Evolution of Industrial Internet of Things

1970s	1980s	1990s	2000s	2010s

Distributed Control System Introduced

Adoption of Windows in Process Control

Adoption of Virtualization

Pre-internet
Human to human
- Fixed and mobile telephone
- SMS

Internet of content
WWW
- E-mail
- Information
- Entertainment

Internet of services
Web 2.0
- E-productivity
- E-commerce

Internet of people
Social media
- Skype
- Facebook
- YouTube

Internet of things
Machine to machine
- Identification, tracking, monitoring, etc.

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Challenges

Engineers spending too much time extracting and aligning data from various sources

Different tools needed for each type of data; different users have access to different tools

Users constructing isolated and inconsistent analysis tools

Lack of visibility to real-time performance against business metrics

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Needs

Collecting and storing all relevant data in the organization

Visualizing information anytime anywhere to gain valuable insights

Predicting and detecting issues and opportunities

Making right decisions at the right time with the right information

Addressing Core Industry Problems

Production Efficiency	Process Reliability	Safety

Gains not possible with conventional methods used today

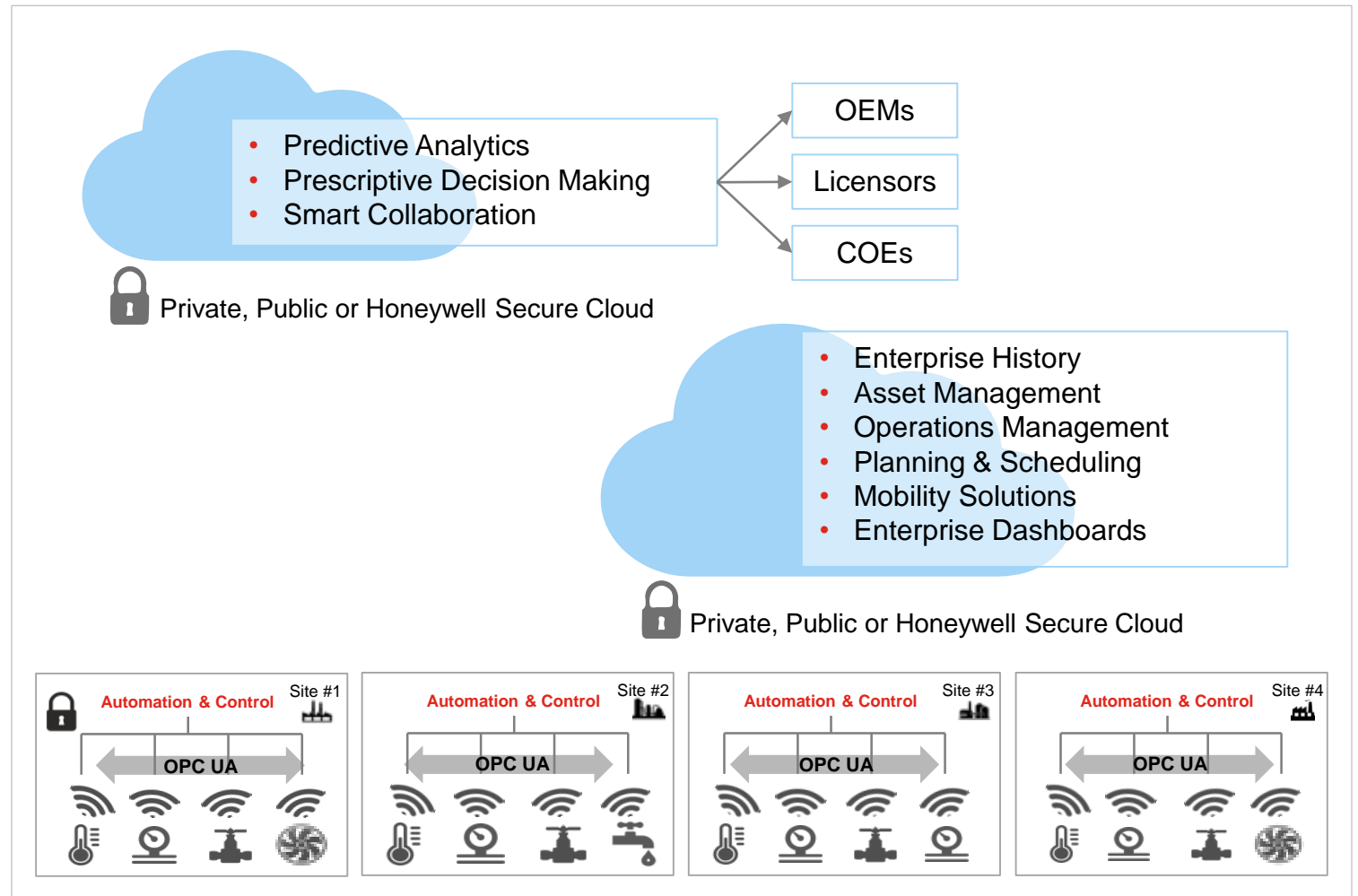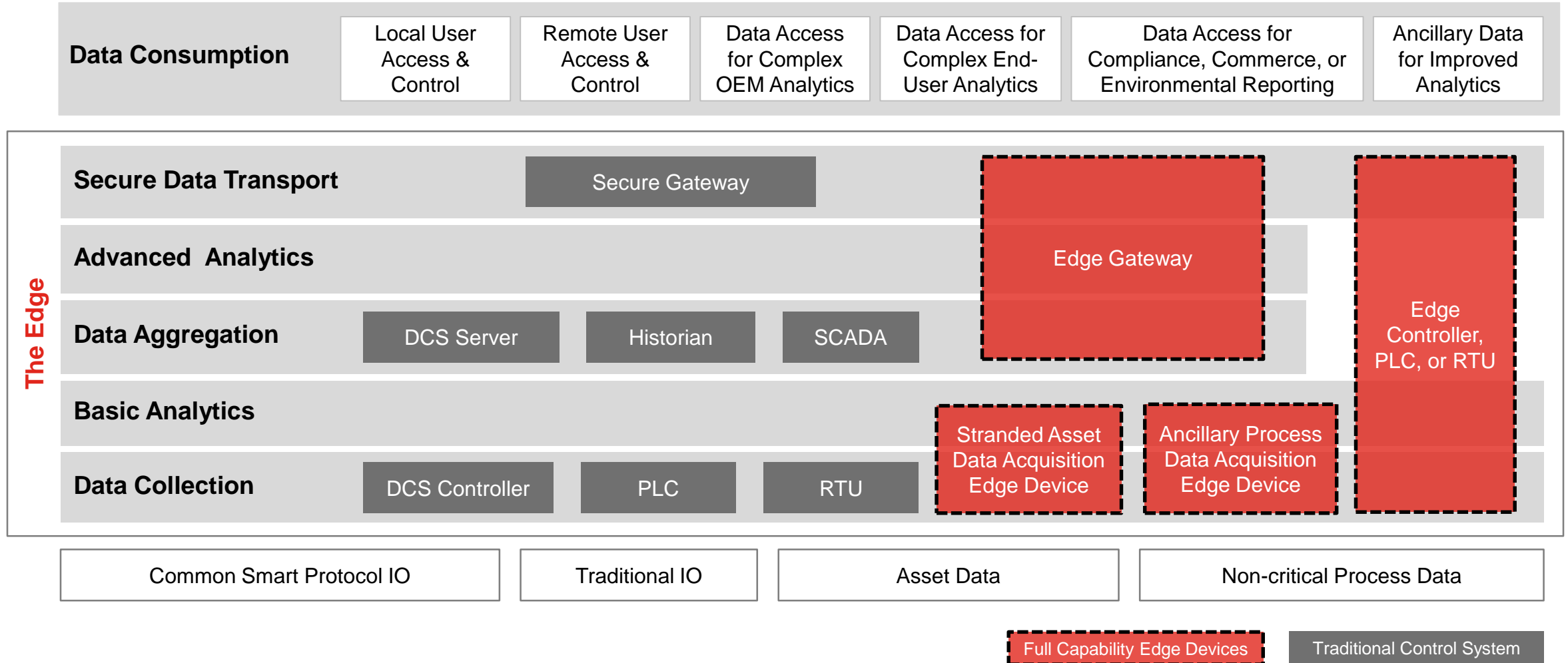| Production Efficiency	Process Reliability	Safety
• Maximize production throughput • Reduce OpEx costs	• Run the plant at peak performance • Eliminate unplanned downtime	• Reduce risks and direct costs of plant incidents • Regulatory compliance
Proven impact **$5-15M** per site per year	Typical savings of **$7-20M** per year	Cost savings **$1.6B** per site per year

