

# OPC-Unified Architecture: From embedded device up to MES/ERP IT Enterprise



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- **OPC Foundation**  
Organization, Activities, Events
- **OPC Unified Architecture**  
Basics, Security, Scalability
- **Cooperation with other organizations**  
UA Informationmodel
- **OPC UA Applications**  
Success Stories: Embedded Devices up to Enterprise Integration

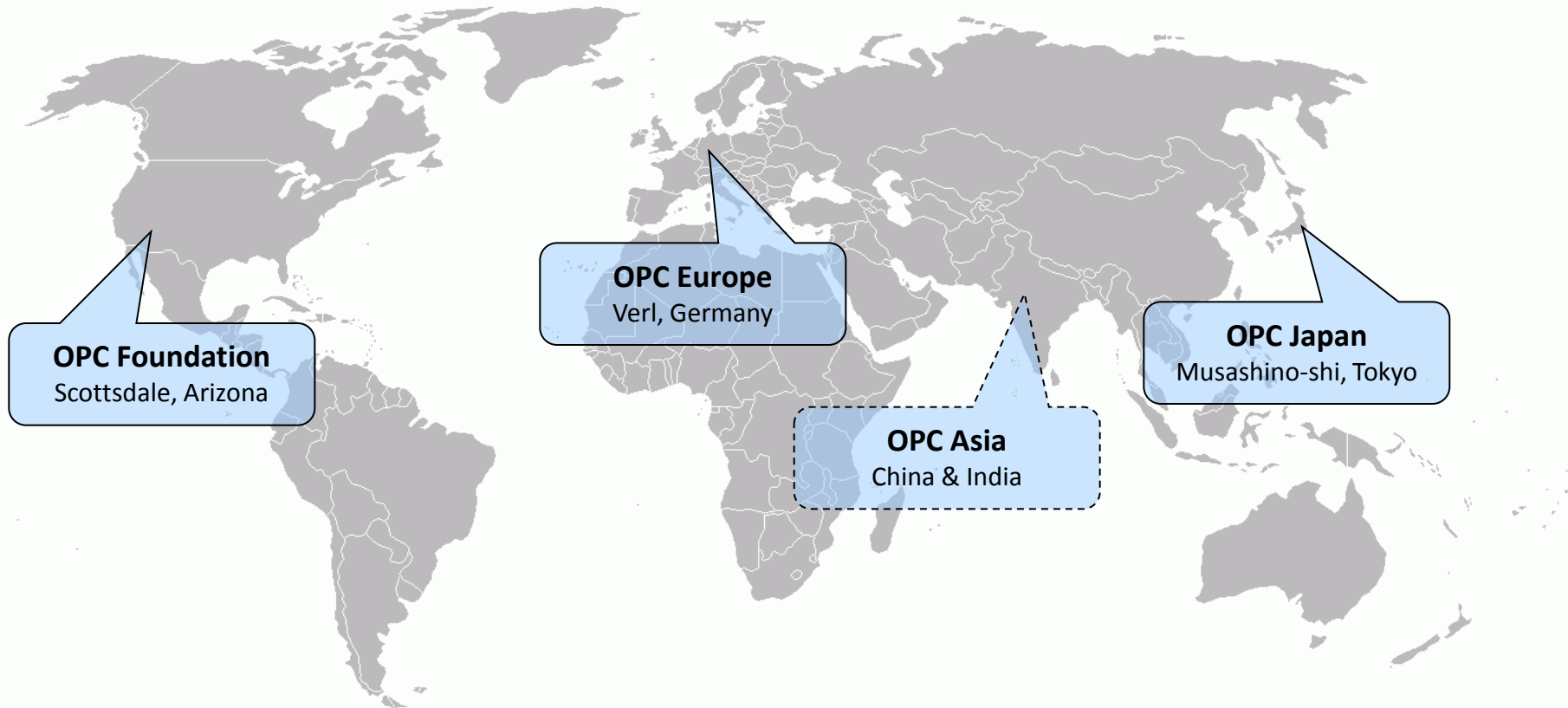


# OPC Foundation

## Organization, Activities, Events

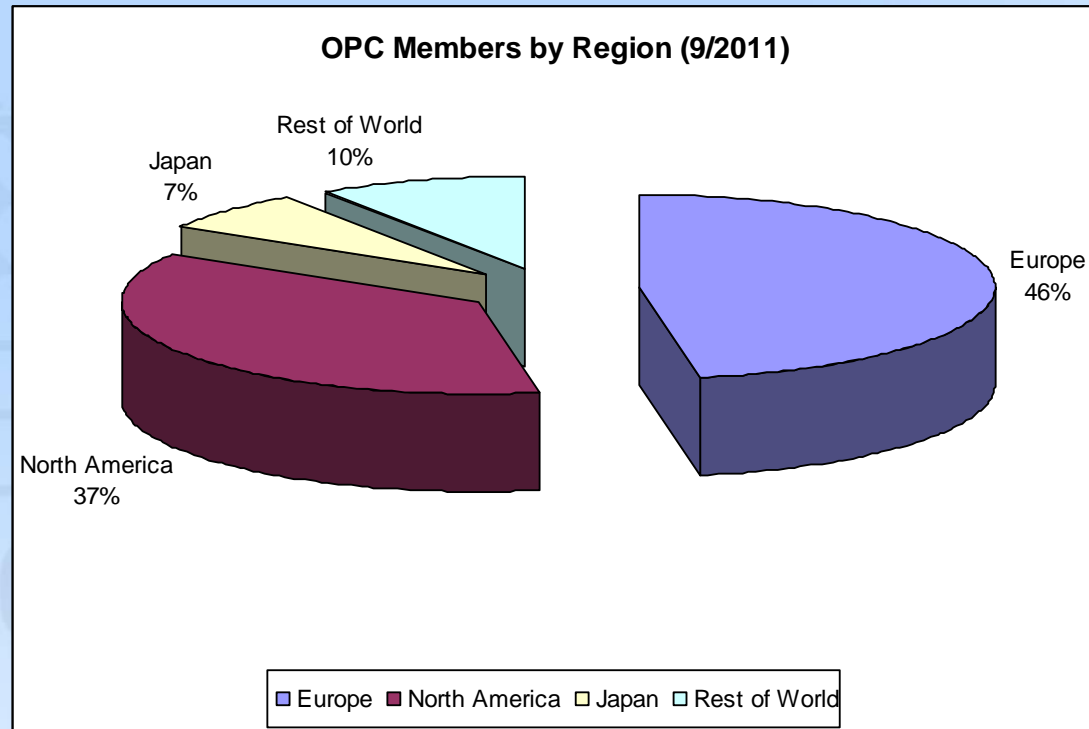
FOUNDATION

- Vision of OPC is secure, reliable, multi-vendor, multi-platform interoperability
- Collaboration is key to incorporating multiple “open” standards into an unified platform architecture



# World Membership Demographics

- International Industry Standard Organization
  - 470 Members (9/2012)



3500 + Total Companies Build OPC Products = 22000 + Products

- Directors and Officers

## OPC Europe Board of Directors

<a href="#">Thomas Hahn</a>	OPC Board Member	<i>Siemens</i>
<a href="#">Thomas J. Burke</a>	OPC Foundation President	<i>OPC Foundation</i>

## OPC Europe Officers

<a href="#">Stefan Hoppe</a>	OPC Europe President	<i>Beckhoff</i>	<a href="#">Stefan Hoppe</a>
<a href="#">Tino Hildebrand</a>	OPC Europe Vice President	<i>Siemens</i>	<a href="#">Tino Hildebrand</a>

- Siemens (Dr. Reinhold Achatz) was founding OPC member and board member since the beginning

- “OPC Europe Advisory Board”
  - Group of influencers, research, technical and marketing experts
  - Experts with different expertise: PLC, SCADA, MES, ERP, vertical markets

Contact	Company
Dr. Wolfgang Mahnke	ABB AG
Juergen Lange	Softing
Yvonne Neumann	MatrikonOPC
Rene Bernhard	Siemens
Peter Seeberg	Softing
Erik Dellinger	Kepware
Andre Lange	ICONICS
Ondrej Flek	Rockwell
Michel Condemine	4CE Industry
Matthias Damm	ascolab
Dr. Marius Postol	CAS
Dr. Arne Manthey	SAP AG
Liam Power	Embedded Labs

- “OPC Europe Advisory Board”
  - Help on local activities: translations, presentations, technical info

## OPC Europe 2012 Country Representatives

Contact	Company	Email Address	Delegate
Michael Haas	<i>Certec</i>	<a href="#">Michael Haas</a>	Austria
Dirk van der Linden	<i>Artesis University College of Antwerp</i>	<a href="#">Dirk van der Linden</a>	Belgium
Zbynek Zahradnik	<i>OPC Labs</i>	<a href="#">Zbynek Zahradnik</a>	Czech
Jouni Aro	<i>Prosys</i>	<a href="#">Jouni Aro</a>	Finland
NEW Francois Baudet	<i>ICONICS</i>	<a href="#">Francois Baudet</a>	France
Michel Condemine	<i>4CE Industry</i>	<a href="#">Michel Condemine</a>	France
Stefan Hoppe	<i>Beckhoff</i>	<a href="#">Stefan Hoppe</a>	Germany
Liam Power	<i>Embedded Labs</i>	<a href="#">Liam Power</a>	Ireland
Claudio Fiorani	<i>Progea srl</i>	<a href="#">Claudio Fiorani</a>	Italy
Espen Krogh	<i>Prediktor</i>	<a href="#">Espen Krogh</a>	Norway
Dr. Marius Postol	<i>CAS</i>	<a href="#">Dr. Marius Postol</a>	Poland
Nacho Armesto	<i>University of Vigo</i>	<a href="#">Nacho Armesto</a>	Spain
NEW Eugenio Silva	<i>Endress+Hauser</i>	<a href="#">Eugenio Silva</a>	Switzerland



## Impressions of activities



5 Flyers – 5 languages (English, German, France, Italian, Spanish)

OPC UA overview

OPC UA security

OPC UA overview collaboration

OPC UA collaboration with PLCopen

**NEW** OPC UA member benefits

**Afiliarse a OPC Foundation es... ¡Más que sencillo!** Hacerse miembro es la mejor forma de mantenerse al día en esta tecnología y estar en contacto con la comunidad más interesada en el valor y los beneficios de OPC. Y, además, incluye ciertos privilegios ...

#### **Obtenga pleno acceso a las especificaciones de OPC**

→ OPC es el estándar de interoperabilidad para un intercambio de información seguro, fiable e independiente de la plataforma. Las especificaciones de OPC definen la interfaz entre clientes y servidores – así como entre servidores – en diversos ámbitos de aplicación, que incluyen el acceso a datos en tiempo real, la monitorización de alarmas y eventos, el acceso a datos históricos y otras aplicaciones. Como miembro corporativo de OPC Foundation, tendrás pleno acceso a las especificaciones de OPC antes que el público en general. Podrás, incluso, unirse a los grupos de trabajo y participar en el desarrollo

Con periodicidad anual, OPC Foundation organiza eventos en diferentes regiones geográficas de Europa, Norte América y Japón. Los miembros corporativos de OPC Foundation pueden obtener un valor añadido para sus productos si consiguen el logotipo de máxima calidad otorgado por OPC Foundation. OPC Foundation certifica los productos en laboratorios independientes situados en Europa y Norte América. *(En el reverso puede obtener una explicación detallada de las diferentes categorías de miembros corporativos).*

¿Por qué certificar sus productos? Las pruebas de certificación realizadas por laboratorios independientes garantizan, de forma objetiva,



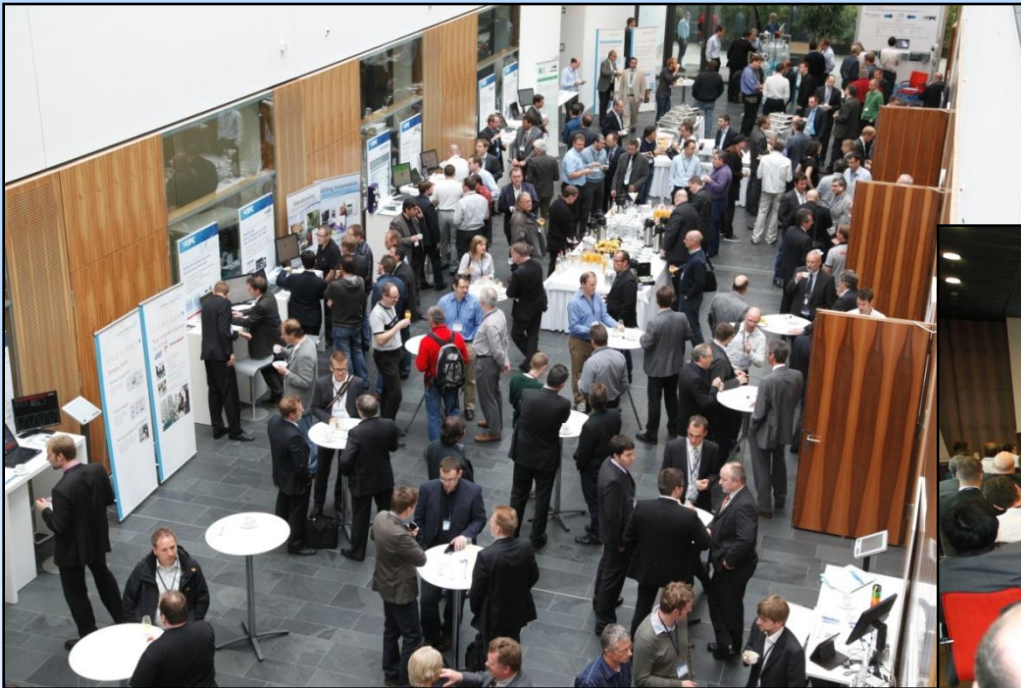
#### **POR QUÉ UNIRSE A LA FUNDACIÓN OPC (OPCF)?**

1. Obtenga pleno acceso a las nuevas especificaciones de OPC Versiones previas a las definitivas („Release Candidate“) y últimas mejoras tecnológicas, así como nuevas características.



# Events 2012 - OPC Day Europe

## OPC Day Europe 2012 at Endress + Hauser, Switzerland Impressions



# OPC-Day Europe 2012

## OPC Day Europe

- **2011, May 25<sup>th</sup> hosted by SAP**  
in their HQ in Germany
- **2012, May 16<sup>th</sup> hosted by Endress + Hauser**  
in their HQ in Switzerland
- **2013, May 15<sup>th</sup> / 16<sup>th</sup> hosted by Yokogawa**  
in their European HQ in Netherland
- **Annual Event**  
same period within year  
different locations, countries
- **Information Source**  
Latest Tech Updates, Networking  
New/Emerging Products  
for Members and Non-Members

## OPC DAY EUROPE 2012

May 16, 2012 | 09 am to 05 pm at Endress+Hauser Process Solutions AG,  
Reinach/Basel, Switzerland

[www.opcfoundation.org](http://www.opcfoundation.org)



OPC Foundation Europe has announced an OPC Day on May 16, 2012 at Endress+Hauser Process Solutions AG. This event is open for OPC members and non-members.

