ENABLE THE CONNECTED PLANT WITH MATRIKON® FLEX OPC UA SDK
OPC UA Session 2

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26 September 2017
Agenda

- Delivering Connectivity Worldwide
- Market Opportunities & Why IIoT?
- Addressing Core Industry Problems
- Honeywell Connected Plant: Access To Context Rich Data
- Why OPC UA?, Why FLEX OPC UA SDK?
- Partners
- Q & A
Future is the Connected Plant

Cloud, Mobility, Analytics

Data is changing the industrial landscape...and Honeywell is in key position as a software-industrial to help extract value
Market Potential for IIoT

**IIoT Market**

- **$110B** by 2020  
  *Morgan Stanley*

- **$123B** by 2021  
  *Industry ARC*

**IIoT Could Add**

- **$14.2T** to Global Economy by 2030  
  *Accenture*

**Global IIoT Market to Grow at CAGR of 7.3%**

until 2020

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**Hype Cycle for the Internet of Things**

- **Internet of Things**
- **Machine Learning**
- **Predictive Analytics**
- **IoT Integration**
- **Asset Performance Management**
- **MDM of Product Data**
- **Data Federation/Visualization Tools**
How Does IIoT Work?

- **Advanced Analytics**
  - Connect process intelligence to business KPIs
  - Apply powerful analytics to detect and predict issues

- **Smart and Secure Collaboration**
  - Organize and visualize data in asset context

- **Data Management and Onsite Control**
  - Capture real-time process and event data

- **Smart & Connected Assets and Devices**
  - Visualize and collaborate across functions

**TODAY**

1990s - Visualize and collaborate across functions
IIoT Demands Access To Data

IIoT Solutions are Powerful with Access to All Data

OPC UA: Diagnostics, Calibration, Process, Analytics

CONTROL BUS

Field Devices

Non- Honeywell Equipment

DCS

CONTROL BUS / OPC*

OPC UA

Private / Public Cloud

All Data

Maintain

Operate

Optimize

OPC UA: Diagnostics, Calibration, Vibration, Process

Connectivity

OPC UA turns every field device into an edge device for direct cloud connectivity

Analysis + Outcome

Easy access to all plant data, combined with structured and unstructured data from other sources, allows optimization of the entire value chain
Honeywell Connected Plant

Deliver and Sustain Improvements in Our Customers’ Profitability by Increasing Throughput & Yield at Lower Cost via:

- Improved Process Reliability
- Increased Production Efficiency
- Integrated Safety & Cyber Security
- Optimized Supply Chain
- Workforce Competency
Honeywell Connected Plant, Unequalled Equation for Success

We connect processes, assets and people to continually redefine optimal performance

- **Connected Process**
  - Deep domain expertise
  - Optimization & analytics via the digital twin

- **Connected Assets**
  - Broad ecosystem of expertise & capabilities
  - Predictive asset performance, increase uptime, decrease downtime

- **Connected People**
  - Enhanced decisions via data analytics
  - Worker safety & compliance

**Connected Plant**
- Unmatched industry offering
- Integrated solutions that span the entire enterprise

Maximize plant throughput and yields by 7%

Improve plant availability by 2%

Protect knowledge of retiring workforce

$26M+ increase in profit/year

Based on foundation of advanced software solutions

*Based on a medium sized refinery in the US*
Honeywell Connected Plant: Delivering What No One Else Can

Delivering ROI
Focused Solutions

For a medium sized refinery in the US...

- ~5% of production lost to unplanned shutdowns/yr...
- 1% improvement in plant availability & quality...
- +$26M increase in profit/yr

Industrial Software Solutions + Connected Platform for Operational Excellence

Cyber Secured Data Stream

Disparate Data Across Enterprise

Plant Availability & Optimization

Process Specialist

OEM Partner Ecosystem

Customer SME

Analytics Based Insight at Enterprise Level

Decisions & Actions

Connected Plant

Connected Plant: Delivering What No One Else Can
Ethernet-based Connectivity “USB” for Industrial Data

By Matrikon
Architecture components and data analytics offer compliance with specification, ease of use, high performance, and robustness

By Matrikon
Offer compliance with specification, ease of use, high performance, and robustness

Developed by Matrikon
Open source

<table>
<thead>
<tr>
<th>OPC Classic</th>
<th>OPC UA</th>
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<tr>
<td>Non-native security</td>
<td>Native security</td>
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<tr>
<td>Microsoft windows only</td>
<td>Multi-platform implementation, including ANSI C, java and .NET</td>
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<td>Designed for desktop</td>
<td>Scalability: from embedded smart sensors to mainframes</td>
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<td>Frequent configuration issues</td>
<td>Easy engineering</td>
</tr>
<tr>
<td>Connectivity without context:</td>
<td>Connectivity with context:</td>
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<tr>
<td>• Value &amp; time stamp</td>
<td>• Value &amp; timestamp → tag → equipment → plant → site</td>
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Matrikon Flex OPC UA SDK

The first high-performance, scalable OPC UA SDK that quickly and easily enables any application, regardless of size or hardware platform.

