June 1st 2018 in Tokyo
The second time “IIC & IVI joint workshop”
IIC & IVI sharing use case information

industrial internet CONSORTIUM

Condition Monitoring and Predictive Maintenance Testbed

NATIONAL INSTRUMENTS

IBM

OSIsoft.

sparkcognition

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Sr. Technical Marketing Manager
ISO 18436-2 Vibration Analyst (CAT II)
National Instruments Corporation Japan

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「予期せぬ運転停止や劣悪な保守計画によって、世界の装置産業にかかるコストは年間総生産の5%、毎年200億ドルに上ります」

“Unscheduled shutdowns, coupled with poor maintenance practices, cost global process industries 5% of total production annually, equivalent to $20B each year.”

—Hydrocarbon Publishing Company

Why condition monitoring is necessary?

売上増
Increase Revenue

- Increase uptime and service offerings
- Optimize asset maintenance activity

コスト削減
Reduce Costs

- Reduce warranty repair costs
- Increase MTBF
- Reduce frequency of unscheduled downtime
- Optimize the workforce

リスク削減と安全性向上
Reduce Risk
and Increase Safety

- Reduce worker contact with dangerous machines/environments
- Prevent catastrophic failure and unscheduled outages

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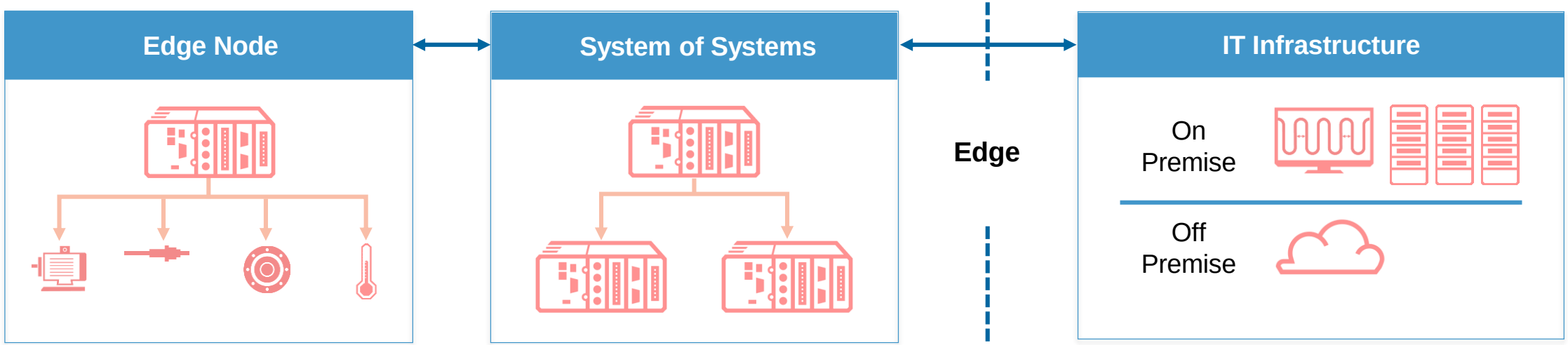
予知保全システム構築時の課題
Issues in building predictive maintenance system

- Edge Computing of Large amount of Sensor Data
- Time Sync. between Various Sensor Measurements

- Data Visualization & Analysis

① センサ計測時の課題 (Measurement Issue)

② センサ計測後の課題



③ 業界を超えた協力体制の必要性 (Collaboration Across Industry)

- IT System
- IT & OT Integration (SI firms are necessary)
- Data Analytics Partners

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How do we address our challenges?

OPEN PLATFORM

- ✓ 計測精度が保てるのか？
- ✓ 各種プロトコルへの対応は？
- ✓ データフォーマットをどうすべきか？
- ✓ 将来の拡張性は？
- ✓ セキュリティーは？

  etc.

- ✓ Measurement Quality?
- ✓ Flexible communication protocols?
- ✓ Common data file formats?
- ✓ Future-proof architecture?
- ✓ Security?

  etc.