### SPONSORS OF OPC DAY:

Hosted by:



### PURPOSE OF THIS EVENT

- Educate attendees by providing OPC updates and information
- Show commitment from international companies
- Demonstrate OPC-UA: From controller to MES/ERP/IT Enterprise
- Demonstrate adoption and provide success stories
- Networking opportunity with potential customers, vendors and sponsors

### AGENDA MAY 15, 2012

17:00 – 20:00 „Come Together“ Welcome evening (sponsored by Endress+Hauser)  
„Meet the sponsors“ – also including a guided company tour

### AGENDA MAY 16, 2012

09:00 Registration  
Welcome  
Keynote  
OPC UA Introduction  
  
Coffee-Break & Exhibition  
Unified Architecture  
Technology basics & updates  
How to start

Lunch-Break & Exhibition  
OPC-UA in process industry

Collaboration with other organizations  
PLCopen UA function blocks  
MES connectivity  
IBAOE

Coffee-Break & Exhibition  
Best practice  
Security in connected solutions  
Closing

17:00 End of conference

# Events - Activities 2012

Germany, March 21 <sup>st</sup>	Automatisierungstage Böblingen
Germany, April 15 <sup>th</sup> - 20 <sup>th</sup>	Light & Building, Frankfurt
Germany, April 23 <sup>th</sup> – 27 <sup>th</sup>	Hannover Messe, Hannover
Switzerland, May 16 <sup>th</sup>	OPC Day Europe 2012 @ E+H HQ
Germany, June 18th-22nd	Achema
Germany, July 06th	MES-DACH partner meeting
UK, Aug 21 <sup>st</sup> -23 <sup>rd</sup>	ARM partner conference Cambridge
Germany, Sept 19th	MES Kolloquium, Karlsruhe
Austria, Oct 4th	OPC Day Austria
Finland, Oct 9th	OPC Day Finland
France, Oct 10th	OPC Day France hosted by Microsoft Windows Embedded
Germany, Oct 22nd – 26th	IOP-Europe, Siemens, Nürnberg
<b>Spain, Nov 15<sup>th</sup></b>	<b>JAI 2012, Vigo</b>
<b>Germany, Nov 27rd – 29th</b>	<b>SPS/IPC/Drives, Nürnberg</b>



- Siemens hosting European Interoperability Workshop (IOP) once per year in their HQ in Nurnberg
- Goal: Testing OPC products against each other
  - to validate interoperability
  - meet and network with other developers
  - test matrix
- 2011: more UA than 'classic' products registered



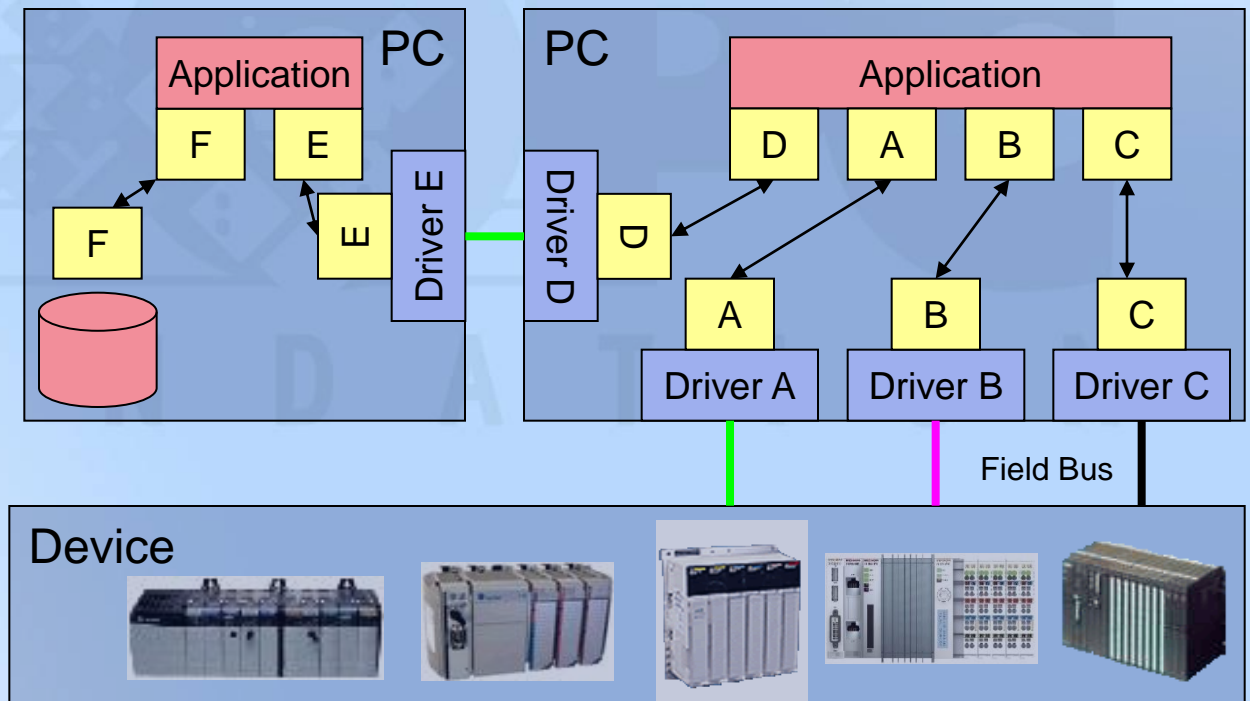


# OPC Technology

from COM to UA

# The problem 16 years ago

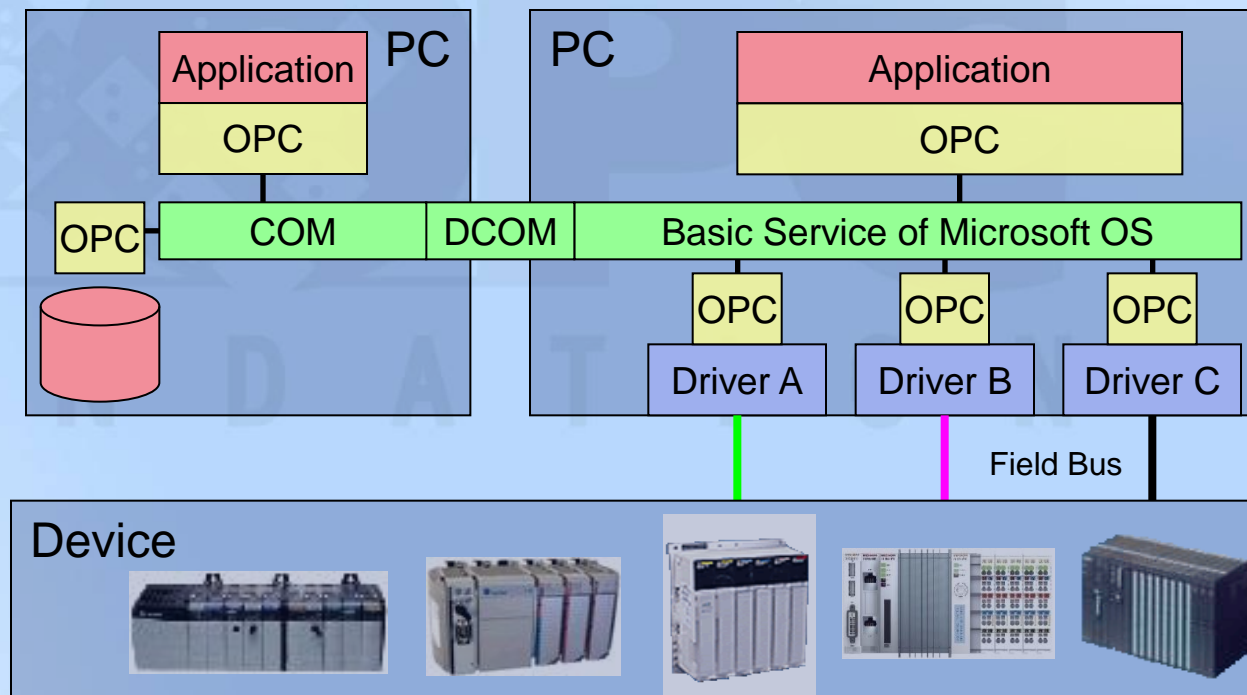
- PC based software products become part of Automation Systems
- Devices are connected via different bus systems and protocols to the PC
- Network interface cards have vendor specific programming interfaces
- Large number of proprietary interfaces required high development and maintenance costs for applications
- OPC (DA) was designed to solve this problem





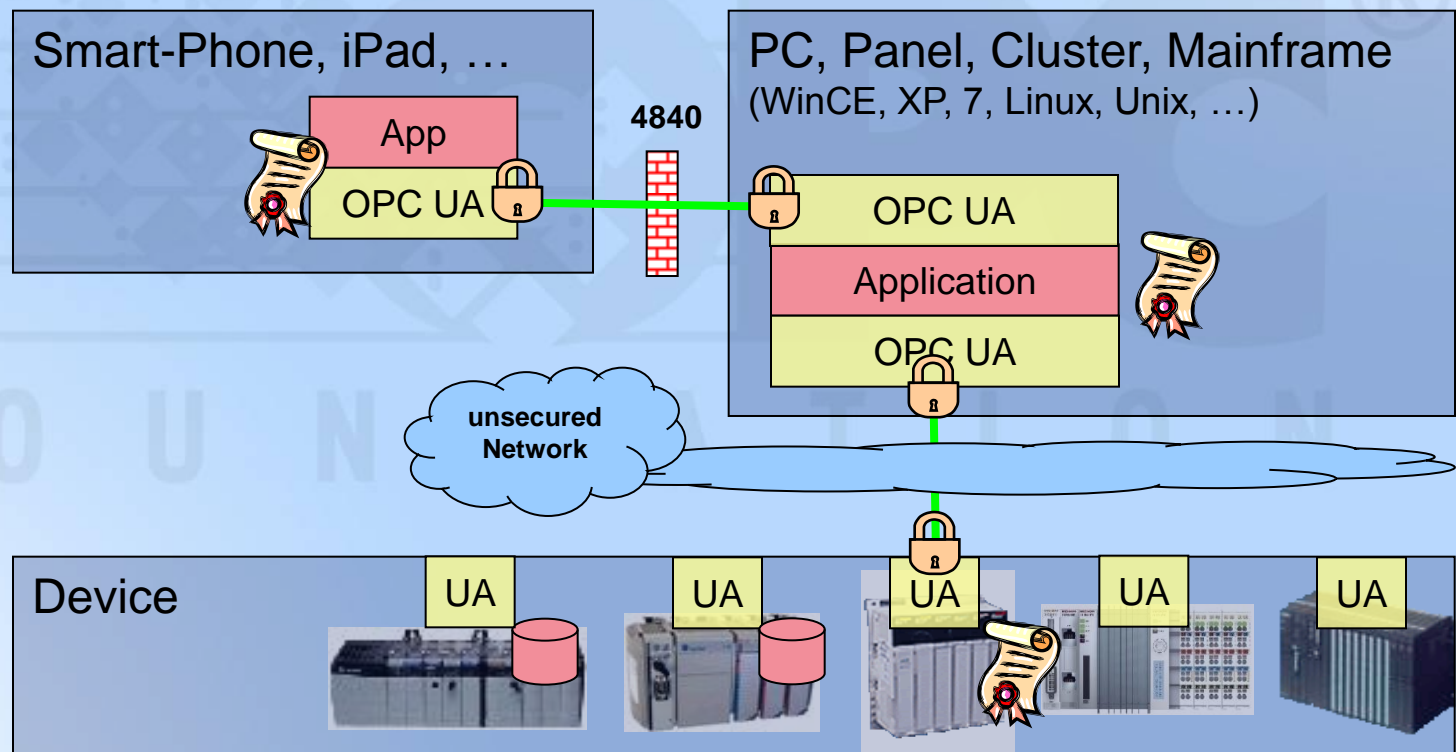
# OPC classic: The Solution

- OPC Foundation defines APIs to access different types of process data
- Special OPC interfaces for current process data, for events and process alarms and for historical data
- OPC interfaces uses Microsoft Windows base technology COM / DCOM
- Hardware vendors can provide OPC Servers as standard driver and software vendors must implement only one driver as OPC Client to access process data



# OPC UA: The NEW Solution

- OPC Foundation defines high performance protocol (TCP Binary)
- One fixed set of services to access all information (DA, AE, HDA)
- Totally platform independent (Win, Linux, vxWorks, QNX, Solaris, ...)
- Security (Authentication, Encryption, Certificates)
- Object Oriented Information Model

