OPC UA Symposium

Cosmin Nan

EMEA Channel Manager
Matrikon

Klinkmann

220 professionals, 10 offices
Partnering with the leading
  suppliers of each segment
Services for the total life cycle of
  the solution:
  Consulting, training, support
  Stock and logistic services
  Global Partner and Service agreements

The largest Finland based company
 in its segment.

Honeywell, the largest automation company
market cap, $87.2 Billion
Revenue, $40 Billion

Matrikon was founded in 1988, with 550 employees and $77 million revenue before it's acquired by Honeywell in 2010.

Corporate Overview

Branded Product Line operating within Honeywell HPS

**MatrikonOPC is the World's Largest OPC Vendor since 1996**

- **Top Technology: Innovation, Quality, Selection**
- **Top Support: Live, 24/7, Experts**
- **Top Training: Vendor Neutral, thousands trained**
- **Over 300 OPC products**
- **Interfacing with control systems across all industrial verticals**
- **OPC tools for storage and data analysis**

Active Community Member

- ## Standards Involvement

  - **OPC UA working group**
  - **Chair-UA Early Adopters working group**
  - **OPC Compliance working group**
  - **OPC Presentations – World Wide**
  - Chair – OPC HDA working group
  - OPC DX working group
  - OPC A&E working group
  - VB Automation object for OPC HDA
  - OPC XML Server for OPC Foundation
  - Open O&M connector
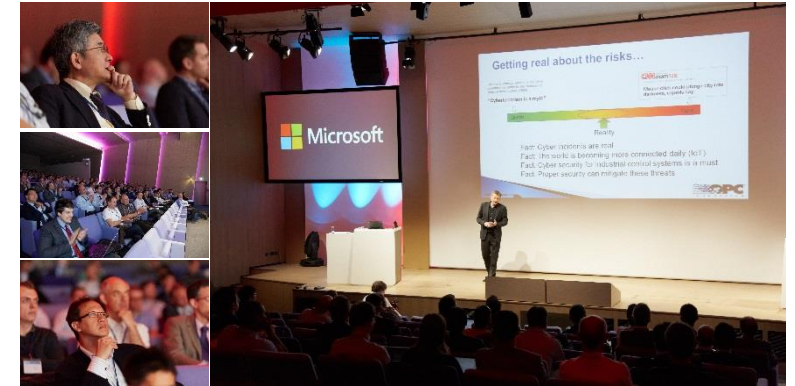
  OPC Day at Microsoft Center in Paris 2015

- ## Education Partner & Sponsor

Innovation & Leadership Recognition

Matrikon

- 1ST OPC UA Server Certified by OPC Foundation
- 1ST Optimized Embedded OPC UA SDK
- Largest OPC Trainer (Over 20,000 Trained)
- 1ST Live, 24/7 World wide Support

- 1ST DCOM Solution (OPC Tunneller)
- 1ST OPC Security Server (Per-User-Per-Tag)
- 1ST Achilles Security Certified OPC Server