Delivering Across the Enterprise with Honeywell IIoT Ecosystem

How Does IIoT Work?

IIoT Elements

4 Smart and Secure Collaboration

3 Predictive Analytics

2 Data Management and Onsite Control

1 Smart & Connected Assets and Devices

IIoT Architecture

- Predictive Analytics
- Prescriptive Decision Making
- Smart Collaboration

OEMs

Licensors

COEs

Private, Public or Honeywell Secure Cloud

- Enterprise History
- Asset Management
- Operations Management
- Planning & Scheduling
- Mobility Solutions
- Enterprise Dashboards

Private, Public or Honeywell Secure Cloud

Automation & Control — Site #1 — OPC UA

Automation & Control — Site #2 — OPC UA

Automation & Control — Site #3 — OPC UA

Automation & Control — Site #4 — OPC UA

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Edge Devices – Functional Model

Data Consumption	Local User Access & Control	Remote User Access & Control	Data Access for Complex OEM Analytics	Data Access for Complex End-User Analytics	Data Access for Compliance, Commerce, or Environmental Reporting	Ancillary Data for Improved Analytics

The Edge

Secure Data Transport		Secure Gateway			Edge Gateway
Advanced Analytics					Edge Gateway
Data Aggregation	DCS Server	Historian	SCADA		Edge Gateway
Basic Analytics				Stranded Asset Data Acquisition Edge Device	Ancillary Process Data Acquisition Edge Device
Data Collection	DCS Controller	PLC	RTU	Stranded Asset Data Acquisition Edge Device	Ancillary Process Data Acquisition Edge Device

Edge Controller, PLC, or RTU

Common Smart Protocol IO	Traditional IO	Asset Data	Non-critical Process Data

Full Capability Edge Devices   Traditional Control System

New "Edge" Devices Expand IIoT Capabilities of Existing Infrastructure

Use Case | *Connected Performance Services*

CPS Architecture and Predictive Analytics

Secure Cloud Collaboration

Big Data

Analytical Models

UOP Remote Expert CPS Services

Customer's Enterprise

Control Room

HPS Controls & Process Data

CPS Dashboard
Solution per Process

Plant

UOP Process

Connected Devices

- Optimize process yields
- Maximize mix of feeds to convert
- Lower energy utilization
- Extend useful catalyst lifetime
- Prevent process downtime
- Benchmark site-to-site operations

Transformational Offering in Process Industry

Use Case | *User Driven Analytics*

The Opportunity

1 Customers want to get more value out of their data without expensive and time-consuming Big Data projects

2 Analysis tools integrated with Honeywell solutions allow users to easily identify abnormal patterns and set up automated monitoring for them

- **Customer** can do more timely analysis and monitor their assets and production more effectively leading to improved quality | increased uptime | lower maintenance costs

- End-user focus maximizes the value of Engineers and Specialists without requiring complex IT projects