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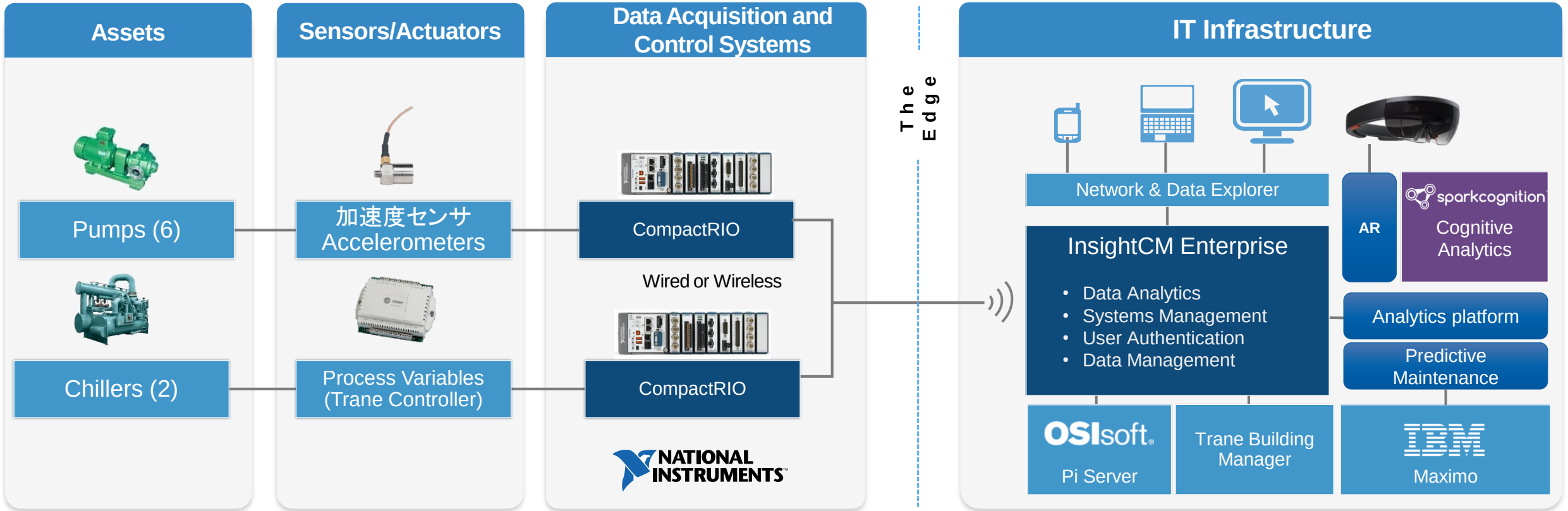
Condition Monitoring and Predictive Maintenance Testbed

Solution Architecture



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Prototype Deployed to a Relevant Environment

NI InsightCM installed at NI Headquarters (Austin, TX)

NI InsightCM Monitoring Devices

Live prototype available online at:

www.ni.com/try-insightcm

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Demo

www.ni.com/try-insightcm

Use Cases

*Source: HIS Markit Technology, Case Study: Duke Energy Leverages IIoT for Predictive Maintenance Applications
http://landing.ni.com/DukeEnergyIIoT

Project Smart Generation

Customer Profile

- Large power generation in US
- 50+ GW Fossil Generation Capacity

80+ Sites

10,000 Assets to Monitor

30,000 Sensors

60,000 Manual Rounds/Month for Data Collection

Business Need

- Increase Revenue: Increase uptime and service offerings, and optimize asset maintenance activity.
- Reduce Costs: Reduce warranty repair costs, frequency of unscheduled downtime, and optimize the workforce.
- Increase Safety: Reduce worker exposure to dangerous machines/environments.
- Reduce Risk: Prevent catastrophic failure and unscheduled outages.

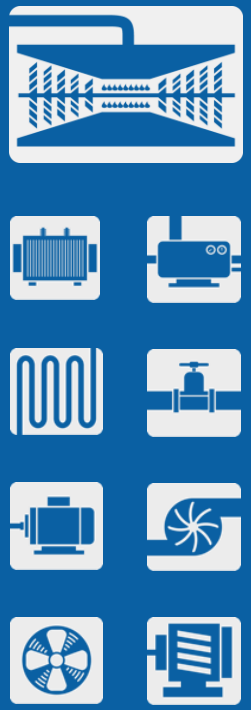
DUKE ENERGY

Challenge: Better leverage new technologies to address increasing reliability demands and workforce optimization.

1. Aging plants with critical equipment at end-of-life

2. Scarcity of specialists

3. Inefficient workforce utilization, 80% Data Collection, 20% Analysis



10,000+
設備

センサー

- 加速度センサー
- 温度センサー
- オイル分析センサー
- サーモグラフィ
- 近接プローブ
- その他

30,000+
センサー

モニタリングシステム

CompactRIO

2,000+
ノード

プラントサーバー

NI InsightCM™
Enterprise

Database
Historian

~30
プラント

モニタリング&診断センター

PlantView™
Fleet-Wide Dashboard

InStep PRiSM™
Pattern Recognition

GP EtaPRO™
Efficiency Monitoring
& Thermal Modeling

OSIsoft™ PI
Database
Historian

EPRI Fault
Signature
Database

M&D
センター

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Before

80% Data Collection

20% Data Analysis

- Periodic manual collection
- Workforce – low value tasks

After

20% Data Collection

80% Data Analysis

- Online continuous monitoring
- Workforce – high value tasks

*Source: HIS Markit Technology, Case Study: Duke Energy Leverages IIoT for Predictive Maintenance Applications
http://landing.ni.com/DukeEnergyIIoT

