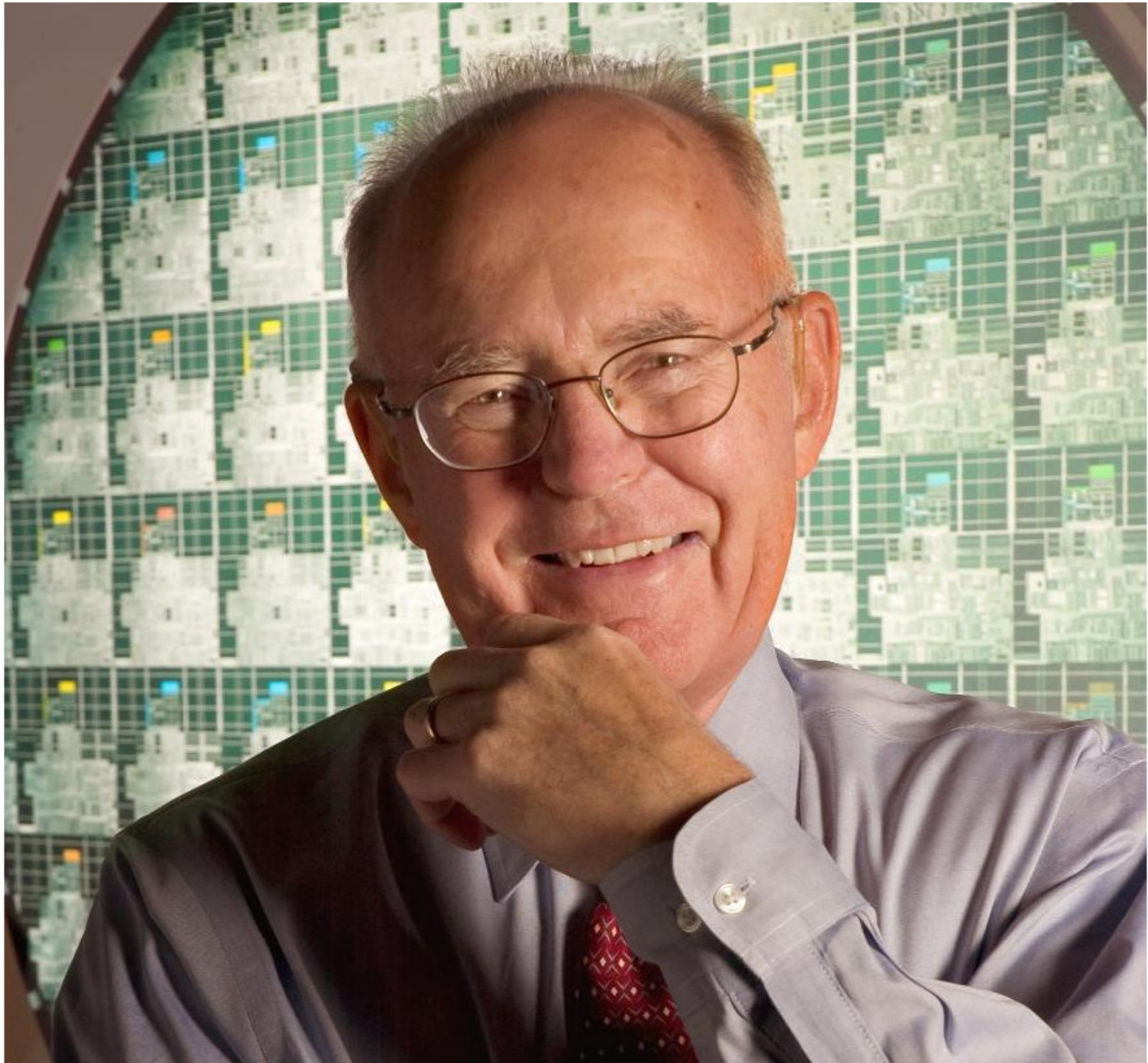
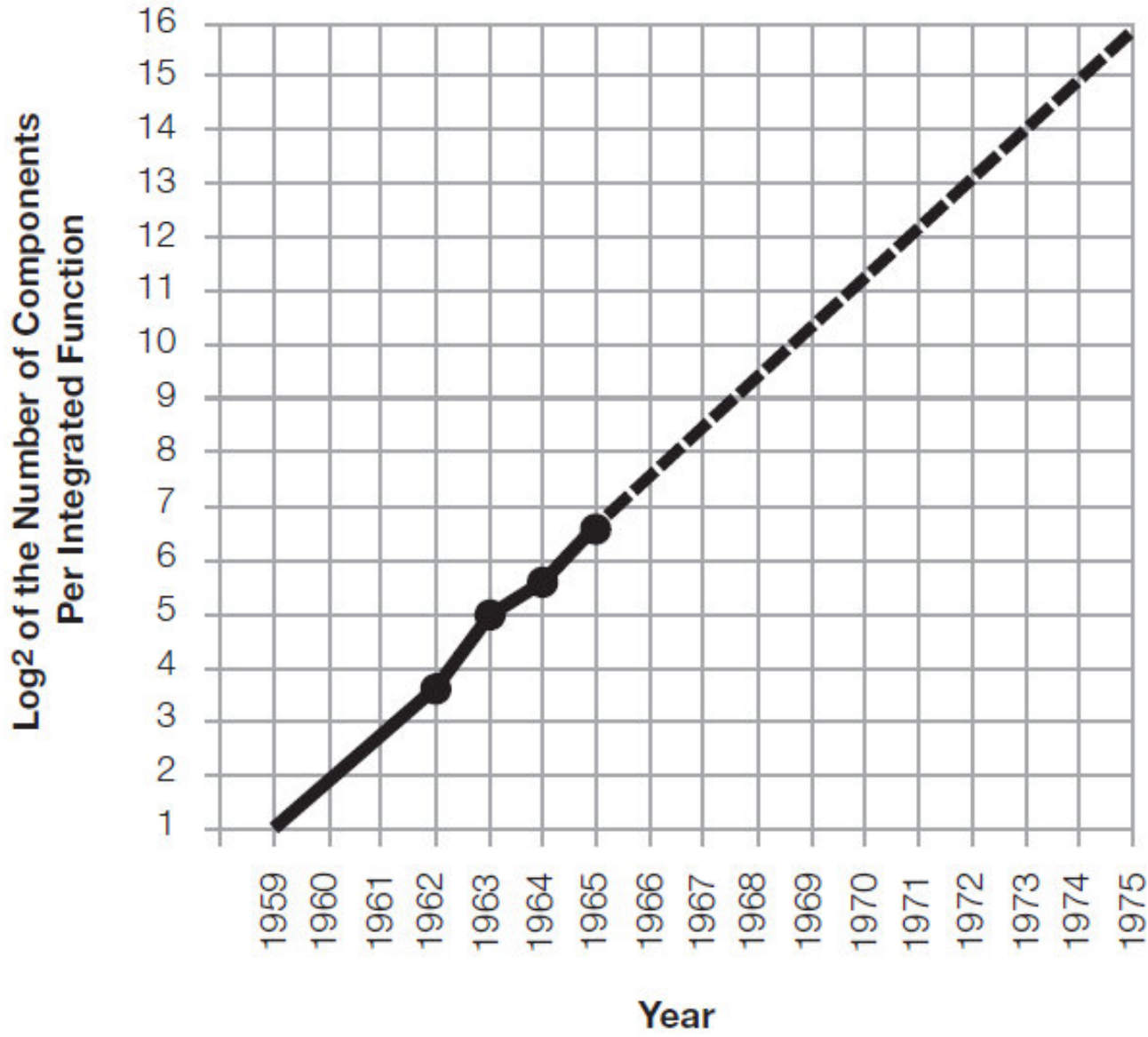




Industry 4.0: OPC UA bridging IT and automation

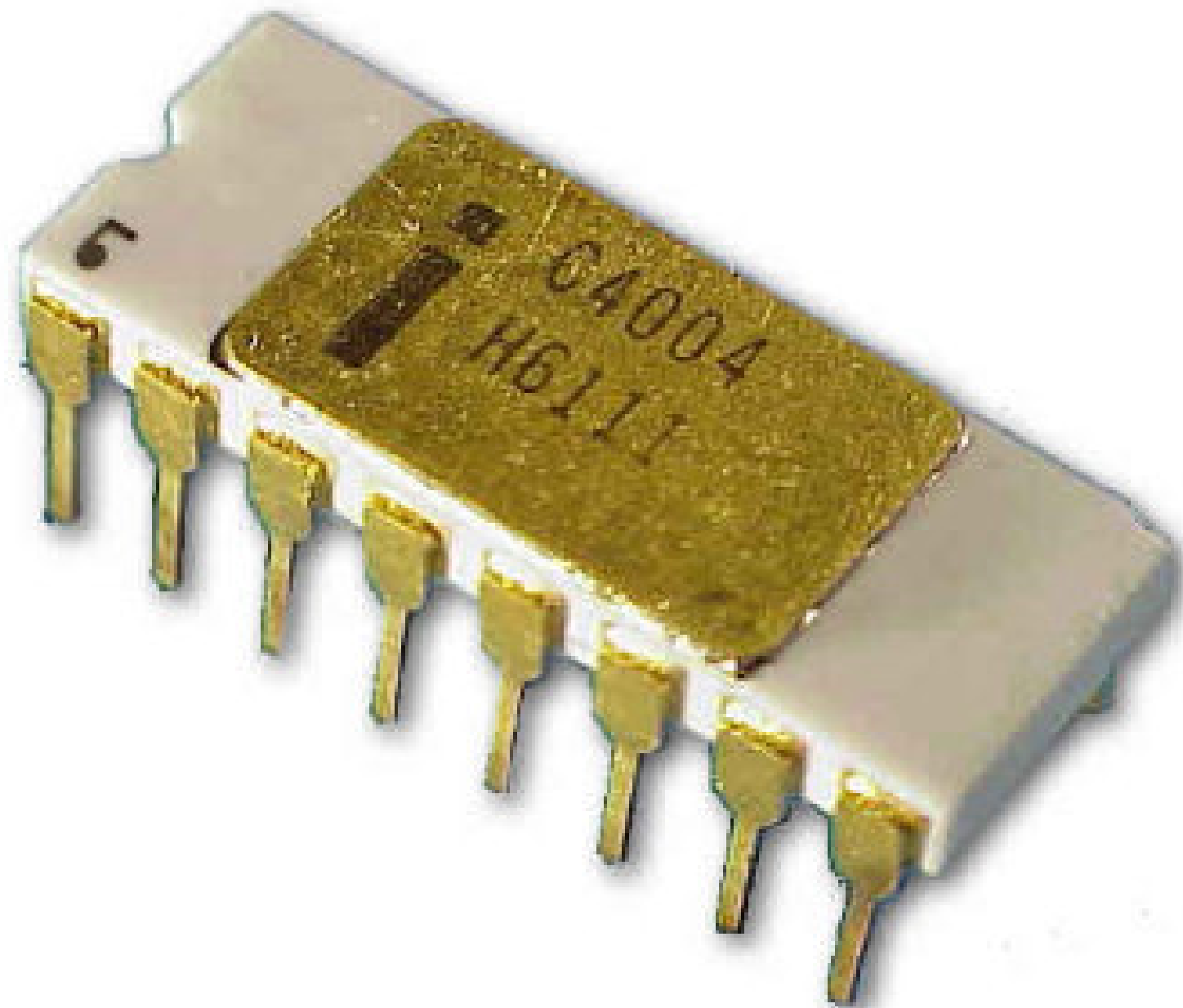
October 7, 2014, OPC & MES Event, Peter Seeberg, © Softing Industrial Automation













© Nippon Calculating Machine Corporation, 1971









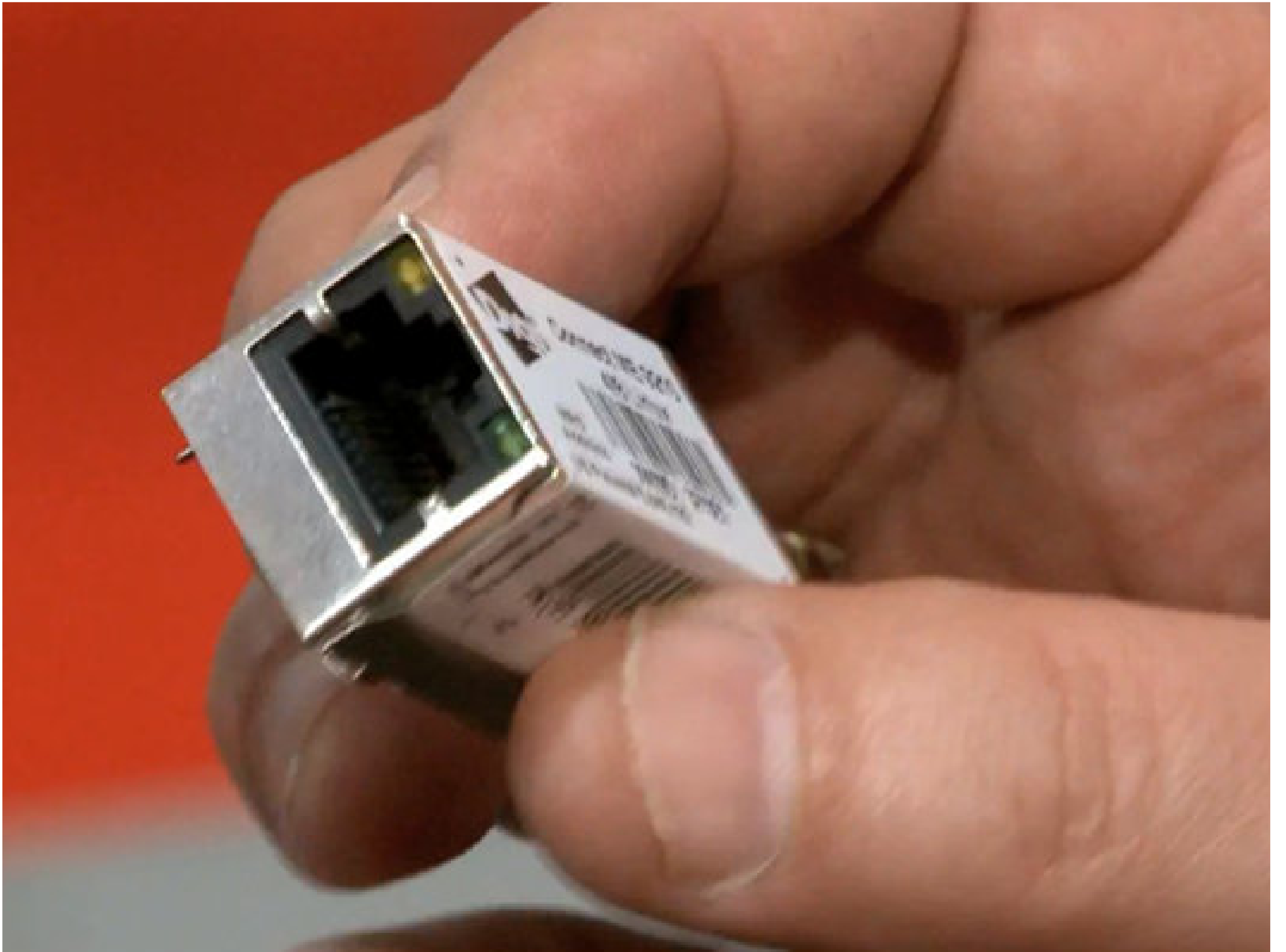
```
22-System Information: Advanced Edition, ICI Sage 1987, 1500, Peter Norton  
Computer Name: IBM-PC  
Operating System: DOS 3.86  
Serial: 8102 2414  
Date: Wednesday, October 07, 1982  
Main Processor: Intel 286  
Serial Ports: 1  
Co-Processor: None  
Parallel Ports: 2  
Video Display Adapter: Hercules VGA  
Current Video Mode: Text: 80 x 25 Monochrome  
Available Disk Drives: T: 0 - C:  
---  
386 supports 640 K-bytes of memory.  
40 K-bytes used by DOS and resident programs.  
320 K-bytes available for application programs.  
A search for active memory finds:  
640 K-bytes main memory (see hex 0000-0004)  
320 K-bytes display memory (see hex 0000-0004)  
320 K-bytes extension are found at hex paragraph: C000  
---  
CompuLink Index (CI), relative to IBM-PC: 1.0  
Disk Index (DI), relative to IBM-PC: Not computed. No drive specified.  
Performance Index (PI), relative to IBM-PC: Not computed.  
E.N.
```