Value

Why Honeywell

- Honeywell's integrated suite of applications supports end to end automation of asset and process monitoring
- Honeywell's solution works with the customers' existing systems and data

The Solution

Sites

Site Engineer

Monitoring Algorithms

Asset & Process Monitoring Solutions

Site Data

COE

Enterprise Data

Monitoring Algorithms

Asset & Process Monitoring Solutions

COE Specialist

"Do It Yourself"
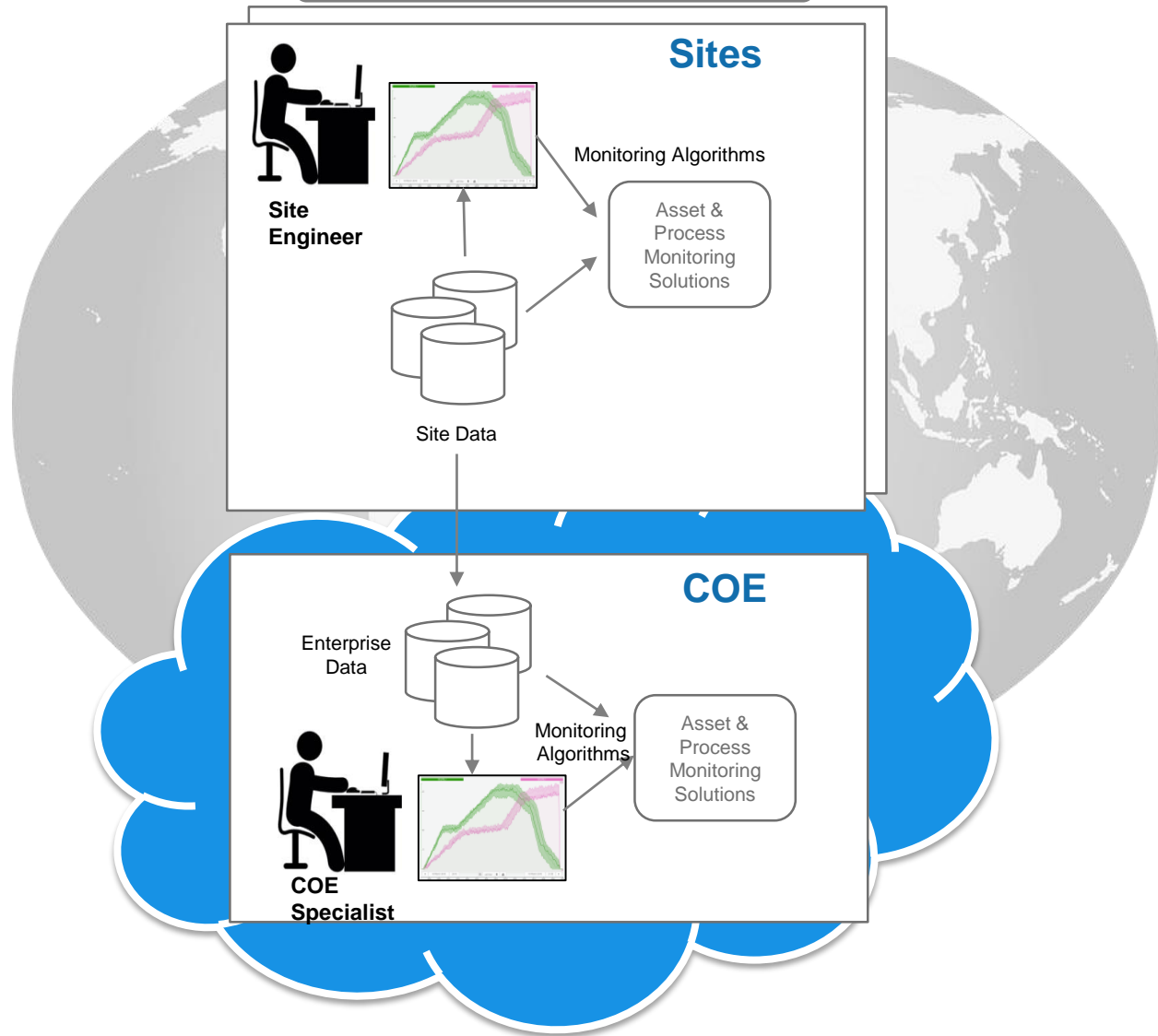
Use Case | *Equipment Vendor*