csia
control system integrators association

2014 Partner of The Year

Integrated Product Portfolio

Matrikon

Line	Platform	Data Products		Differentiators

Cloud — Secure Mobile Access

Applications — Data Storage & Management ⓘ

Drivers — Universal Connectivity ⓘ

Industrial — Simplified Architecture ⓘ

Embedded (SDK) — Native UA & 3rd Party Adoption ⓘ

Differentiators

Seamless:
- Deployment
- Access
- Maintenance
- Diagnostics

OPC UA Advantage

Open Data Connectivity

Any Operating System

Any Hardware Platform

Matrikon

Data Context Preservation

UA Client

OPC UA

OPC UA

OPC UA

OPC UA
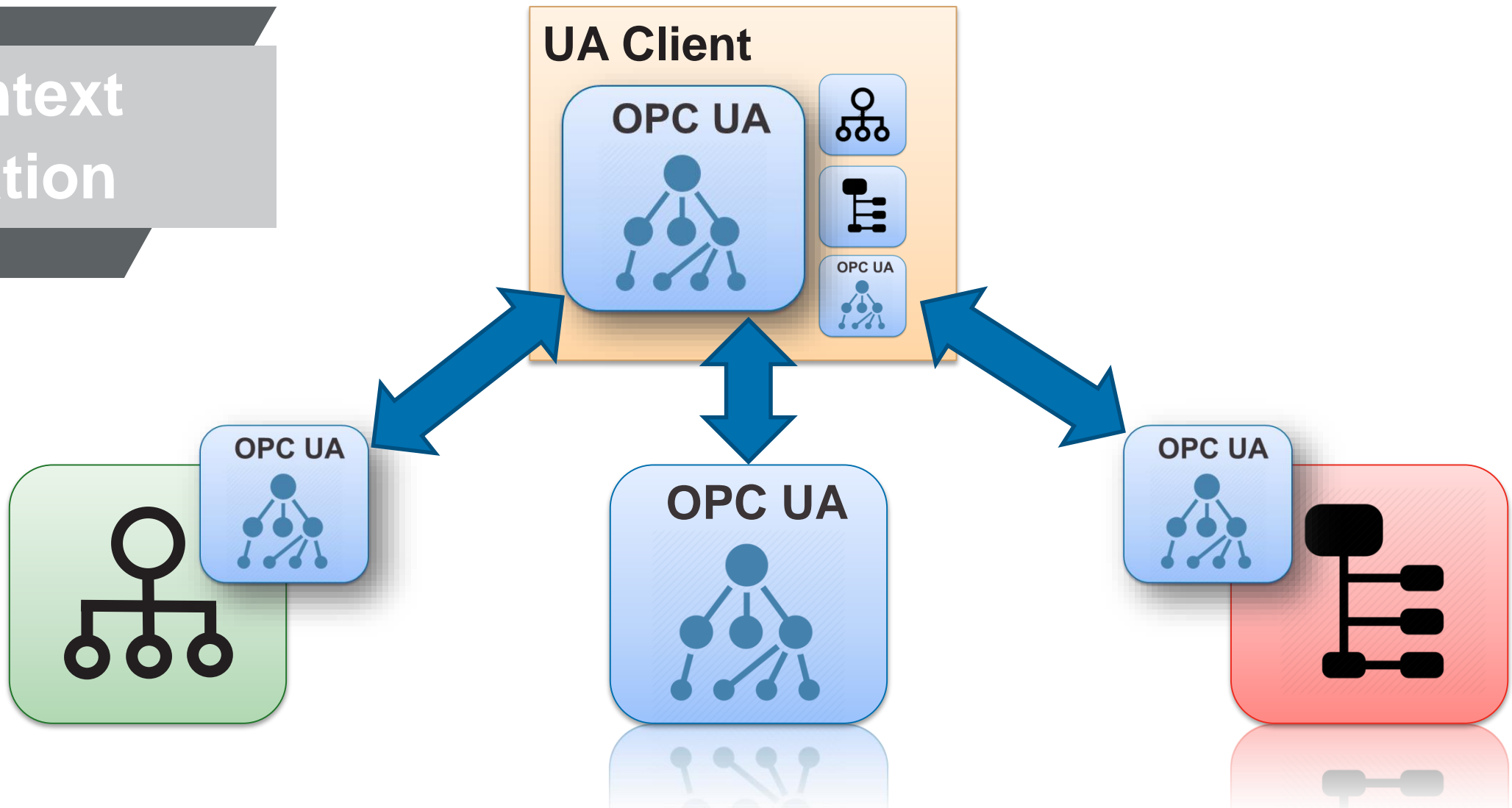
Data Security

- **Ground-Up Secure Design**
- **Based on latest security standards**
- **Encryption**
- Recognized by various organizations:
  - NIST
  - Industrie 4.0
  - MDIS
  - ...

Result: Communications Without Boundaries

OPC UA R300—Just released

Maximum Platform Independence:

    Embedded products (RTOSs, no OS, embedded Linux, etc.)

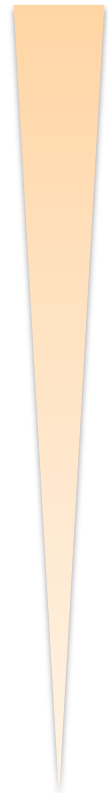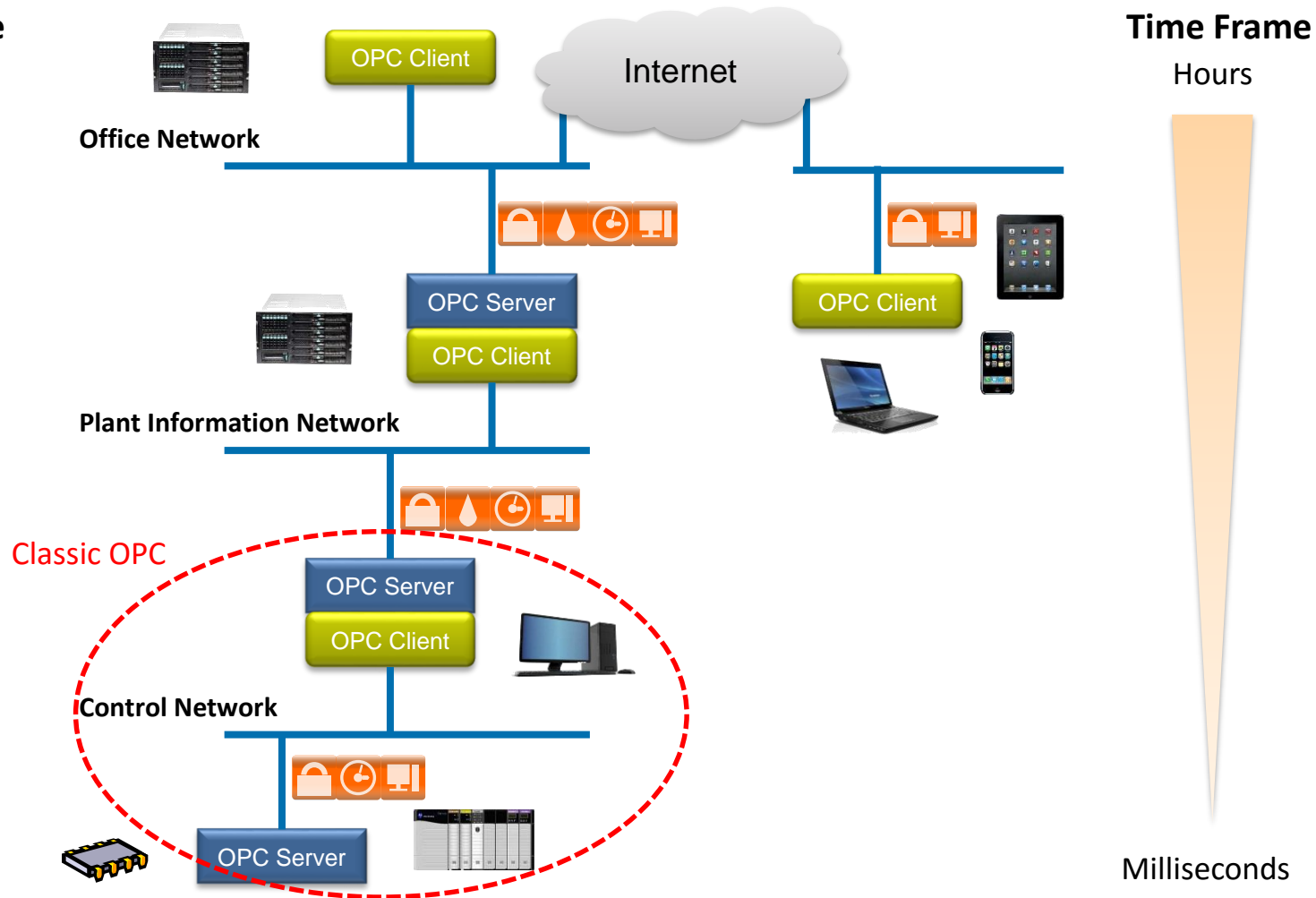   **Mobile products (Android, iOS, etc.)**

    PC based (Windows, Linux, etc.)

Superior Scalability ideal for:

    Existing products: with minimal memory and MCU/CPU resources

    New products: where bill of material cost savings impact profitability

    PC based applications where performance and availability are key

Rapid Development Completion:

    Ease of use is paramount - quick drop-in design yields fast, hassle free implementation. Develop a prototype in hours not weeks.