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FLOWSERVE

Project Smart Pump

Customer Profile

- Leading provider of fluid motion and control products and services
- 5 Billion annual revenue, 18K+ Employees

200+ Years in Business

245 Locations Worldwide

10,000+ Customers

195 Quick Response Centers

Business Need

- Increase Revenue: Increase uptime and service offerings, and optimize asset maintenance activity.
- Reduce Costs: Reduce warranty repair costs, frequency of unscheduled downtime, and optimize the workforce.
- Increase Safety: Reduce worker exposure to dangerous machines/environments.
- Reduce Risk: Prevent catastrophic failure and unscheduled outages.

FLOWSERVE

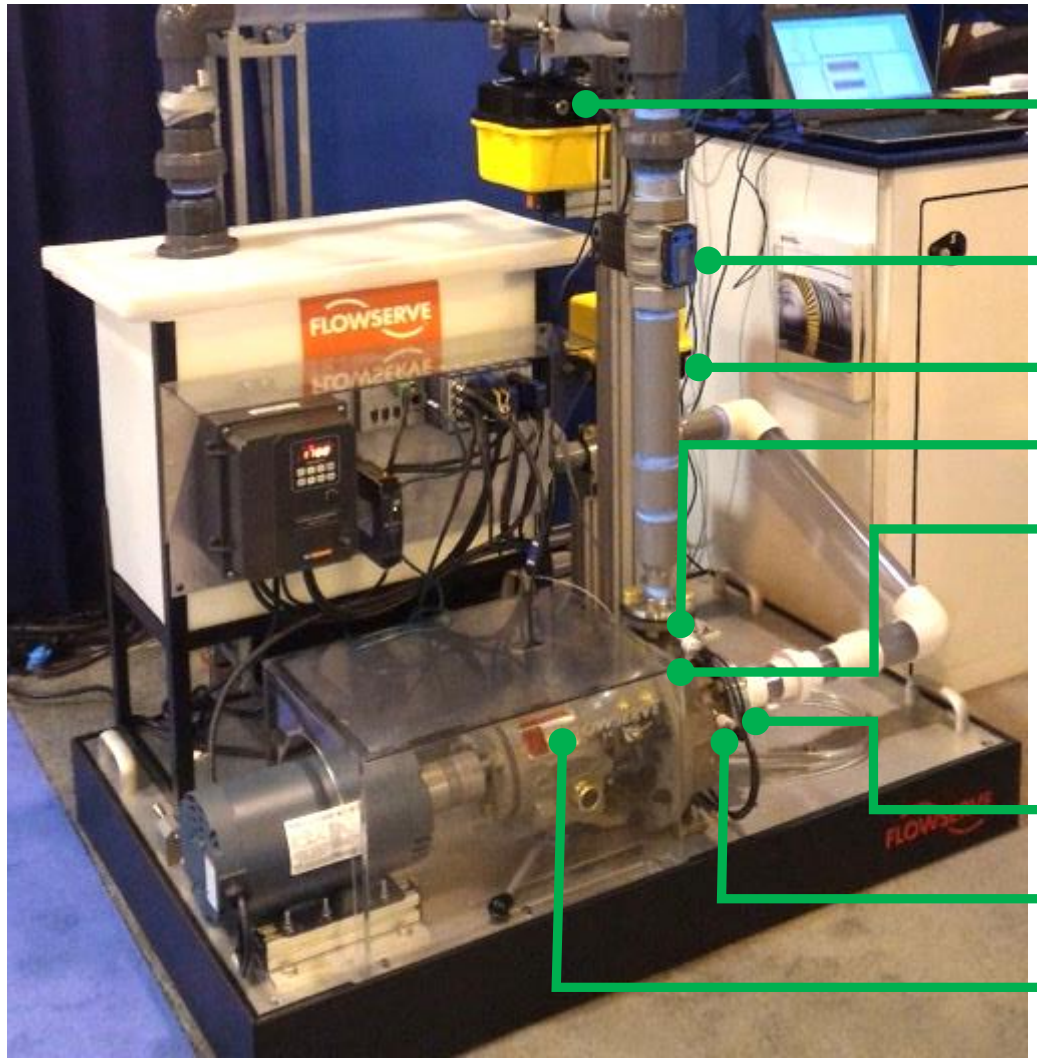
Challenge: Leverage IIoT technologies to make older assets smart.