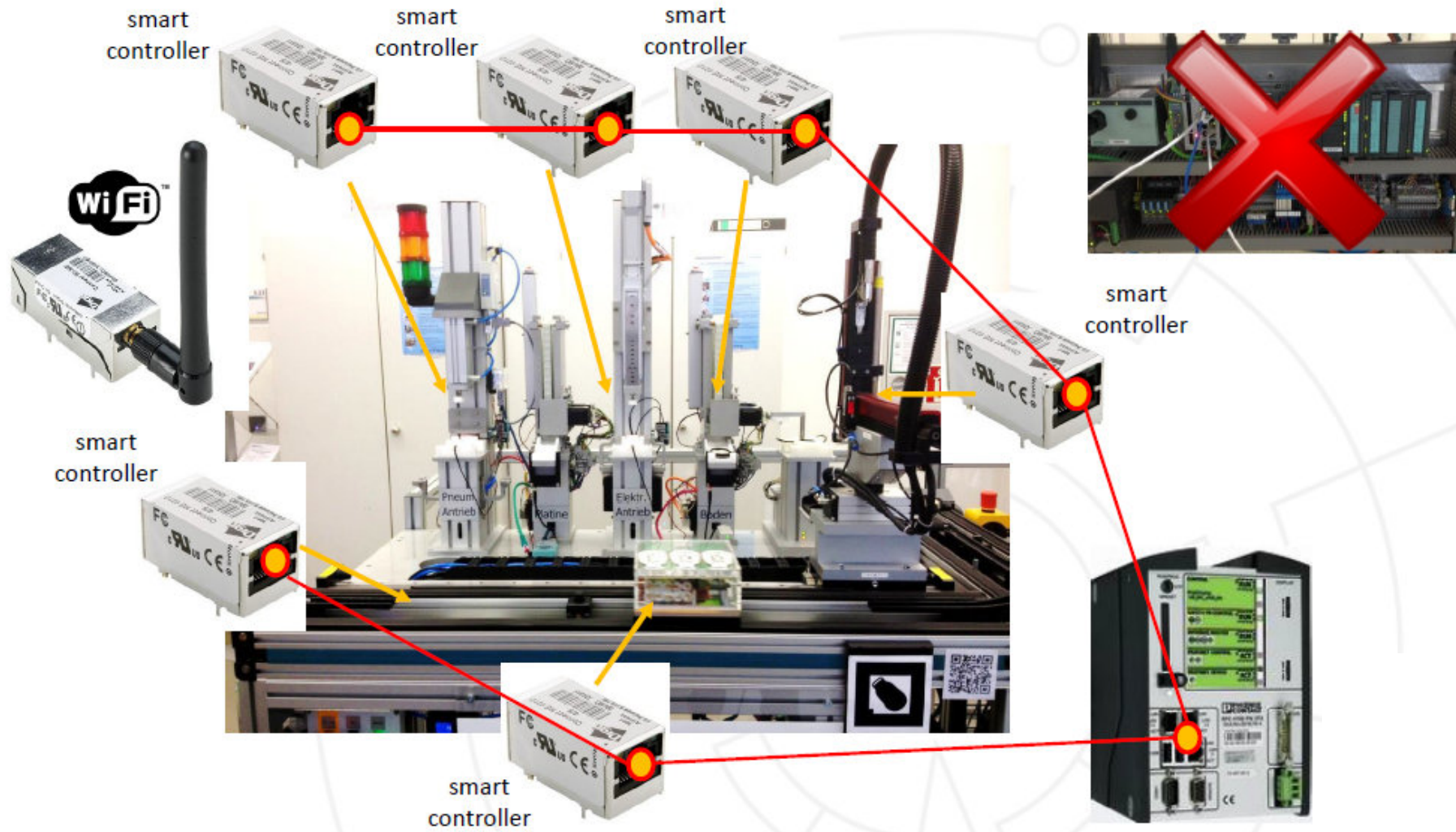


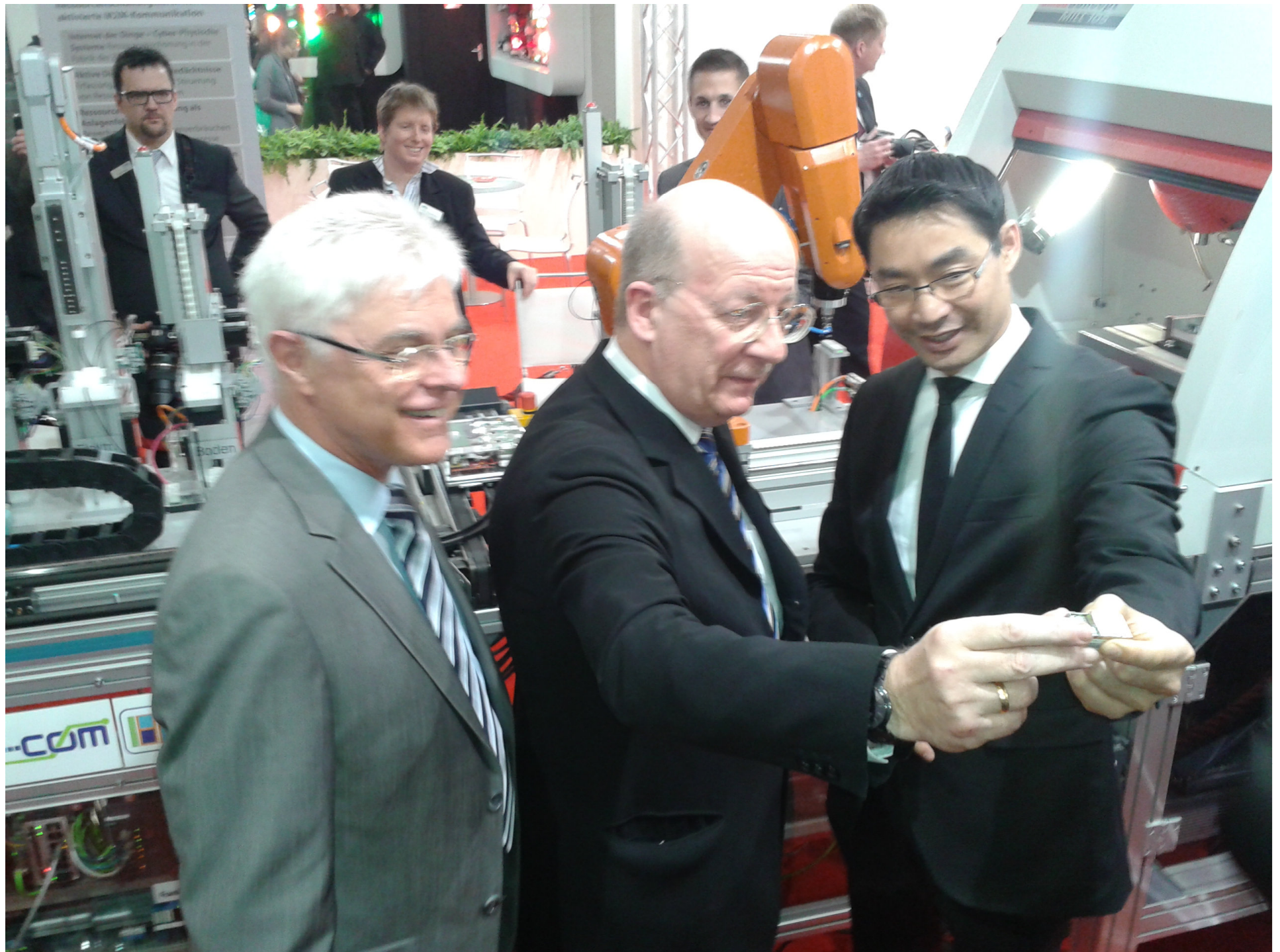
© Apple Inc., 2007





Smart Machine Module







Forschungsunion

Wirtschaft und Wissenschaft
begleiten die Hightech-Strategie

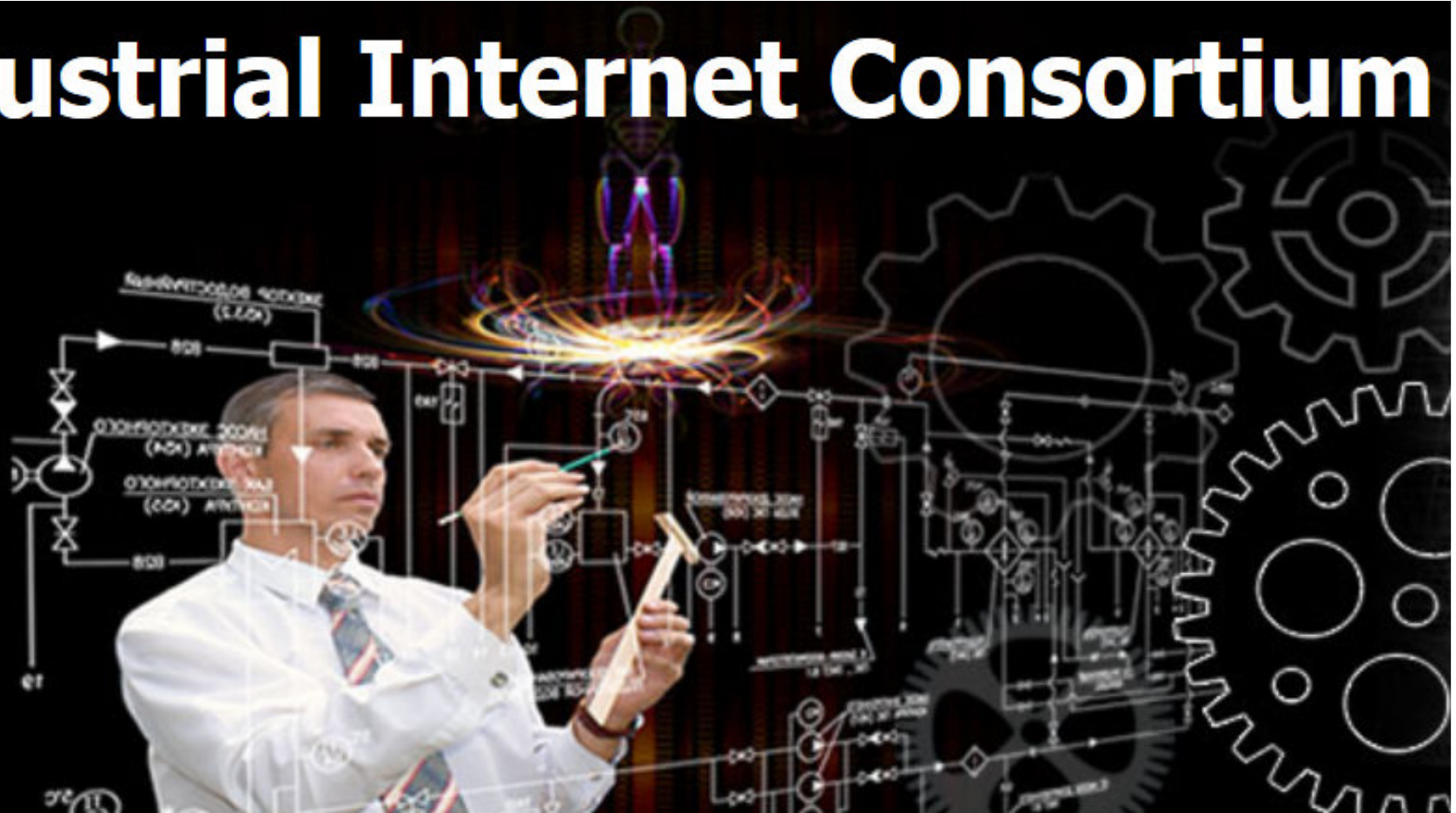
 **acatech**

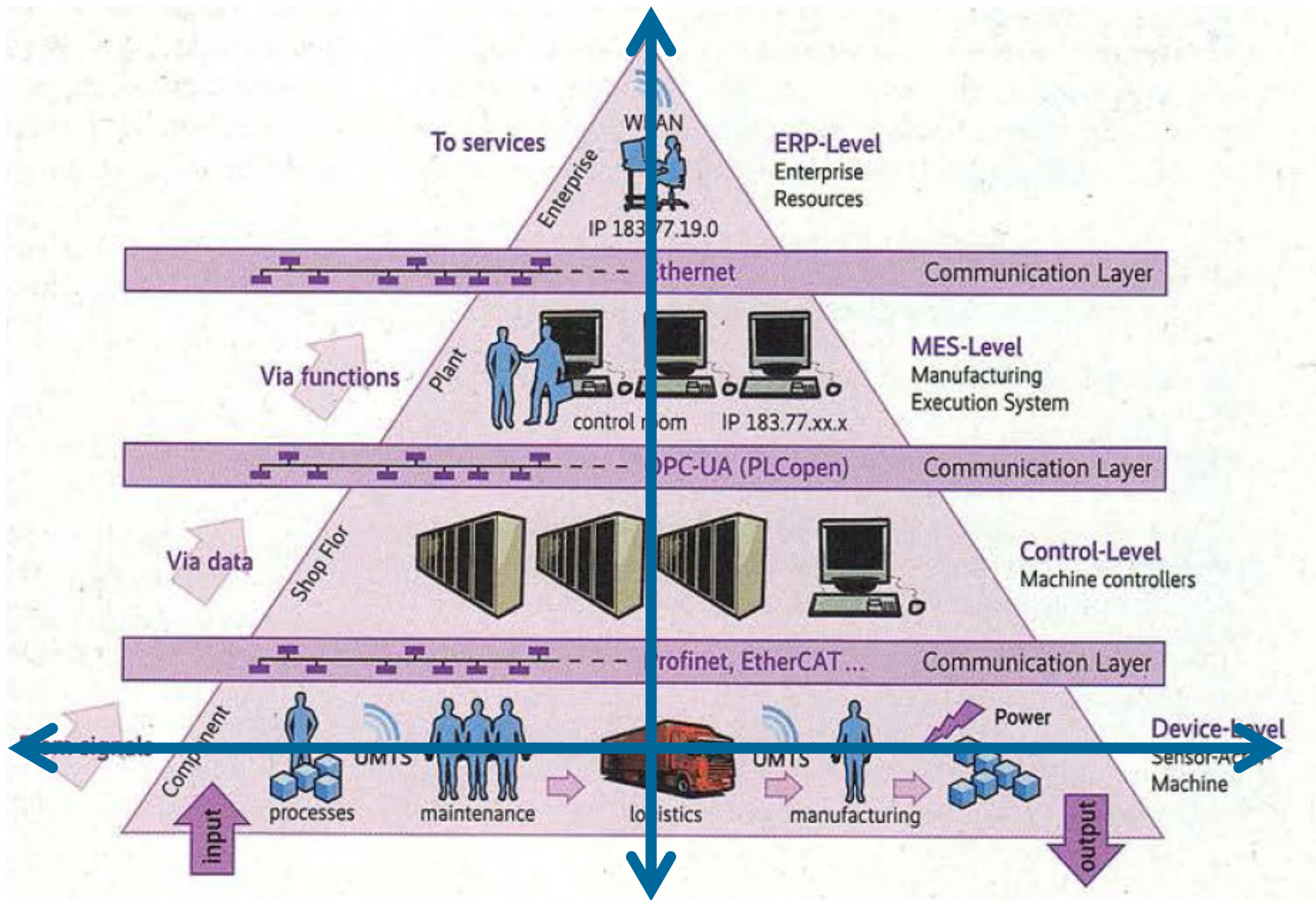
DEUTSCHE AKADEMIE DER
TECHNIKWISSENSCHAFTEN