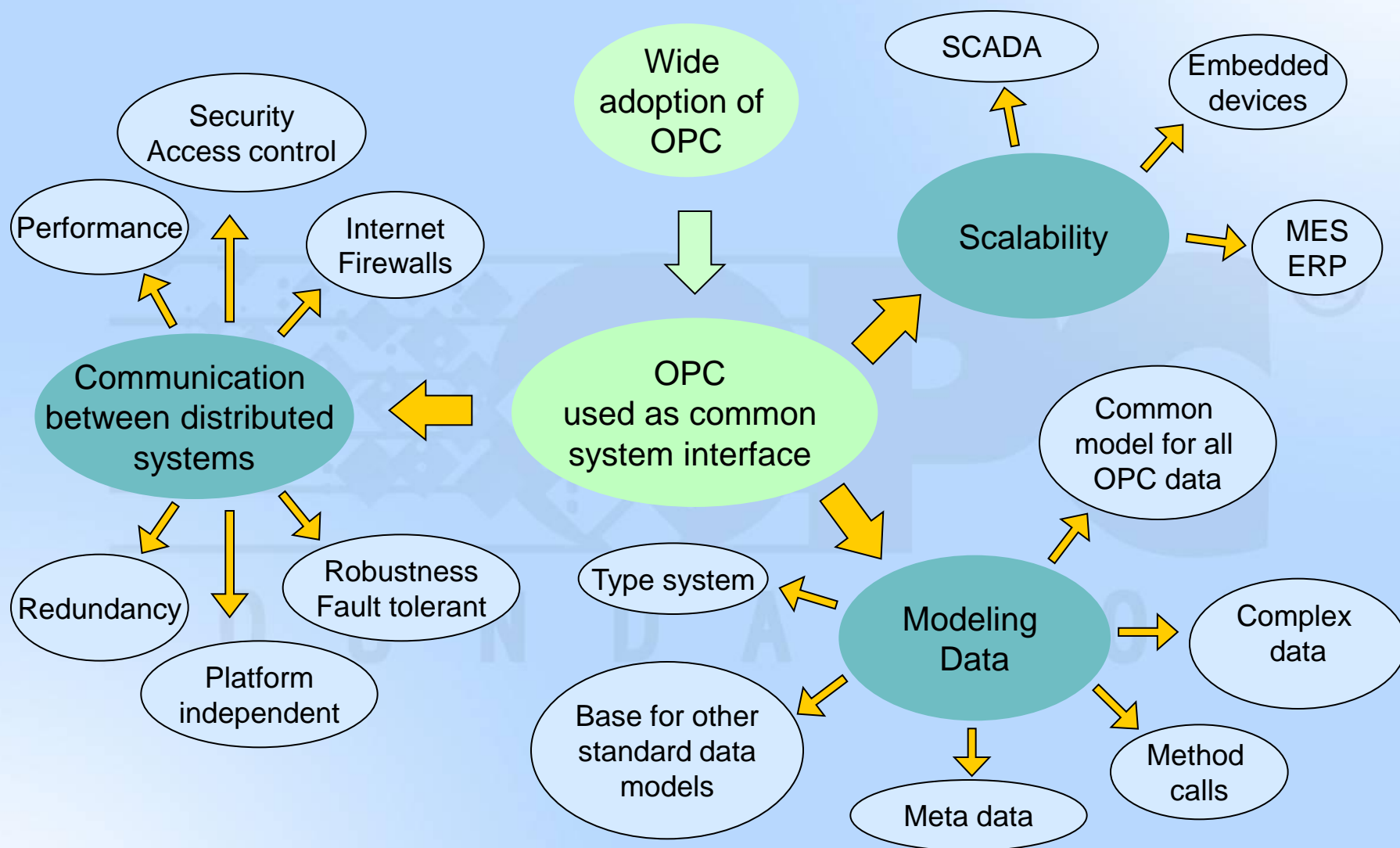




# OPC UA

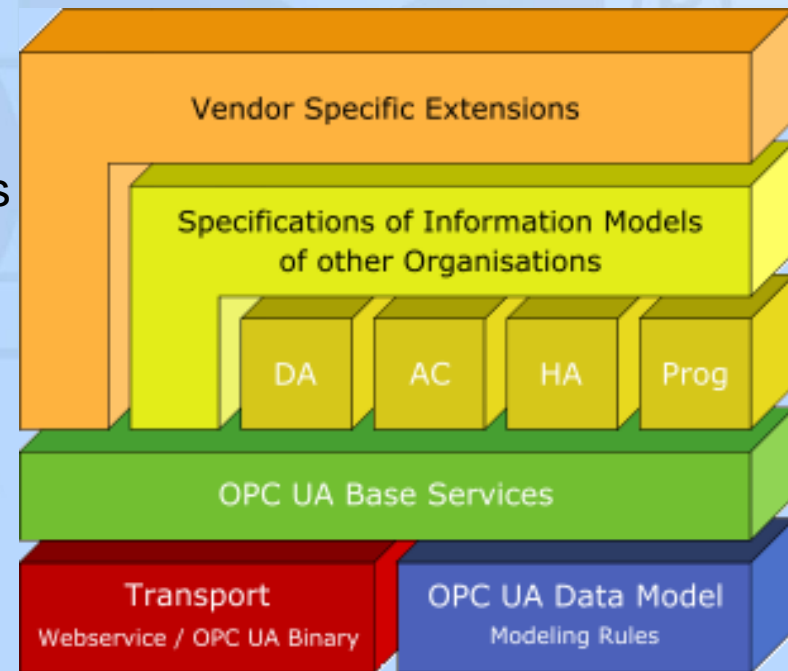
**Basics, Scalability, Security**

# Requirements for OPC UA



## OPC-UA: New Generation OPC

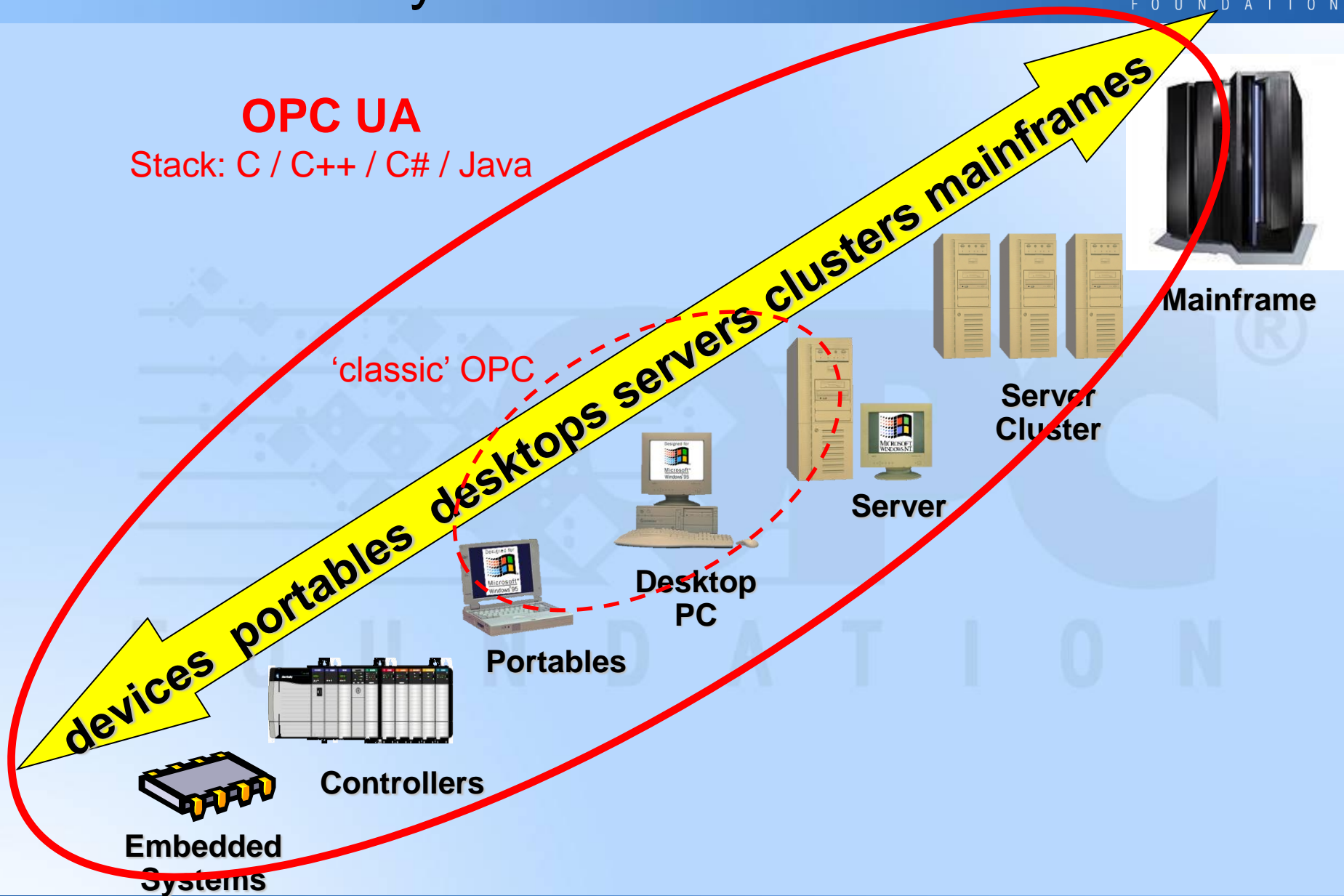
- Definition 2003 – 2006
- Verification and Implementation 2006 – 2008
- Final OPC Foundation Release 2009
- IEC 62541 Release 2010 – 2011
- **OPC UA = established OPC features**
  - + Platform independence
  - + Standard internet and IP based protocols
  - + Built in security features
  - + Generic object model
  - + Extensible type system
  - + Scalability through profiles
- + Migration path from Classic OPC



# OPC Scalability

## OPC UA

Stack: C / C++ / C# / Java



**OS platform independent:** Windows, WinCE, Linux, Euros, QNX, VX-Works...

- avoid DCOM, offers direct communication via TCP / HTTP
- allows to integrate UA products directly into controllers

## Protocols/Bindings

- Binary: best performance, one single TCP port 4840
- Web service (SOAP): firewall friendly (e.g. port 80/443)

## OPC Deliverables

- OPC Foundation providing UA stacks and sample code  
C/C++ stack / .NET stack / JAVA stack

**Security** (mandatory implemented in UA stack, optional use)

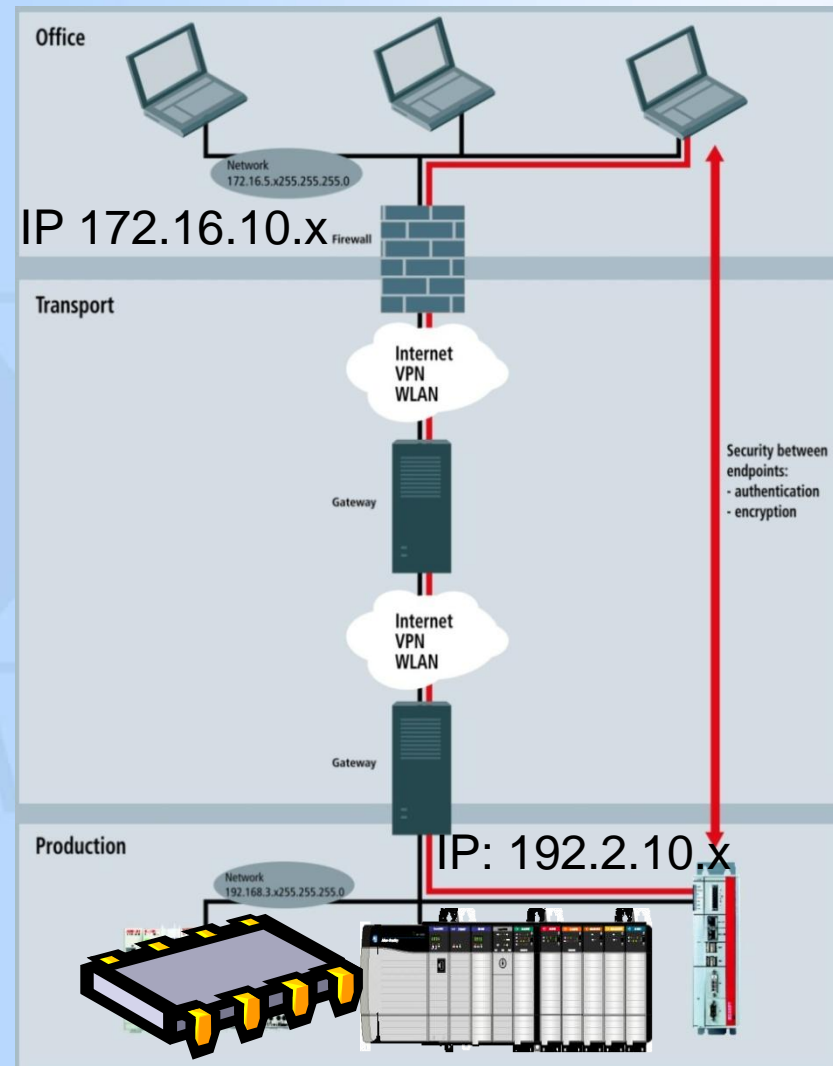
- Authentication via x509 certificate, SSL-encryption and data integrity

## Technical Enhancements:

- Support for redundancy
- Heartbeat for connections in both directions
- Buffering of data and acknowledgements of transmitted data  
Lost connections don't lead to lost data



- Implemented in UA-stack, optional use
  - Authentication & Authorisation
    - via x509 Certificates
    - User Name / Password
    - Kerberos
  - Integrity
    - Signing of messages
  - Confidentiality
    - SSL encryption between endpoints
- Benefits
  - Allows secured communication through unsecured environment
  - From office through gateways into production







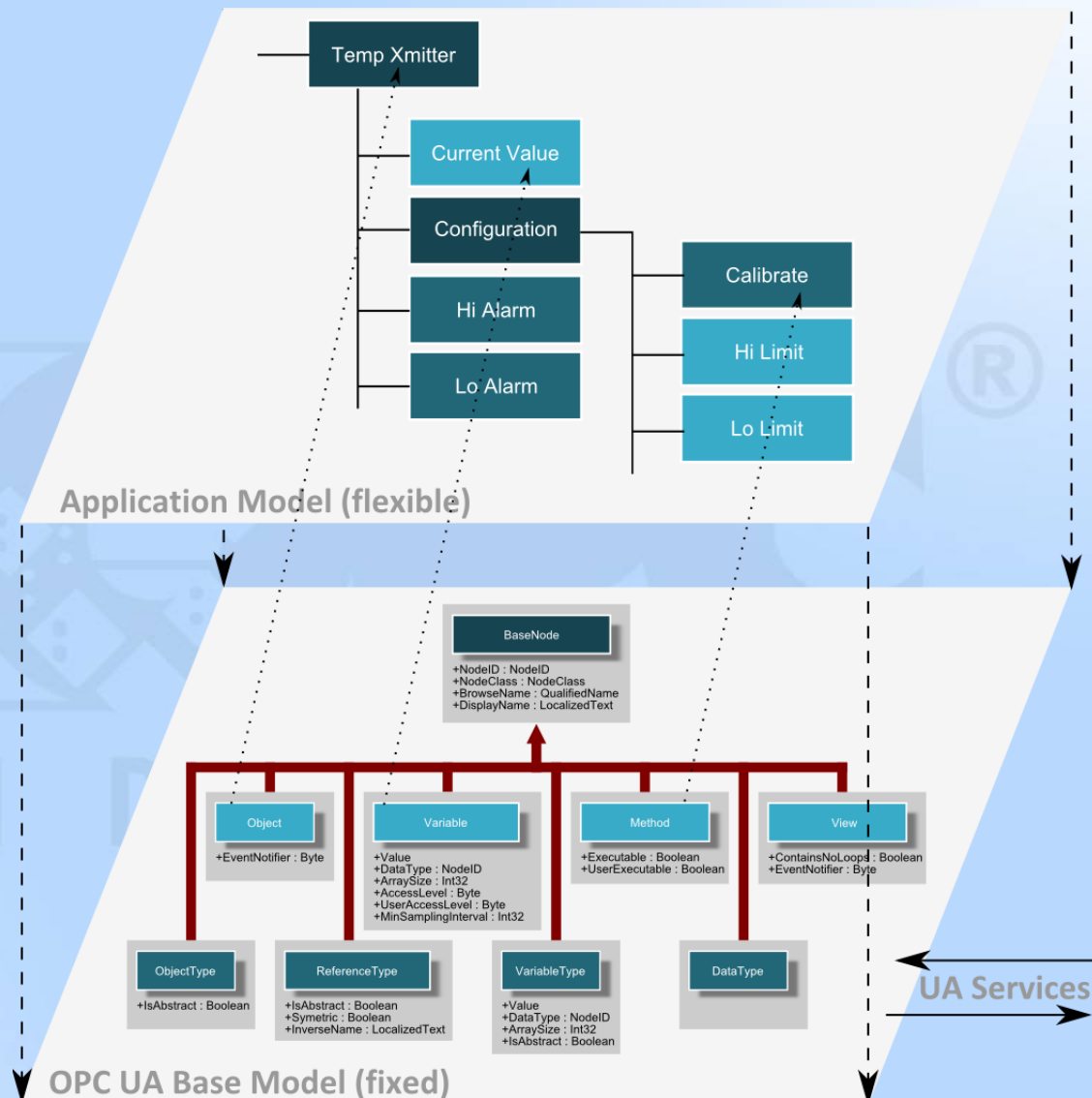
# Collaboration

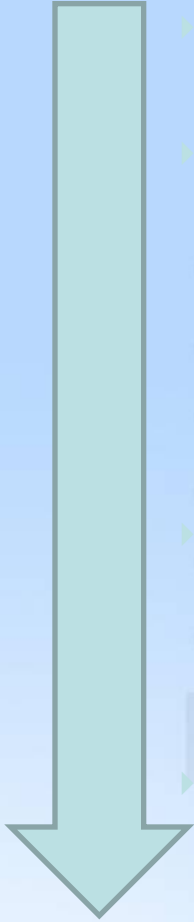
## OPC UA Information model

# UA Base Information Model

- Object Oriented Base Model
- Types and References
- Mashed Network
- Inheritance

>> **Everything** that can be described with an object oriented language, can also be **modeled in UA** and **transferred** over the network and **accessed** via standardized services.



- 
- ▶ Common working group OPCF & BACnet (BIG EU)
  - ▶ Motivation
    - Several companies started to implement a mapping of BACnet information model into OPC-UA namespace
    - Today: Multiple different BACnet representations in UA namespace
    - Today: Poor experience for OPC-UA clients
  - ▶ Result
    - Both organizations agree, to cooperate to define “THE ONE OFFICIAL” mapping
  - ▶ Status, Plans
    - Memorandum of understanding is signed by both organizations
    - First technical meeting was begin Oct 2012 in Frankfurt 2012
    - Press conference during SPS/IPC/Drives 2012

## MES-Connectivity

- ▶ MES D.A.CH  
(D.A.CH = Germany/Austria/Switzerland)



- ▶ Goal: “Universal Machine connectivity” (UMC) for MES
- ▶ Profiles: Design MES complex data profiles in IEC61131-3
- ▶ Transport: OPC-UA
- Status: First technical meeting done  
Planning for OPC workshop & common press conference



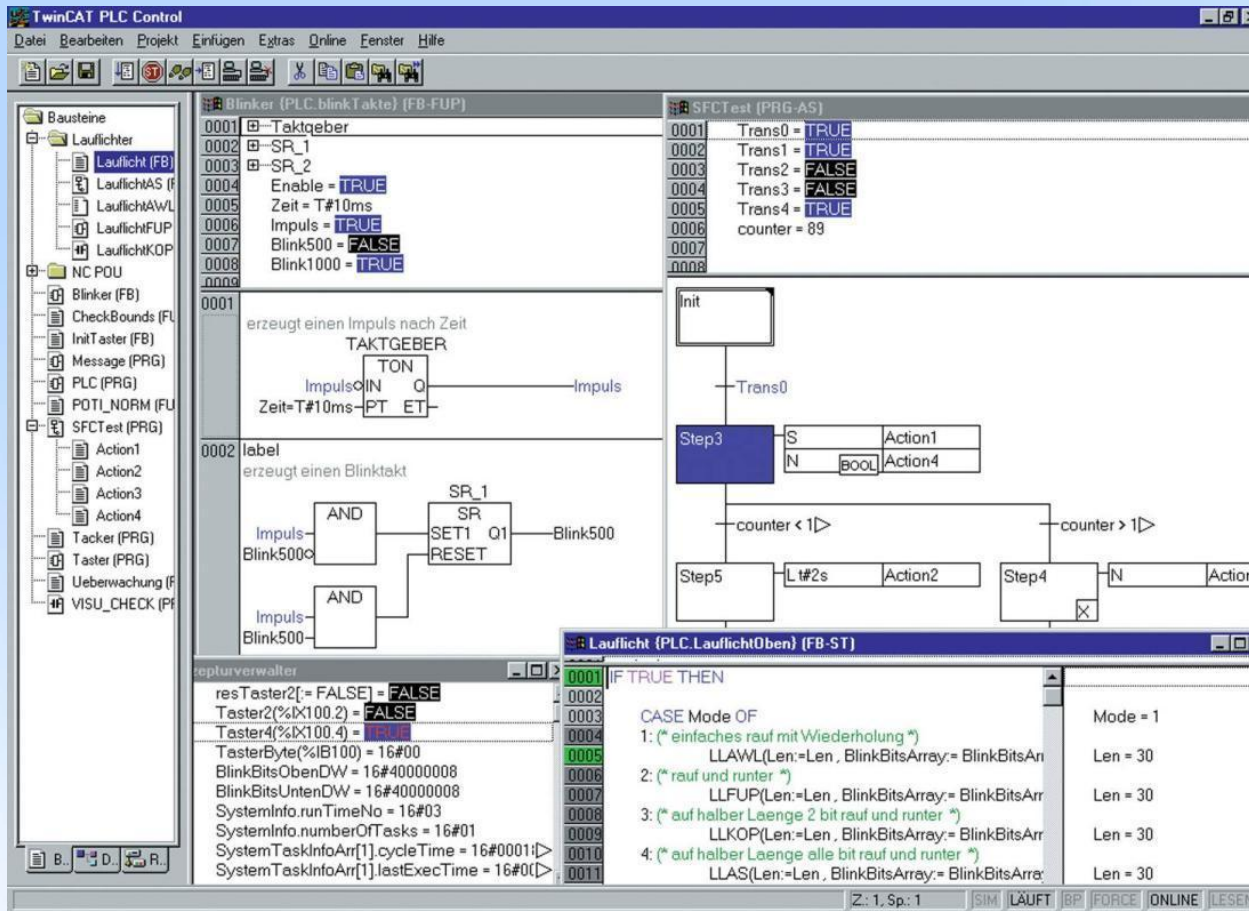
## M2M Alliance Germany

- ▶ OPC-UA is listed in “the book for government”
- ▶ 6 OPC-UA articles with focus M2M in Computer&Automation
  - Stefan Hoppe: M2M require OPC-UA Interoperability – not just connectivity
  - Uwe Steinkrauss: Scalability with OPC-UA
  - SAP: Connect from shop floor to top floor
  - ...