1. Aging assets with limited data

2. Scarcity of specialists

3. Connectivity with existing systems

Making Existing Assets Smart



- Discharge Valve
- Flow Meter
- Suction Valve
- Pressure Out
- Seal Temperature
- Bearing Vibration
- Pressure In
- Impeller Vibration (X and Y)

- https://youtu.be/xjbtHJqegMA (Japanese)
- https://youtu.be/xiAXXl36w8g (English)

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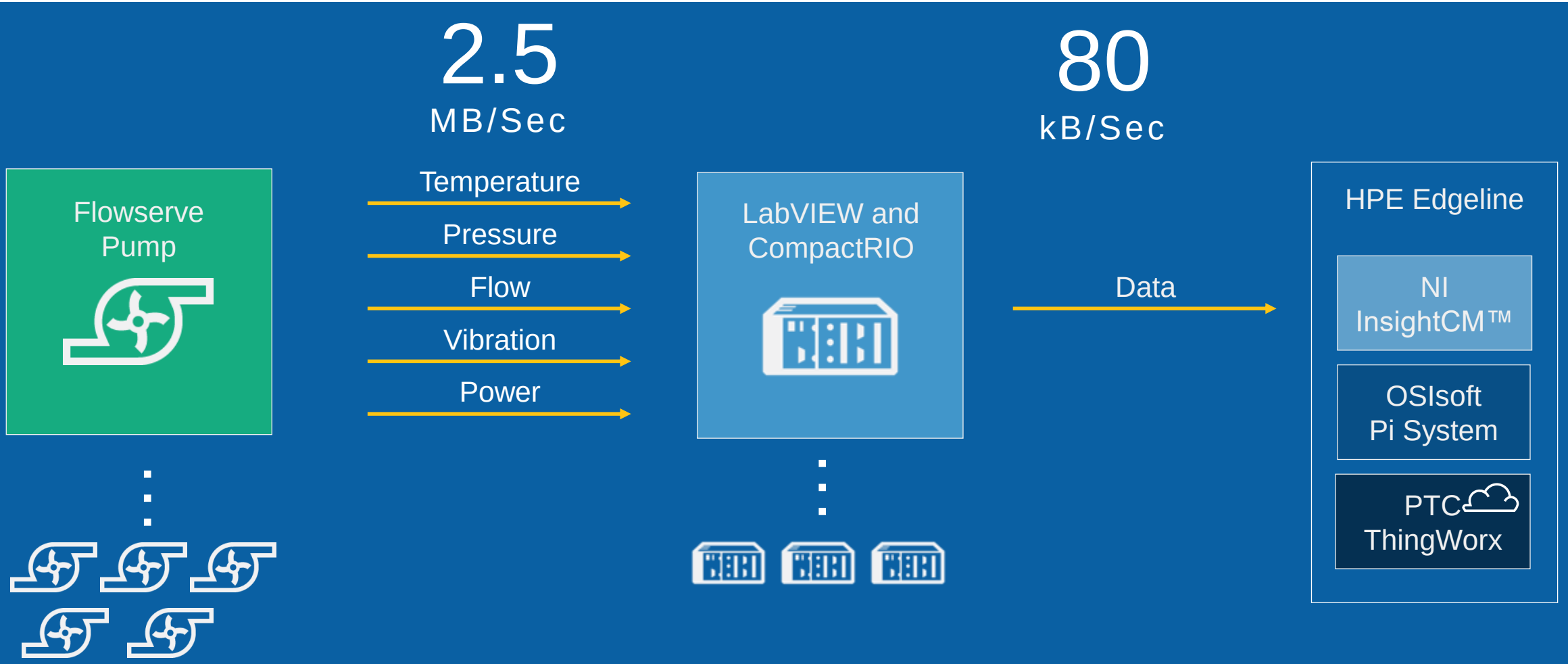
Demo Video

https://youtu.be/xiAXXl36w8g


2.5
MB/Sec
80
kB/Sec
Flowserve
Pump
Temperature
Pressure
Flow
Vibration
Power
LabVIEW and
CompactRIO
Data
HPE Edgeline
NI
InsightCM™
OSIsoft
Pi System
PTC
ThingWorx

IIC Testbedで鍛えた
オープンプラットフォームを市場投入しています

ご静聴頂きありがとうございました

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弊社導入事例などの勉強会の御要望を承っております

ni.com/iot

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