Recommendations for implementing the strategic initiative **INDUSTRIE 4.0**

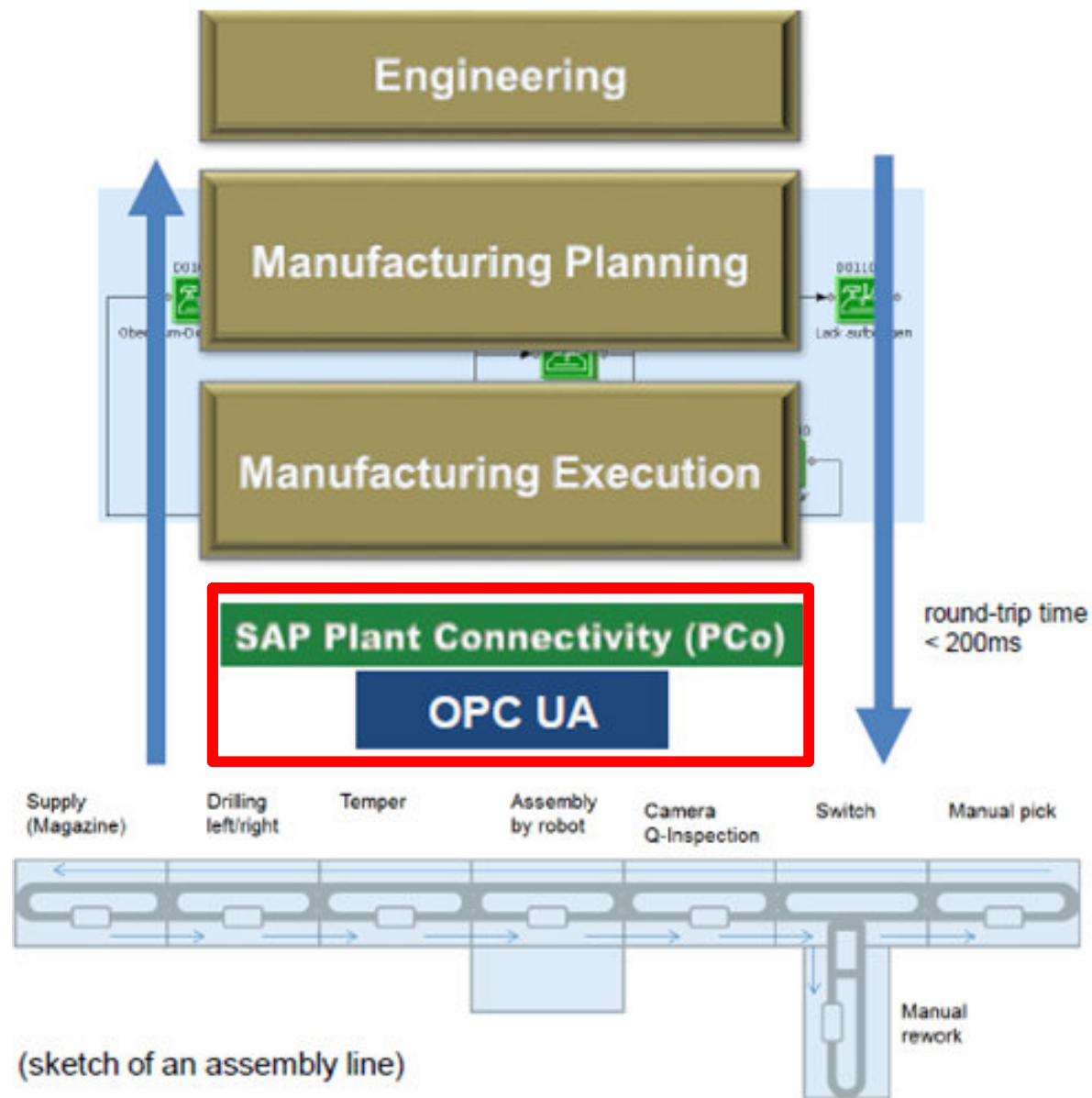
Final report of the Industrie 4.0 Working Group