F O U N D A T I O N

# PLCopen Overview

- PLCopen : [www.plcopen.org](http://www.plcopen.org)
  - IEC61131-3: Global standard for Industrial Control Programming
  - Languages: ST, IL, LD, FBD



PLCopen  
motion  
control

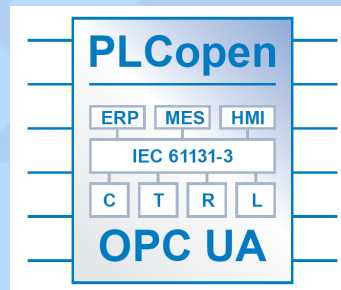
PLCopen  
safety

PLCopen  
Benchmarking

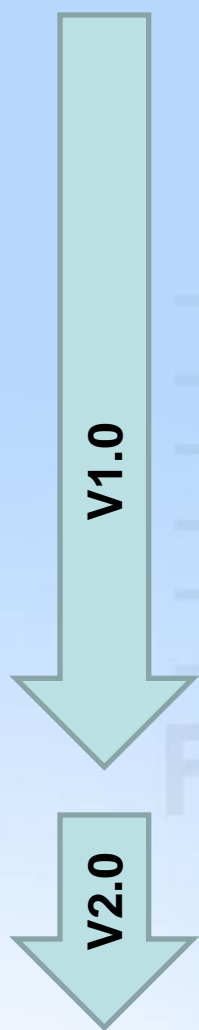
PLCopen  
XML  
EXTENSIBLE  
< MARKUP >  
LANGUAGE

## PLCopen & OPC UA: Interoperability On The Next Level

- Enables OPC interfaces in embedded controller
- PLC information model in a standardized format
- Rapid engineering for HMI / MES / ERP
- Moving information from shop floor to enterprise
- Secure, remote “out-of-the-PLCopen-box” communication







## **2008 October: Kick off meeting common group**

- Chairman                      Stefan Hoppe (Beckhoff)
- OPC Editor                    Matthias Damm (ascolab)
- PLCopen Editor              Prof. Rene Simon (ifak)

- Goal V1: Common Namespace for IEC 61131-3 Information model
- Goal V2: PLCopen-OPC-UA function blocks and services

## **2009 November: V0.9 Release Candidate available**

- Live demo on SPS/IPC/Drives 2009

## **2010 March: V1.0 Released from both organizations**

- multi vendor demo at April-2010 Light&Building and Hanover Fair

## **2010 December: continue with goals V2**

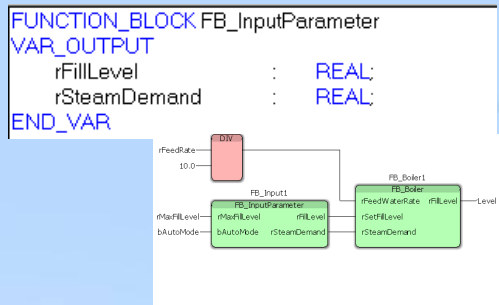
**2012 November: Live demo**



# PLCopen and OPC: Results

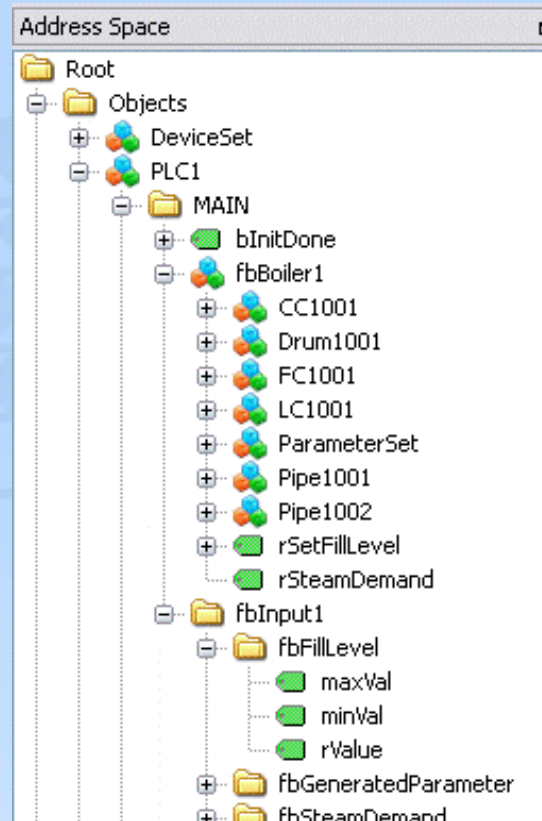
## PLCopen:

Content „WHAT“



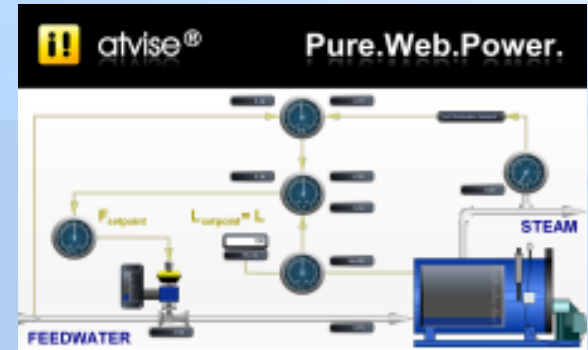
## OPC-UA-Server:

Communication „HOW“



## UA-Clients: SCADA/MES/ERP

Presentation



All information about IEC61131-3 project:

- FB's
- POU's
- Structures
- Tasks / Resources..

- Standardized UA access
- Identical namespace
- Complete information model

Advantages:

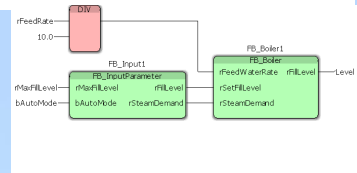
- Re-useable HMI Faceplates“
- Rapidly engineering
- Transparent PLC controller

# PLCopen and OPC: Results

## PLCopen:

Content „WHAT“

```
FUNCTION_BLOCK FB_InputParameter
VAR_OUTPUT
    rFillLevel      : REAL;
    rSteamDemand    : REAL;
END_VAR
```

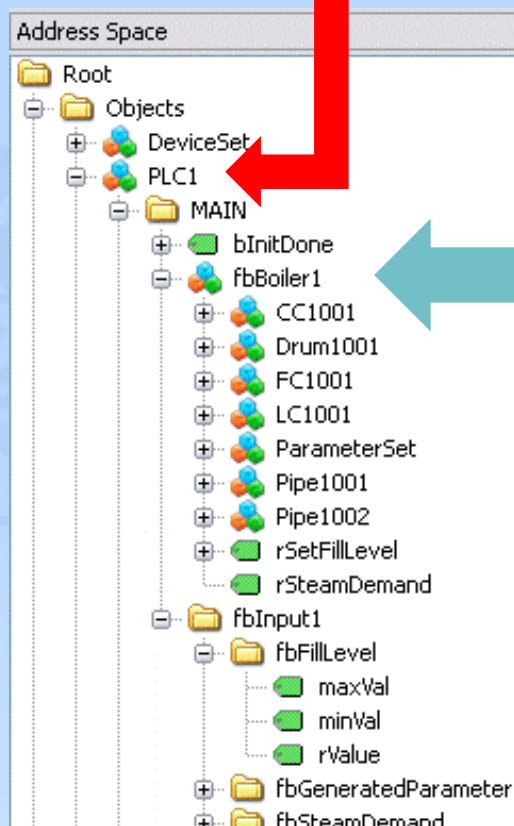


All information about  
IEC61131-3 project:

- FB's
- POU's
- Structures
- Tasks / Resources..

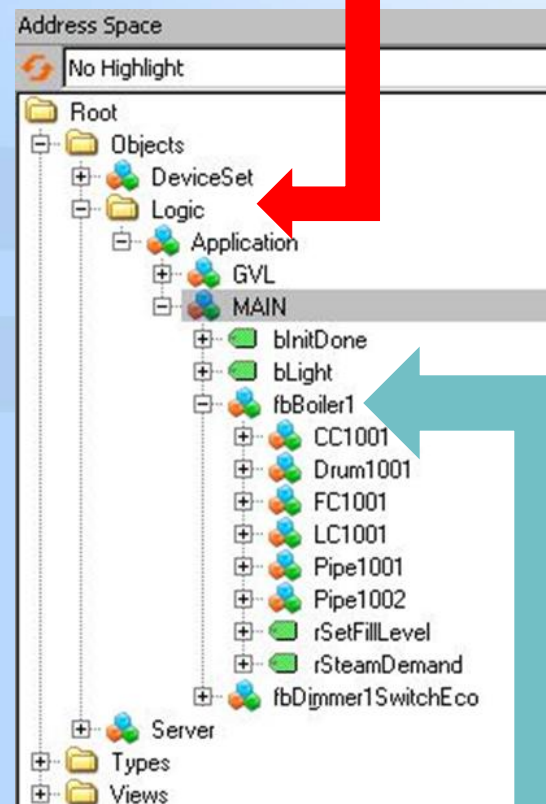
Beckhoff

„PLC1“



Bosch-Rexroth

„Logic“



Different entry point

... but semantic identical objects!

# PLCopen and OPC: Demo

  <p>Vendor: Certec EDV GmbH Product: atvise Description: Fully featured web HMI in pure web technology</p>	  <p>Vendor: Allmendinger Product: Add-on for SIMATIC WinCC Description: OPC-UA Client Channel for SIMATIC WinCC</p>	  <p>Vendor: ICONICS Inc. Product: GENESIS64 Description: Microsoft .NET based, web-enabled, OPC based 64-bit HMI/SCADA Suite</p>	  <p>Vendor: ascolab GmbH Product: OPC UA Services Description: OPC UA Consulting, Training and Development Services</p>	  <p>Vendor: COPA-DATA GmbH Product: zenon Description: OPC UA Client solution for zenon</p>	  <p>Vendor: INOSOFTE GmbH Product: VisiWinNET Description: HMI/SCADA Software Microsoft .NET based HMI/SCADA Software with support for Visual Studio and Expression Blend</p>
  <p>Vendor: Beckhoff Automation Product: CX1010-0111 Hardware: 500MHz X86 CPU, 512MB RAM Description: IPC with PLC controller and OPC-UA-server/client</p>	  <p>Vendor: Bosch Rexroth AG Product: Indralogic Hardware: 1GHz X86 CPU, 512MB RAM Description: controller based PLC with integrated OPC-UA server</p>	  <p>Vendor: ifak v.v. Product: OPC UA Generic Server Hardware: SIMATIC S7-300 Description: Server adaptable to diereent data sources</p>	  <p>Vendor: Phoenix Contact Product: VALUeline IPC Hardware: Core2™ Duo 1.5 GHz Description: IPC with ProCOROS embedded CLR SoftPLC and OPC UA communication</p>	  <p>Vendor: logi.cals/MicroSys Product: logi PLC 5200 Hardware: 400MHz Freescale MPC5200 CPU Description: PLC controller / OEM PLC</p>	  <p>Vendor: Unified Automation GmbH Product: OPC UA Server SDK Description: Online server for PLC address space and Server development tools</p>

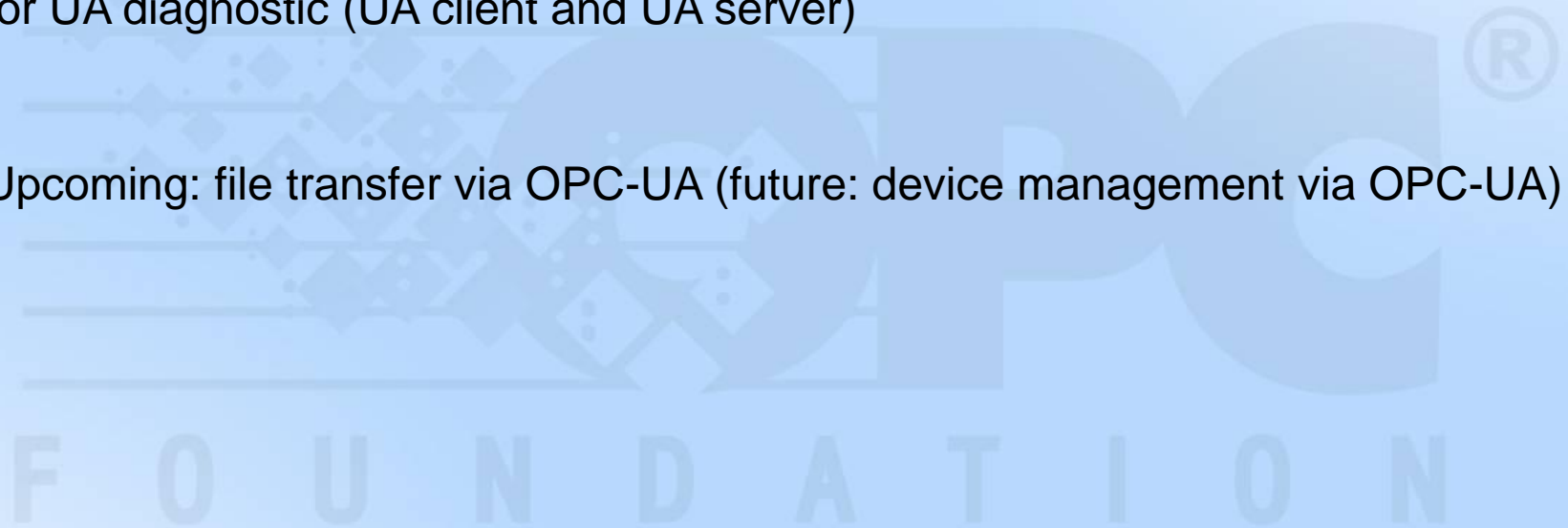
# PLCopen & OPC: Current status

Define PLCopen IEC61131-3 FB's to communicate via OPC-UA

for UA-client communication functionality

for UA diagnostic (UA client and UA server)

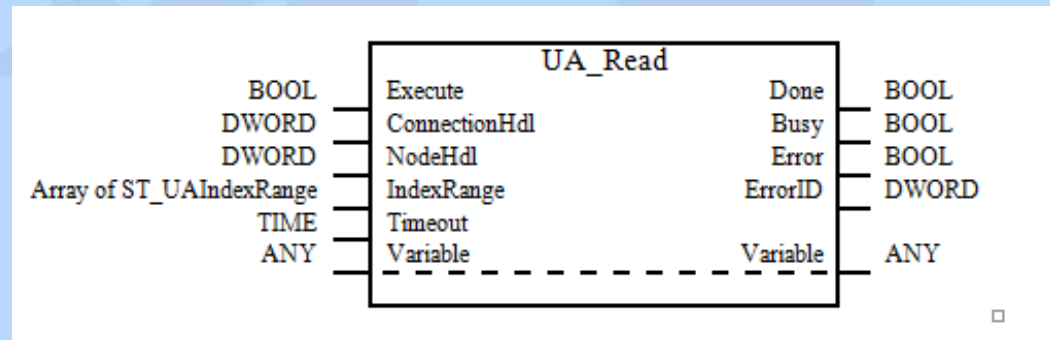
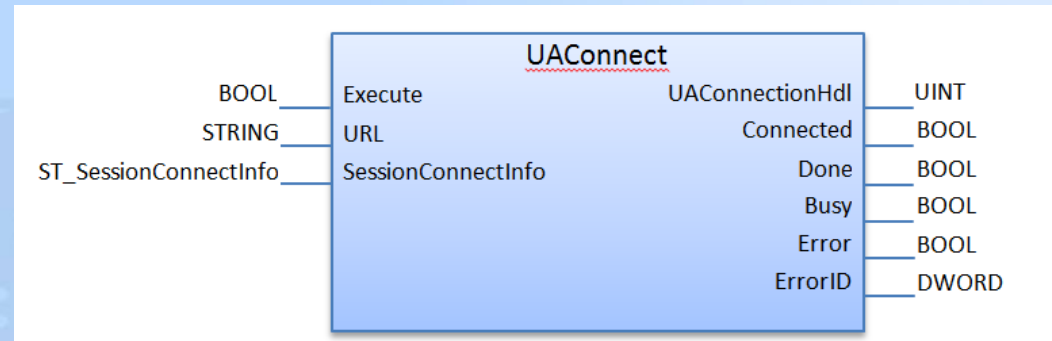
Upcoming: file transfer via OPC-UA (future: device management via OPC-UA)



## FUNCTIONSBLOCKS

### Data Communication

UaConnect  
UaNodeGetHandle  
UaNodeReleaseHandle  
UaNodeGetInfo  
UaMonitoredItemCreate  
UaMonitoredItemDelete  
UaRead  
UaReadList  
UaWrite  
UaWriteList  
UaMethodGetHandle  
UaMethodReleaseHandle  
UaMethodGetInfo  
UaMethodCall



□

## FUNCTIONSBLOCKS

for UA diagnostic (UA client and UA server)

