Matrikon® | Beeond

OPC UA

[E-BOOK]

OPC UA vs. Classic OPC
Why Switch and How To Get Started

Everyman's Guide to OPC UA Series

E-Book – Dec 2018

Matrikon www.MatrikonFLEX.com

Beeond Incorporated www.Beeond.net

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The **Everyman's Guide to OPC UA Series** provides easy to understand bite sized overviews on key OPC UA topics.

In this edition: Find out where Classic OPC came from, why OPC UA was needed, and how you can mix and match both technologies using the right tools and methodologies.

Backgrounder

Shop Floor Data Connectivity

Shop Floor Data Connectivity Evolution

Classic OPC

In the early to mid-1990s, control automation vendors and end-users got together to define a better way to share supervisory control data throughout the plant level. They created a revolutionary new open standard called **OLE for Process Control (OPC)** and formed the OPC Foundation to manage it. Thomas Burke was the first president.

Based on Microsoft OLE (Object Linking and Embedding) technology built into all Windows versions, OPC was easy for vendors to adopt since the transport mechanism came 'free' with Microsoft Windows – the dominant OS used in industry at the time.

Within a few years OPC became the global de facto standard for standards-based open data connectivity. However, tying OPC to a specific OS technology had its drawbacks as IT an OT realized when inherent security vulnerabilities and other connectivity issues surfaced in the OS.

OPC Unified Architecture

Approximately 15 years after OPC came to be, industry experts from OPC Foundation working groups crafted the next generation communication and interoperability standard aptly named **OPC Unified Architecture (OPC UA)**.

Combining the lessons learned from the classic OPC standard and some truly visionary foresight as to what control automation would need not just in the present but in the future, OPC UA was designed as a open, secure, OS agnostic, and extendable standard that could adapt as security, connectivity, and data modeling requirements changed over time.

The value of this approach was soon proven when the IoT era sprung to life a few years later and OPC UA was quickly identified as the key data interoperability standard robust and secure enough to be used as the foundation for Industrial IoT applications.

Data Connectivity in the Industrial IoT Era

It hard to argue against the vision of IIoT and Industrie 4.0. The challenge is how to make the vision a reality. There are billions of dollars of installed legacy systems and there are many stakeholders in an enterprise, each with different viewpoints and requirements.

Digital Business Transformation through IIoT technologies enables businesses to operate more efficiently and effectively through friction-less communications throughout the organization and supply chain. As Digital Business Transformation initiatives take hold they must address Business/Financial, Usage, Functional and Implementation requirements as defined below.

- **Business/Financial** – Executive management is looking at the financial health of the business and what to see business value and ROI for any investment.
- **Usage** – New devices and systems must be securely registered and accessed by business users
- **Functional** – Systems and devices must interoperate in and across the fine functional domains of: Control, Operations, Information, Applications and Business
- **Implementation** – IT must implement and support system architectures, interfaces, protocols cost effectively.

Business	• Business Value & ROI • Cost of Maintenance
Usage	• New device registration in plant and cloud system • How information is accessed, users added
Functional	• Component Interoperability in and across five functional domains: ○ Control, Operations, Information, Applications, and Business
Implementation	• Architecture, component distribution, topology • interfaces, protocols, behaviors, etc.

OPC Unified Architecture (UA) Meets Connectivity Standards Criteria

The *Industrial Internet Consortium* and *Plattform Industrie 4.0* are two key organizations that have defined the requirements for next generation manufacturing systems and architectures. They have evaluated the key connectivity standards available today and both have declared that the *OPC Unified Architecture Standard* meets their requirements.

About Plattform Industrie 4.0

Plattform Industrie 4.0 is the central network to advance digital transformation in production in Germany. In close cooperation with politics, industry, science, associations and trade unions, over 300 players from more than 150 organizations are actively involved in the platform. The platform is one of the largest international and national networks and supports German companies – especially small- and medium-sized companies – in implementing Industrie 4.0, particularly by providing practical examples of Industrie 4.0 to companies and deploying them on site. In addition, it provides decisive impulses through concrete recommendations for action, as well as information on means of support and test environments. Numerous examples of international cooperation by the platform underscore its strong role in the international discussions on Industrie 4.0. (www.plattform-i40.de)

About The Industrial Internet Consortium

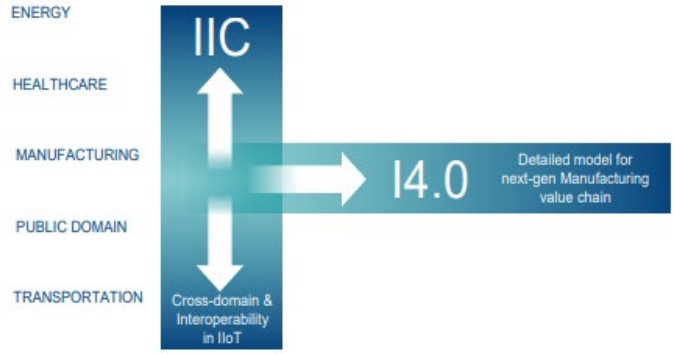
The Industrial Internet Consortium was founded in March 2014 to bring together the organizations and technologies necessary to accelerate the growth of the Industrial Internet by identifying, assembling and promoting best practices. Membership includes small and large technology innovators, vertical market leaders, researchers, universities and government organizations. (www.iiconsortium.org)

Key Industry Consortia Join Forces

IIRA & RAMI Architecture Models

The *Industrial Internet Consortium (*IIC™*)* and *Plattform Industrie 4.0 (I4.0)* have independently developed reference architecture models for the industrial internet. The *IIC* has defined the Industrial Internet Reference Architecture (IIRA), and *I4.0* has defined the Reference Architecture Model for Industrie 4.0 (RAMI), respectively.

Naturally, questions have been asked about how these two approaches relate to one another. In 2015, representatives from both organizations met to explore the potential alignment of their two architecture efforts and to understand the technical issues from both perspectives.