Industrial Internet Consortium

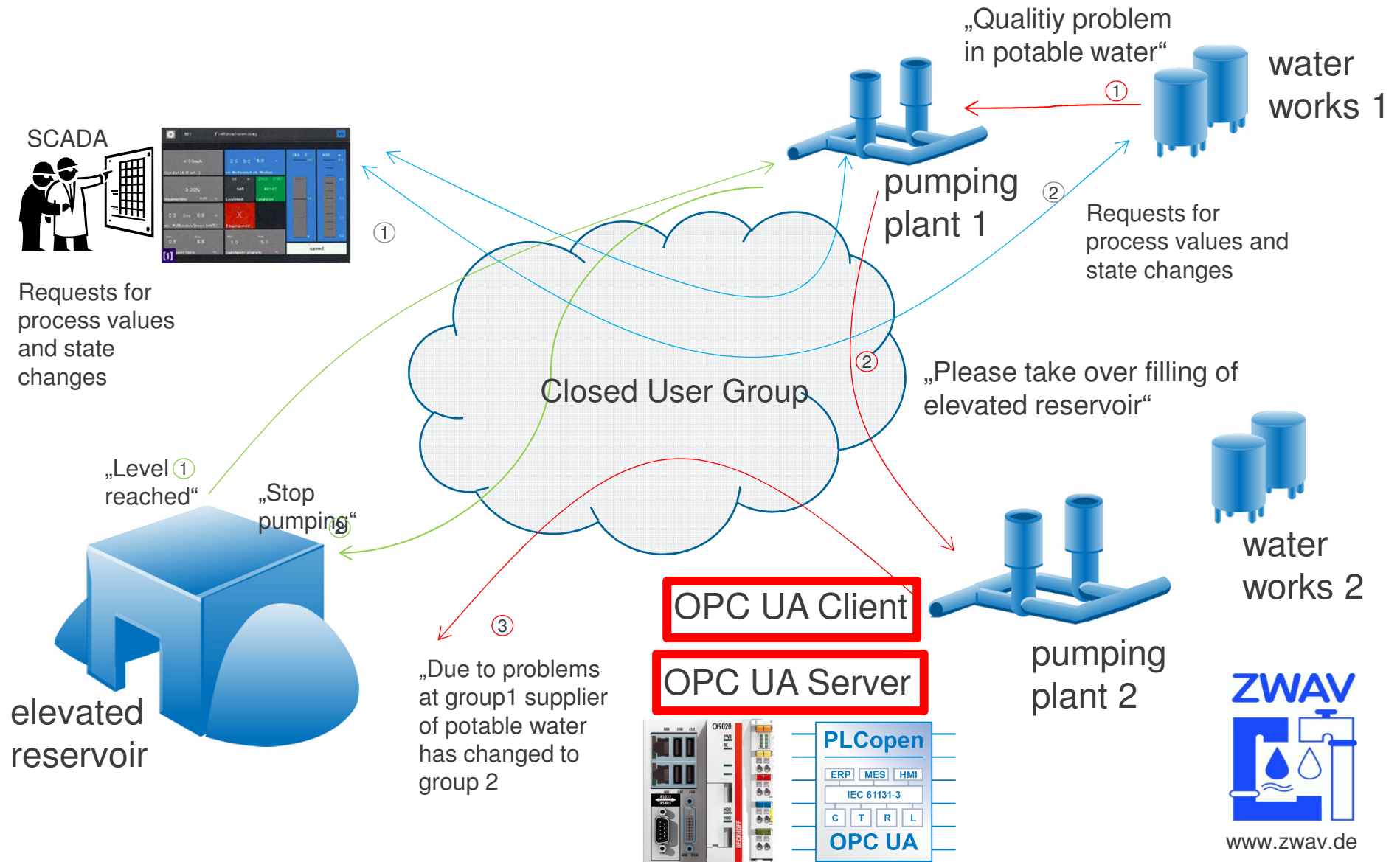


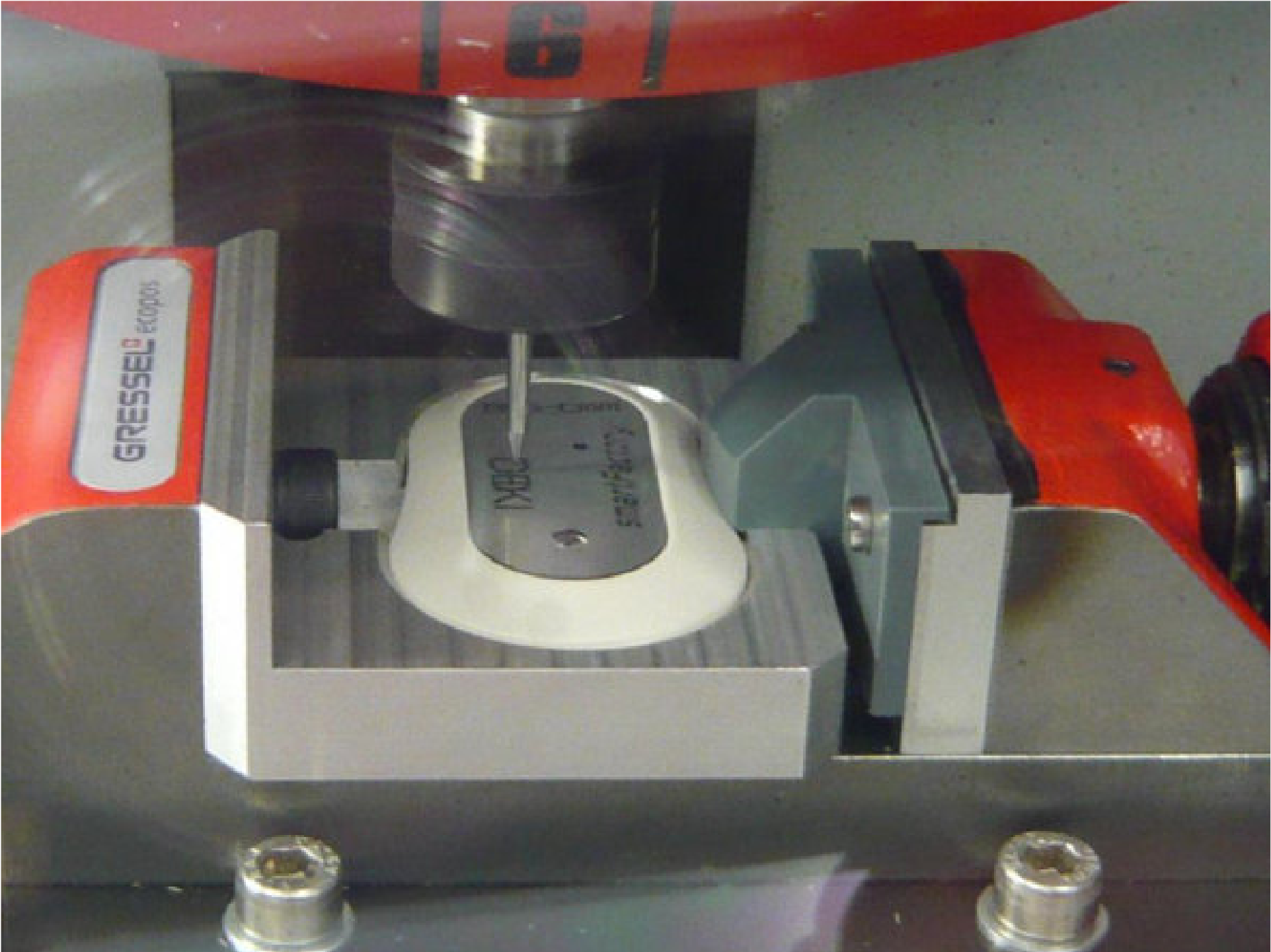


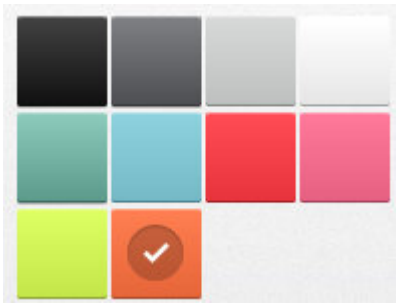
Manufacturing Process Control

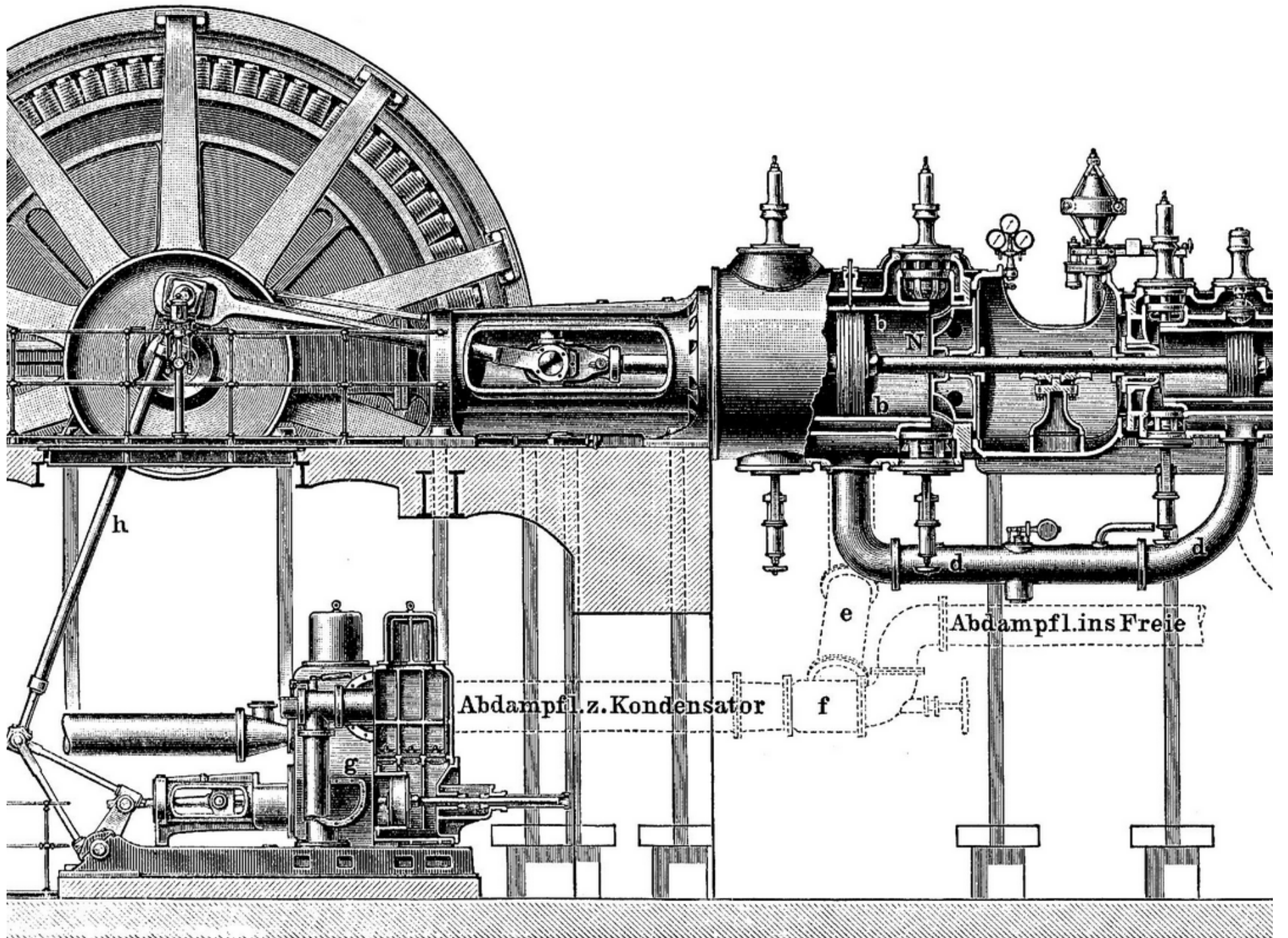


M2M Intelligent Water Management



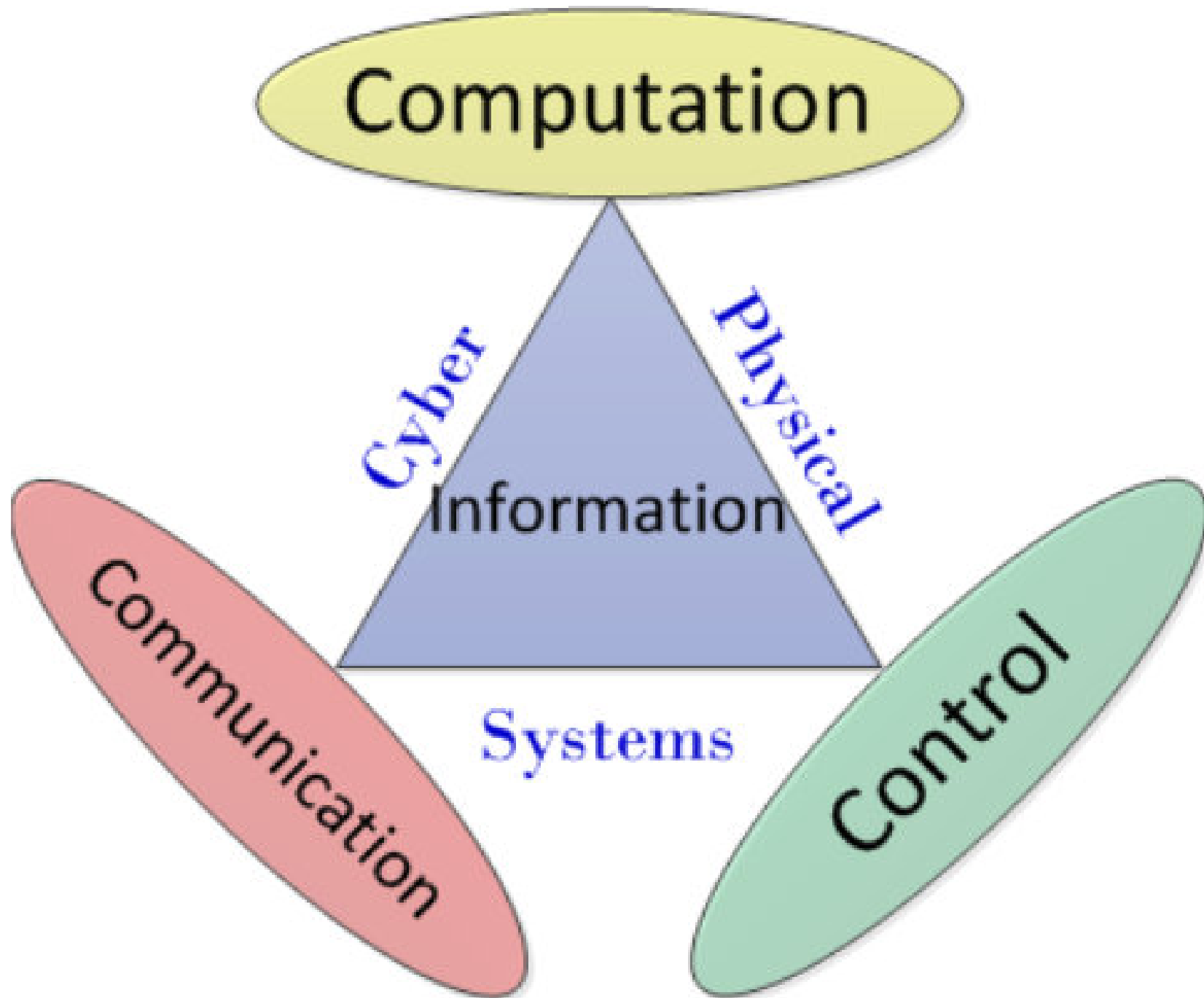




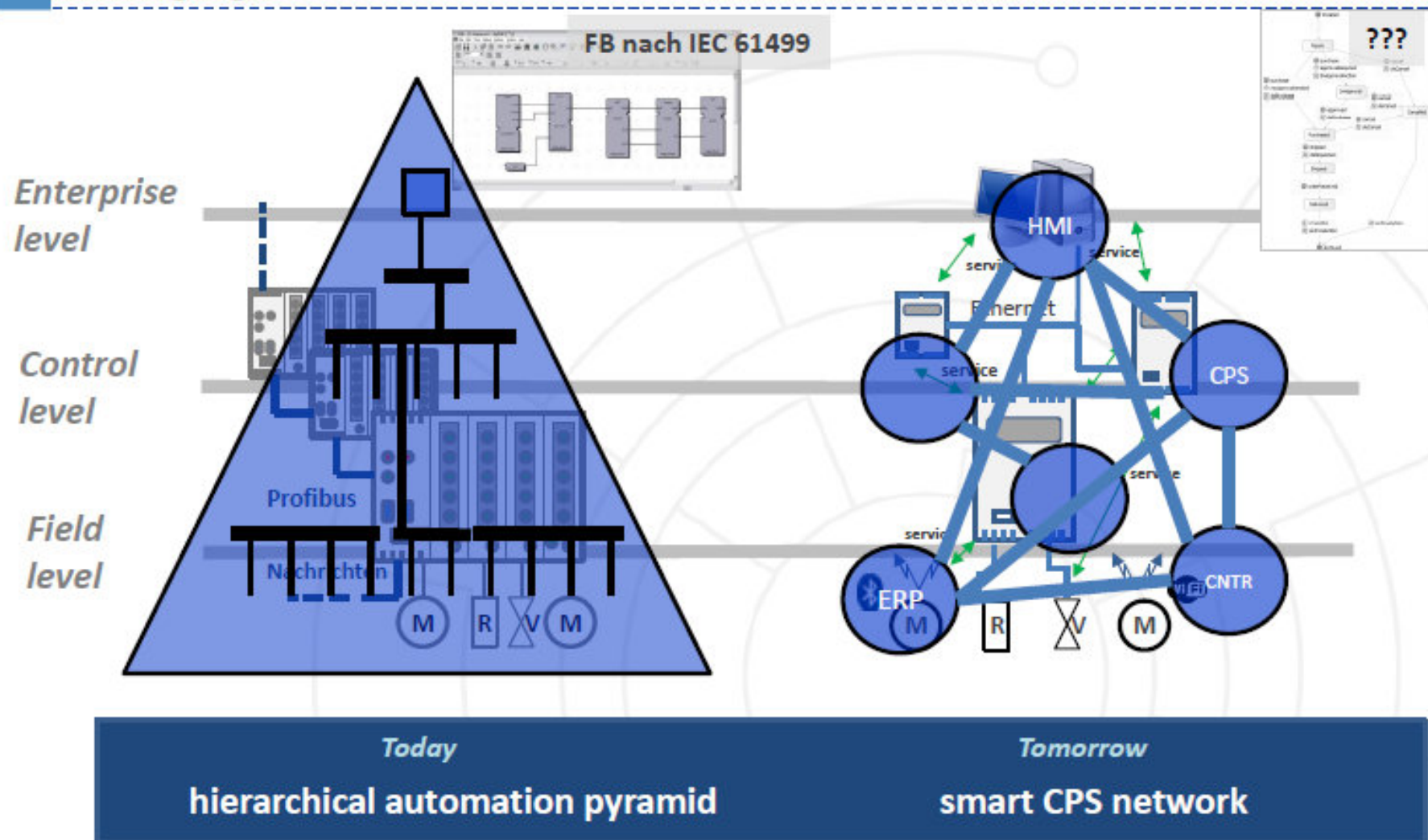




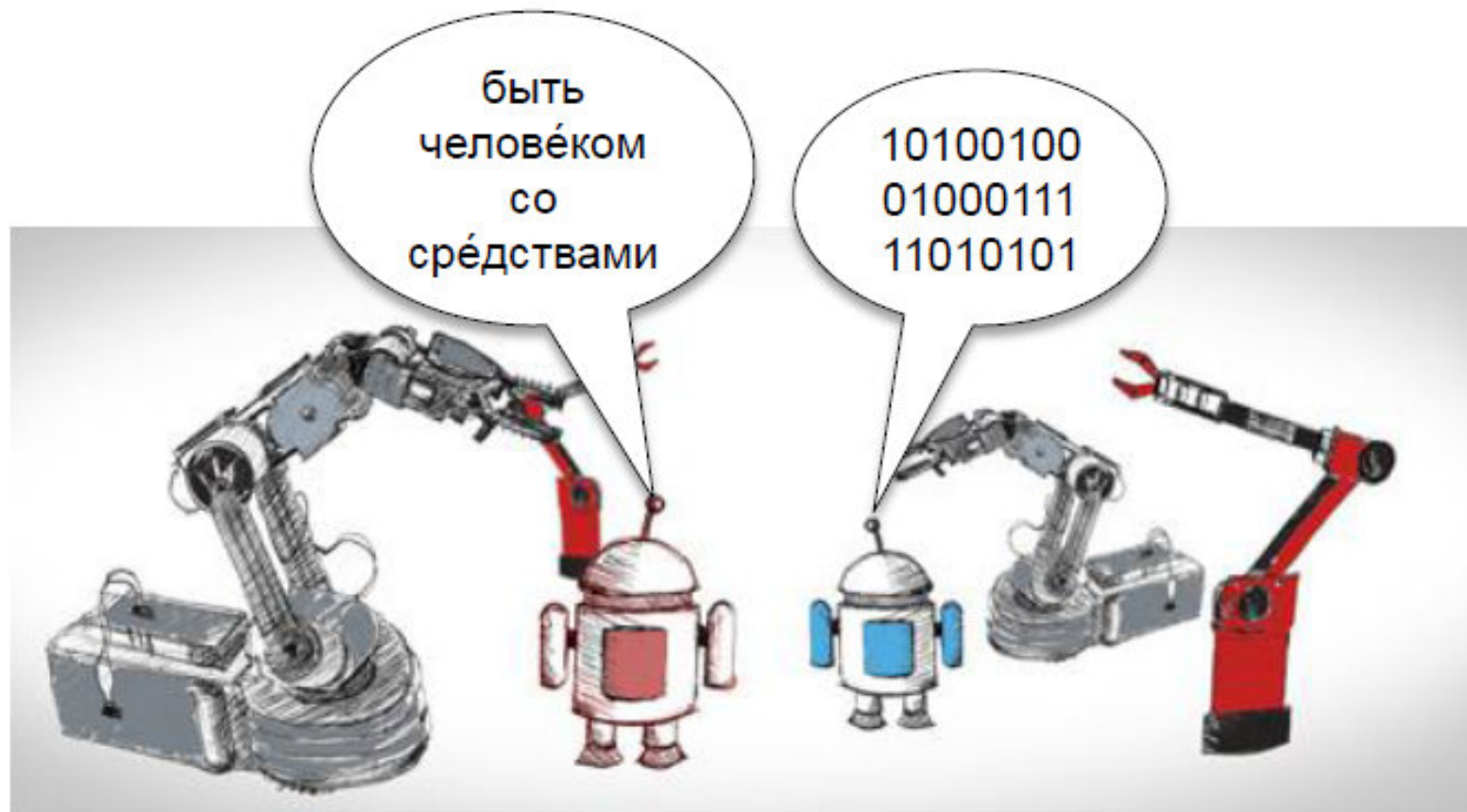




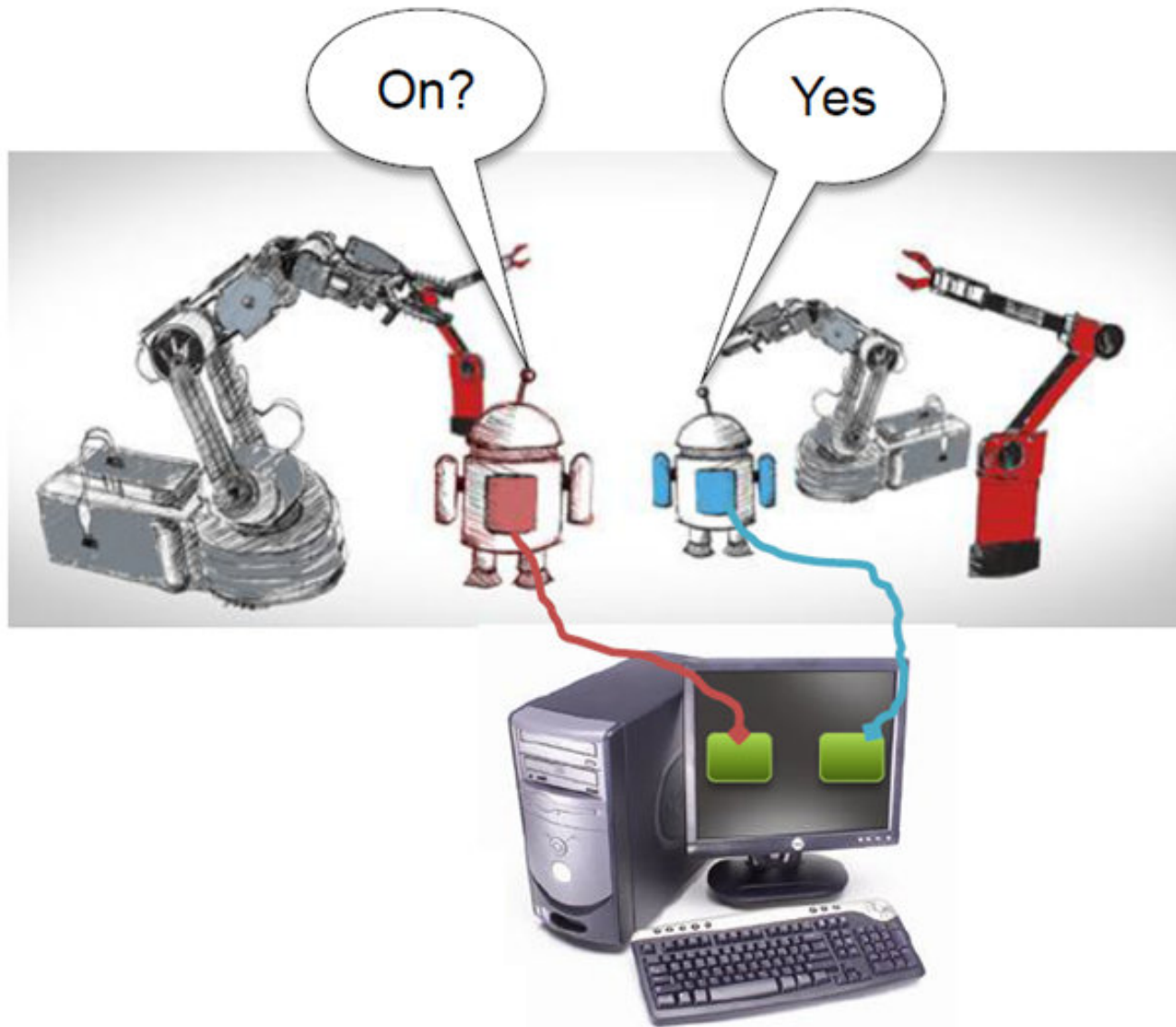
Changing control architecture



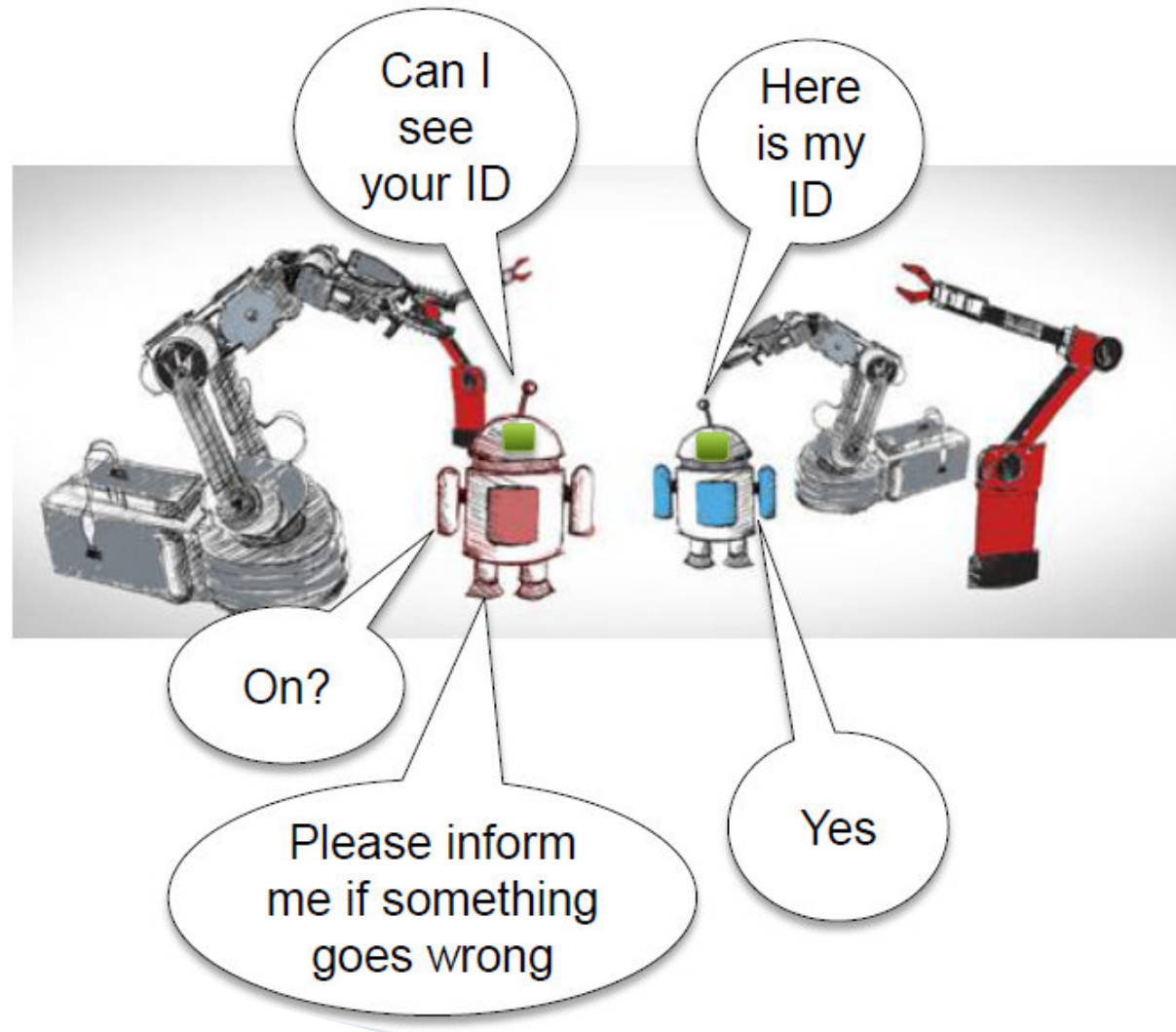
Before OPC



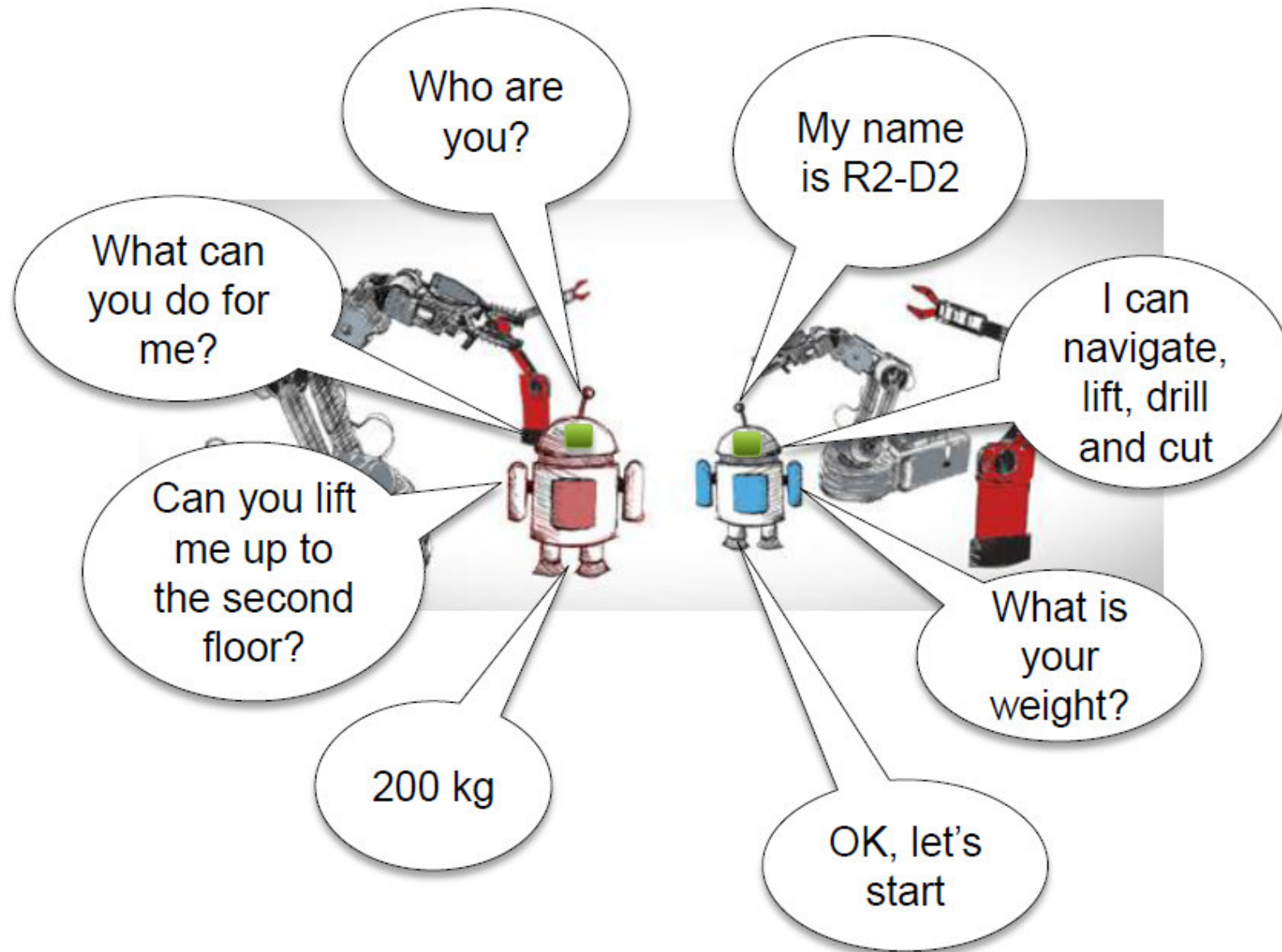
With Classic OPC