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<th>High Performance</th>
<th>Secure, reliable design built from embedded-first principles maximizes uptime.</th>
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<td>Smaller Footprint</td>
<td>Optimized memory and CPU bandwidth enables OPC UA in any hardware or software product.</td>
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<tr>
<td>Scalable</td>
<td>Scalable to all products – from the smallest MCUs to the most powerful multi-core CPUs.</td>
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<td>Easy to Use</td>
<td>Faster to market with drop-in 'OPC UA Server &amp; Client Inbox' design.</td>
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Flex OPC UA SDK is Platform Independent and Can Be Embedded in Everything
OEM Decision – Build Versus Buy?

Can We or Should We Build?
• Can we complete in a reasonable time?
• Can we deliver a quality implementation?
• Can we deliver at a reasonable cost?
• Can we affordably maintain and enhance the technology?
• Can we realise a best in class solution?
• Are we focussing on our key competitive advantage?

For OPC UA the Correct Answer is “BUY”
What Do You Need In An SDK?

Cost Optimized Solution

Rapid Development
• Short time to market
• Low development cost

Quality and Reliability
• Your brand and reputation in our hands
• Delegate complexity to the experts

Broad Applicability
• Deploy the same technology for every application
Matrikon Flex Allows Rapid Development

- Simple C API for basic data access servers
- Easy to use C++ API for full-featured servers and clients
- Encapsulates all server services (server-in-a-box design)
- Client / server creation – easy as instantiating a C++ object

Server Steps to Success:

1. Instantiate server object
2. Load information model into server address space
3. Hook up server process variables to your data source
4. Start the server
Quality & Reliability

Code Quality
• High quality, strongly typed C++ implementation
• Smart pointer-based memory management
• Memory sandbox option for embedded systems

Process Quality
• Formal HPS Iterative Process (HIP)
• Continuous integration of builds, unit tests and functional tests

Third Party Approvals
• Sample products certified for compliance by the OPC Foundation
Broad Applicability

- Client and server support
- Comprehensive feature set and development roadmap
- Scales from sub-$5 microcontrollers to “big iron” multicore systems
- Simple “bare metal” microcontroller-based deployments
- Any OS or RTOS
- .Net and Java Native Interface (JNI) bindings on our roadmap
Broad Applicability

Patent-pending SDK architecture supports high-performance operation in both single and multi-threaded build configurations

Platform Requirements:
- 32 or 64-bit architecture
- C++98 compiler
- Sufficient system resources for your use case
Future

- IIoT Model / Perdue Model
- Data As Intelligence (Fog + Cloud)
- Optimized middle layer (Fog Computing)
- Cloud Historians collecting contextualized data
- Minimized costs
- OPC UA = Norm
Coming Soon: OPC UA Publish-Subscribe

- OPC UA Part 14 adds native PubSub capabilities
- Enables:
  - Highly scalable infrastructure
  - Secure cloud connectivity using AMQP
  - High Speed data exchange
Example PoC: Data Connectivity

Scalable Cloud based data collector:
- Preserved Data Context = easy reference, fast setup, reduced errors:
  - Device X
    - Temp: 120
    - EU: F
    - Min: 80
    - Max: 250

Consistent Data Model: Context preserved

Benefit: Cost Reduction & Security
- Eliminate Middle ware PC
- Eliminate Windows Patching & Antivirus upkeep costs
- Eliminate IT engagement
- Eliminate use of wrong data registers using on-board human readable values
- Maximize Device ROI by extending device lifespan
- Secure legacy devices that have no built in security
Migrating Toward True Digital Business Transformation

Emerging Challenges
- Digital Business Models
- Integrated Cloud + Edge (Fog Computing)
- From ‘Me’ to ‘We’ Ecosystems
- Smart Workforce - Augmented

Existing Infrastructure
- Legacy ROI + Migration
- Industry vertical silos
- Open data connectivity
- Data Security
Conclusion

OPC UA Data Connectivity benefits:
- Extended & secure visibility to Field/Shop Floor
- Context rich Data
- Ease of deployment and maintenance
- Reduction in IT and middleware costs
→ NEXT STEP: Start Phased Migration

Digital Business Transformation is a multistep process
- **Fog Computing @ Edge**
  - Local Analytics
  - Local Filtering – reduction of data noise/volume
- **Cloud**
  - Improved Analytics
  - Improved access across enterprise and eco system
  - Workforce training/alignment
→ NEXT STEP: Start Your IIoT PoC

• UA Tunneller
• UA Modbus Gateway
• Industrial Data Logger
• Matrikon FLEX OPC UA SDK

• Industrial Data Logger
• IIoT Cloud collector
• IIoT HUB
Matrikon® FLEX – Most Widely Supported

Matrikon is partners with major chip manufacturers to ensure Matrikon® FLEX reference designs are available for your projects:

- Infineon
- Intel / Altera
- Renesas
- ST
- Texas Instruments
- Xilinx