    Flexibility: Customization is a snap with access to low level OPC UA functions

    Support: clear documentation, easy workflow, great samples for rapid ramp-up

    Knowledge Reuse: learn once then apply across all product lines

High Reliability:

    Fragmentation Free Memory management for maximum device up time

    Tested for performance on every major platform

    Optimized and OPC Foundation certified

Benefits of Matrikon OPC UA SDK

• Eliminate costly and time consuming configuration of register based data.
• Enable direct point and click device configuration, management and monitoring from any OPC UA Client.
• Promote your device to be a first class citizen in the automation hierarchy. No longer do your customers need to marshal data through third party systems in order to move it to where it needs to be.

Highlights

• Optimized, proprietary OPC-UA Software Stack instead of the ANSI C Stack distributed by the OPC Foundation.
• Does not use the system heap for memory allocation in order to minimize the risk of heap exhaustion and fragmentation.
• Single threaded and multi-threaded implementation which can run on bare metal environment or within a RTOS or OS task/thread. Also, can be run on high end main frame computers with multiple threads and multiple physical cores.

Matrikon OPC UA SDK is the only OPC UA toolkit you will need today and in the future.

Different Platform Needs

PC / Server Platform

Embedded Platform

- Powerful Processor (Active Cooling)

- Complete motherboard

- Lots of memory

- Expensive

- Windows, Linux
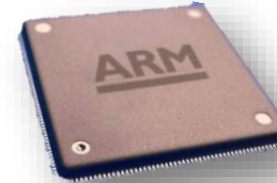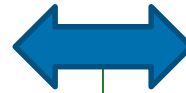
- Lower power processor (Passive Cooling)

- Limited resources (No MMU)

- Limited RAM/ROM

- Low cost

- RTOS, embedded LINUX, Bare Metal

Easily scales to PC platforms

Embedded UA SDK

Highly Scalable OPC UA SDK
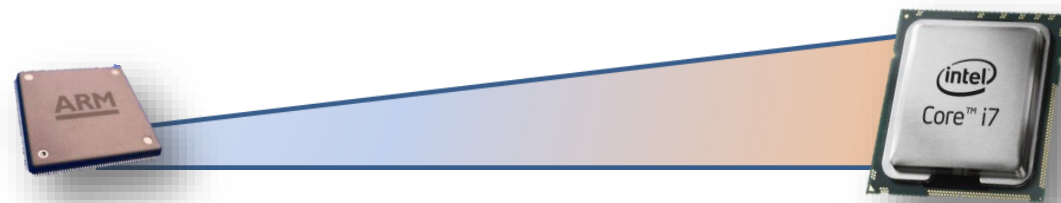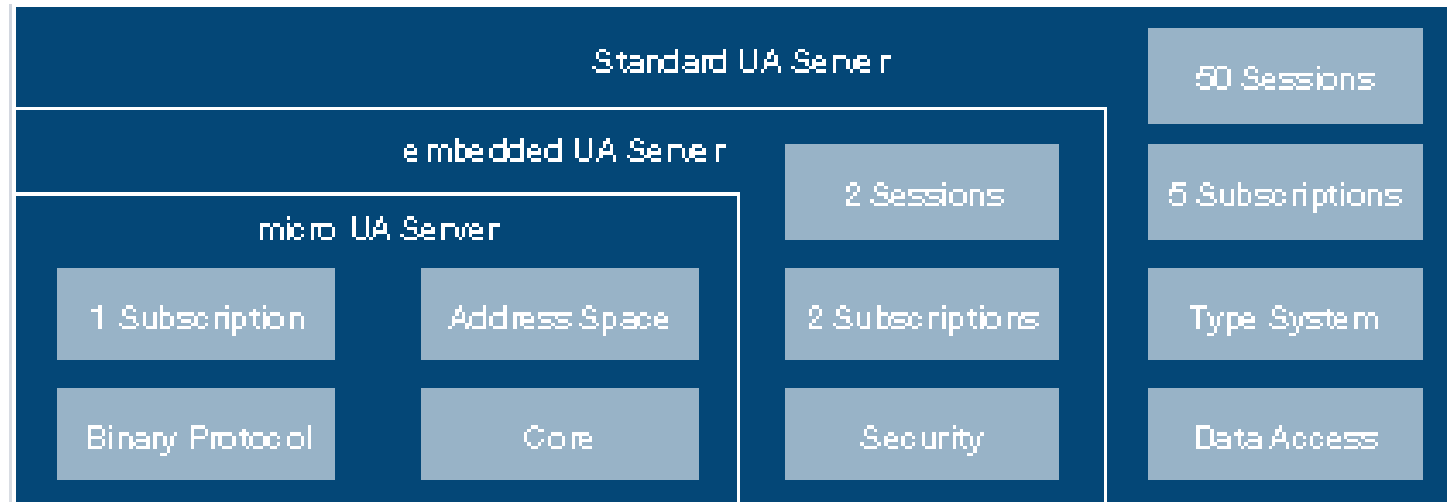
Integrating the Matrikon Embedded UA SDK

Matrikon

STEP 1
Write Code

```
Int main()
{
    // main loop
    Int count,I;
    x=cin(..);
    …
    …
}
```

Matrikon Embedded UA SDK

STEP 2
Compile

101000101
0010110110
011010100
0110110101
010101101

1101010110
100101010

STEP 3
Download & Use on Device.

OPC-UA SERVER APPLICATION

REAL PROCESS VARIABLES

OPC-UA DEVICE SERVER SDK API

OPC-UA SERVICES

ADDRESS SPACE NODES → MONITORED ITEMS

SUBSCRIPTION

OPC-UA STACK CORE

REQUEST MSGS | RESPONSE MSGS | PUBLISH MSGS | NOTIFICATION MSGS

Device Programming

Matrikon
Embedded OPC UA

UA Clients

Embedded UA SDK Details

- Supports 32-bit processors and higher

- Written in C++

- Program using Ansi C, C++, or Java (JNI)

- Requires C++ compiler that conforms with *ISO/IEC 14882:1998* (C++98)

- OS: RTOS or no OS "Bare metal"

Common Examples:
- **Intel Quark, Curie, Atom, Core**
- **ARM Cortex**
- **MIPS Processors**

Key Features

- **Easy :** Drop-In Design & well documented
- **Reliable:** Heap free design (no memory fragmentation)
- **Flexible:** No external libraries required (OS Independent)
- **Light:** Does not duplicate database