### Diagnosis

UaConnectionGetStatus

UaServerGetStatus

UaServerGetInfo

UaSessionGetList

UaSessionGetInfo

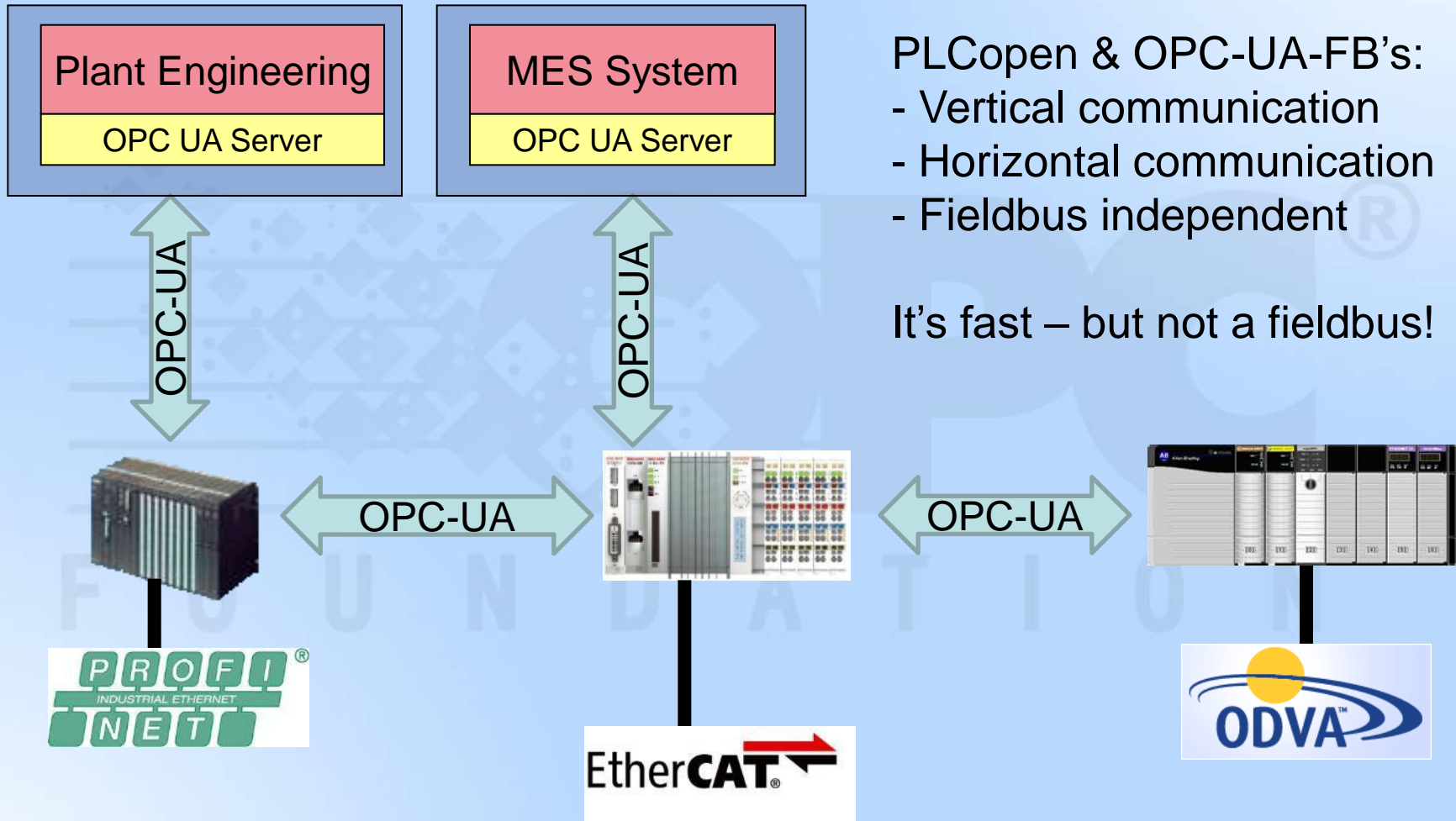
UaSubscriptionGetList

UaSubscriptionGetInfo



# PLCopen & OPC: Current status

Scenarios for data communication:



PLCopen & OPC-UA-FB's:

- Vertical communication
- Horizontal communication
- Fieldbus independent

It's fast – but not a fieldbus!



**PLCopen**  
*for efficiency in automation*

## PLCopen and OPC Foundation

**Kick-Off meeting on 17/18.11.2011**  
hosted by SAP AG, Walldorf, Germany

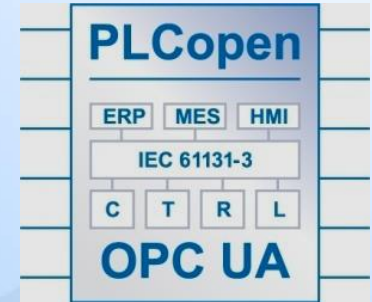
**Manufacturing Execution System (MES)**  
**Connectivity**

**Integration of machine and process data for**  
**utilisation by MES based on OPC UA and**  
**PLCopen**

Supported by



**ZVEI:**





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## Start:

- 2011 November 17/18<sup>th</sup> : MES-Connectivity hosted by SAP
  - Create PLCopen FB's and complex data structures which provide MES informations to be transported via OPC-UA

## Goals:

- Definition of communication mechanisms via OPC UA for MES integration
- Definition of the semantics for MES integration
- Connectivity from MES down into controllers to be easy and fully secured based on PLCopen & OPC-UA technology
- Fieldbus independent

## MES-Connectivity

- Team members:

3S, ABB, Ascolab, Beckhoff, Bosch, Bosch-Rexroth, Continental, EDAG, Fraunhofer- IOSB, Honeywell, ITAC, Leikon, MES-DACH, NAMUR-MES, PSI, Rockwell, RWTH Aachen, SAP, Siemens, Trebing&Himstedt, ifak, Uni Dresden, VDMA, ZVEI

- IMPORTANT:

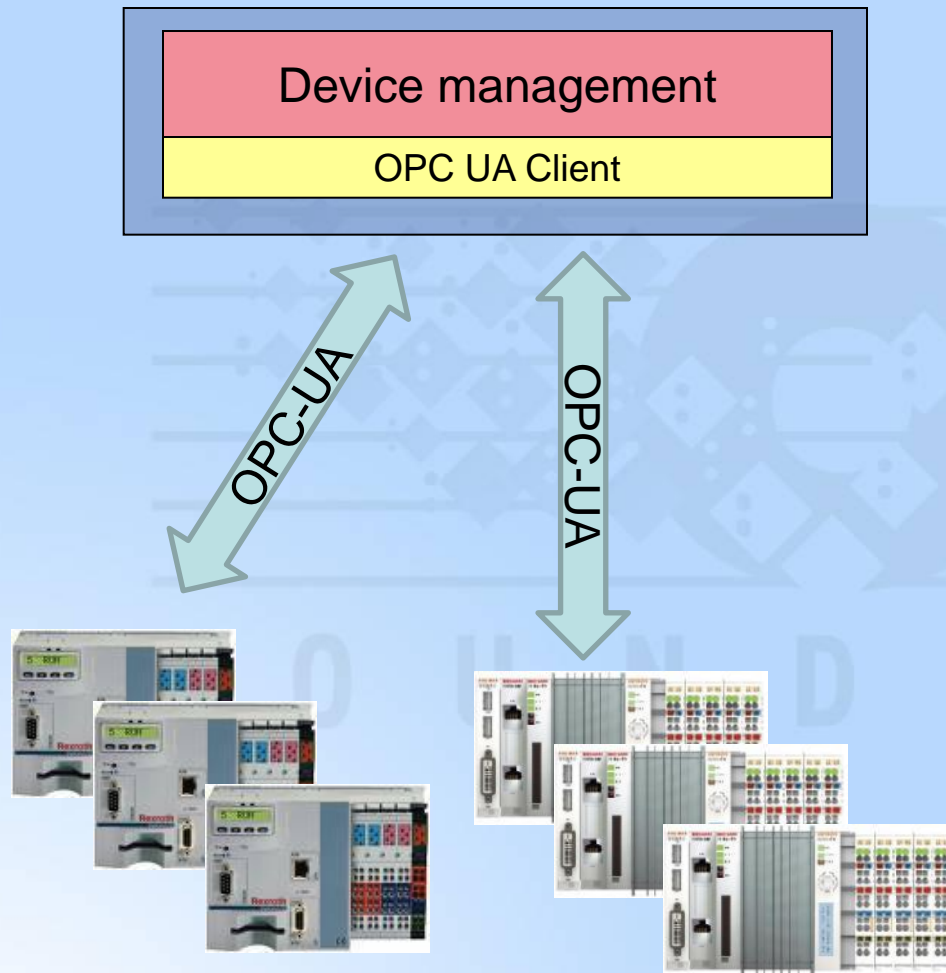
- PLCopen & OPCF do not define new MES standards
- Instead cooperate with VDMA, ZVEI, others to let MES experts define the content
- OPC-UA just provides transport & security



OPC-UA technology provides more benefits we should make use of



PLCopen & OPC group work on standardized file transfer



## 1. Easy file /folder deployment

Download of

- e.g. of PLC binary code
- e.g. of recipes

## 2. Easy management for Upload

- e.g. measurement data

## Target market

- Building automation
- Water treatment
- Wind parks

# Benefit - Method-programs

- Market demand to start and stop a PLC, drive, .. download a file to a device, invoke a batch file and track download resp. batch process
- OPC UA defines program invocation and state machines as part of the unified address space

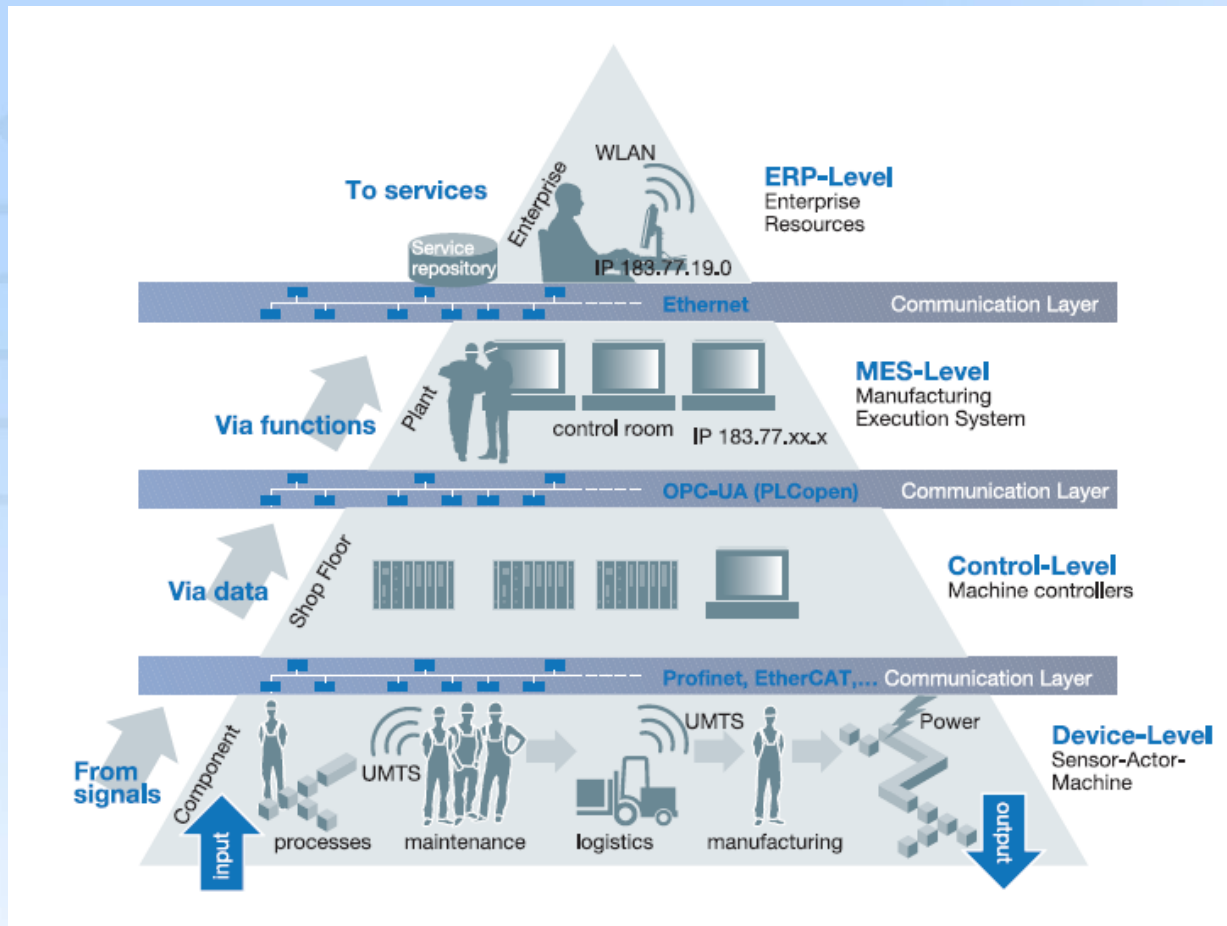


# From Controller to IT Level

Today

Transition process

“From signal -> via data -> via functions -> to services”



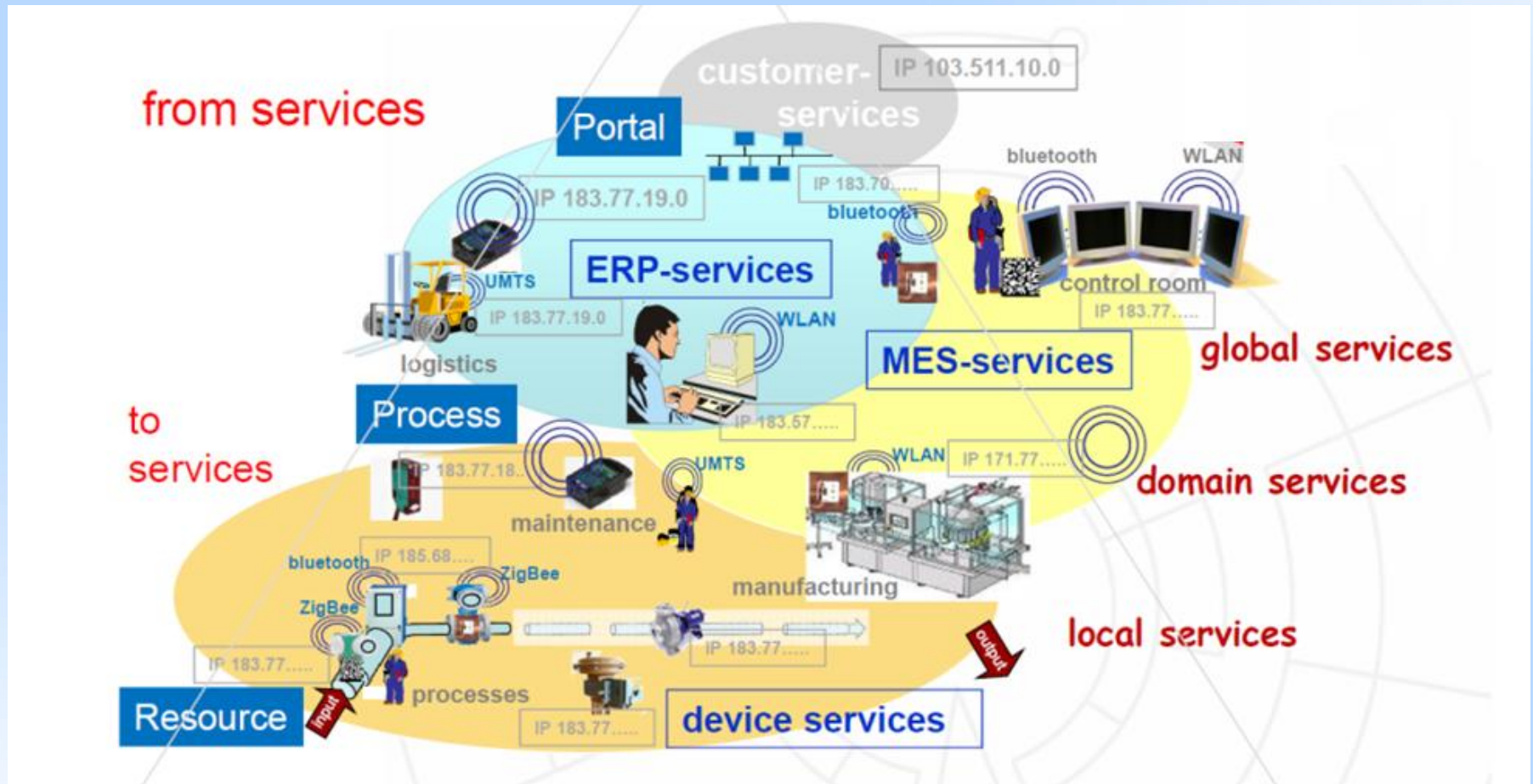


# From Controller to IT Level

Tomorrow

Transition process

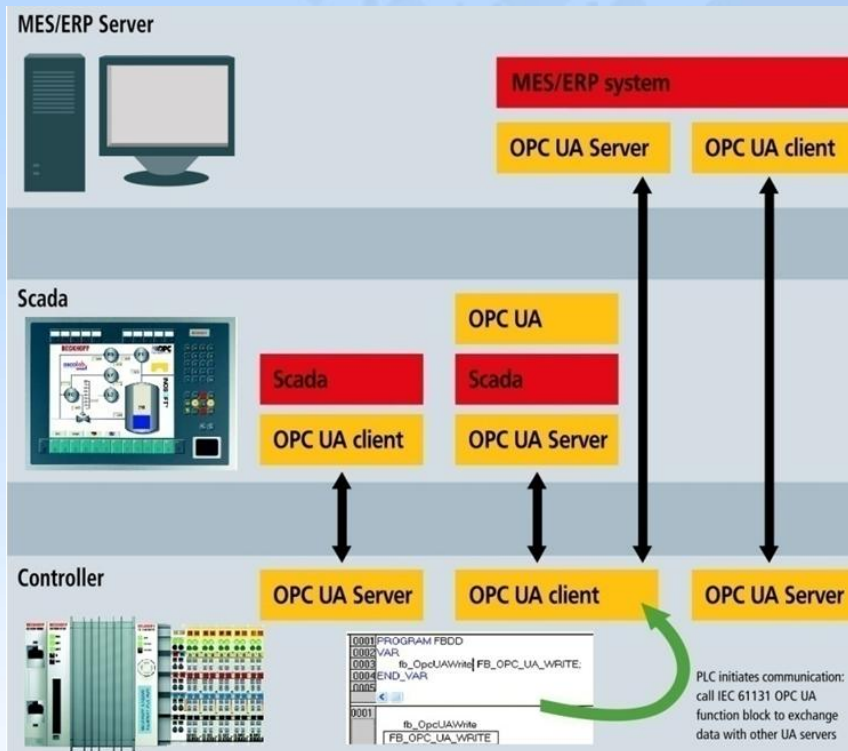
“From services -> to services”