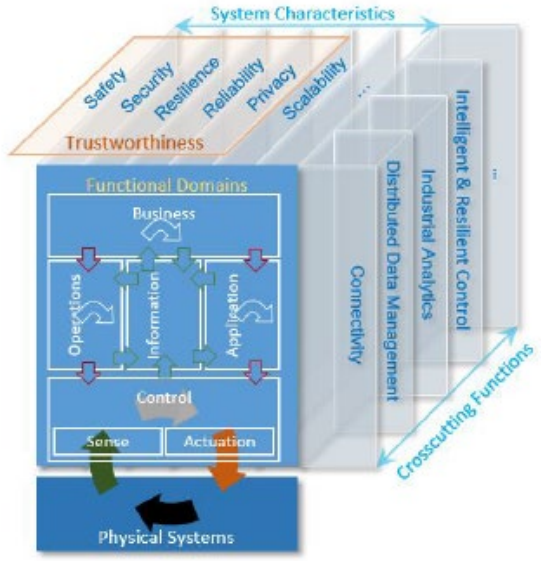


Courtesy of Industrial Internet Consortium / Platform Industrie 4.0

On February 6, 2018, the *IIC* and *I4.0* announced the publication of a joint whitepaper – Architecture Alignment and Interoperability – which details the mapping and alignment between the two leading industrial internet of things (IIoT) reference architecture models, the Industrial Internet Reference Architecture (IIRA) and the Reference Architecture Model for Industrie 4.0 (RAMI 4.0), published by the two organizations respectively.

industrial internet CONSORTIUM

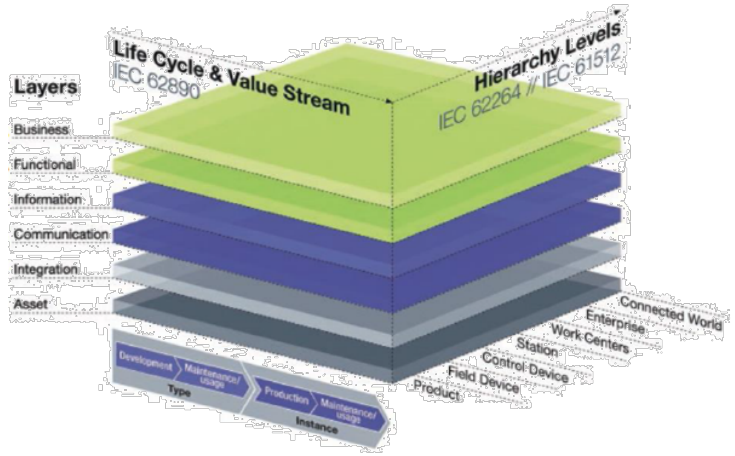
Industrial Internet Reference Architecture (IIRA)



Source: Industrial Internet Consortium IIRA

PLATTFORM INDUSTRIE4.0

Reference Architecture Model Industrie 4.0 (RAMI)



Source: Platform Industrie4.0 RAMI

OPC UA: A Core Connectivity Standard

Industrial Internet Connectivity Framework (IICF)

The *IIC / I4.0* Architecture Alignment and Interoperability white paper defines an Industrial Internet Connectivity Framework (IICF). The IICF…

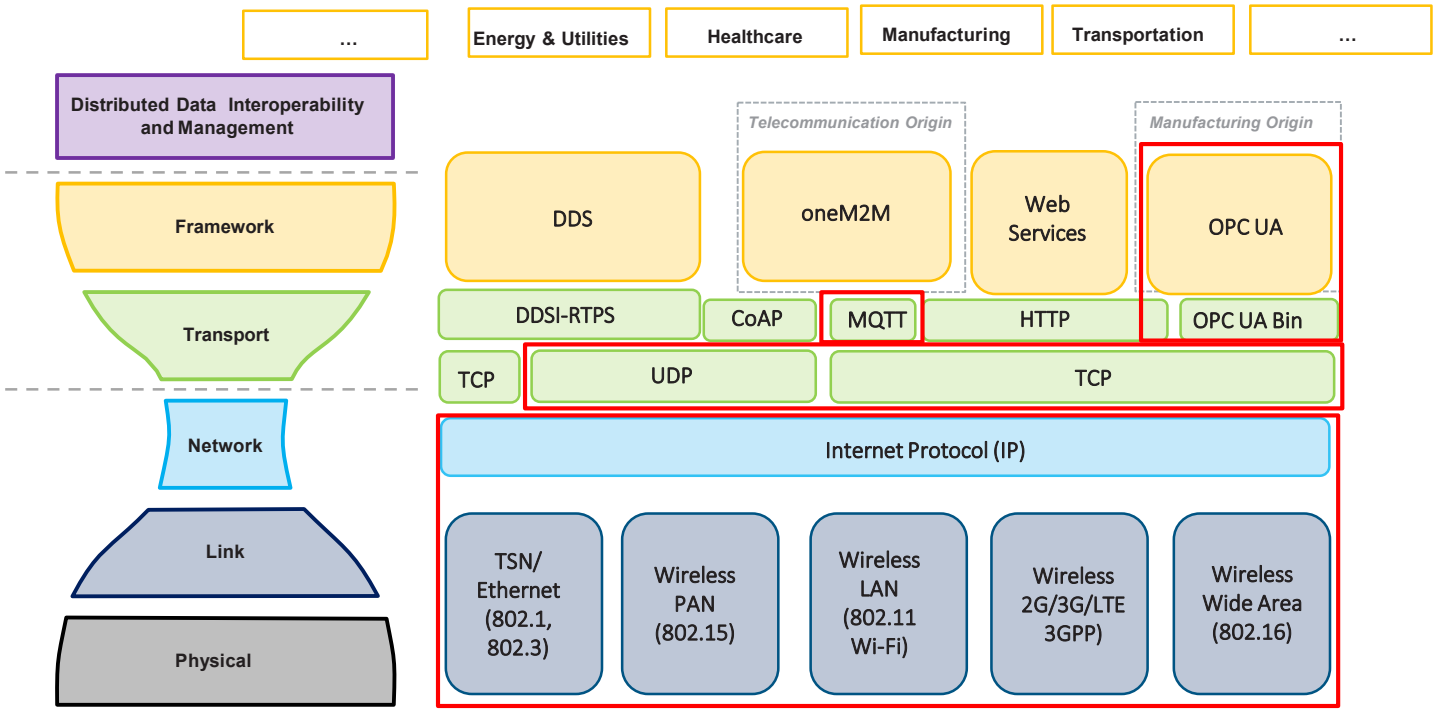
> *"clarifies IIoT connectivity with a new IIoT stack model, defines an open connectivity reference architecture, and helps practitioners to categorize, evaluate and determine the suitability of a connectivity technology for the IIoT system at hand.*
>
> *The connectivity challenges in IIoT systems include meeting diverse requirements, supporting many transports and connecting an overwhelming array of "things" from small devices to huge, intelligent networks of complex subsystems."*

The number of core data standards was kept as small a possible to minimize complexity and addresses not only manufacturing but all possible markets including healthcare, transportation and others.

