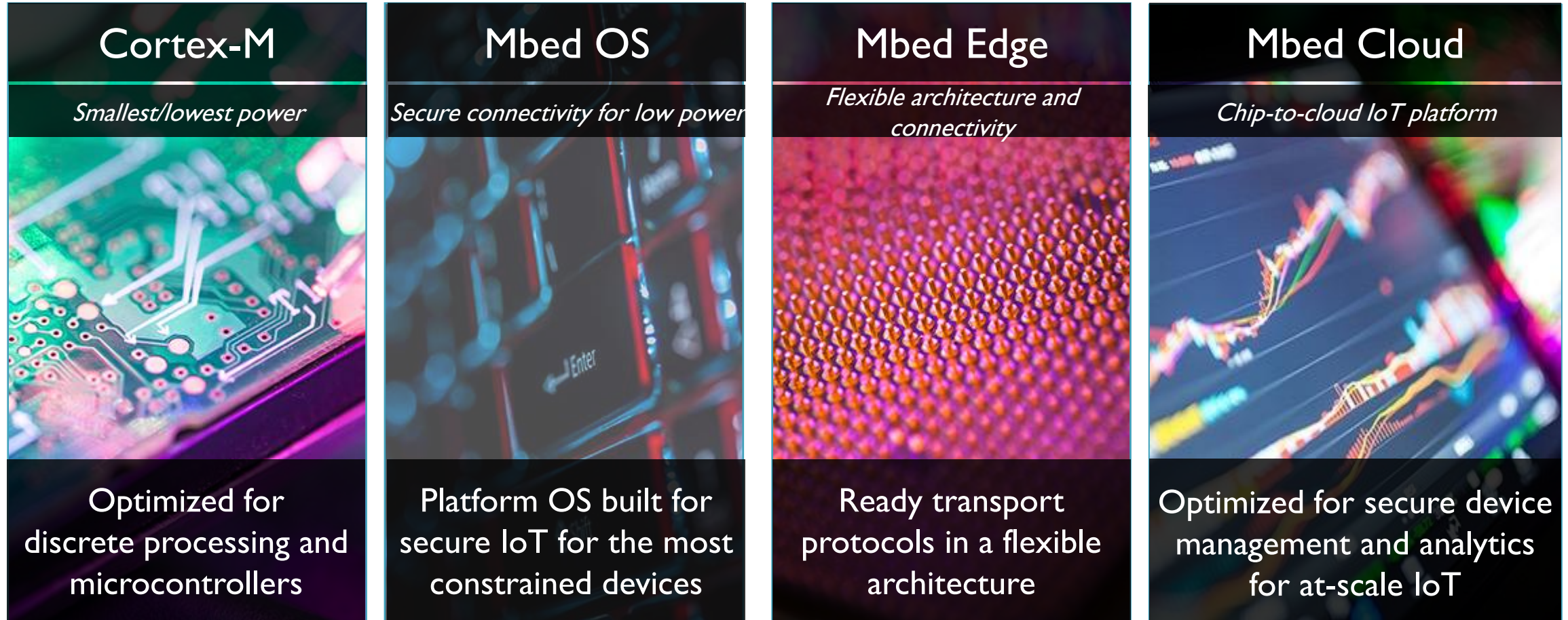


Difficult to Update & Patch



Large Security Surface Area

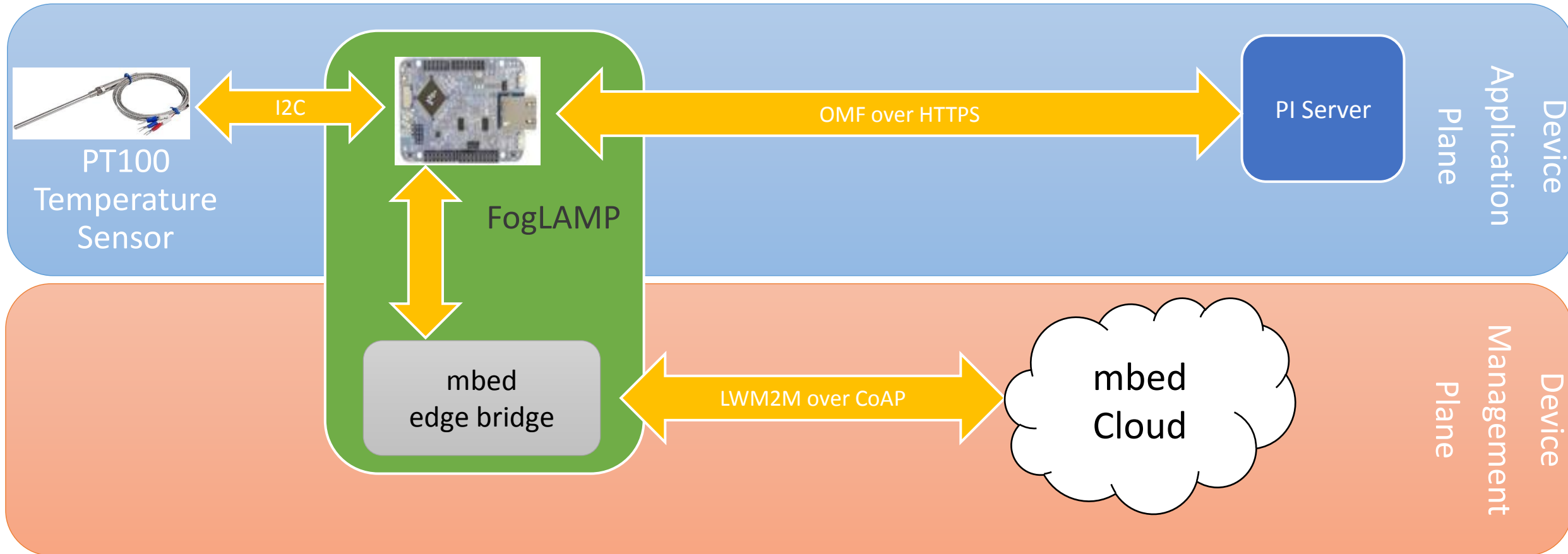
Arm Mbed IoT Platform - Chip to Cloud IoT



Designed for IoT from the silicon,

To lifecycle management

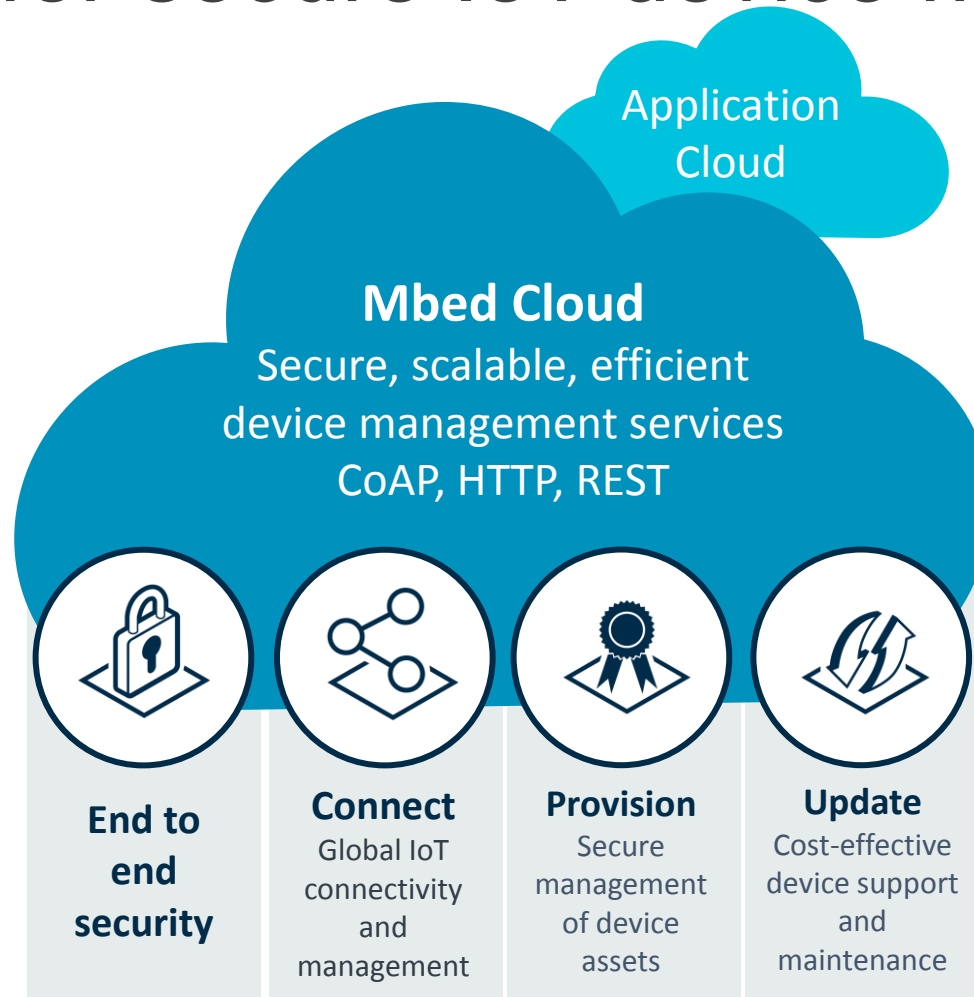
Next Phase: Cloud Management and Security



- Application Data: temperature/humidity data is sent directly to the local PI Server
- Device Management: Temperature/humidity sensors and FogLAMP seen in mbed Cloud as managed devices
 - Arm-contributed north-bound plugin into FogLAMP utilizing mbed-edge creates device management plane.