The Opportunity

1 Customers need better insight on how to manage their equipment to maximize performance and lifespan

2 Vendors need to benchmark equipment data & tools performance and offer advisory services to their customers

- **Customer** gets better performance and/or lifecycle out of their equipment
  - More production, less downtime
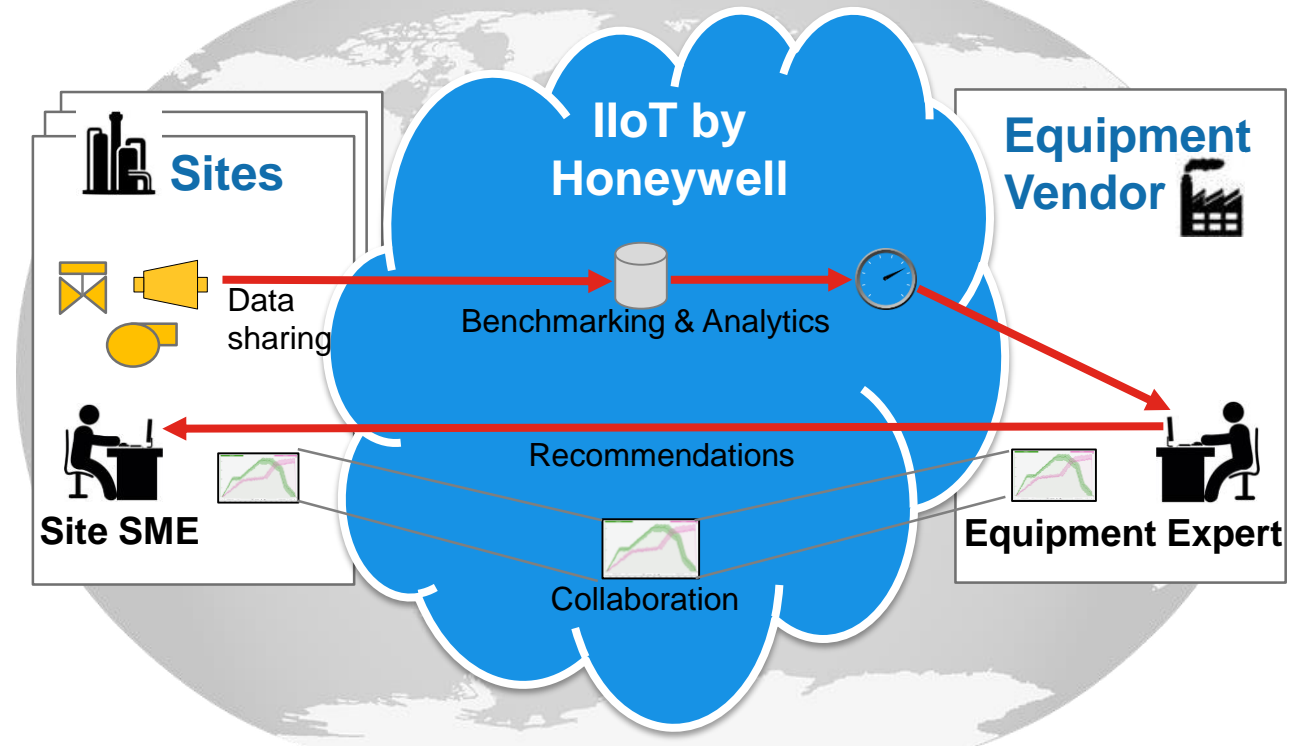 - Lower maintenance cost, reduced capital cost for replacement and spares
- **Vendor** gets increased customer satisfaction | Subscription revenue for enhanced support services | Product improvement feedback