Embedded UA Server SDK Role

Performance

Matrikon

| Test	Conditions	Hardware	CPU Utilization (%)
100 continuously changing tags	Sampling and reporting every 100ms	ARM Cortex-M4F (STM32F407) @ 168MHz	12.50%
1000 continuously changing tags	Sampling and reporting every 100ms	ARM Cortex-A8 (Sitara AM3359) @ 1GHz	31.00%
50,000 continuously changing tags	Sampling every 100 ms	Intel i7 using 1 core (PC) **	10%

* Metrics obtained using GCC -O3

** Embedded OPC UA SDK scales very well up to a server class PC.

High Efficiency = Maximum Performance

OPC UA R300—Just released

Matrikon Evaluation Kit
NXP LPC4088 MCU board
ARM Cortex® M4F @120 MHz
96 kB on-chip SRAM
32 MB SDRAM
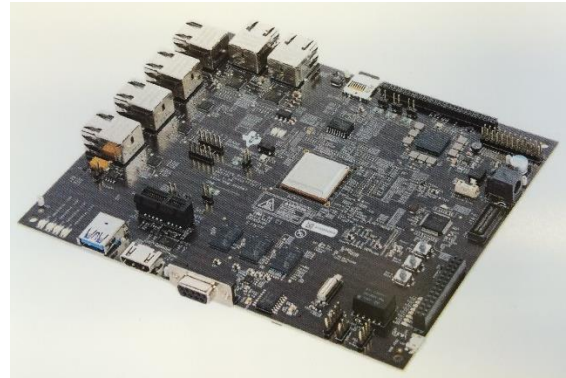
Texas Instruments AM572X
Industrial Development Kit
AM572x Dual-Cortex® A15 Processor
256MB Quad SPI NOR flash memory
16 GB eMMC memory

Infineon XMC™ MCUs
Industrial Microcontrollers
Portfolio powered by
ARM® Cortex®-M

Matrikon OPC UA SDK is the only OPC UA toolkit you will need today and in the future.

- Many sensors and low level devices generate data
- Previously not cost effective to put in PCs and software
- More flexible delivery mediums:
  - Ex. Wireless, Cellular
- Complete data can be exposed from device (ex. Modbus provides only a value – what about time?)
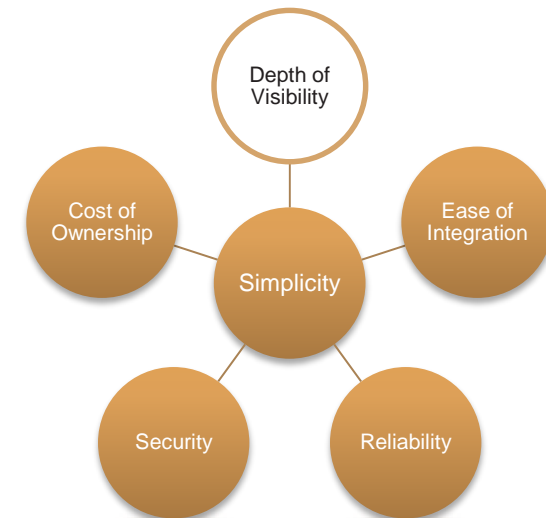
- Plug-and-Play
- Cross-functional/industry devices all inter-connected
- Remote bi-directional access

End User Benefits - Reliability & Security
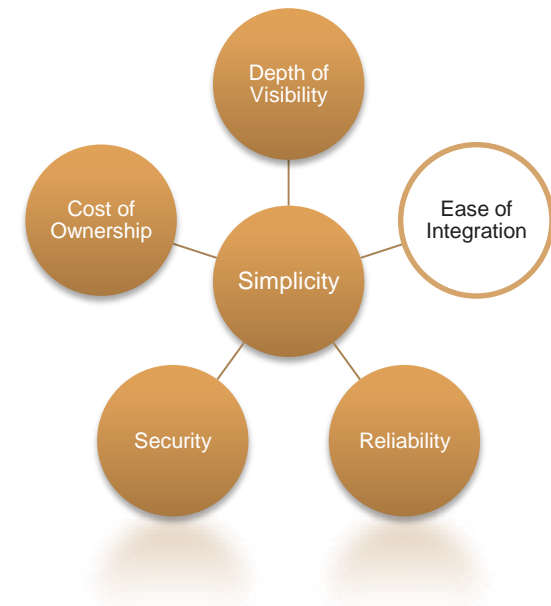
- Encryption
- Security right from device/source
  - Ex. Modbus is not secure… embedded UA is secure-by-default
- OPC Server "always on"
  - Recover from device restarts
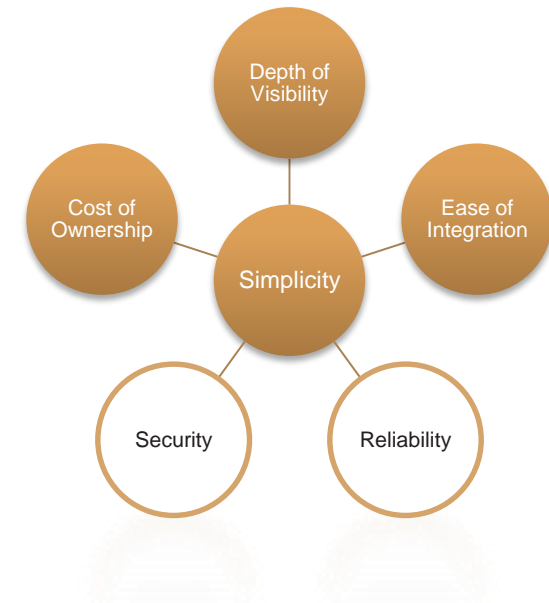
- Reduced:
  - Cost of additional PCs and their maintenance
  - IT staff time
  - Better visibility into system= better maintenance = Less downtime
  - Less training needed