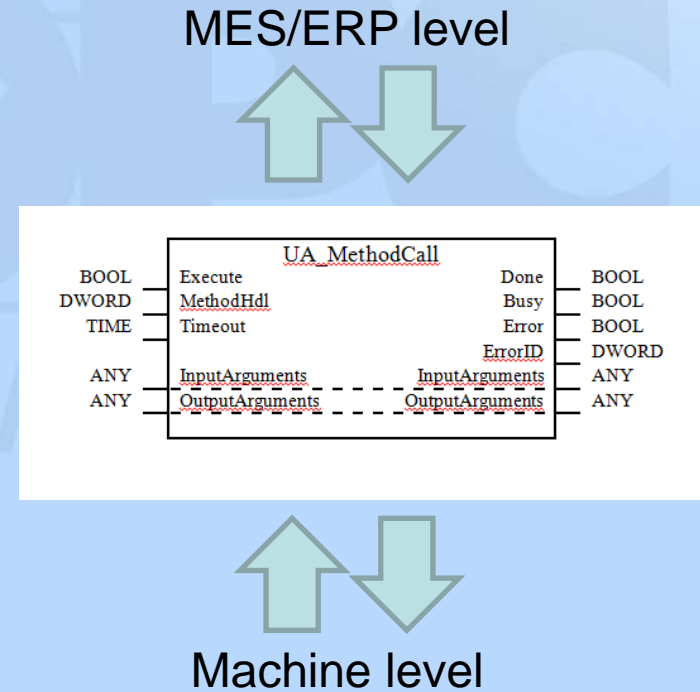
# From Controller to IT Level

- Today:**
- HMI or MES initiate communication (act as client)
  - Controller answer (act as server)

- Tomorrow:**
- HMI or MES additionally act as server
  - Controller additionally act as client



PLC initiates communication:  
call IEC 61131 OPC UA  
function block to exchange  
data with other UA servers





# OPC UA Products

FOUNDATION

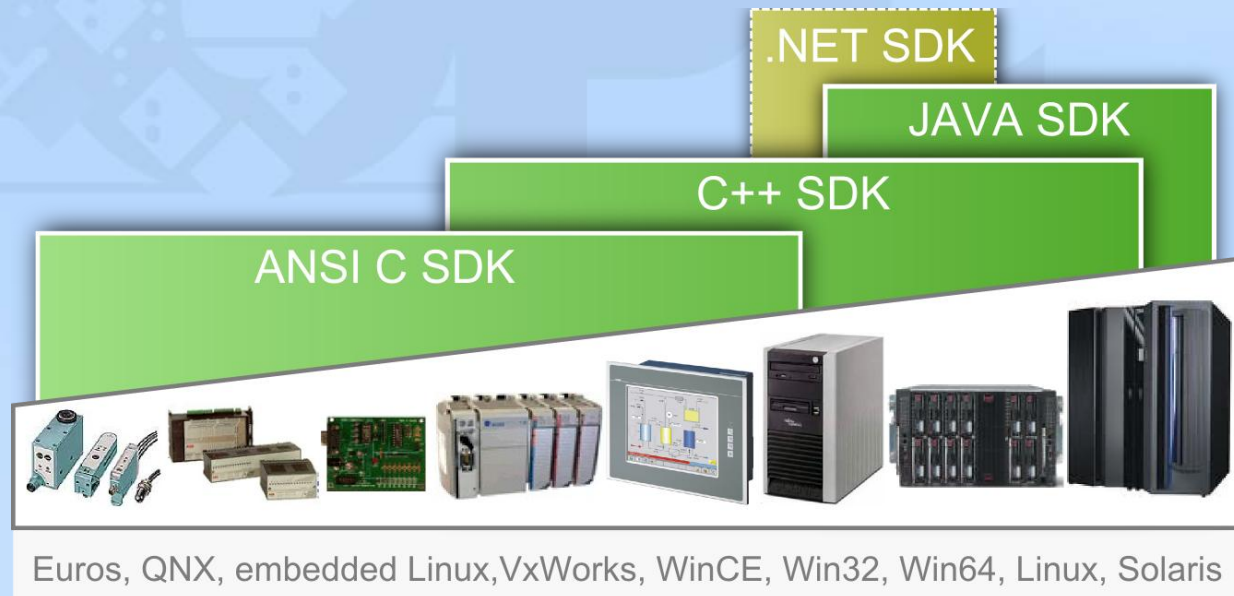
# UA solutions: Device to Mainframe

- Toolkits and SDKs (C / C++ / Java)
- used by all large automation vendors
- all platforms, all architectures  
(x86, ARM, PPC, x64, Mips, ... <> WinCE, vxWorks, Linux, QNX,...)
- UaModeler - Code Generator
- OEM solutions for legacy OPC



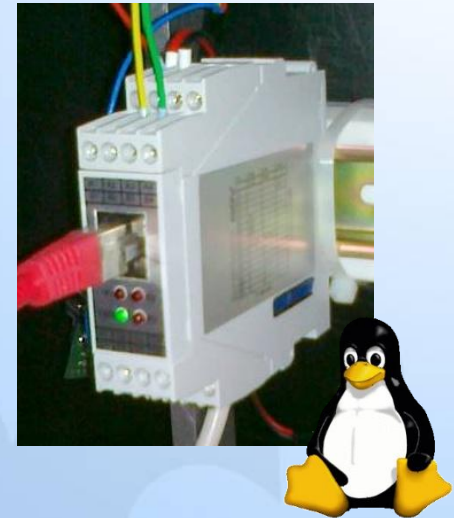
## Solutions:

- PC, IPC, Panel
- Embedded Device
- Smart-Phone



# UA solutions: UA Server Device

- ARM 9 rack mount UA Server Gateway
- Embedded Linux
- S7, Modbus, CAN, ...
- Ring Buffer Data Storage
- Configured through UA



OPC UA goes Mobile: Android and Apple (iPhone and iPad)



- ARM Cortex A8
- Android 2.2
- UA Client
- UA Security

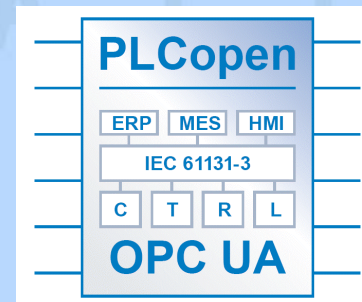




# UA solutions: PLC controller



- Automation Controller series with PLC, Motion and GUI
- OPC-UA Server integrated:
  - DA: Data Access
  - HA: Historical Access
  - AC: Alarm & Condition
- OPC-UA client integrated
  - UA client functionality as FUNCTIONSBLOCKS out of the IEC61131-3 PLC



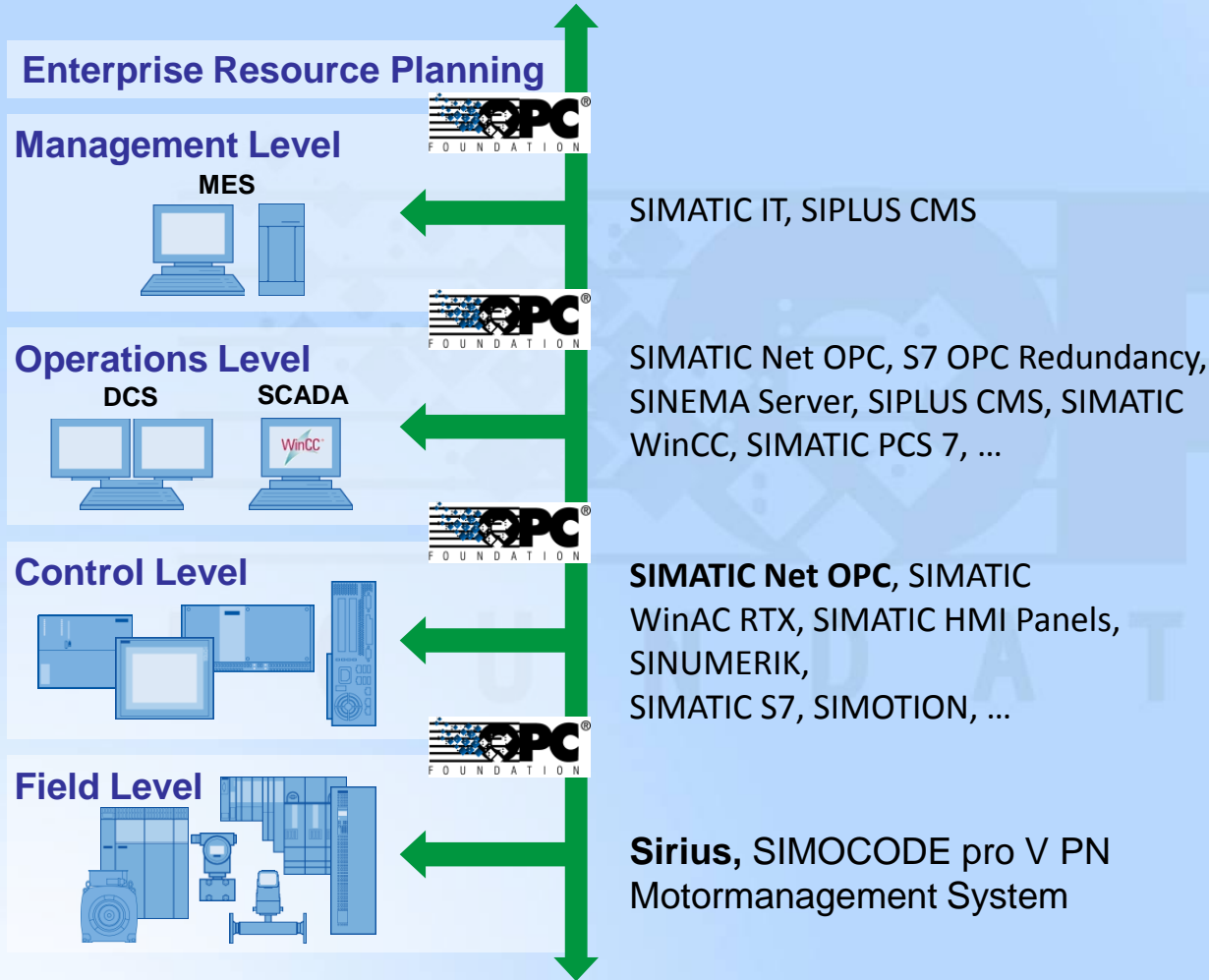


# UA solutions: @ Siemens

## Penetration at all automation levels



# SIEMENS



## OPC-UA in field-devices

**Product: Sirius, SIMOCODE pro V PN Motormanagement System**

Produktdatenblatt

3UF7011-1AU00-0

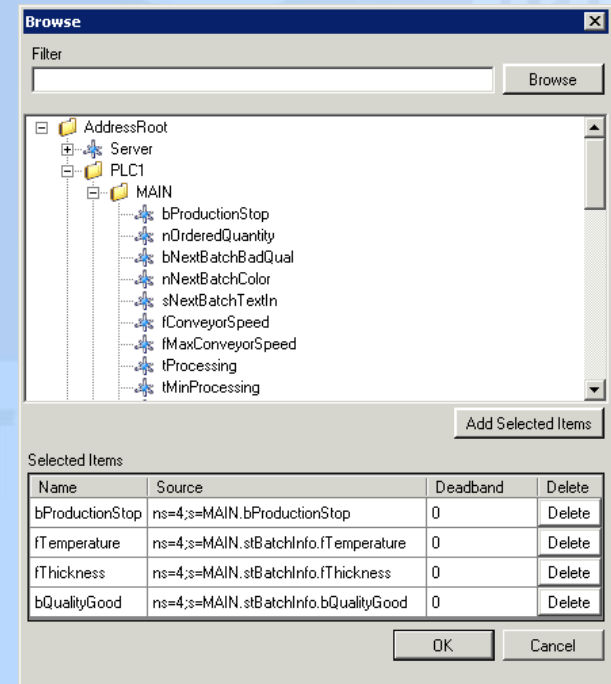
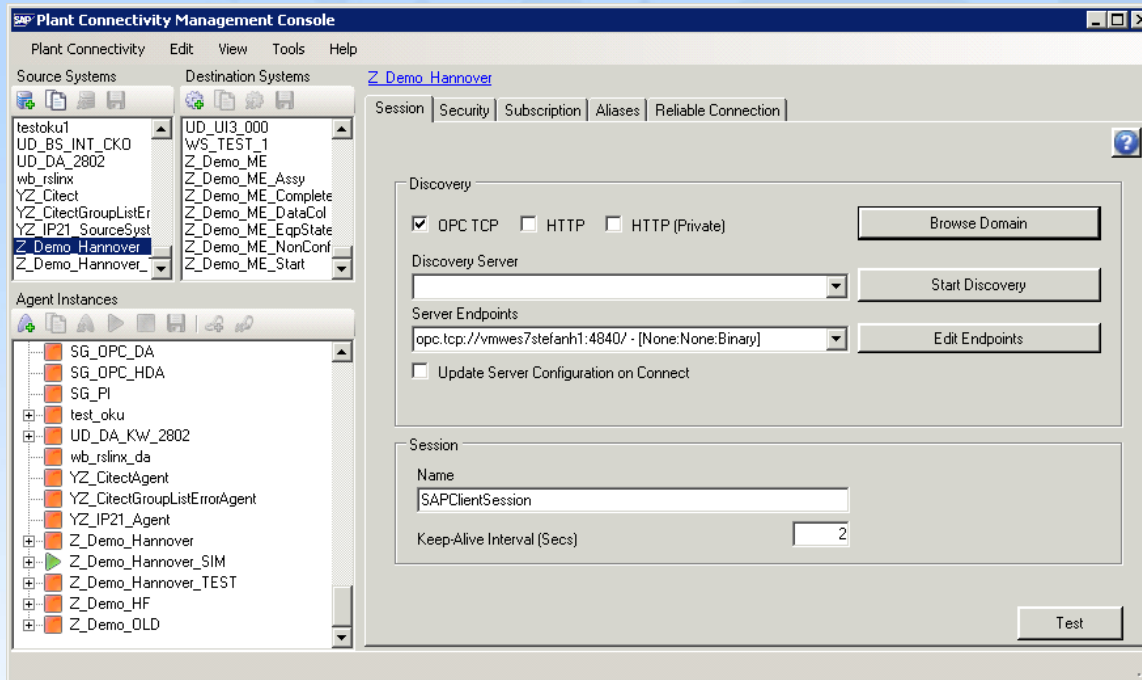


GRUNDGERAET 3 SIMOCODE PRO V PN ETHERNET /  
PROFINET IO;  
OPC UA SERVER / WEBSERVER;  
UEBERTRAGUNGSRATE 100MBIT/S;  
2 X BUSANSCHLUSS UEBER RJ45 4E/3A FREI  
PARAMETRIERBAR;  
US: AC/DC 110-240V;  
EINGANG F. THERMISTORANSCHLUSS;  
MONOSTABILE RELAISGAENGE;  
ERWEITERBAR DURCH ERWEITERUNGSMODULE

# SIEMENS

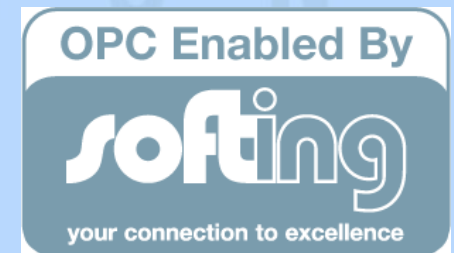
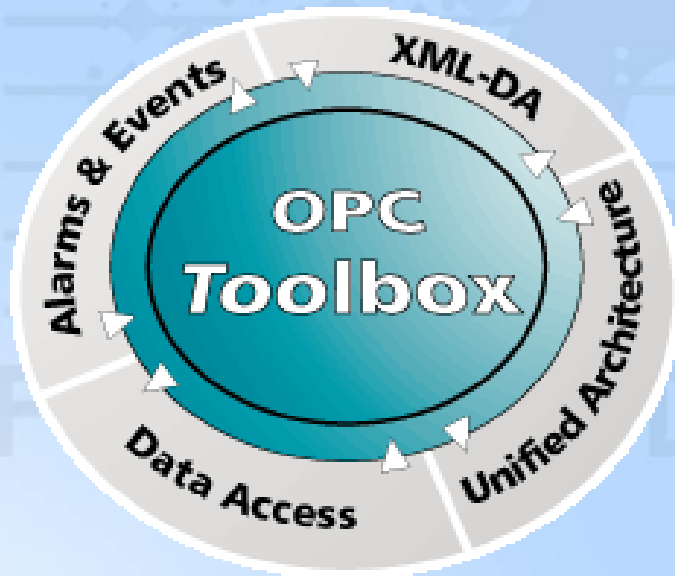
# UA solutions: @ SAP