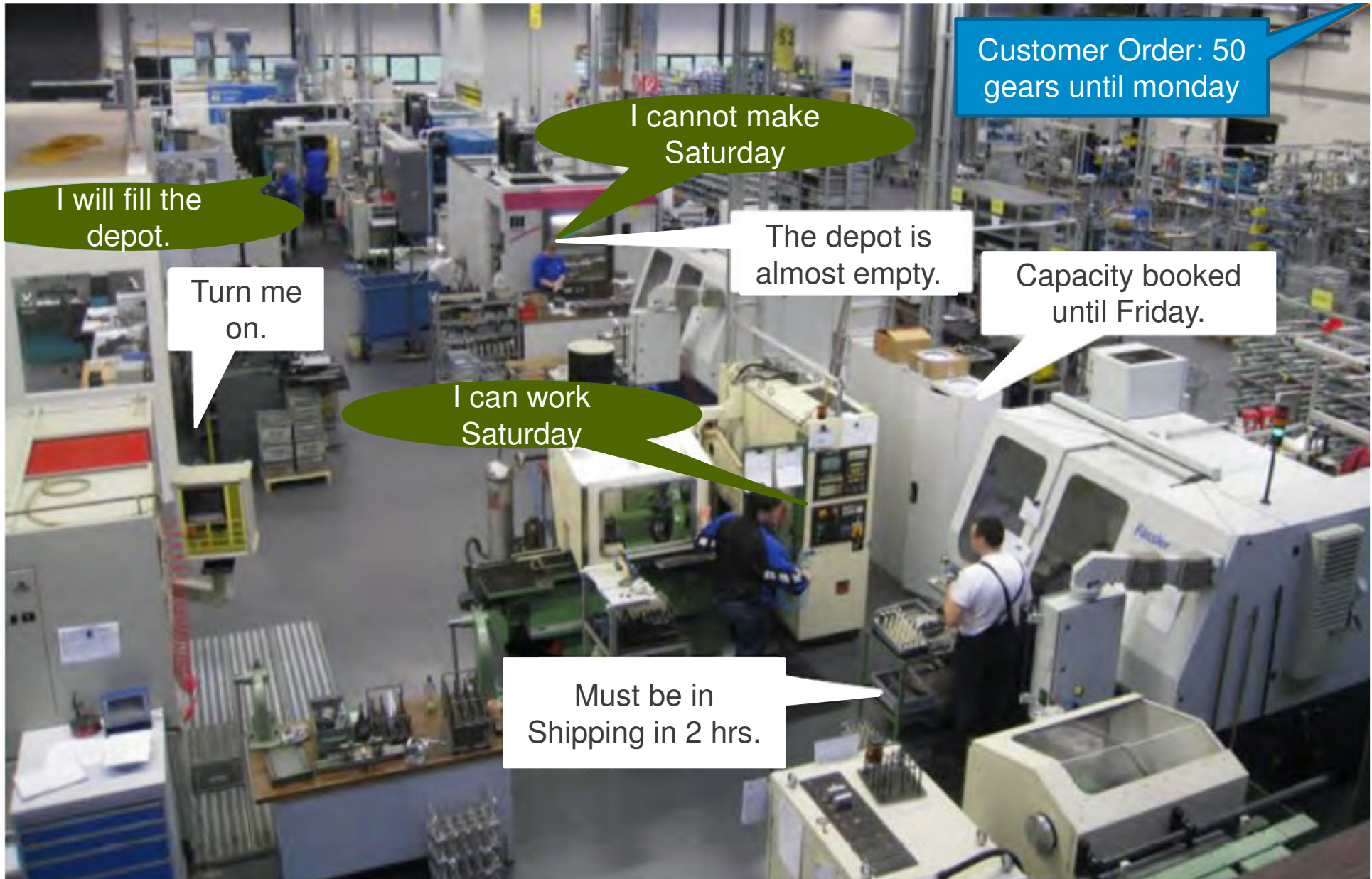


With OPC Unified Architecture



With OPC UA Information Models





Customer Order: 50
gears until monday

I cannot make
Saturday

I will fill the
depot.

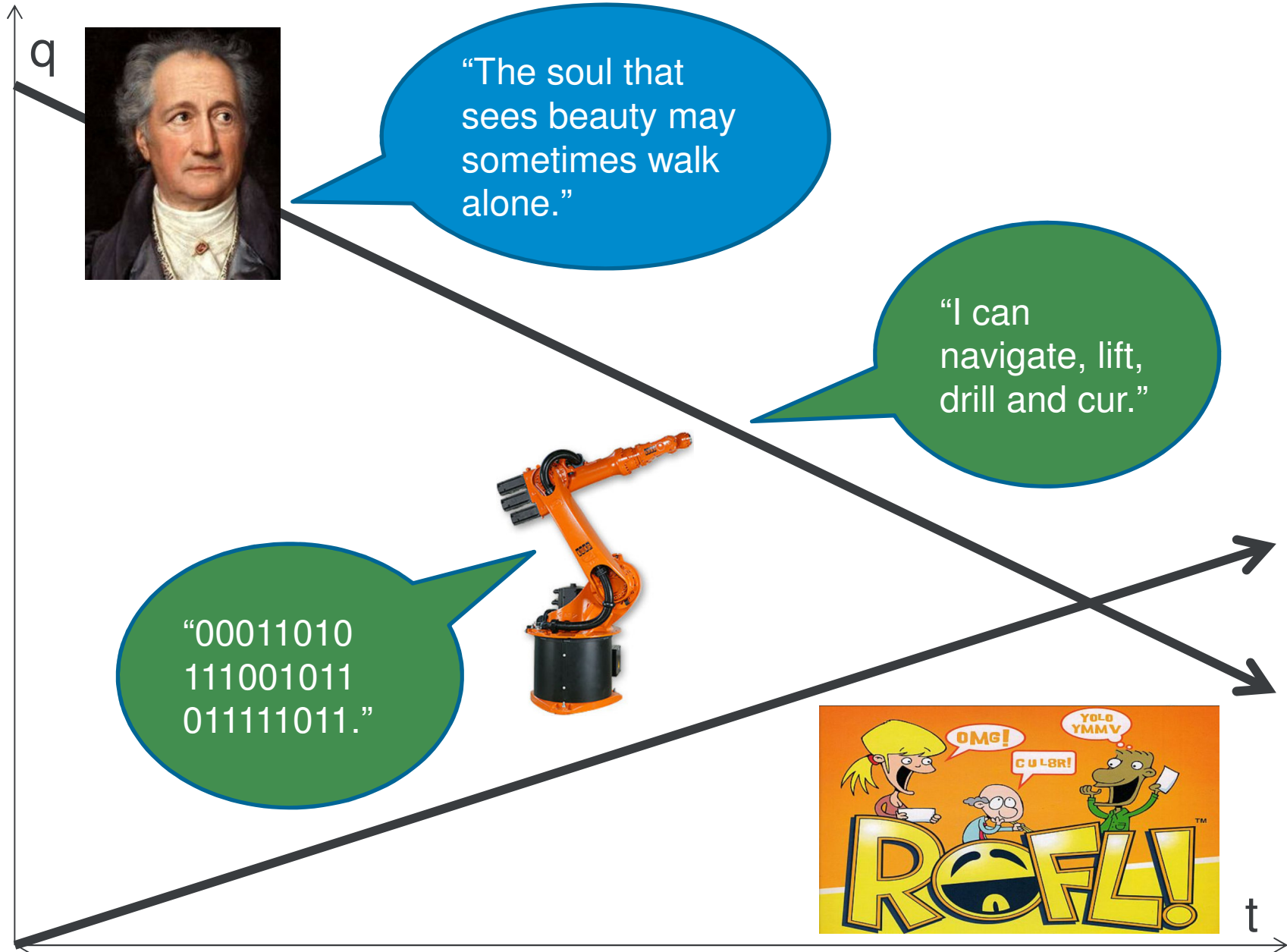
Turn me
on.

The depot is
almost empty.

Capacity booked
until Friday.

I can work
Saturday

Must be in
Shipping in 2 hrs.



© Seeberg

CHALLENGES FOR THE IMPLEMENTATION OF INDUSTRY 4.0

(several answers are possible)



Source: "Recommendations for implementing the strategic initiative Industry 4.0", Forschungsunion, acatech 2013