At right, the red highlighted technologies, show that OPC UA supports the levels of the technology framework. Critical Criterial for the framework included:

- ✓ Syntactic Interoperability
- ✓ Secure
- ✓ Performant
- ✓ Scalable
- ✓ Reliable
- ✓ Resilient
- ✓ Open Standard
- ✓ International Adoption
- ✓ Vendor Agnostic
- ✓ SDKs Available (Open Source + Commercial)

Industrial Internet Connectivity Framework (IICF)



Source: IIC/I4.0 Architecture Alignment and Interoperability White Paper.

OPC UA vs Classic OPC

What are the differences & Why Switch?

OPC UA versus Classic OPC

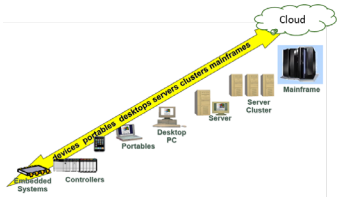
System Integration & Maintenance

Despite its strengths, the classic OPC standard falls short of what is expected from modern control automation systems and the way they interact with the rest of the enterprise. Key issues around shop floor integration, IT policy compliance, reliability, data context preservation, and other issues are all key business drivers for moving to OPC UA.

This section looks at key criteria used to compare what the difference are between classic OPC and OPC UA technologies.

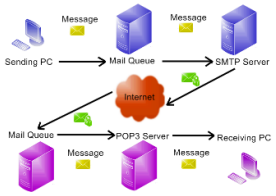
Platforms & Scalability

Platforms & Scalability discusses the requirements surrounding the need to deploy data connectivity on a broad range of computing platforms and operating systems. This is crucial for a standard that must be equally at home running on a sensor as well as a cloud based application.



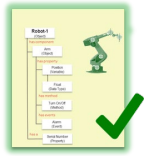
Communication Transports

There are many transports to choose form for moving data between two points. Some examples are TCP/IP, MQTT, HTTPS, and UDP. These protocols are in wide use and each well adapted for use in specific scenarios. A data interoperability standard needs to be able to utilize these transports as needed. It must also provide a way for new transports to be added in the future as technologies evolve.



Information Modeling

How is data / information defined? How robust is the information model. Does it allows for vendor abstraction? The ability to define a vendor independent information model would allows for universal application communications and interoperability.



Security

Cybercrime was one of the top news stories in 2017 with the estimated global cost set to reach $6T annually by 2021, according to Cybersecurity Ventures. The manufacturing sector is at the top of the list of most frequently hacked, second only to healthcare. Much of the current industrial infrastructure was installed, 10 to 20 years ago, when data security was much less of an issue and the focus was on performance and safety. The next generation Framework must provide a high level of security to protect against sabotage, espionage and compromising a IT system's integrity.

Integration Experience

An optimum Communications Framework must address the primary End User requirement to significantly reduce or eliminate system integration complexity, cost and maintenance. The Framework must allow for: a) vendors to differentiate their applications, b) applications from different vendors to easily interoperate with minimal effort, and c) deployment of applications throughout the entire enterprise, from sensor to cloud and throughout the supply chain.

Platforms & Scalability

OPC UA

Computing Platforms

- ✓ Embedded (ARM Processors)
- ✓ Personal Computers / Servers
- ✓ Bare Metal

Operating Systems

- ✓ Windows
- ✓ Linux
- ✓ iOS
- ✓ Android
- ✓ No-OS

Scalability

- ✓ Sensor to Cloud
- ✓ Throughout the Supply Chain

OPC UA can be Deployed Anywhere – Any Platform & Operating System

Classic OPC

Computing Platforms

- ✓ Personal Computers / Servers

Operating Systems

- ✓ Windows only

Locally discoverable per PC

- ✓ Need DCOM permissions on remote PCs to check for OPC Servers
- ✓ No global discovery
- ✓ Need to search per PC

Scalability

- ✓ PC / Windows Platforms only

Classic OPC only runs on Windows

Communications Transport

OPC UA

Client-Server: Binary/TCP
- ✓ Supervisory control over LAN

PubSub: MQTT (Sensor-Cloud)
- ✓ Secure access over WAN
- ✓ Highly scalable

PubSub: UDP (M2M)
- ✓ Efficient, High speed data
- ✓ Highly Scalable

Connection Recovery
- ✓ Suitable for unreliable networks

Reverse Connection across firewalls

OPC UA supports various Communications Transports

Classic OPC

DCOM based transport only
- ✓ Difficulties with unreliable networks
- ✓ Requires 3rd party tool like OPC UA Tunneller to eliminate DCOM
- ✓ Windows Updates often break DCOM settings
- ✓ Not suitable for M2M communications
  - Slow
  - Too expensive to deploy PCs

Classic OPC relies on Windows COM/DCOM technology

Information Modeling

OPC UA

Object Oriented Information Modeling

- ✓ Data & Commands (Services)
- ✓ Companion specifications provide standardized Information Models
- ✓ Dynamically updates Information Models as needed
- ✓ Meta data for application independent definition of data

OPC UA Enabled products have:

- ✓ Data structures predefined
- ✓ Units, limits, etc. match device configuration

OPC UA supports comprehensive object oriented information modeling

Classic OPC

No Information Modeling

- ✓ Simple Items: Name, VTQ
- ✓ No relationship between items
- ✓ Users: employ dot-naming convention to imply structure
  - Error prone and work intensive
  - Easily Outdated
  - Low consistency

Classic OPC only uses a simple dot naming convention for items.

Security

OPC UA

Passed extensive security tests performed by the German Federal Government (BSI)

Threats Addressed:

Threat	Authentication	Authorization	Confidentiality	Integrity	Auditability	Availability
Message Flooding						X
Eavesdropping			X			
Message Spoofing		X		X		
Message Alteration		X		X		
Message Replay		X				
Malformed Messages				X		
Server Profiling	X	X	X	X	X	X
Session Hijacking	X	X	X			
Rogue Server	X	X	X		X	X
Compromised User Credentials		X	X			

OPC UA was designed on best security practices from the ground up.