Device Vendor Benefits
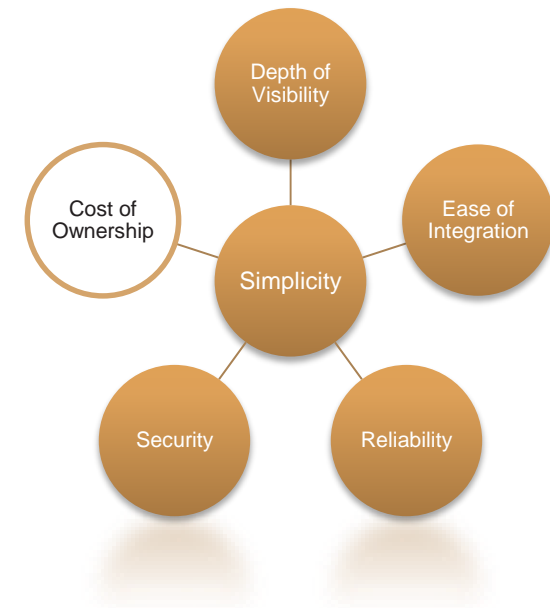
- Access to broader Industries
- Capitalize on wide OPC adoption and install base
- Eliminate need to maintain code to follow OPC Standard
  - Time Sensitive Networks
  - Pub-Sub
  - Companion specification
- One SDK for all platform development

Device Vendor Benefits - Customer Value

- Embedded UA provides:
  - Easy installation
  - Hassle free IT integration
  - Simple configuration
  - Reduction in Training
  - Lower cost of ownership

Device Vendor Benefits - Margins

Matrikon
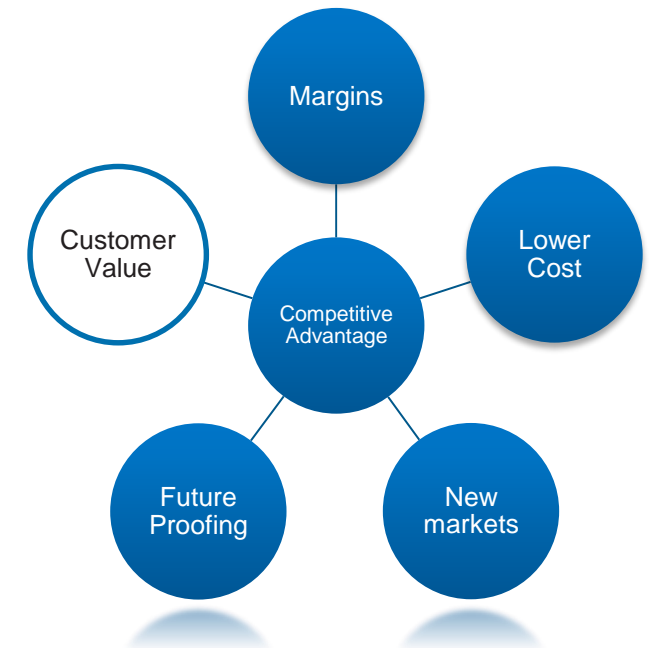
- Provides opportunity to maintain or increase price
  - Ex. Some vendors may choose to provide OPC UA add-on modules
- Reduced time to market

Use the right OPC Foundation Certified Embedded SDK to keep development time at minimum
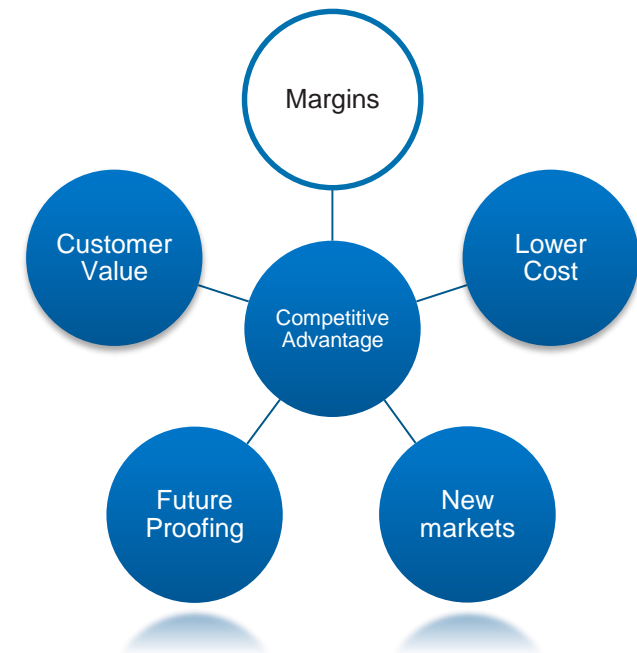
- Allow 3rd Party Clients to:
  - Expose selected data
  - Configure/Manage
- Result in:
  - reduced inventor items
  - reduced technology debt