DKE NORMUNGS-ROADMAP

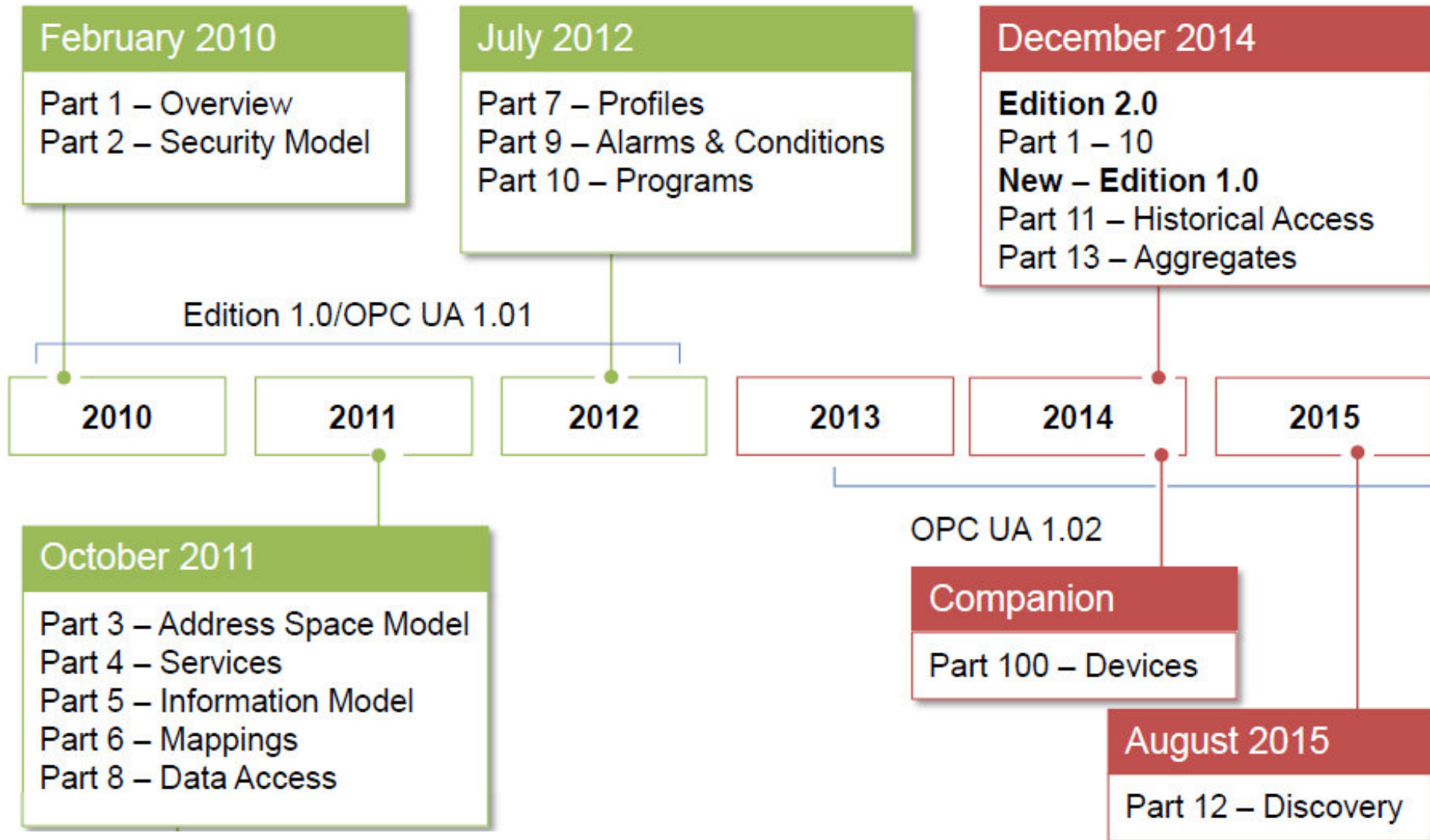
Service oriented Architecture

IEC 62541

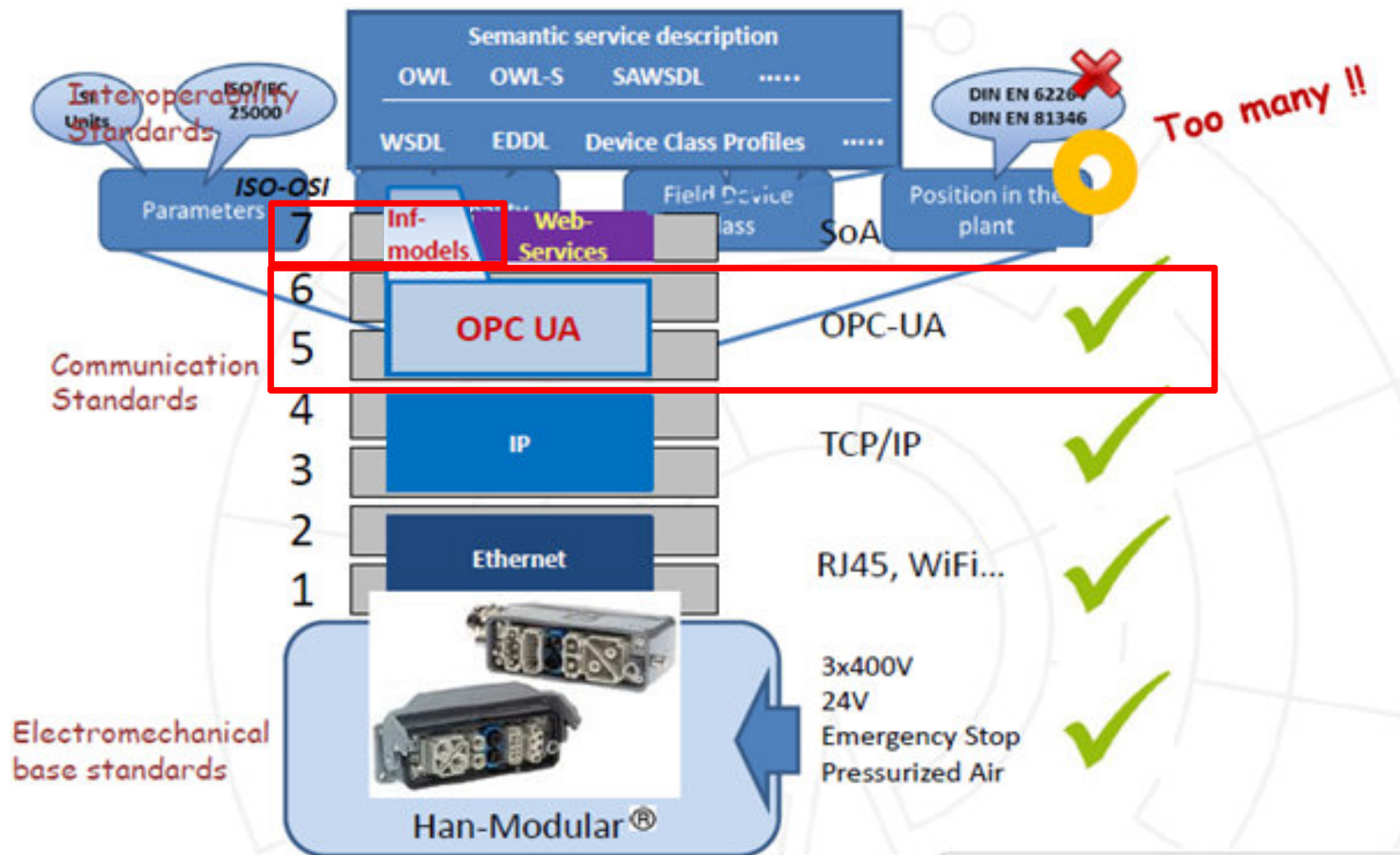
OPC UA

DIE DEUTSCHE NORMUNGS- ROADMAP INDUSTRIE 4.0

IEC 62541



Standards are available



Implicitly Secure

Authentication of Clients and Servers

- ▶ Achieved by using X.509 certificates ("application instance certificates")



Authentication of users

- ▶ Achieved by using username/password, X.509 certificate, or WS-SecurityToken



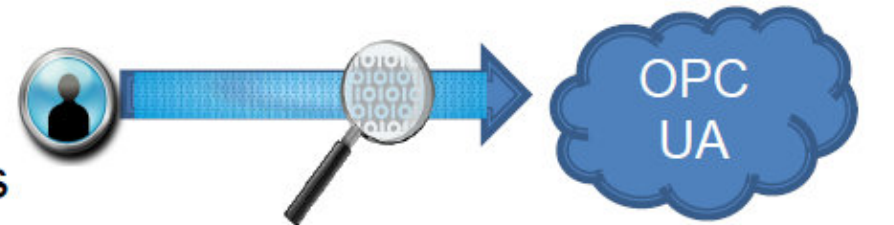
Integrity of their communications

- ▶ Digital signatures based on X.509 certificates



Confidentiality of their communications

- ▶ Encryption based on symmetric cryptography, key negotiation includes authentication based on X.509



ICS TOP 10 Threats and OPC UA Countermeasures

		OPC-UA
1.	Infection with malicious software via Internet and Intranet	++
2.	Transfer of malicious software via removable media or external Hardware	○
3.	Social Engineering	-
4.	Human Error and Sabotage	- +
5.	Intrusion via Remote Service Access	++
6.	Internet-connected control components	++
7.	Technical Malfunctions and Force Majeure	○
8.	Compromising Smartphones used in Production environment	+
9.	Compromising Extranet and Cloud-Components	++
10.	(D)DoS Attacks	++