Classic OPC

DCOM Issues

- ✓ Intrusion & Propagation
- ✓ System Control Takeover
- ✓ Espionage & Sabotage

Network Issues

- ✓ Error prone and work intensive
- ✓ Easily Outdated
- ✓ Low consistency

OPC Server Behavior

- ✓ Tag Browsing: Reconnaissance
- ✓ Tag Reads: Espionage & Reconnaissance
- ✓ Tag Write: Sabotage

Classic OPC primarily relies on outdated Windows COM/DCOM security.

Integration Experience

OPC UA

Enhance Integration Experience

- ✓ Simplified multi-vendor system integration
- ✓ OPC UA Companion Specifications provide common Information Models for users
- ✓ Information Model preserved data context improving analytics & insights
- ✓ Vendors retain unique internal implementations
- ✓ Servers discoverable Locally or Globally via Global Discovery Service (GDS)

Enhanced Shop Floor Integration

- ✓ Shop-Floor application use OPC UA natively and pre-configured (no PC Setup)
- ✓ Applications call OPC UA Services directly
- ✓ Programming focuses on logic not translation

OPC UA minimizes integration efforts as it runs natively in devices and applications.

Classic OPC

Shop Floor Integration

- ✓ Protocol Drivers needed per component
- ✓ Programming needed to facilitate interaction between components & production logic
- ✓ Locally discoverable per PC
  - *Need DCOM permissions on remove PCs to check for OPC Servers*
  - *No Global Discovery - Need to Search per PC*

Classic OPC only runs on Windows, requires more integration work for non-windows devices.

End User Adoption

Mixing and Migrating to OPC UA

OPC UA / IIoT Considerations

Legacy Infrastructure Considerations

Most industrial enterprises have automation systems from multiple vendors installed in their facilities. Custom software using either the vendor's proprietary or Classic OPC protocol is used for system integration and data extraction for monitoring, alarms, history and reporting. As long as these facilities continue to run in an optimized manner with acceptable administration and maintenance cost, it does not make economic sense to replace these systems.

As new and enhanced applications, hardware and software systems are introduced offering improved functionality, easier integration and maintenance, and higher and more reliable performance, end users have started to look for viable upgrade strategies that retain their infrastructure ROI.

Mix & Migrate Best Practice

As vendors increasingly embed OPC UA into their products, what is the best practice for blending OPC UA enabled applications with legacy applications? The following pages discusses the options that are available and approaches that can be taken.

OPC Classic

Proprietary Protocols

Mix & Migrate to OPC UA

Phased Migration from Classic OPC to OPC UA

Mixing OPC UA Clients and Servers With Classic OPC Counterparts

As new enhanced OPC UA enabled applications and devices are introduced into facilities primarily based on Classic OPC it becomes necessary to integrate the OPC UA and Classic OPC components.

Problem: OPC UA and Classic OPC applications cannot communicate directly as they use different transports.

Solution: Bridging software like Matrikon® OPC UA Tunneller (UAT) enables reliable and secure communications between classic OPC and OPC UA components. This extends the useful life of existing assets while enabling you to start using next-generation technology today.

UAT enables either OPC UA Servers to communicate with Classic OPC Clients (Figure 1) and OPC UA Clients to communicate with Classic OPC Servers (Figure 2).

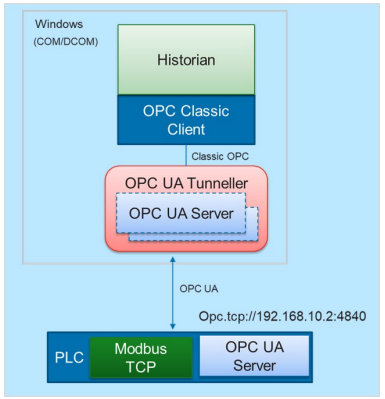


Figure 1: Classic OPC Client & OPC UA Server Communication

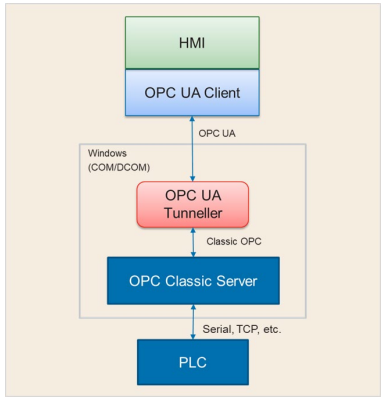


Figure 2: OPC UA Client & Classic OPC Server Communication

The ability to mix Classic OPC and OPC UA components today helps future-proof your control infrastructure in preparation for a time where only OPC UA is used at minimal effort and expense.

Migration to OPC UA

Eventually, full migration to OPC UA simplifies infrastructures as middleware PCs and bridging software like Matrikon OPC UA Tunneller will no longer be required. (Figure 3).

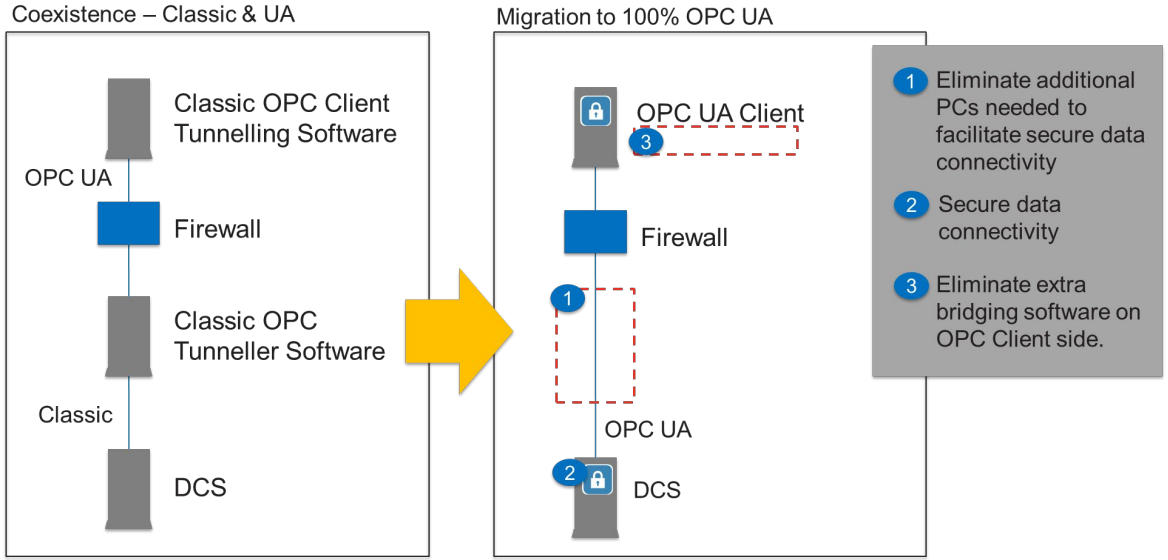


Figure 3: Migrating fully to OPC UA simplifies your infrastructure and reduces integration and maintenance costs beside the other advantages OPC UA offers.

