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

Data is changing the industrial landscape…and Honeywell is in key position as a software-industrial to help extract value

Cloud, Mobility, Analytics
Market Potential for IIoT

IIoT Market
$110B by 2020
MORGAN STANLEY

IIoT Market
$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

Hype Cycle for the Internet of Things

- Internet of Things
- Machine Learning
- Predictive Analytics
- IoT Architecture
- IoT Platform
- IoT Integration
- Asset Performance Management
- MDM of Product Data
- Data Federation/Visualization Tools
- Innovation Trigger
- Peak of Inflated Expectations
- Trough of Disillusionment
- Slope of Enlightenment
- Plateau of Productivity

Time
Expectations
How Does IIoT Work?

- Advanced Analytics
- Smart and Secure Collaboration
- Data Management and Onsite Control
- Smart & Connected Assets and Devices

**TODAY**

- Connect process intelligence to business KPIs
- Apply powerful analytics to detect and predict issues
- Organize and visualize data in asset context
- Capture real-time process and event data

**VISUALIZATION**

**COLLABORATION Across Functions**

**1990s**
IIoT Demands Access To Data

IIoT Solutions are Powerful with Access to All Data

- OPC UA: Diagnostics, Calibration, Process, Analytics
- Field Devices
- Control Bus
- DCS
- OPC UA
- Private / Public Cloud
- All Data
- Maintain
- Operate
- Optimize

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

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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

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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

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

Developed by OPC Foundation
Open source

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

<table>
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<tr>
<th>Feature</th>
<th>Description</th>
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<tr>
<td>High Performance</td>
<td>Secure, reliable design built from embedded-first principles maximizes uptime.</td>
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<tr>
<td>Smaller Footprint</td>
<td>Optimized memory and CPU bandwidth enables OPC UA in any hardware or software product.</td>
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<td>Scalable</td>
<td>Scalable to all products – from the smallest MCUs to the most powerful multi-core CPUs.</td>
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<tr>
<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

Cloud Application: AMQP

Local Application: UDP
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

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