Value

Why Honeywell

- Honeywell has significant experience offering world-class remote services to the process industries
- Equip vendors don't need to be IoT system integrators or manage IT – Honeywell has the IIoT platform, tools and integration experience
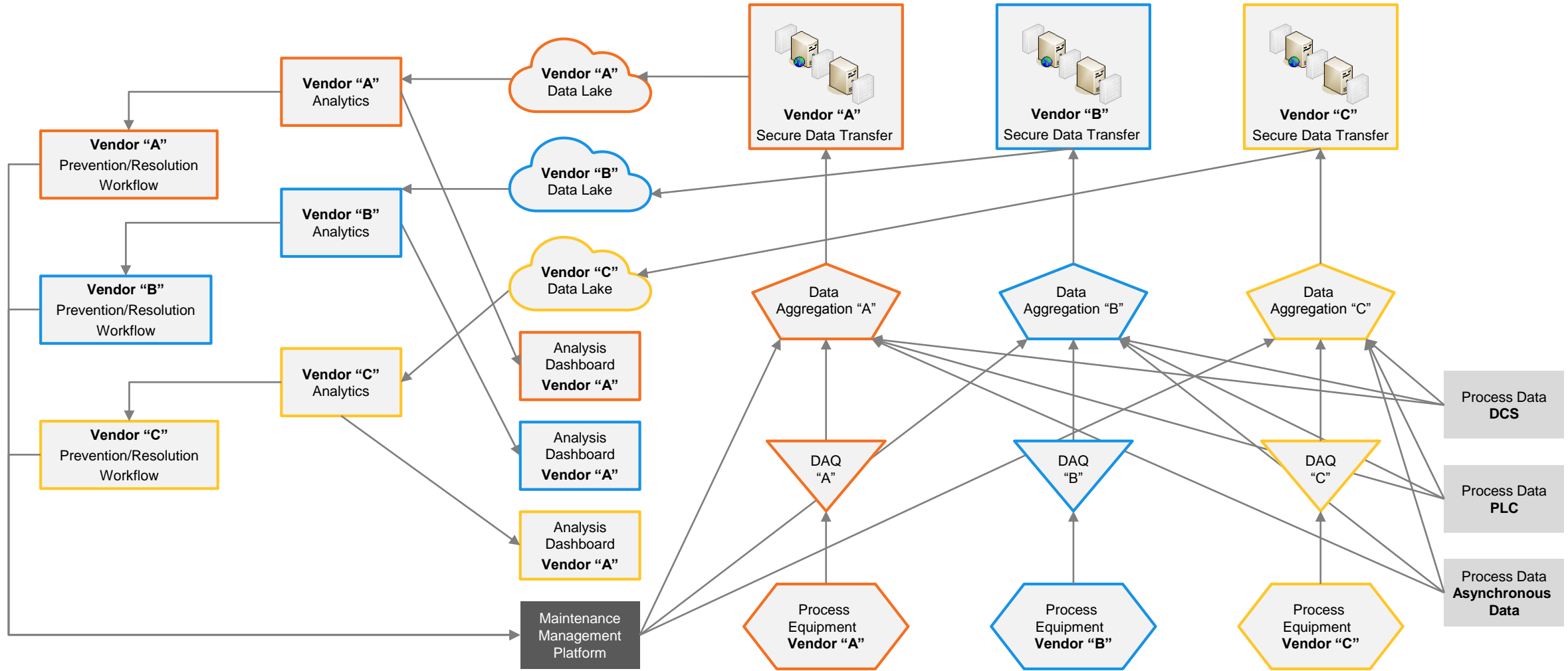- Mutual customers unlock potential for broader collaboration