Putting OPC UA to Work

There are a multitude of sensors, equipment, devices, and applications in a typical plant or factory. Each of these uses different communication methods including Classic OPC, proprietary protocols, Modbus, and others. Whatever the setup, best practices for mixing & migrating to OPC UA apply. Common scenarios include:

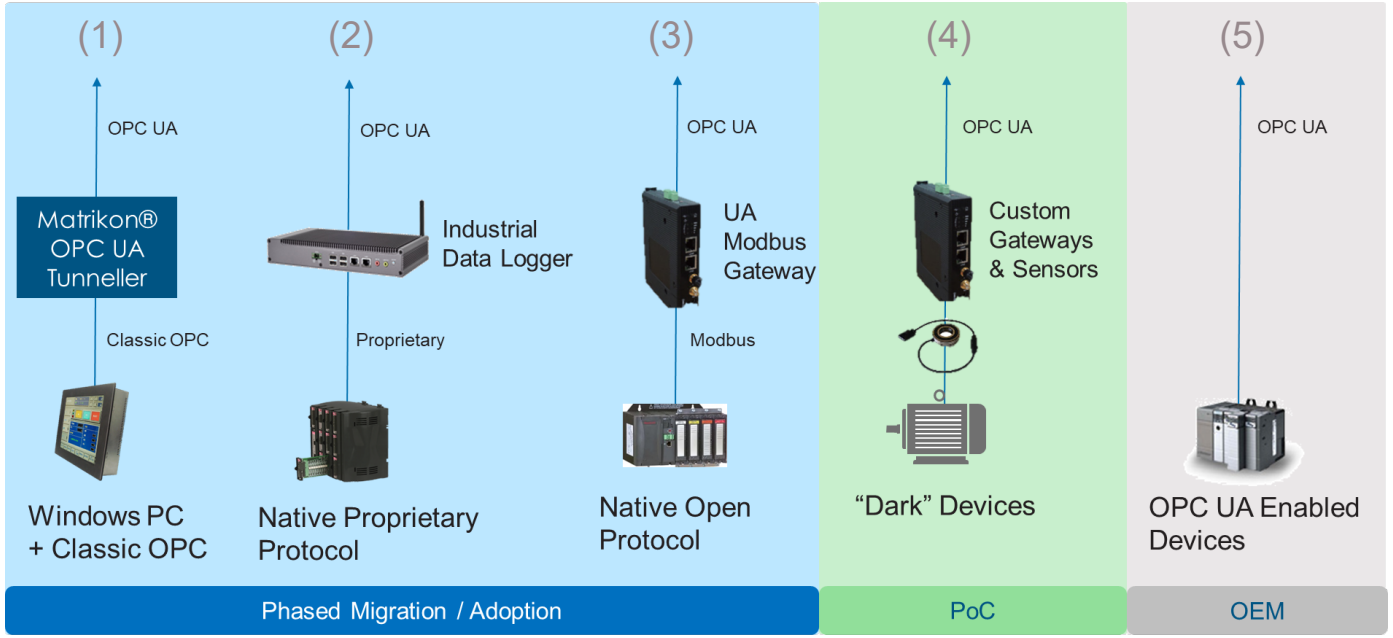
(1) Classic OPC Architectures – As previously discussed use of Matrikon® OPC UA Tunneller™ is recommended to improve the classic OPC infrastructure security and to enable mixing in of OPC UA components.

(2) Native Proprietary Protocols - To connect to proprietary protocol based components, OPC middleware is used to enable other systems to openly communicate with them. Matrikon® Industrial Data Gateway is an example of a data appliance that provides 3rd Party connectivity and Matrikon OPC UA Tunneller preloaded.

(3) Native Open Protocols – There are many OPC UA Gateways available for the numerous Open Protocols that are in use today, such as Modbus, FactoryTalk, Fieldbus, etc. Ex. Matrikon® OPC UA Modbus Gateway which, translates between Modbus and OPC UA without the need for a PC.

(4) "Dark" Devices – When equipment or devices have no communications capabilities then custom OPC UA gateways can be developed to interface to new sensors applied to these Dark devices.

(5) OPC UA Enabled Devices – As more and more vendors OPC UA enable their products then End Users adoption is simplified. The recommendation is for End Users to encourage their strategic vendors to OPC UA enable their products to match their adoption timetable.



End User Adoption Strategy – A Structured Practical Approach

Five Steps to IIoT Adoption

Many factors come into play when planning and implementing an IIoT strategy. To maximize your chances of success, a practical Five Step IIoT Adoption Process for End-Users has been devised by Beeond. Following it helps you realize value quickly and efficiently. Following this process:

- ✓ Helps you develop a roadmap that moves your organization and your vendors toward IIoT
- ✓ Trains your IT and automation staff and vendors on how to implement and support the OPC UA infrastructure
- ✓ Helps you and your vendors deploy and test the OPC UA infrastructure in your plant and products

The five steps in this process are:

1. IIoT Strategy Workshop: Define your IIoT goals, strategies and priorities. This begins with an assessment of your installed technology and identification of strategic vendor and their roadmap plans. The deliverable is a plan with prioritized requirements for moving your plant(s) and vendors toward IIoT.