„OPC UA key role for industrie 4.0“

„OPC UA culture of security“



Platform Independence

Scalability



Cloud



Server Cluster



Server



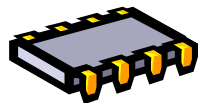
Desktop PC



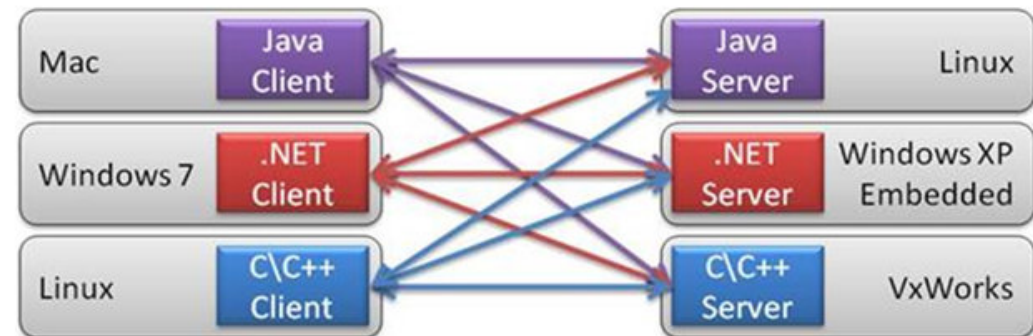
Portables



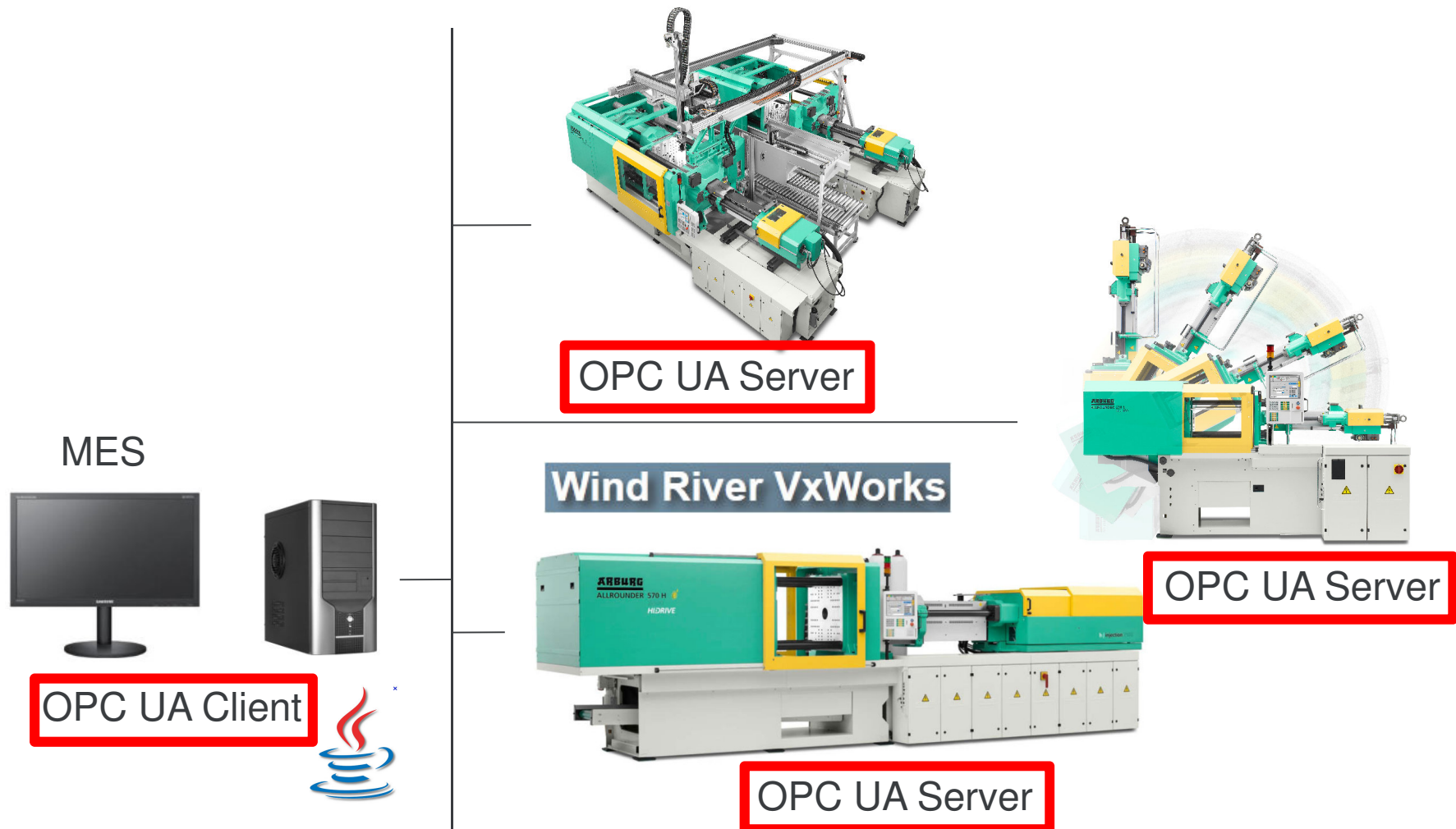
Controllers

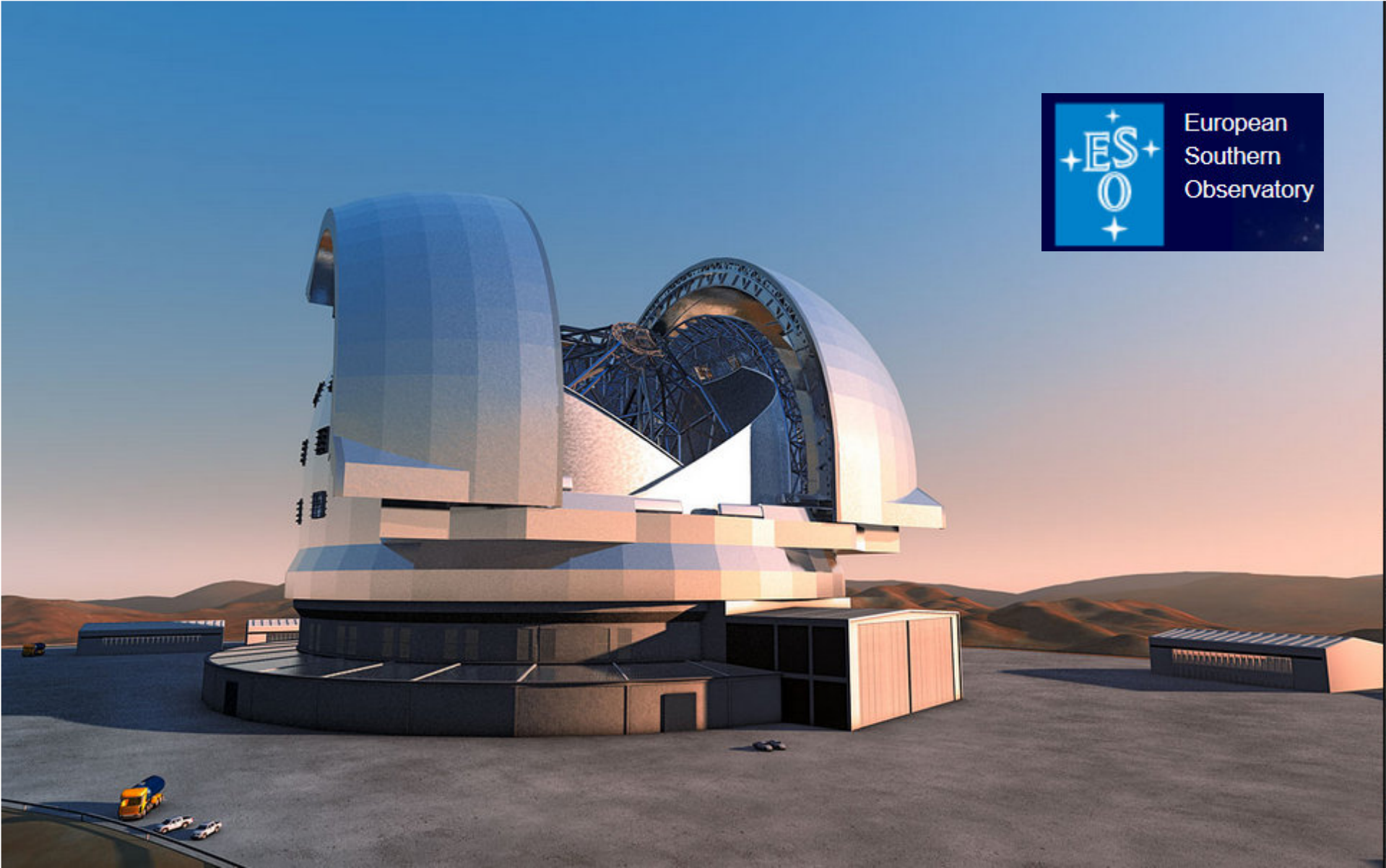


Embedded Systems



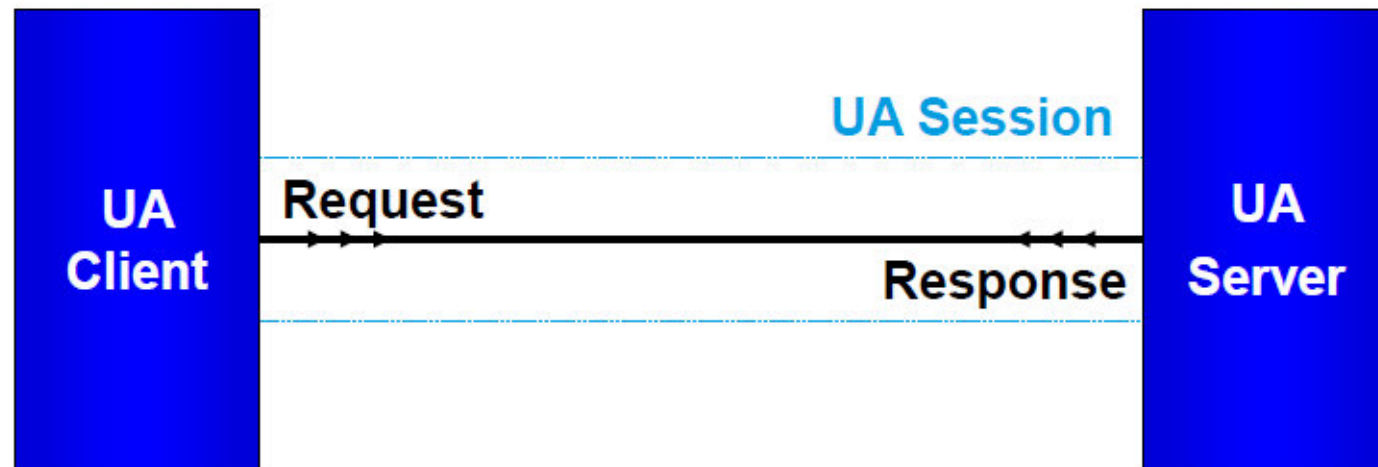
MES – Moulding Systems



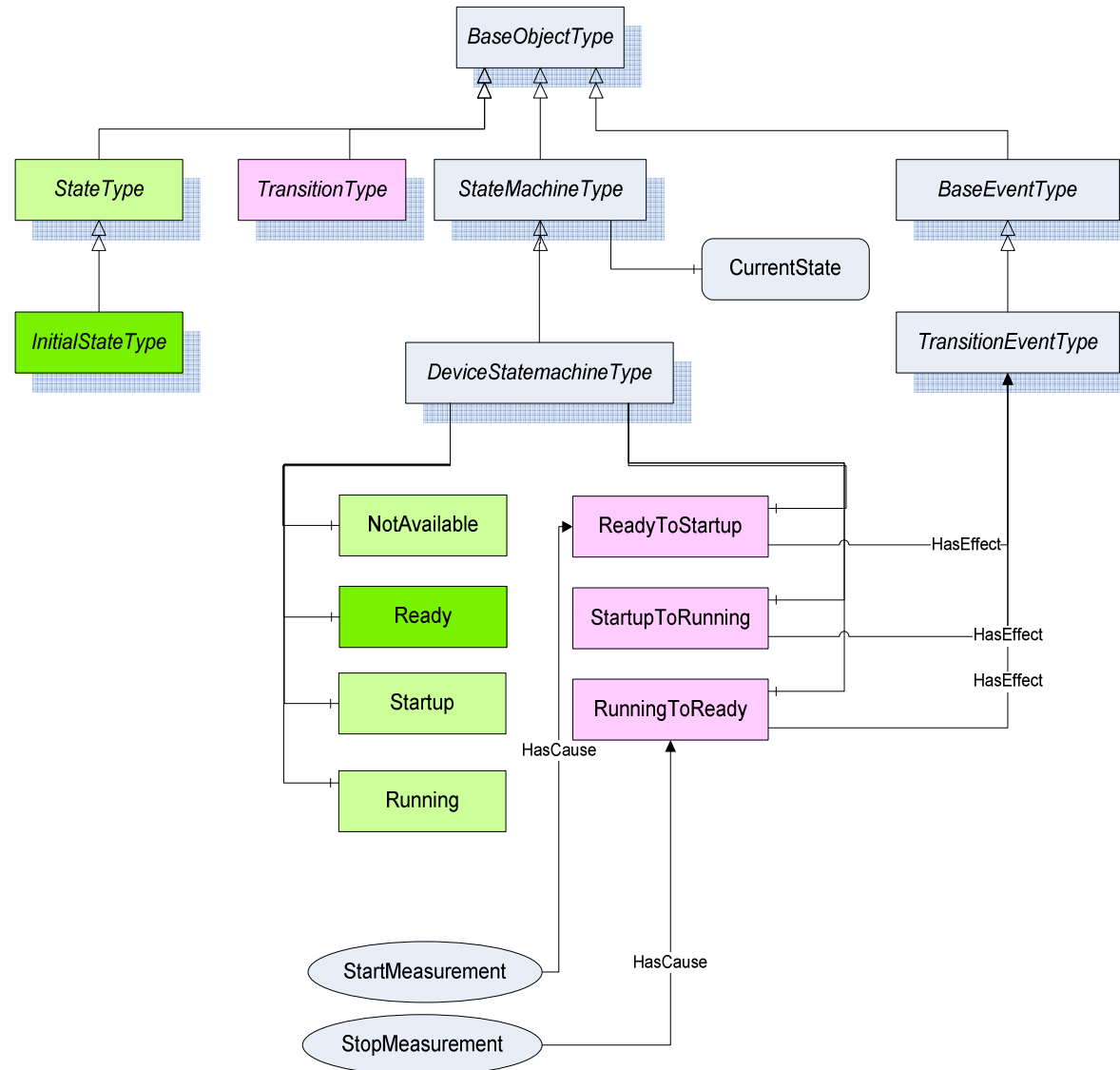


Communication Reliability

- ▶ OPC UA recovers from communication loss
- ▶ OPC UA ensures robust and reliable communication
 - Keep-alive monitoring
 - Buffering of data and acknowledgements
 - Fast recovery in case of communication errors
 - Redundancy concepts



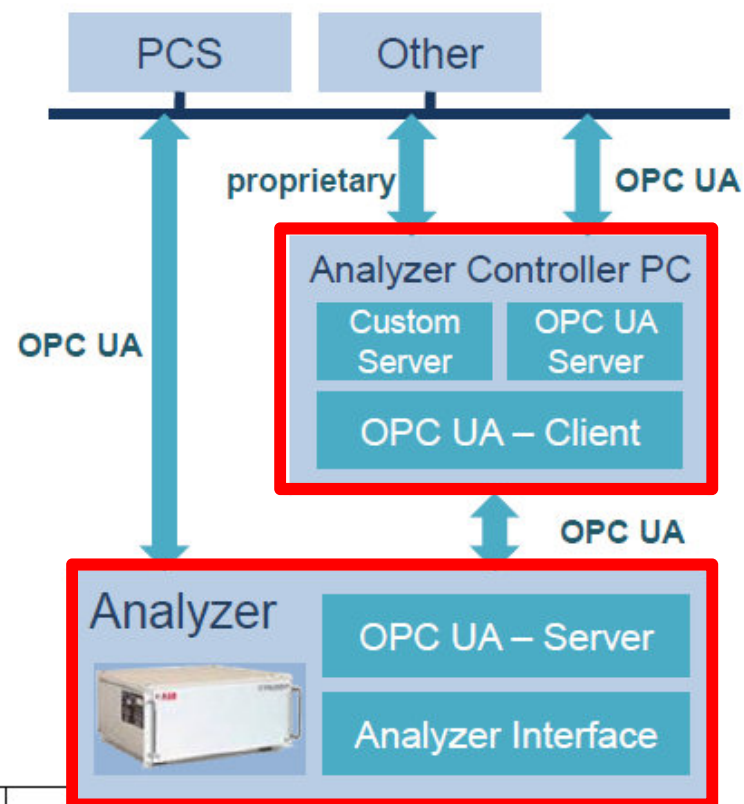
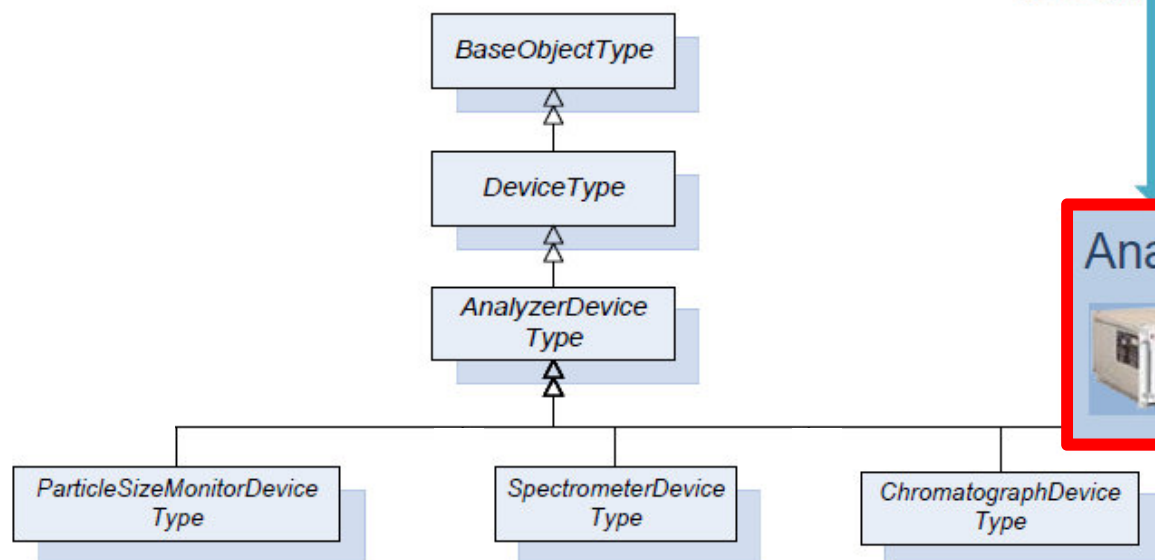
Information Modelling



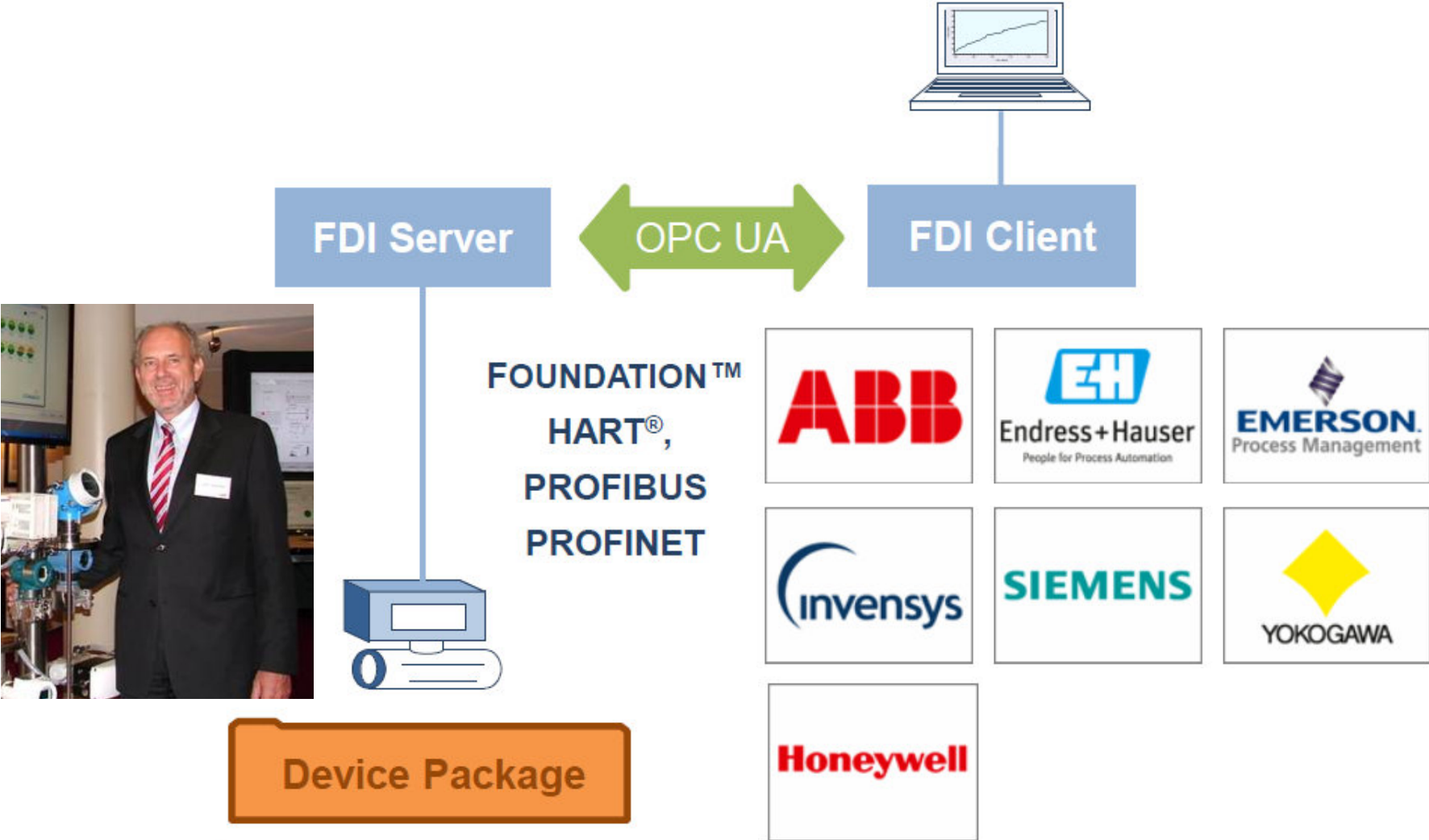
Analyzer Device Integration (ADI)

V 1.1 Released July 2013

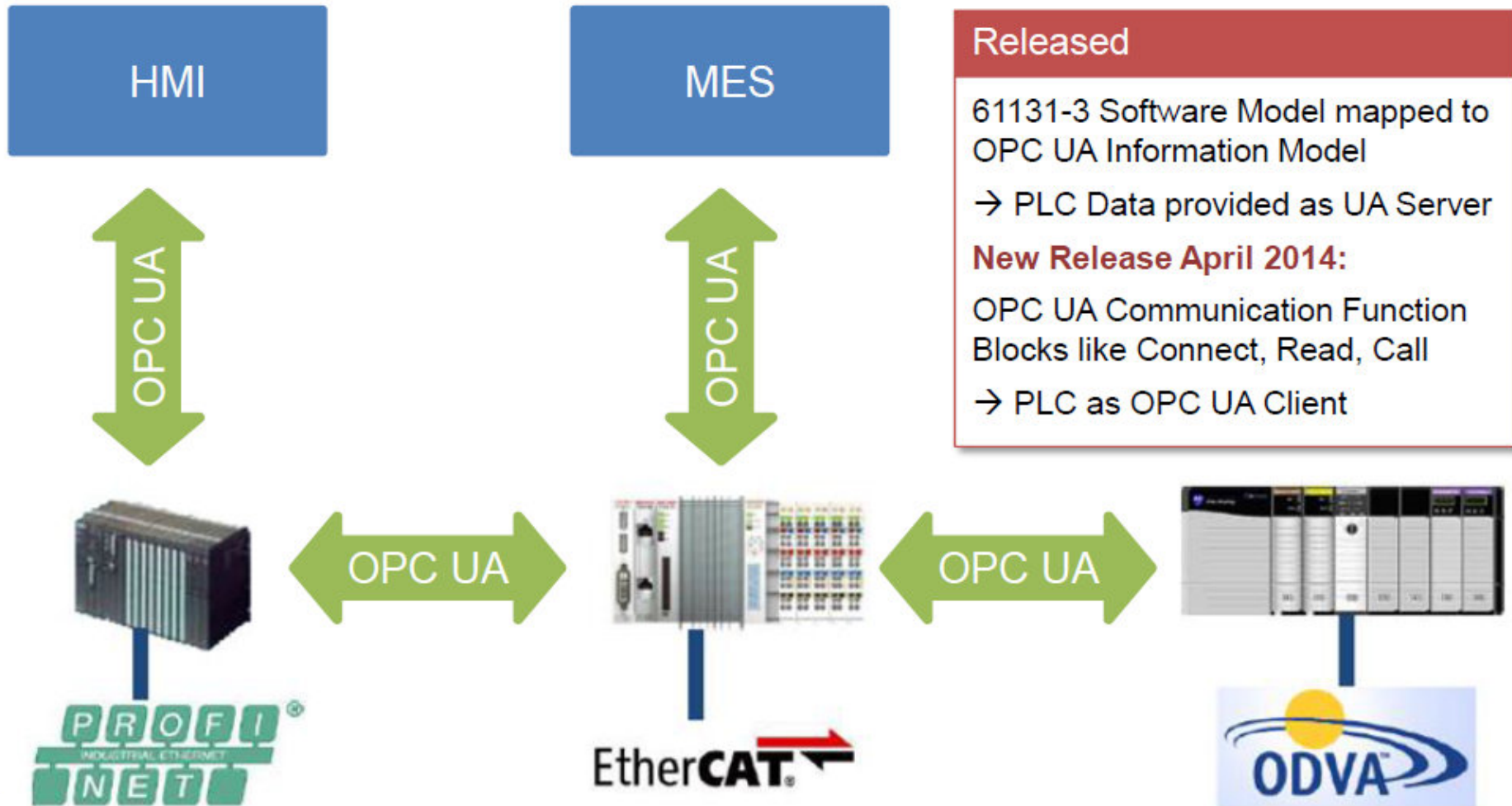
Information Model for process analyzers
 Update driven by vendors implementing the model
 Generic Variable Types moved to OPC UA Part 8