The Solution

Sites

IIoT by Honeywell

Equipment Vendor

Data sharing

Benchmarking & Analytics

Recommendations

Collaboration

Site SME

Equipment Expert

Call in the Expert

Vendor-Specific IIoT Framework
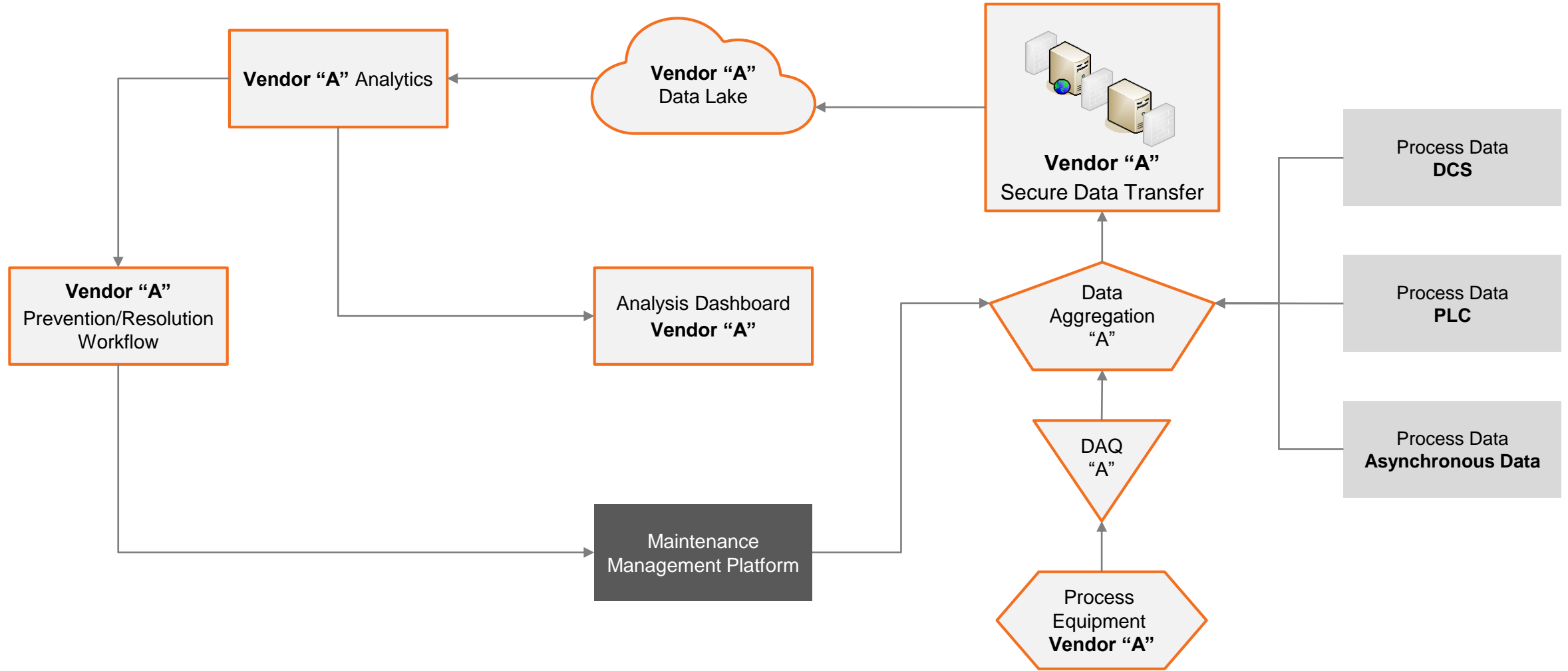
Multiple Vendor-Specific IIoT Frameworks