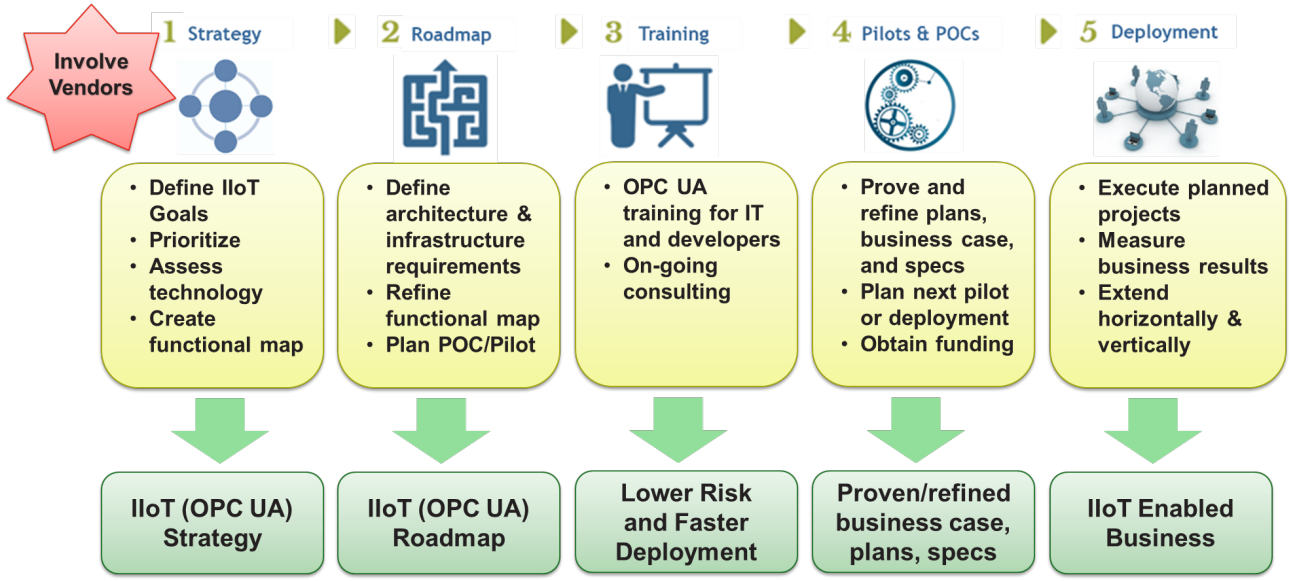
2. IIoT Roadmap Workshop: Define an adoption roadmap to move you to an IIoT-enabled plant where both legacy and new IIoT era automation components coexist.

3. OPC UA Training: Train your IT, engineering and vendor resources on how to deploy and implement the OPC UA specification addressing coexistence, infrastructure, information model and security.

4. Pilots & POCs: Execute pilot or proof of concept projects to prove the business case and key assumptions, and refine plans and specifications.

5. Deployment: Based on your OPC UA Adoption Roadmap, deploy OPC UA enabled applications.

Systematic IIoT Strategy to Achieve Increased ROI



Vendor Adoption

How to OPC UA enable your Products.

Vendor Adoption Strategy – Go To Market Faster with Lower Risk & Cost

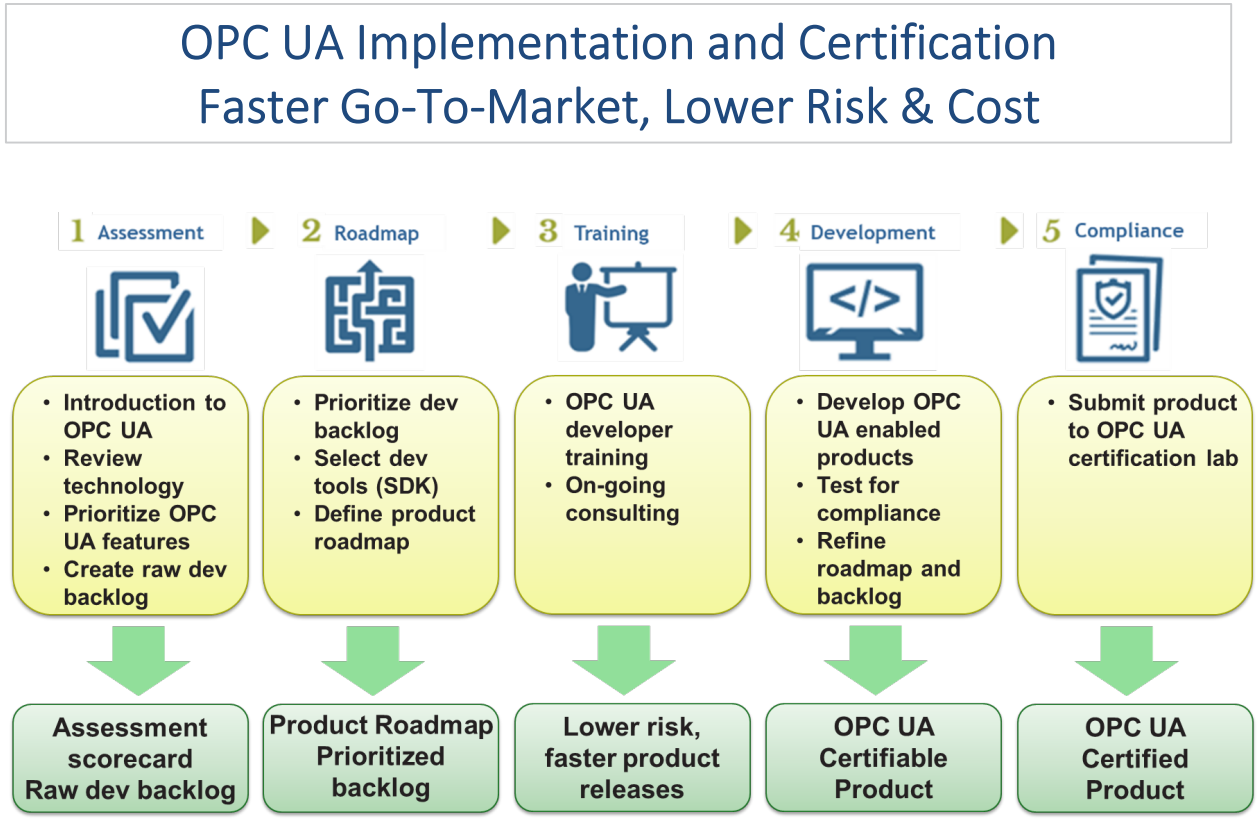
5 Steps to IIoT Adoption

A structured approach to enabling your products and services with OPC UA helps you do so with maximum efficiency. The practical Five Step OPC UA Adoption Process helps Vendors realize value quickly and efficiently. Following the process leads to:

- ✓ Faster Time to Market – Phased approach delivers value fast
- ✓ Lower Risk & Development Cost – Expert guidance & training is key to lowering development risk and cost
- ✓ Competitive IIoT Offering – OPC UA Certified products provide a competitive advantage to you & your customers

The five steps in this structured OPC UA process are:

1. OPC UA Assessment Workshop: Assess your IIoT business and product goals. An assessment scorecard is created that maps your current product capabilities and goals against the OPC UA Standard.
2. OPC UA Roadmap Workshop: Define an OPC UA adoption roadmap for enabling your product(s) with OPC UA as quickly and cost effectively possible.
3. OPC UA Training: Train your development resources on how to implement the OPC UA specification using the Matrikon® FLEX™ OPC UA SDK.
4. Development Services: Utilize experienced OPC UA developers that will work with your staff and within your development environment to implement the OPC UA standard quickly.
5. Compliance Assistance: Ensure that your implementation meets the OPC UA standard.