Device Vendor Benefits - New Markets
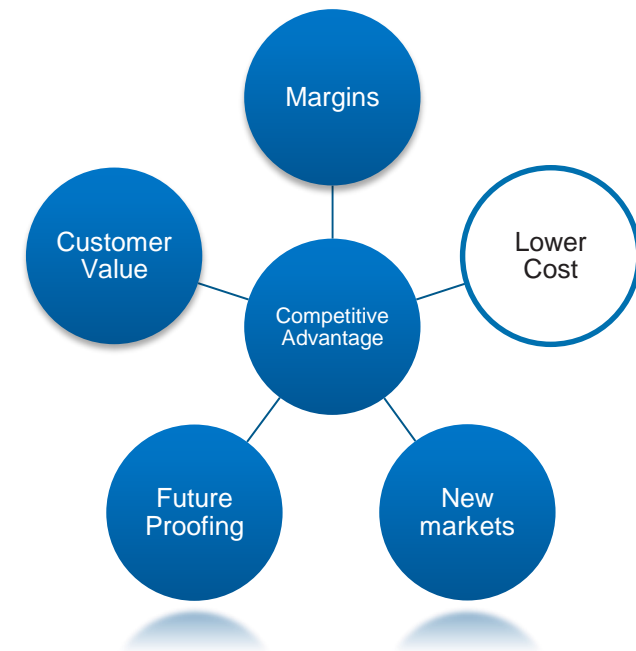
- Functionality applicable in multiple markets
- Using OPC Embedded:
  - Avoids Industry specific protocol lock-in. Does not preclude it.
  - Allows use of standard 3rd party tools
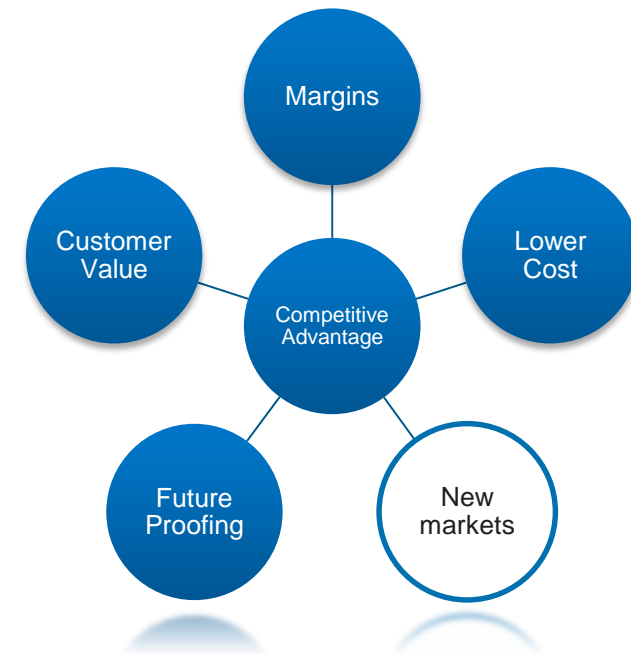
- Embedded UA is a flexible standard
  - De facto open connectivity standard
  - Information modeling allows for changing data needs
    - Ex. Use DA **natively** today – file transfer **natively** tomorrow.
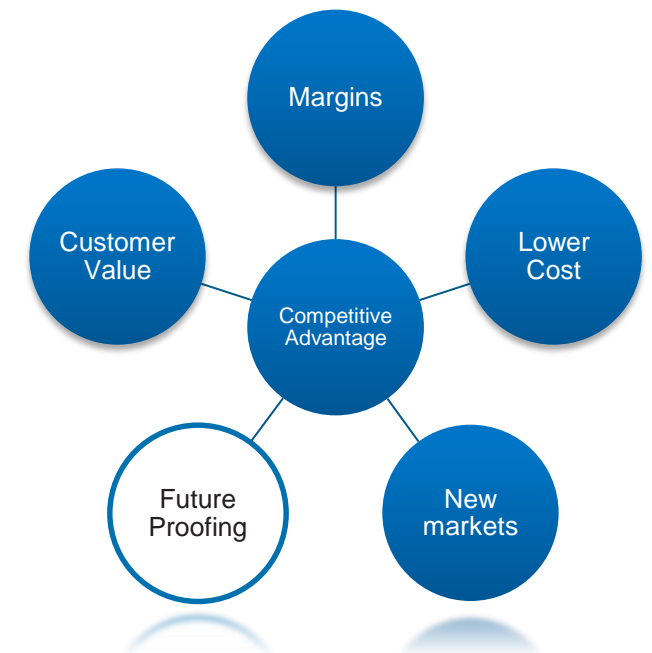
UA SDK:
Oracle Cloud Integration

- Distillation Environment Challenges

  - Lack of contextualized data for making informed decisions

  - Multiple control systems and standards

  - Traditional / proprietary solutions are expensive

  - Standard solution owned by 3rd parties

  - Data controlled by 3rd parties

  - Unit cost a factor with many sites

- Opportunity for Matrikon/Oracle IoT
  - Easy solution to integrate multiple data formats & protocols : DCS, PLC, ASCII streams, 4-20 mA etc…
  - Aggregate the data into a single, standardized data dictionary / stream
  - Centralize of data from multiple sites
  - Further provide the data into multiple systems – SCADA, Historian, Big Data storage, Analytics, Visualization etc …
  - Use a single IT-friendly transport
  - Future-proof/non-proprietary solution for new technologies

IOT Cloud Integration on Data Logger Hardware

DataLogger
Matrikon

Matrikon
UA Client

Oracle IOTC
Client Lib

OPC UA

MatrikonOPC
Server for UA Wrapper

OPC Classic

Classic
OPC Server

Classic
OPC Server

Classic
OPC Server

Distillation
Tower

Feed Pump

Seal

Distillation Tover Simulation
Matrikon / Honeywell

Crude Feed

Oracle IoT
Cloud Service

Mobile Technician
Notifications
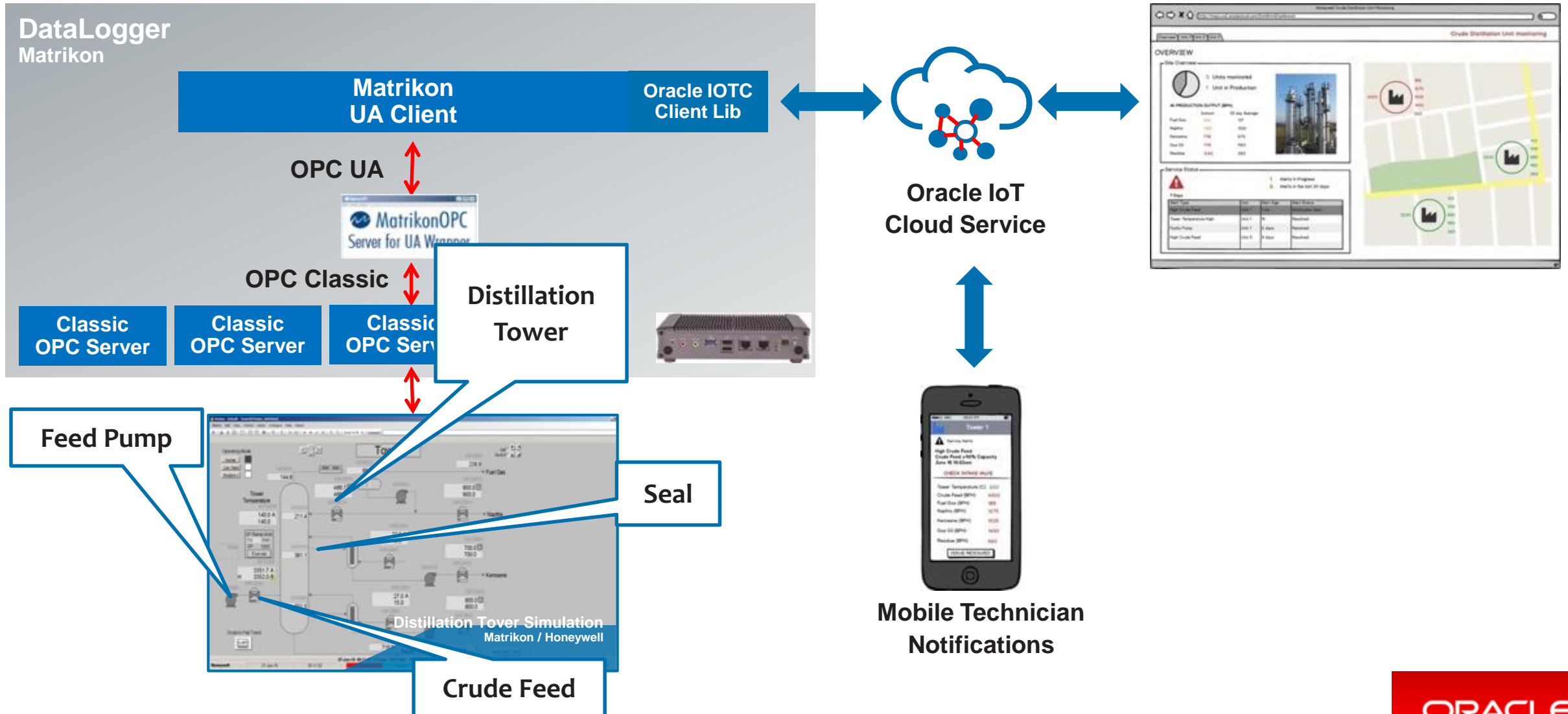
Embedded UA SDK
Case Study: Areva