Unified Honeywell IIoT Framework

Honeywell Data Lake

Honeywell Secure Data Transfer

Analysis Dashboard Honeywell

Maintenance Management Platform

Data Aggregation Honeywell

Process Data **DCS**

Process Data **PLC**

Process Data **Asynchronous Data**

Hon Edge

Hon Edge

Hon Edge

Process Equipment **Vendor "A"**

Process Equipment **Vendor "B"**

Process Equipment **Vendor "C"**

Vendor "A" Module
Analytics & Prevention/Resolution Workflow

Vendor "B" Module
Analytics & Prevention/Resolution Workflow

Vendor "C" Module
Analytics & Prevention/Resolution Workflow

- Common Data Lake
- Single secure data transport path
- Single dashboard (Experion HMI Integration)
- Single data aggregation module shares common DCS/PLS/etc data links
- Common edge devices (by Honeywell)
- Simplified collaboration between site, remote SMEs, OEMs

Vendor "A"   Vendor "B"   Vendor "C"

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IIoT by Honeywell Ecosystem

Customers

Leveraging IIoT to solve key customer challenges

1 Operating without unplanned shutdowns

2 Reaching plant peak performance… ….and staying there

3 100% HSE performance, people, plant & environment

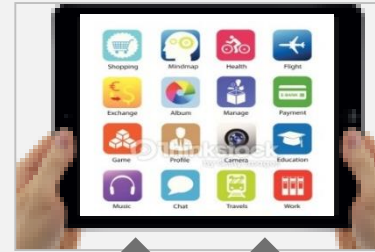**4** Data Driven Optimization of enterprise supply chains

Honeywell Hub and Spoke Architecture

Honeywell App Store

INspire Programs

External App Developers

Knowledge Vendors
- EPCs
- OEMs
- SIs
- Process Licensors

Honeywell HUB

Cloud Analytics

Honeywell Sentience™

Data Scientists
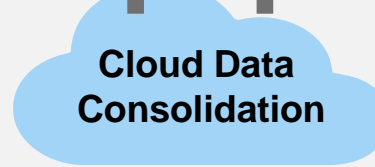
Cloud Data Consolidation

3rd Party Equ. Vendors

DCS Process Data

Secure Ecosystem Adds Domain Knowledge to Solve Challenging Problems

Industrial Internet by Honeywell

Honeywell Knowledge Apps

Knowledge Vendors

Joint Customer Development

Equipment Vendors

The Vision

To solve customer problems, previously thought unsolvable:

- Enable enterprise-wide supply chain optimization
- Allow you to operate at optimum capacity
- Avert unplanned shutdowns at your plants
- Improve safety and security throughout your enterprise

Secure | Scalable | Quick & Easy Connection

The Solution

- An ecosystem based on our secure, cloud-based platform designed to handle industrial data
- The power of your data unlocked, making actionable insights available in the palm of your hand – **easy to use enterprise apps**

Insight in the Palm of Your Hand

The Most Complete Set of Secure, IIoT-Ready Solutions

Smart & Secure Collaboration

- Honeywell™ Pulse (Mobility Solutions)
- Intuition® Executive
- LEAP™
- Industrial Cyber Security Risk Manager
- Big Data & Collaboration
- Digital Suites for Oil & Gas
- Experion® Collaboration Station

Analytics

- Uniformance® Asset Sentinel
- DynAMo® Alarm and Operations
- Lifecycle Services & Dashboards/ Assurance 360
- Uniformance® KPI
- Uniformance® Insight
- UniSim®

Data Management & Onsite Control

- DCS Experion® / RTU 2020
- Uniformance® PHD
- IIoT-enabled SCADA systems
- Experion® Orion Console
- Cloud Engineering
- Virtualization
- Safety Systems
- Optimization – Profit®

Smart, Connected Assets & Devices

- SmartLine® Transmitters
- Gas Flow Measurement
- Matrikon® OPC UA / Classic
- OneWireless™
- Universal IO
- Tank Level Measurements
- C300 Controllers

HONEYWELL IIoT READY

Innovation to Drive New and More Profitable Ways to Operate

www.honeywellprocess.com

www.hwll.co/IIoT

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