Use a Proven & Supported OPC UA SDK

Matrikon® FLEX™ OPC UA SDK

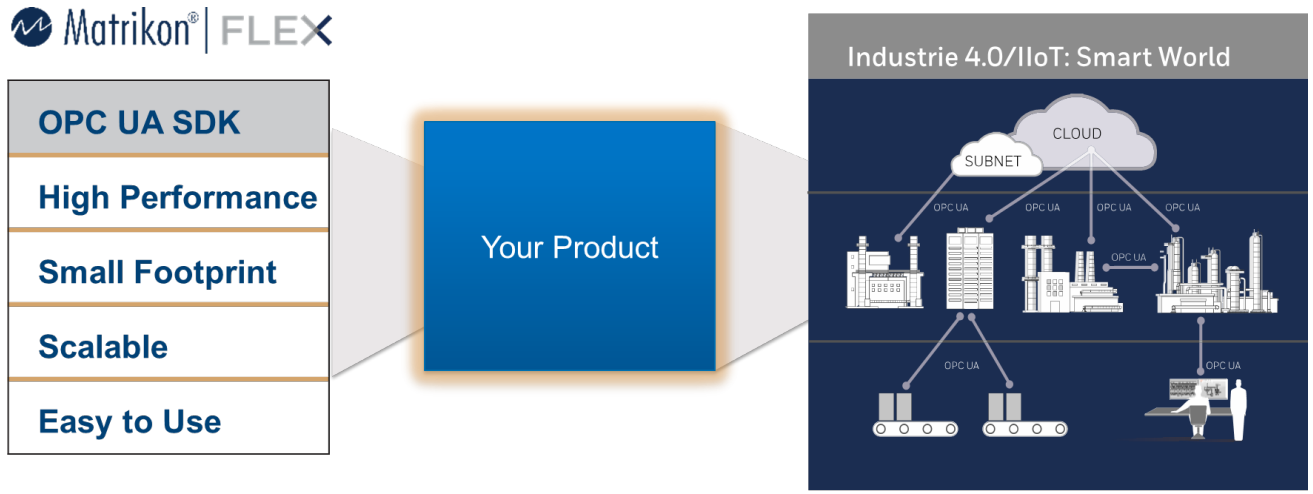
The Matrikon FLEX OPC UA SDK is a robust, high-performance toolkit designed from ground up to support all applications: from small embedded systems to large PC based systems.

Use it to quickly and easily enable your application, regardless of size, to work with OPC UA. As versatile and performant – Matirkon FLEX is intended for use anywhere OPC UA is used.

Trusted by professional developers from major automation vendors to specialized custom embedded application developers alike, Matirkon FLEX offers exceptional value:

- ✓ Is based on a secure open standard
- ✓ Robust dynamic Information Modeling
- ✓ Fully hardware-independent
- ✓ Zero operating system (OS) dependencies (OS agnostic)
- ✓ Scales for use in embedded and personal computer (PC) environments
- ✓ Ideal for communications of all types (sensors, devices, M2M, shop floor applications, enterprise, and cloud.

Matrikon® FLEX™ is the toolkit of choice for applications ranging from small, embedded chips to enterprise servers.



Resources & Help

How to OPC UA enable your Products.

Resources & Help

For End Users

Tools:

Matrikon® OPC UA Tunneller

- Easy OPC UA←→Classic OPC Connectivity
- Go to: http://www.matrikonopc.com

Free OPC UA Modeling tool (UMX)

- Go to: www.beeond.net
- Open Source available on GitHub
- Download Windows / Linux Executables

Consulting: 5-Steps to OPC UA Adoption

A structured and organized approach that reduces costs & risk. (www.beeond.net)

Training: OPC UA Virtual Classroom

Deployment, Migration & Architectures Training
View Syllabus, Schedule and Register at:
https://beeond.net/opc-ua-developer-training/

For Vendors & Developers

Tools:

OPC UA SDK Matrikon® | FLEX

- Go to: www.matrikonflex.com
- Data sheet & demo versions (Unix \ Win)

Free OPC UA Modeling tool (UMX)

- Go to: www.beeond.net
- Open Source available on GitHub
- Download Windows / Linux Executables

Consulting: 5-Steps to OPC UA Implementation

A structured and organized approach that reduces costs & risk. (www.beeond.net)

Training: OPC UA Virtual Classroom

Deep Dive Developer Training
View Syllabus, Schedule and Register at:
https://beeond.net/opc-ua-developer-training/