AREVA Valve Monitoring Goes UA-Native

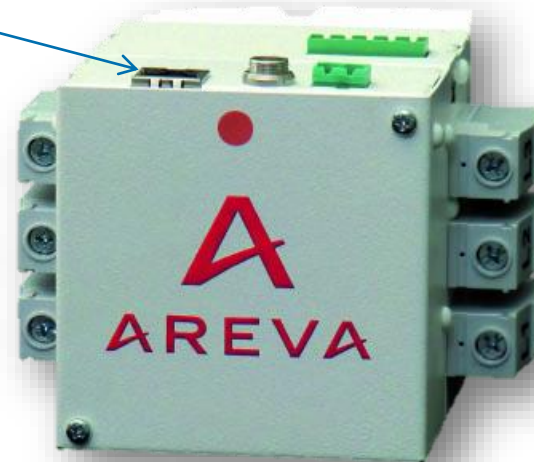**Company: AREVA NP GmbH,** (Part of the global AREVA Group)
Headquarters: Erlangen, Germany
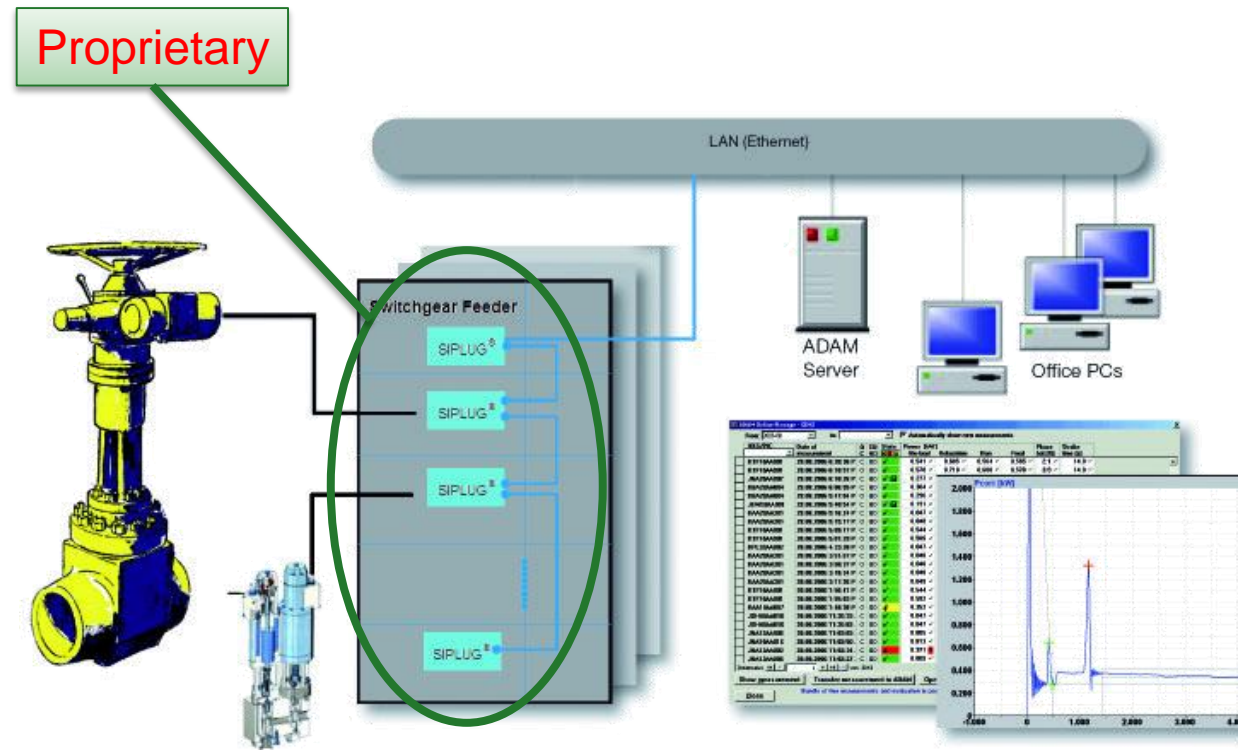**Expertise:** electrical systems, I&C
Industries: Nuclear power and renewable energy
Product: SIPLUG® - Continuous Valve Condition Monitoring and Diagnostic System

RJ45 Terminal

Implementation Details

- **Goal:** Leverage UA to enter into new markets & expand access to SI Plug Data
- **Challenge:** Avoid hardware changes (upgrading MCU, RAM, etc) due to lengthy and expensive to re-certification
- **Requirements:** SDK Selection Criteria:
  - Needed small footprint to fit low power processor
  - Well tested for ARM Cortex M3
  - Optimized OPC UA Stack
  - Known OPC Brand
  - Solid expert support
- Choice: Matrikon Embedded OPC UA SDK