Arm Mbed

Platform for secure IoT device management



Mbed OS Platform Security

PSA-compliant security components to enable deployment of trusted devices

Communication Security

Authentication,
confidentiality and
integrity



Mbed TLS

Device Security

PSA-Compliant
trusted boot, storage
and opaque
cryptography



**Mbed secure
firmware**

Lifecycle Security

Trusted firmware
update,
provisioning and
device-based
authorisation



Mbed Cloud

arm

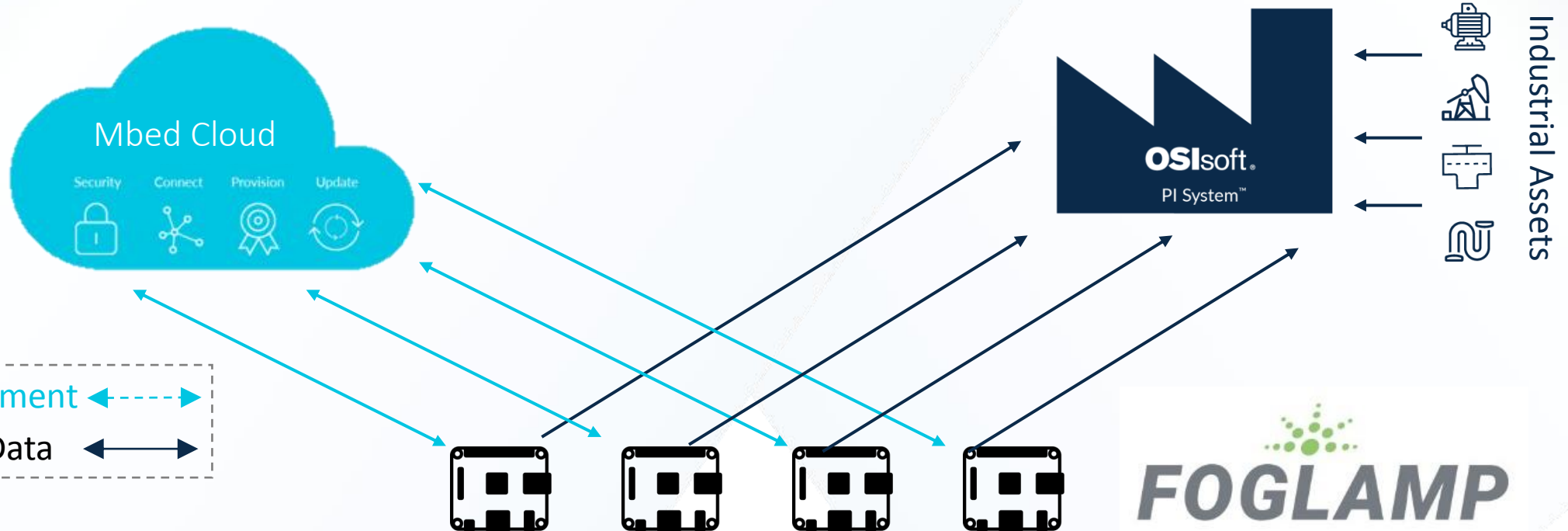
Device Management Plane

- Device Provisioning
- Lifecycle Management
- Security & Key Management

OSIsoft®

Operational Data Plane

- Real Time Visibility
- Elimination of Data Silos
- Clear Data Ownership



FOGLAMP

IIoT is Here. And it's Big.

- Open Source and Standards are critical - FogLAMP
- Scalable Provisioning and Management – Arm Mbed
- Industrial Data Management - OSIsoft



Possible only through partnership

Learn More about FogLAMP

- PI World Talks

Time	Talk
Thurs 10:30	Introduction to FogLAMP
Thurs 1:30	Lab: IoT and Fog Computing: Develop Data Ingress Applications from Edge to Cloud
Thurs 2:30	Fog Computing on the Plant Floor

- Visit the FogLAMP Community Booth

- dianomic.com

- github.com/foglamp

Merci

谢谢

Спасибо

Danke

Gracias

Thank You

감사합니다

ありがとう

Grazie

Obrigado