- Company: SAP AG
- Product: SAP Plant Connectivity (PCo)
- OPC UA: OPC-UA Client (PCo Agent)



# UA solutions: @ Softing

- Company: Softing
- Product: Development Toolkit for Windows, VxWorks, Linux, QNX
- OPC UA: UA Data Access, Alarms&Conditions, Client, Server



# UA solutions: @ EmbeddedLabs

- Company: Embedded Labs
- Product: *fasaLINK* - OPC-UA Server Module
- OPC UA: OPC-UA Server





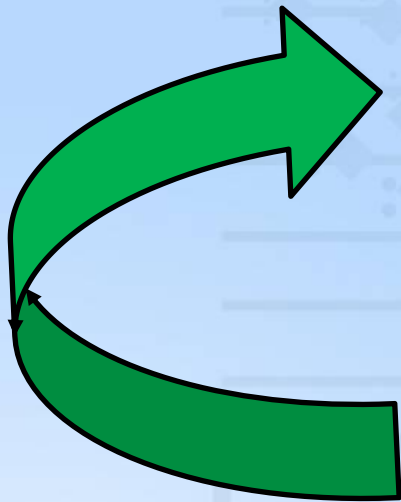
# OPC UA solution for MES connection





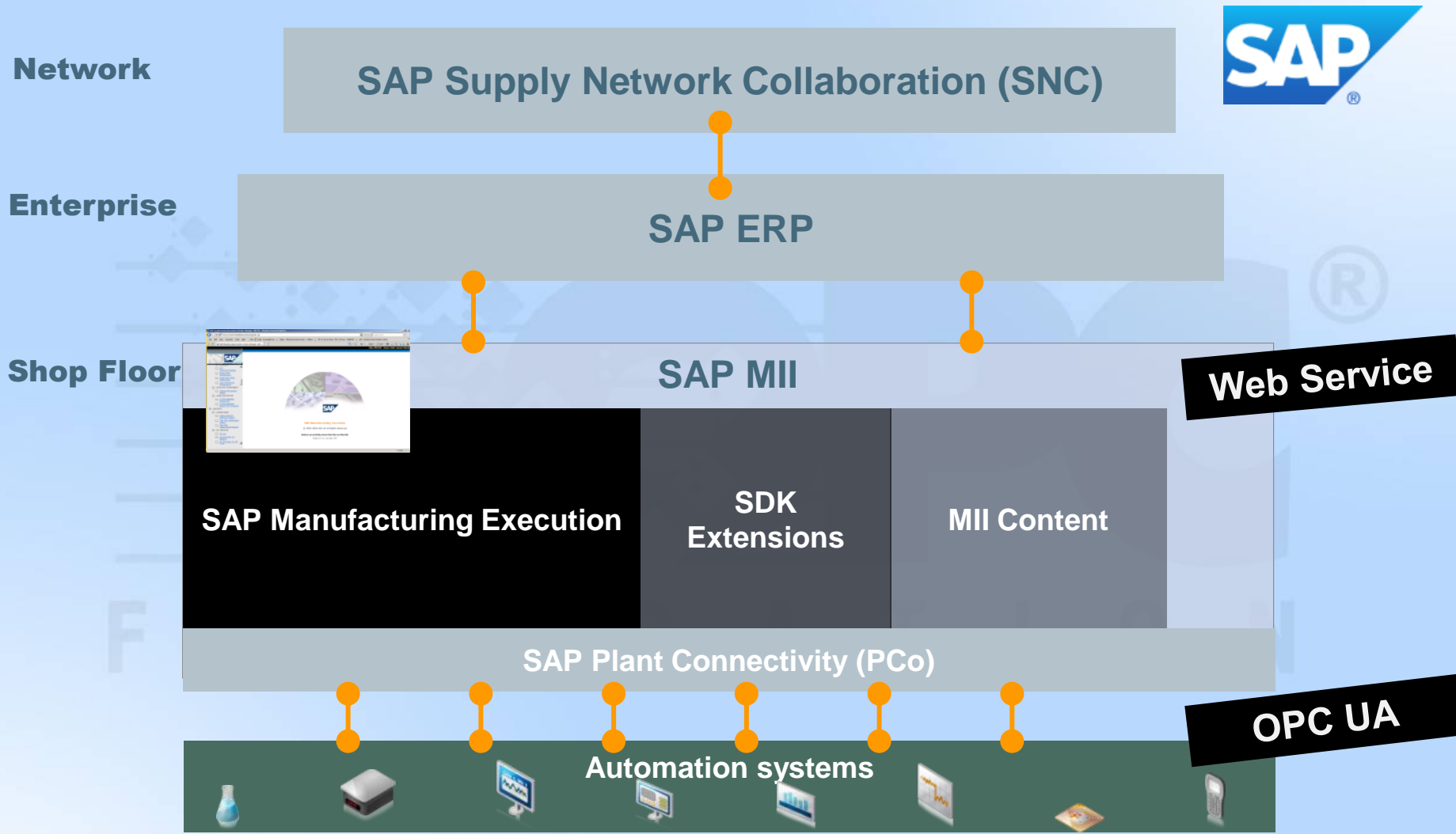
**Success Story:**

**From Top Floor ...**



**..... to shop floor**

# SAP Manufacturing Solutions







- Standardized interface layer to shop floor devices
  - No need to support a variety of proprietary interfaces
  - Ethernet as common connection layer
- Easier to connect shop floor to top floor
- Standard Transport and Security Mechanisms  
→ Security out of the box
- Firewall friendly port usage
- Option for new innovative scenarios like integration of Supplier / Partner Information

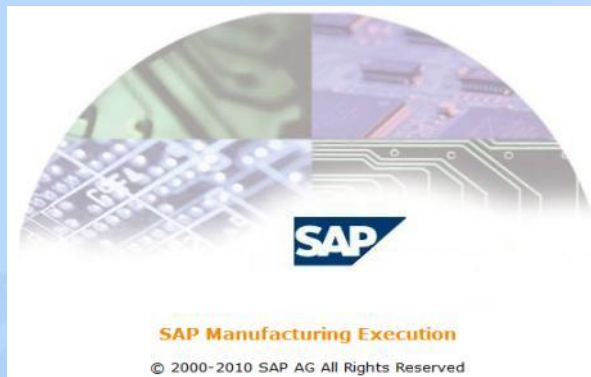


# Elster: on the glance / markets



- 7,000 employees
- 38 major locations
- 200 million installations in the last 10 years
- 115 global markets

Global Market			
Upstream	Transmission	Metering Gas, Water, Electricity	Utilization Heating, Process Heat
			
The Elster Instromet logo, featuring a blue and white globe icon to the left of the word "elster" in a sans-serif font, with "Instromet" in a smaller font below it.	The Elster logo, featuring a blue and white globe icon to the left of the word "elster" in a sans-serif font.	The Elster logo, featuring a blue and white globe icon to the left of the word "elster" in a sans-serif font.	The Elster Kromschroeder logo, featuring a blue and white globe icon to the left of the word "elster" in a sans-serif font, with "Kromschroeder" in a smaller font below it.



Web Service

SAP Plant Connectivity (PCo)

OPC UA

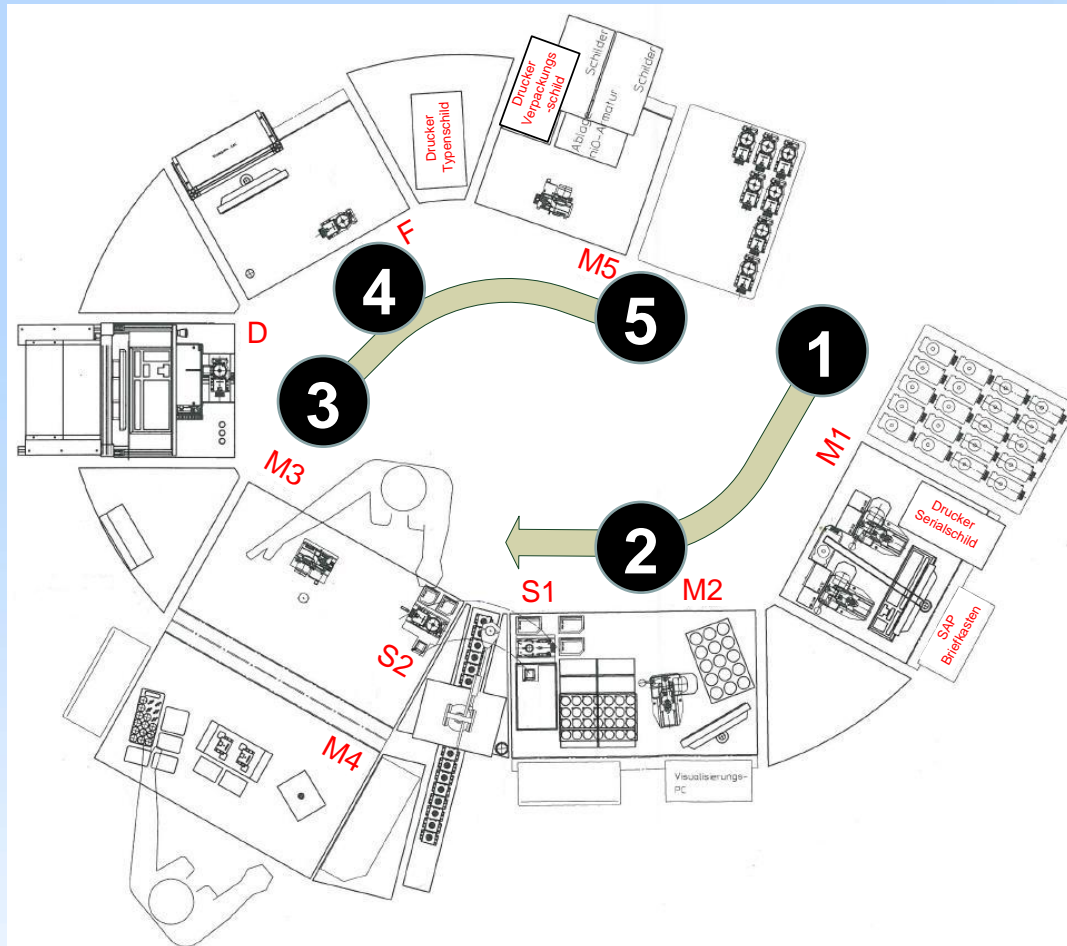


BECKHOFF

PLC with integrated  
OPC UA Server



# Example #1 production line

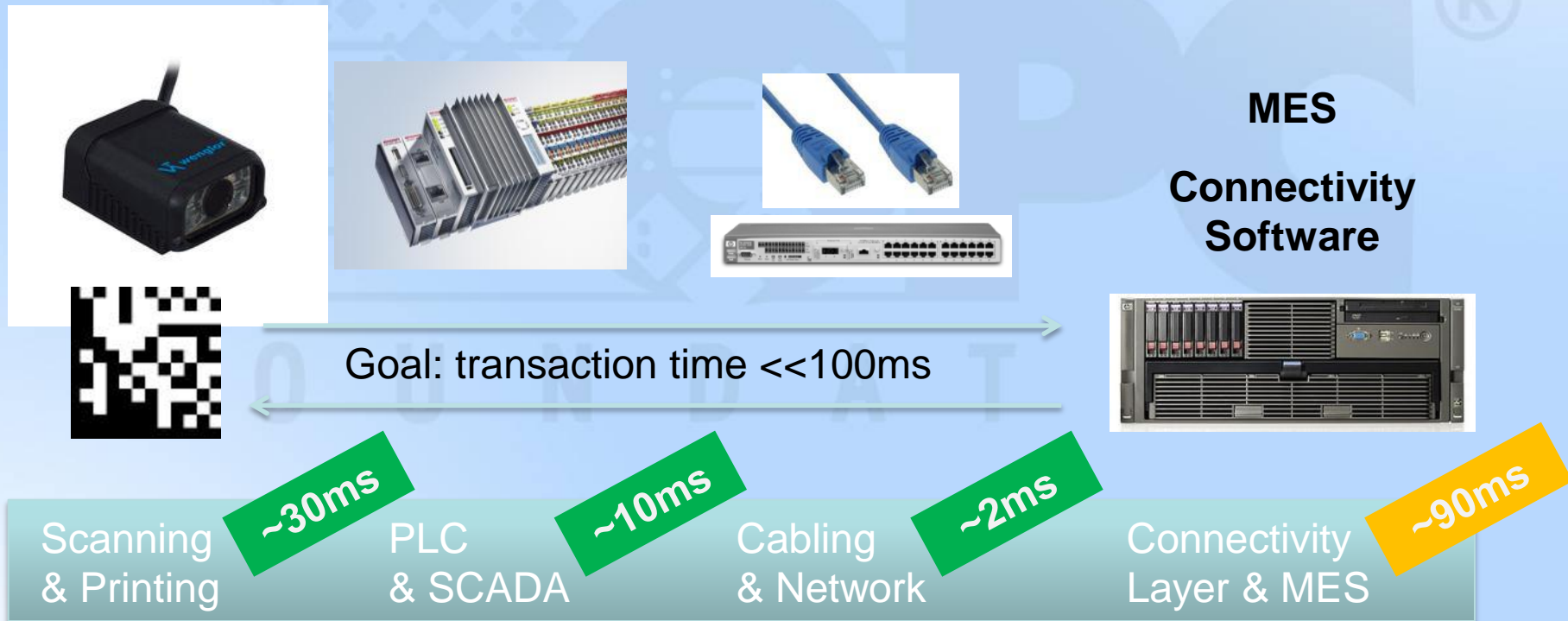


- 1 - Print Serial Number
- 2 - Assembly
- 3 - Leakage Test
- 4 - Functional Test
- 5 - Packing



# MES Communication Chain

- IT is the key to ensure production quality and efficiency
- High performance and high reliability is needed



# Key challenges MES Interfaces

- terminology & variable structure
- speed, reliability

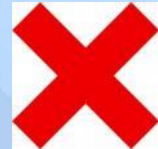
▶ Physical



▶ Communication



▶ Semantic



- easy to use for PLC programmers and MES team
- standardized interface layer
  - that means PLC vendor and MES communicates without any customizing
  - Ethernet as common connection layer
  - includes security out of the box
- no more DCOM stuff
- Firewall friendly port usage
- usage of complex data types



# OPC UA Solutions

FOUNDATION

# UA solutions: Wind Turbines

- Areva Multibrid 5000 wind turbine offshore (Alpha Ventus)
- Connectivity to IT: OPC-UA