New Solution: OPC UA Embedded Server
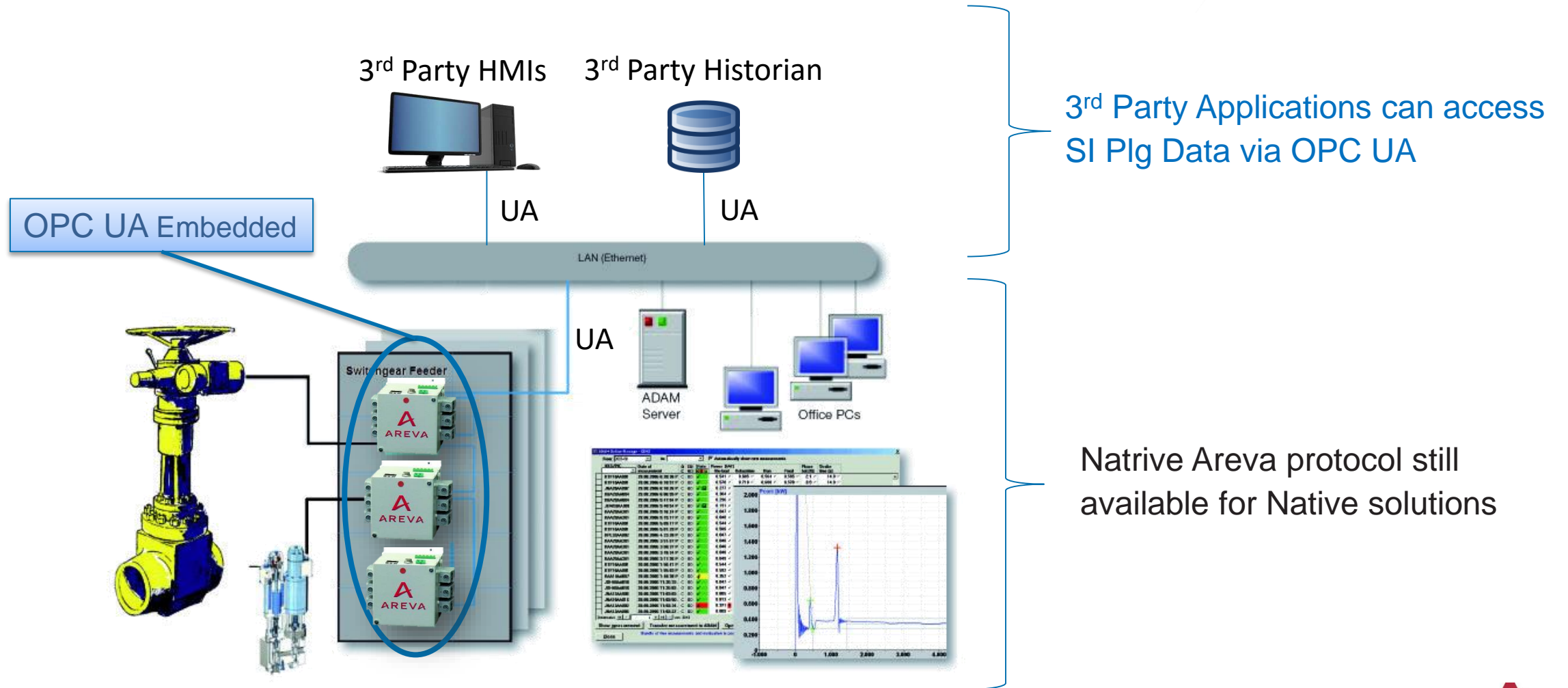
Embedded UA SDK
Case Study: Infineon

Infineon Bundles OPC UA
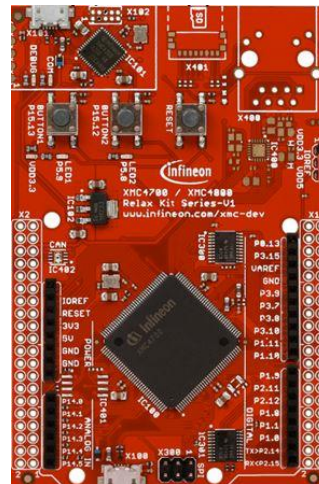
Company: **Infineon Technologies Austria AG**
Headquarters: **9500 Villach, Austria**
Expertise: MCU
Industries: CPU for industrial controls, mobile
Product: Supports 32-bit processors and higher e.g. XMC4000 MCU family

Infineon Bundles OPC UA

Matrikon

Performance

The Matrikon Embedded OPC UA SDK delivers maximum performance with minimum CPU loading. Letting more capacity for your applications

Reliability

Independently certified against the **Embedded OPC UA Server profile**, the Matrikon Embedded OPC UA SDK provides maximum stability thanks to its industry-first Heap-Free OPC UA Server design.

Ease of Use

The Go-to-market sooner SDK – the Matrikon Embedded OPC UA SDK provides you with a complete OPC UA Server already written. Simply tell it where to find the data it needs to expose, how you want to present it, set a few configuration parameters – and voila! Your product is OPC UA enabled in relatively no time flat.

OPC UA™

Target market and applications
›› Programmable logic controllers
››Sensors and actuators
››Gateways products for protocol translation
››Building automation controllers
››Drives and Servo-amplifiers
››Smart meters

Infineon

Infineon Bundles OPC UA

Benefits

›› Fast drop-in UA server design

›› Stable thanks to no-heap design

›› Smallest RAM footprint

›› Scalable functionality: use one UA SDK across all products lines

›› Continuous SDK updates ensure your products support latest OPC UA standard

›› Reconfigurable, on the fly, address space

›› Flexible number of sessions, subscriptions, monitored items and node counts – solely dependent on resources

›› Expert support for fastest ramp-up

System requirements

›› Written in C++

›› Program using Ansi C, C++, or Java (JNI)

›› Requires C++ compiler that conforms
with ISO/IEC 14882:1998 (C++98)

UA SDK
Case Study: Emerson

Emerson Process Management Case Study

Company: Emerson Process Management (Part of Emerson Electric)
Headquarters: Erlangen, Germany
Expertise: electrical systems
Industries: Oil & Gas and energy
Product: CSI 6500 ATG Machinery Health™ Protection System

Emerson Process Management Case Study

- Emerson Process Management select Matrikon SDK to embed OPC UA in their CSI 6500 ATG Machinery Health™ Protection System

- Device vendors like Emerson are turning to the Matrikon OPC UA SDK to easily and seamlessly embed OPC UA into their products

- Matrikon OPC UA SDK provides a robust, user-friendly solution to quickly move products to market

- Evaluation for further deployment within Emerson Process Management is ongoing.