Resources

Matrikon FLEX OPC UA SDK

> Download the Matrikon FLEX OPC UA SDK Free trial

> Matrikon FLEX OPC UA SDK - Datasheet

Convenient OPC UA Modeling tool

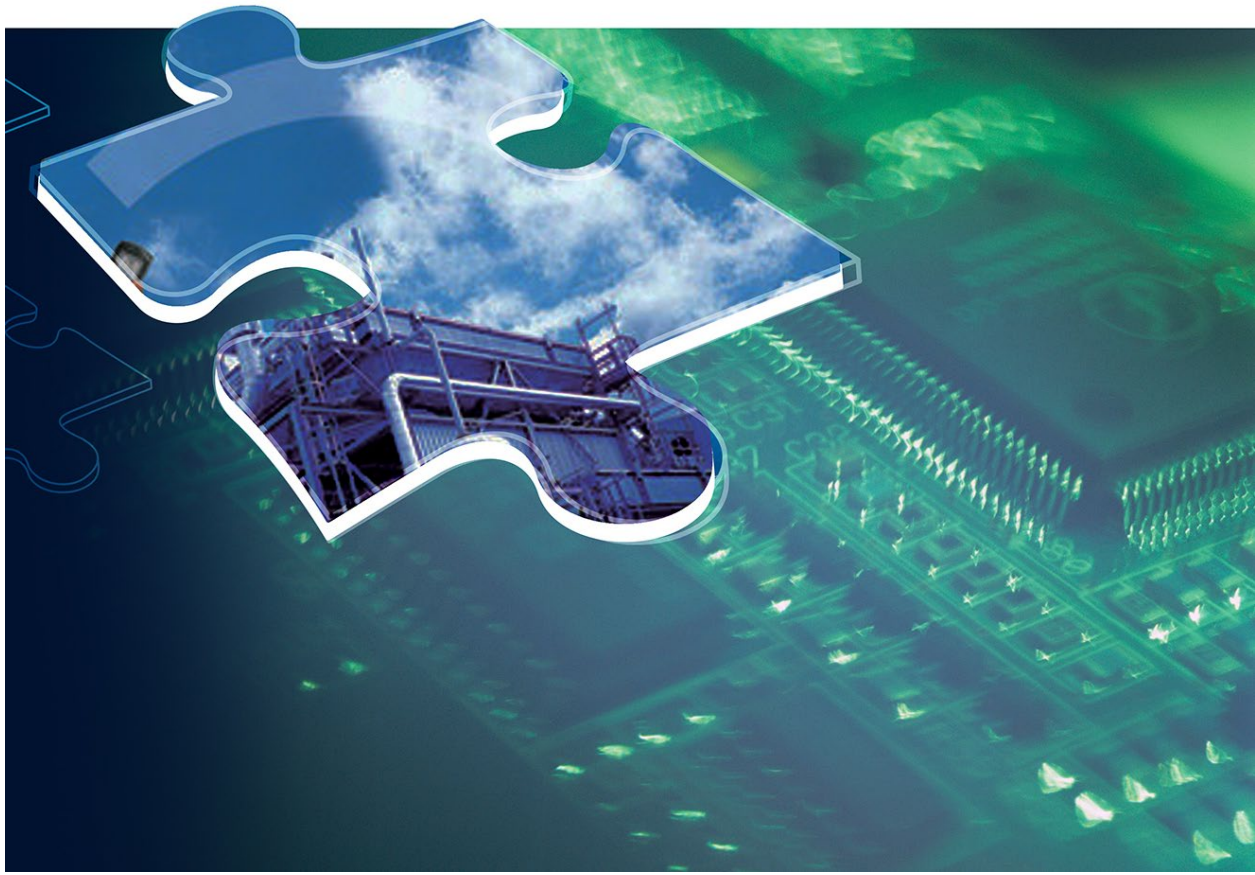
> Download the Free Beeond UMX Modeling Tool

Expert OPC UA Developer Training

> Register for Beeond's Deep Dive OPC UA Developer Training

Watch the recorded webinar

>> Request a Live DEMO



Matrikon®

About Matrikon®

Matrikon® is a vendor neutral supplier of OPC UA and OPC based data interoperability products for control automation. The Matrikon brand promise is to empower vendor and end-user customers with reliable, scalable, and innovative data connectivity and interoperability products, training, and support to best compete in the Industrial Internet of Things (IIoT) and Industrie4.0 (I4.0) era.

- For automation vendors: Matrikon provides a leading OPC UA software development toolkit perfect for use across all product lines ranging from embedded devices to cloud applications.
- For end-user customers: Matrikon provides engineers and system integrators with key data tools needed to best facilitate enterprise wide data sharing.

More than a software supplier, Matrikon actively participates in standards organizations and builds close relationships with its customers and partners globally to help them best address their business and technical challenges in an ever more complex, competitive, and connected world.

Learn more about OPC and OPC UA Training Workshops at:
https://www.matrikonopc.com/training/workshops/course-schedule.aspx

For more information visit our website at *www.MatrikonOPC.com*

About Beeond

Beeond, Inc. helps technology vendors become IIoT compliant faster by providing IIoT and OPC UA consulting and software development services that guides and supports them through the complete technology adoption lifecycle.

We follow a Five Step IIoT Adoption Process that is structured and organized, so our customers realize value quickly and cost-effectively. Unlike, traditional software development companies, we focus only on OPC UA and its implementation in embedded software, equipment and automation systems. Our experience and expertise reduces time to market and lowers project risk for our customers.

OUR VALUE & BENEFITS

- **Faster Time to Market** – Phased approach delivers value fast
- **Lower Risk & Development Cost** – Expert guidance & training is key to lowering risk and cost
- **Competitive IIoT Offering** – OPC UA Certified products provide a competitive advantage to you & your customers

Beeond

For more information visit our website at www.beeond.net

OPC UA Implementation and Certification
Faster Go-To-Market, Lower Risk & Cost

5-Step to OPC UA Adoption

1. IIoT Assessment Workshop: This workshop will assess your IIoT business and product goals. We will create an assessment scorecard that will map your current product capabilities and goals against the OPC UA Standard.

2. IIoT Roadmap Workshop: Our OPC UA experts will help you develop an IIoT Adoption Roadmap.

3. OPC UA Training: Our deployment and developer training courses will instruct your engineering staff on how to implement OPC UA and address infrastructure, information modeling and security.

4. Development & Consulting Services: Our experienced OPC UA developers will work your staff and within your development environment to implement OPC UA standard.

5. Compliance Assistance: Our experts will ensure that your implementation meets the OPC UA standard. We will help your developers successfully complete the OPC UA Certification tests.

Have Your Say!

Q: Have questions, comments or suggestions for future topics?

A: Let us know, it's easy!

Click here now to get started!

About the Authors

Darek Kominek
Sr. Consulting Manager / Matrikon

As the Sr. Consulting Manager at Matrikon (Honeywell), Darek works with vendors and end-users alike to help unlock the business value of the data in their assets via OPC UA. Darek works frequently with the OPC Foundation to help evangelize OPC UA by presenting on it globally and publishing articles about the technology and its advantages in the IIoT/Industrie4.0/M2M worlds. For the past 15 years Darek has played various roles at Matrikon/Honeywell including sales, marketing communications, product manager, and strategic marketing. Before joining Matrikon, Darek worked as a professional software engineer with Hewlett Packard, GE, and ran his own software consulting business. Darek is a professional engineer with a B.Sc. in Computer Engineering from the University of Alberta.

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Stan Brubaker
President / Beeond, Inc.

Stan Brubaker has 20+ years in the product development and manufacturing execution systems (MES) business. This time includes 8 years as product development manager for the MES products. Following product development, Stan spent 15 years managing large MES programs and projects and helping manufacturing companies realize business value from technology. Stan has a Bachelor of Science in Computer Science and an MBA from Penn State University and is a certified Project Management Professional (PMP).

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For More Information
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