- Controller:  
BECKHOFF CX1020  
embedded CE PLC  
with integrated UA Server



- GUI:  
C# Client based on  
Unified Automation

# UA solutions: @ Arburg

Company: Arburg  
worldwide leading vendor of injection molding machines

Application: VxWorks based PLC

OPC UA: Embedded OPC UA Server



- Visualization
- Configuration
- Diagnostics
- Vertical integration

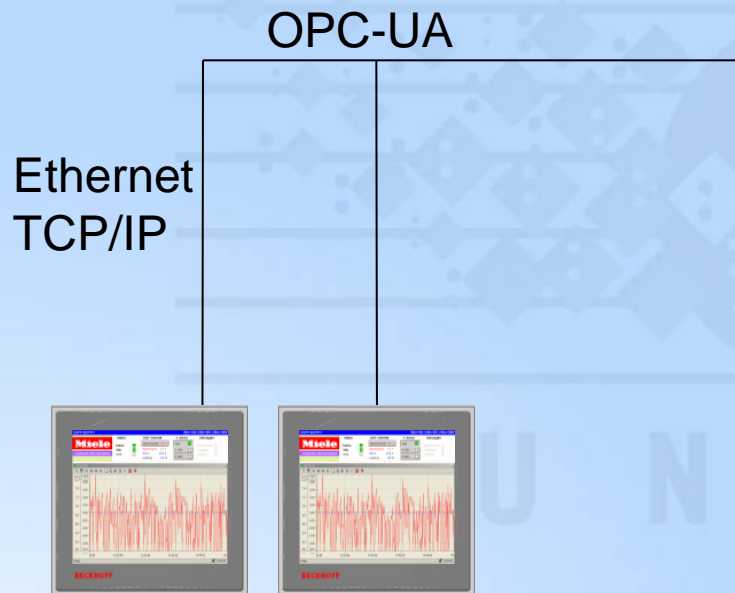




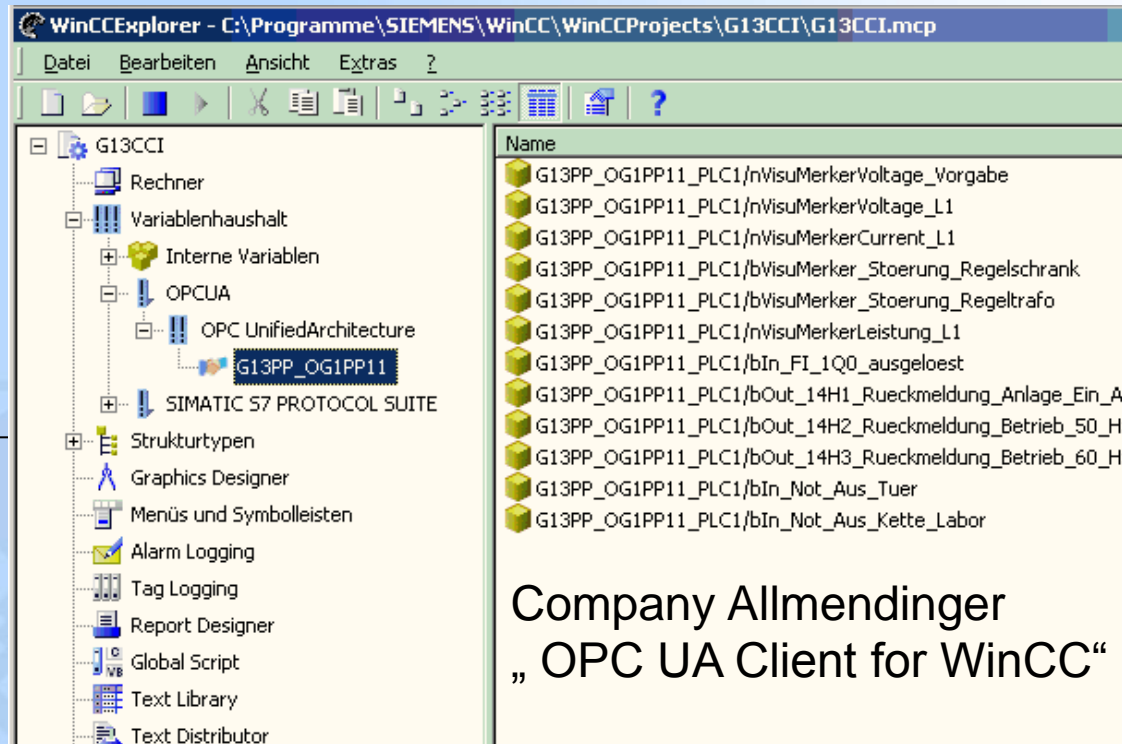
# UA solutions: @ Miele

Connection between

- HMI Siemens WinCC V7.0
- PLC BECKHOFF TwinCAT



30 Test stations with  
OPC-UA Server



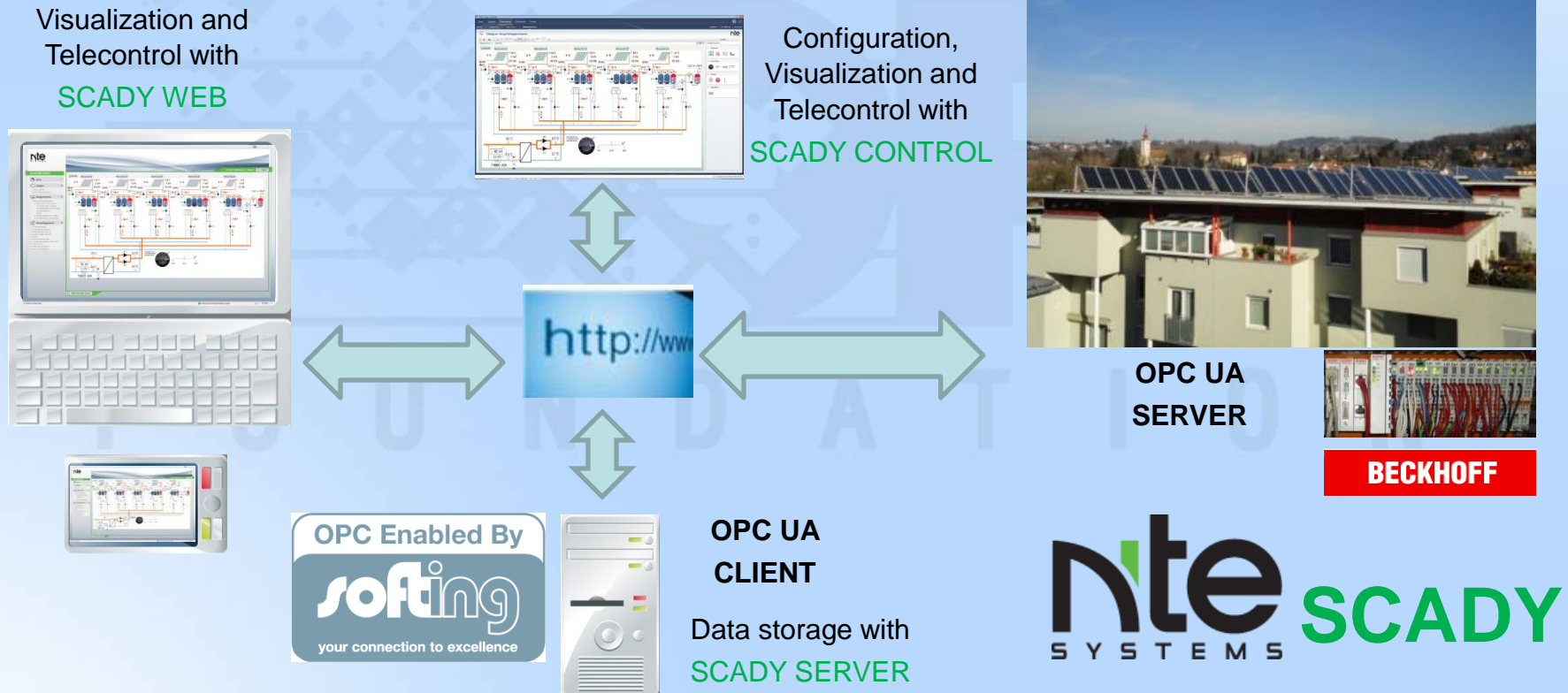
„Because of the use of OPC-UA we got a stabil and high-performance system, which meets our requirements.“



Frank Mestekemper, Miele

# UA solutions: @ NTE Systems

- Company: NTE Systems Austria [www.ntesystems.at](http://www.ntesystems.at)
- Application: Energy Monitoring and Telecontrol for an Energy System with 300m<sup>2</sup> Solar thermal system in 5 apartment houses with 59 flats



Impressions Embedded World 2012

ARM CPU's to scale from sensor  
to consumer devices

OPC-UA to scale from sensor  
to IT Enterprise

6 different OS:  
VxWorks, Linux, WindowsCE,  
Windows, Android, QNX

3 languages: C++, C#, Java



# UA solutions: Sensor Level



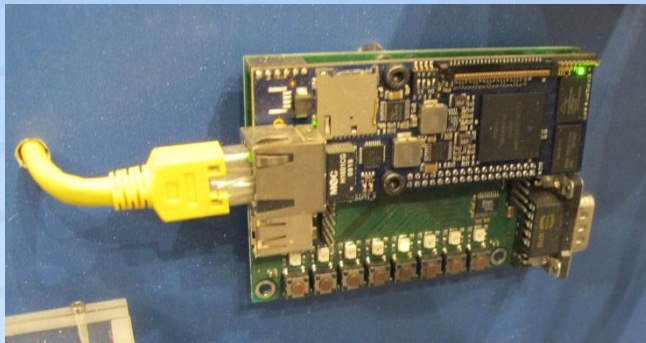
Company Softing (SW)

HW STMicroelectronics embedded MPU

CPU: Dual Core Cortex™-A9

OS: VxWorks 6.9

OPC: UA-Client and Server Development Kit



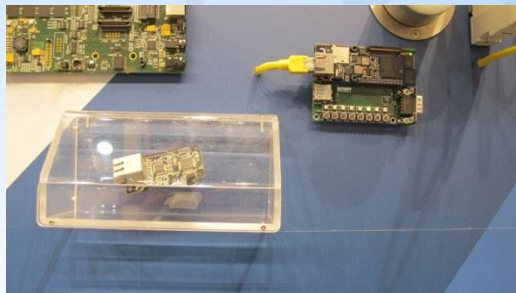
Company Beckhoff

HW Sensor board

CPU: ARM® Cortex™-M3

OS: Windows Embedded CE6

OPC: UA-Server



Company EmbeddedLabs

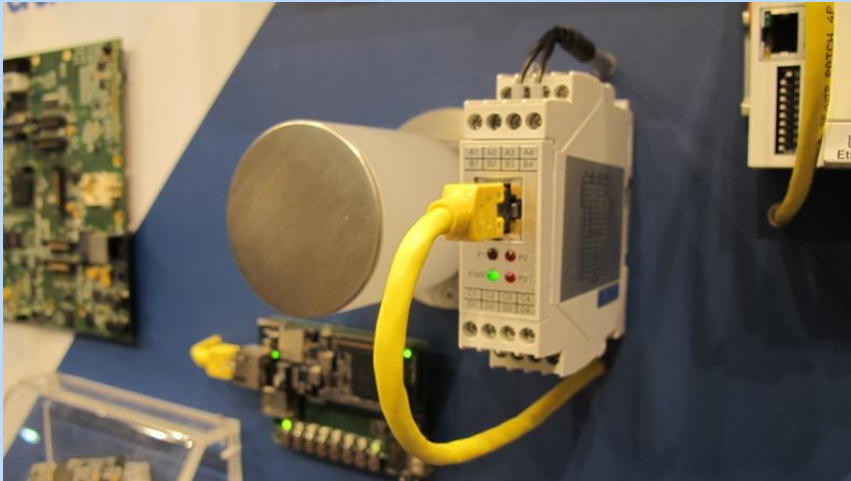
HW Sensor Demonstration Board

CPU: ARM® Cortex™-M3

OS: None (bare metal).

OPC: UA-Server





## Gateway level

**Company SSV**

**HW: IGW/865 Gateway serial/TCP**

**CPU ARM9™ Atmel AT91SAM9263**

**OS Linux**

**OPC OPC-UA Server**

# UA solutions: Field device level



**Company** Siemens

**HW:** SIMOCODE pro V PN

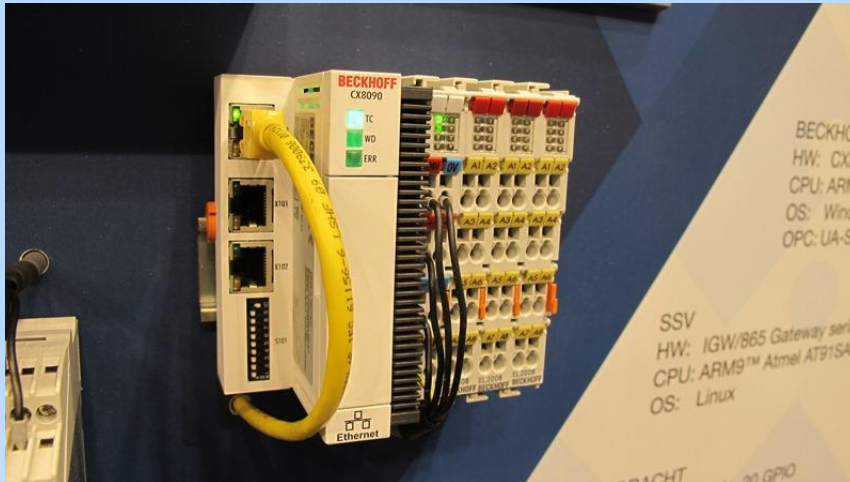
**SIRIUS Motor Management System**

**CPU** ERTEC200 with ARM946

**OPC** UA-Server



# UA solutions: Controller level



## Company Beckhoff

**HW:** CX8090 PLC controller

**CPU** ARM9™ Freescale i.MX25

**OS** Windows Embedded CE6

**OPC** OPC-UA Server (DA/HA/AC) and also OPC-UA client

# UA solutions: Operator / HMI level



**Company Siemens**

**HW: KTP400 Comfort HMI Panel  
WinCC V11 (TIA Portal)**

**CPU ARM11**

**OS Windows Embedded CE6**

**OPC OPC-UA Client**



**Company Garz&Fricke (HW) / Inosoft (SW)**

**HW: Panel PC Cupid**

**CPU ARM11™ Freescale i.MX35**

**OS Windows CE6.0R3**

**SW VisiWin HMI software**

**OPC OPC-UA Client**

# UA solutions: Consumer level



## Company Unified Automation (SW)

**HW:** Samsung  
**CPU** ARM  
**OS** Android  
**OPC** OPC-UA Client C++

## Company ProSys (SW)

**HW:** Samsung  
**CPU** ARM  
**OS** Android  
**OPC** OPC-UA Client Java

# OPC: Demo wall

Impressions, Hannover 2012



Additionally at SPS-Show 2012: B&R, GE, Rockwell



# UA solutions: OPC UA to the cloud

Demo Microsoft

Move data and information from Controller into Cloud via WCF or OPC-UA





# OPC UA certification



- Europe  
Ascolab GmbH  
Am Weichselgarten 7  
D-91058 Erlangen  
[www.ascolab.com](http://www.ascolab.com)



- USA  
OPC Foundation  
16101 N. 82nd Street, Ste 3B  
Scottsdale, AZ 85260  
[www.opcfoundation.org](http://www.opcfoundation.org)



- **Functionality** testing verifies interoperability and compliance/adherence to the OPC Specifications.
- **Performance** is tested and compared to the performance expectations as supported and claimed by the vendor.
- **Stress Testing** is done by pushing the software to the limits as defined by the vendor to check for consistency in behavior as well as data throughput.
- **Recovery** is tested by checking device failures and communications failures.
- **Resource** testing conducted over many days to verify no resource leaks or performance degradation occurs.
- **Usability** is tested to ensure the product is easy to install, configure, use and troubleshoot.
- **Environment** is checked to make sure the product works on the Device and O/S as claimed by the vendor.

# OPC Lab Europe: UA Certifications

OPC Lab Europe by Ascolab certified first OPC-UA products  
Siemens: first certified UA product



Siemens  
Simatic NET Server



Beckhoff  
TwinCAT UA





# OPC UA resources

www.opcfoundation.org



**Dedicated to interoperability in automation**

OPC DATA > DESKTOP  
FACTORYWIDGETS

CLICK TO SEE IT

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### Embedded UA



[OPC UA Product Development for Embedded devices and Linux.](#)

### OPC Books



OPC Unified Architecture Textbook, written by Wolfgang Mahnke, Stefan-Helmut Leitner and Matthias Damm. [Click here](#) for ordering information



OPC from Data Access to Unified Architecture by Juergen Lange, Frank Iwanitz and Thomas Burke. [Click here](#) for ordering information.

### OPC Certification



**OPC Certification™ Testing**

Learn how to reduce your system integration and deployment costs with OPC Certified™ products.

### OPC Foundation News From Around The World

**NEW OPC France Announces OPC Booth @ IBS September 20 - 21, 2011 (Paris):** Opportunity to be a Sponsor in an OPC Booth @ IBS [\[Full Story\]](#)

**NEW OPC Foundation Announces Updates to OPC UA SDK:** The OPC Foundation Announces the updated release of the OPC UA SDK deliverables. The downloads are available [here](#).

**OPC UA Working Group F2F in Walldorf, Germany:** The OPC UA Working Group will meet in Walldorf, Germany (SAP headquarters) from May 23th to 25th. More information [here](#)

**The OPC Foundation is expanding in Social Media Networks:** Add The OPC Foundation to your favorite Social Media site: [Twitter](#), [Facebook](#), & [YouTube](#).

**OPC Foundation Announces Release of OPConnect Issue 27:** The OPC Foundation and Automation World released OPConnect Issue 27. The newsletter can be found [here](#).

**OPC Europe Announces OPC Day in May:** OPC Foundation Europe has announced an OPC Day on May 25, 2011 at SAP Headquarters in Germany. This event is for both members or the OPC Foundation and non-members. [Click here for more Information/Registration](#).

**OPC UA Working Group F2F in Foxboro:** The OPC UA Working Group will meet in Foxboro from Mar 16th to 18th. More

### Latest OPC Events

## OPC Day Europe at SAP Headquarters, Germany



**When:** May 25, 2011.

This one-day event held at the SAP Headquarters in Germany presents OPC UA with an introductory

# OPC UA resources

- Articles
- White Papers
- Brochures
- Books
- Webinars
- Videos
- Road shows
- Fairs
- Trainings
- Consulting





# Events 2013 - OPC Europe

## OPC Day Europe 2013: May 15/16 @ Yokogawa HQ Netherland





# OPC-Unified Architecture: From embedded device up to MES/ERP IT Enterprise



**Thanks!**

**Question?**



**Stefan Hoppe**  
**President OPC Europe**  
**[Stefan.Hoppe@opcfoundation.org](mailto:Stefan.Hoppe@opcfoundation.org)**