Field Device Integration (FDI)

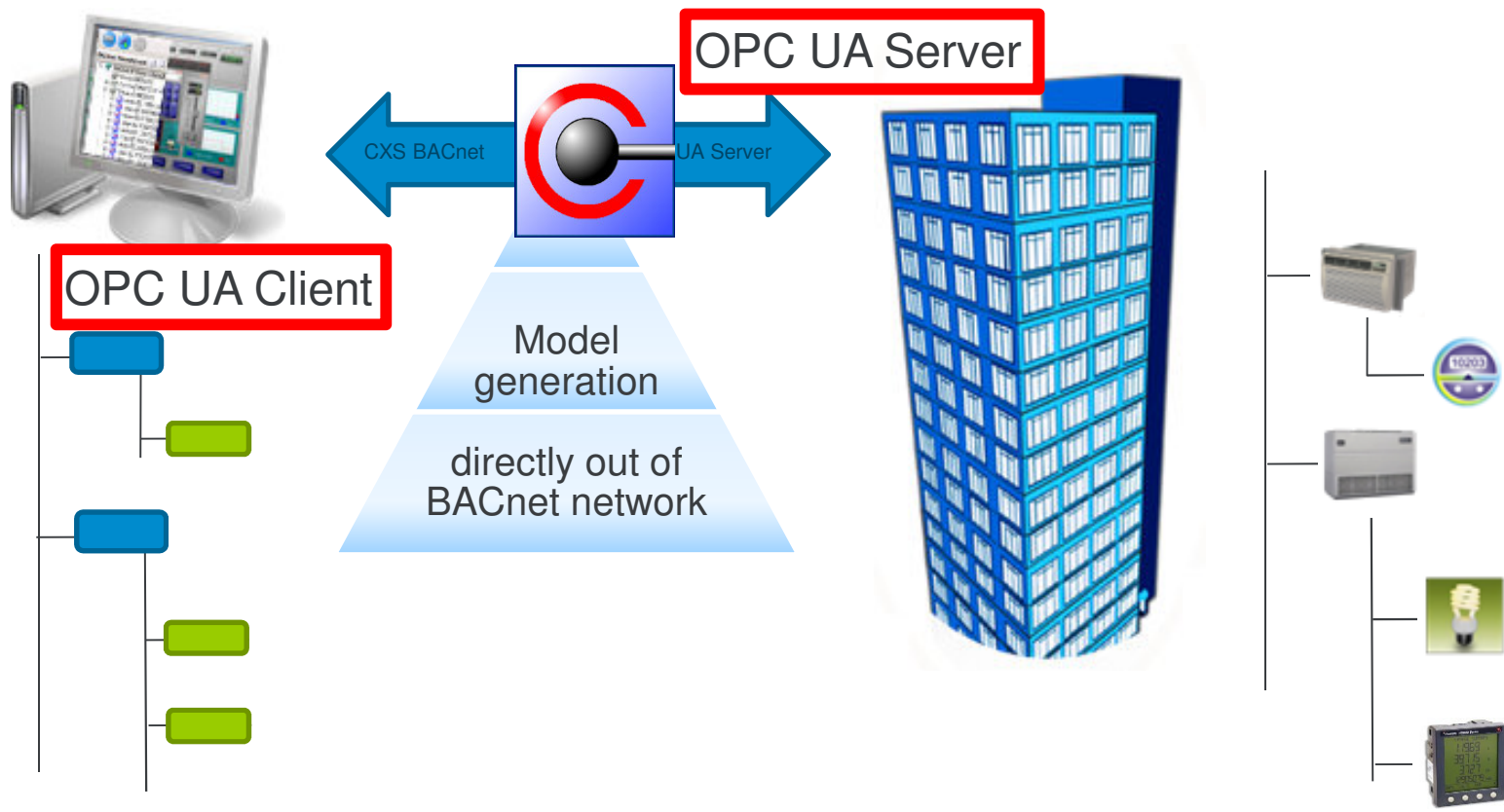


OPC UA for IEC-61131-3 (PLCopen)



Facility Management

OPC UA



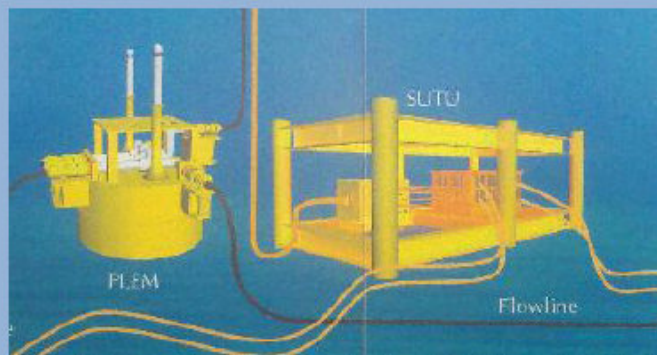
MDIS – Oil and Gas Industry

Working Group since 2012

MCS – DSC Interface Standard

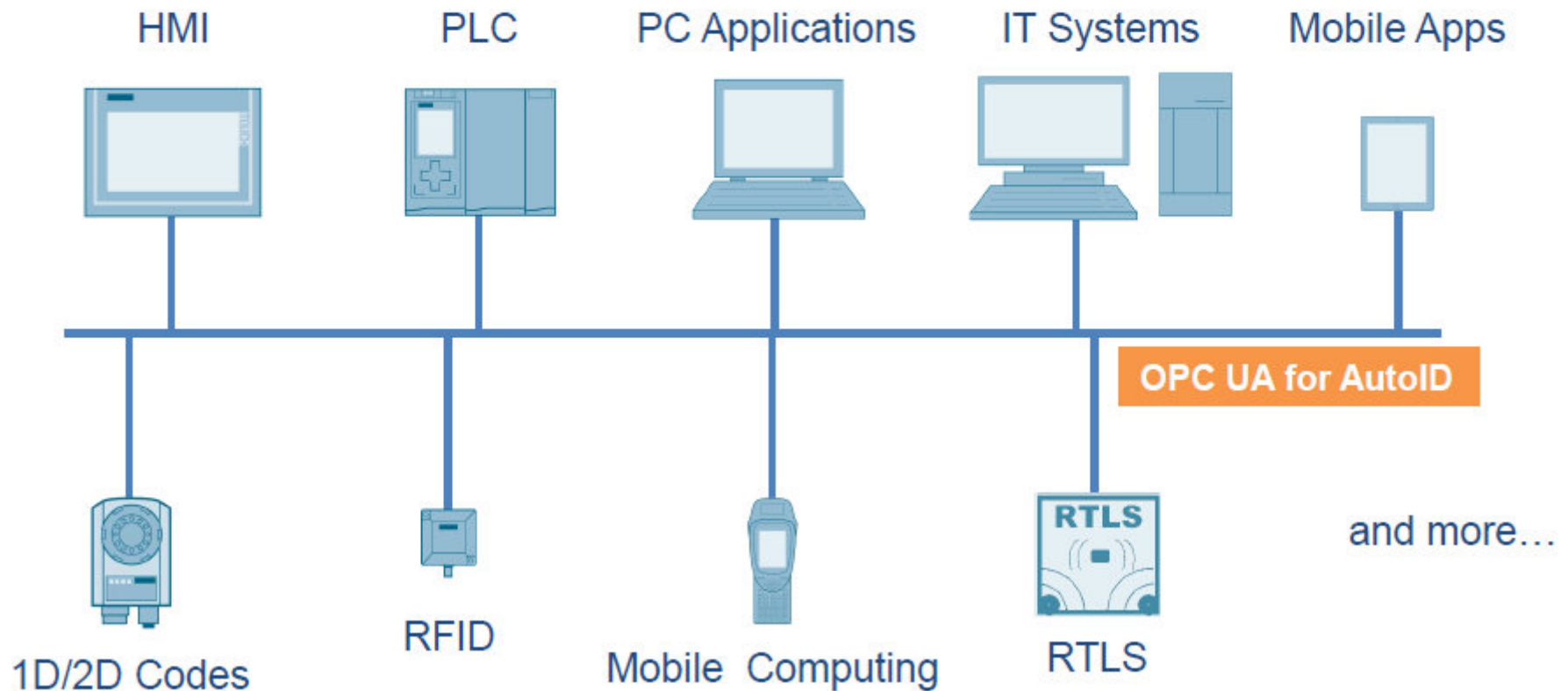
Working Group consists of

- All major Oil companies (operators)
- All major DCS vendors
- All major Subsea vendors

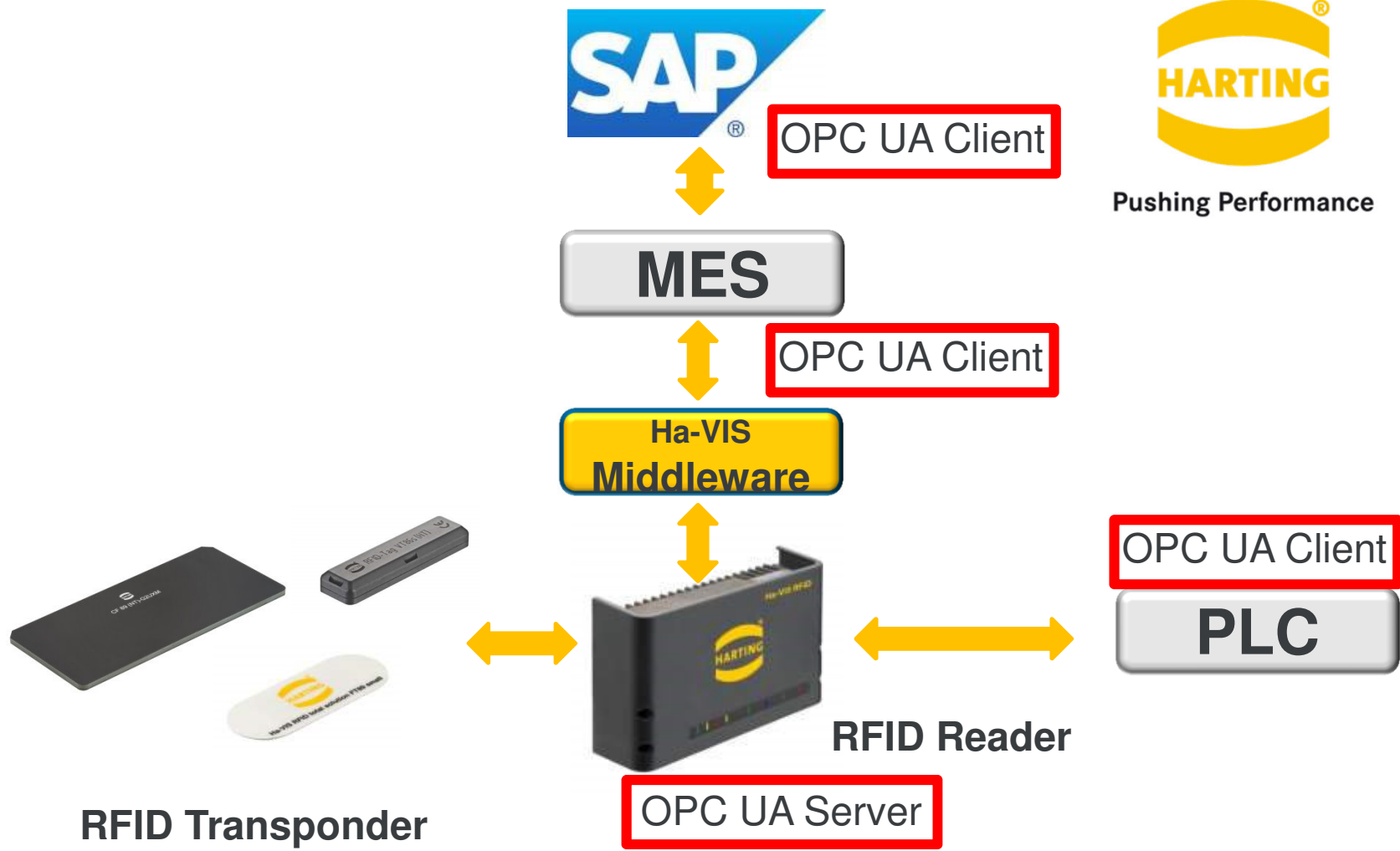


OPC UA for
communication between
Subsea Production
and
DCS Systems

AIM – OPC UA for AutoID



Embedded OPC UA – RFID Reader



Compliance

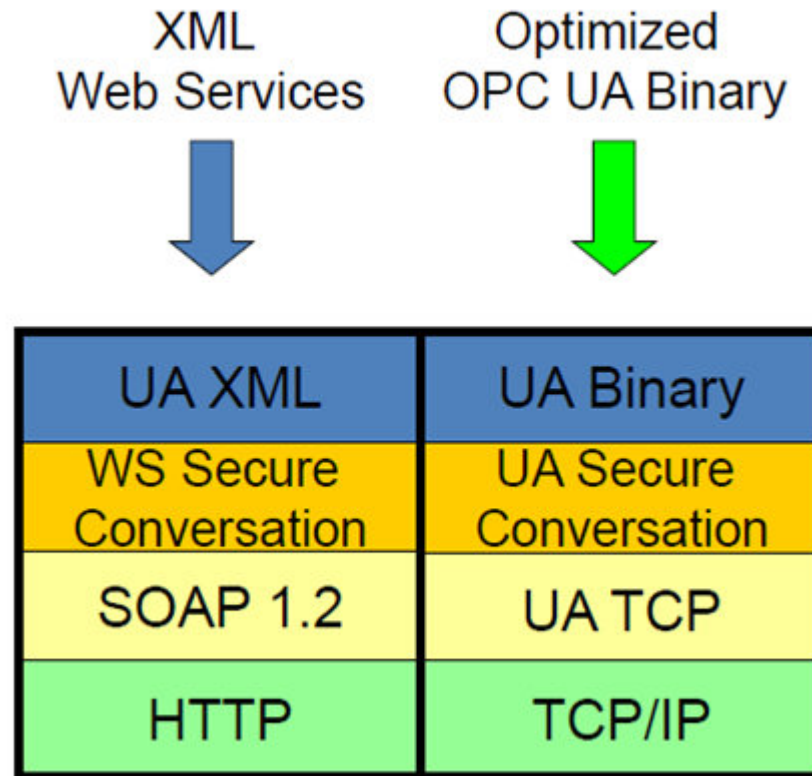
OPC Interoperability Workshop, Asia

June 18 - 20, 2014, Tokyo, Japan



Transport Protocol Bindings

- ▶ OPC UA has been architected for speed and network performance



The new smartfactory demonstrator and its partners



smartFactory^{KL}®



IFS Innovative
Factory Systems

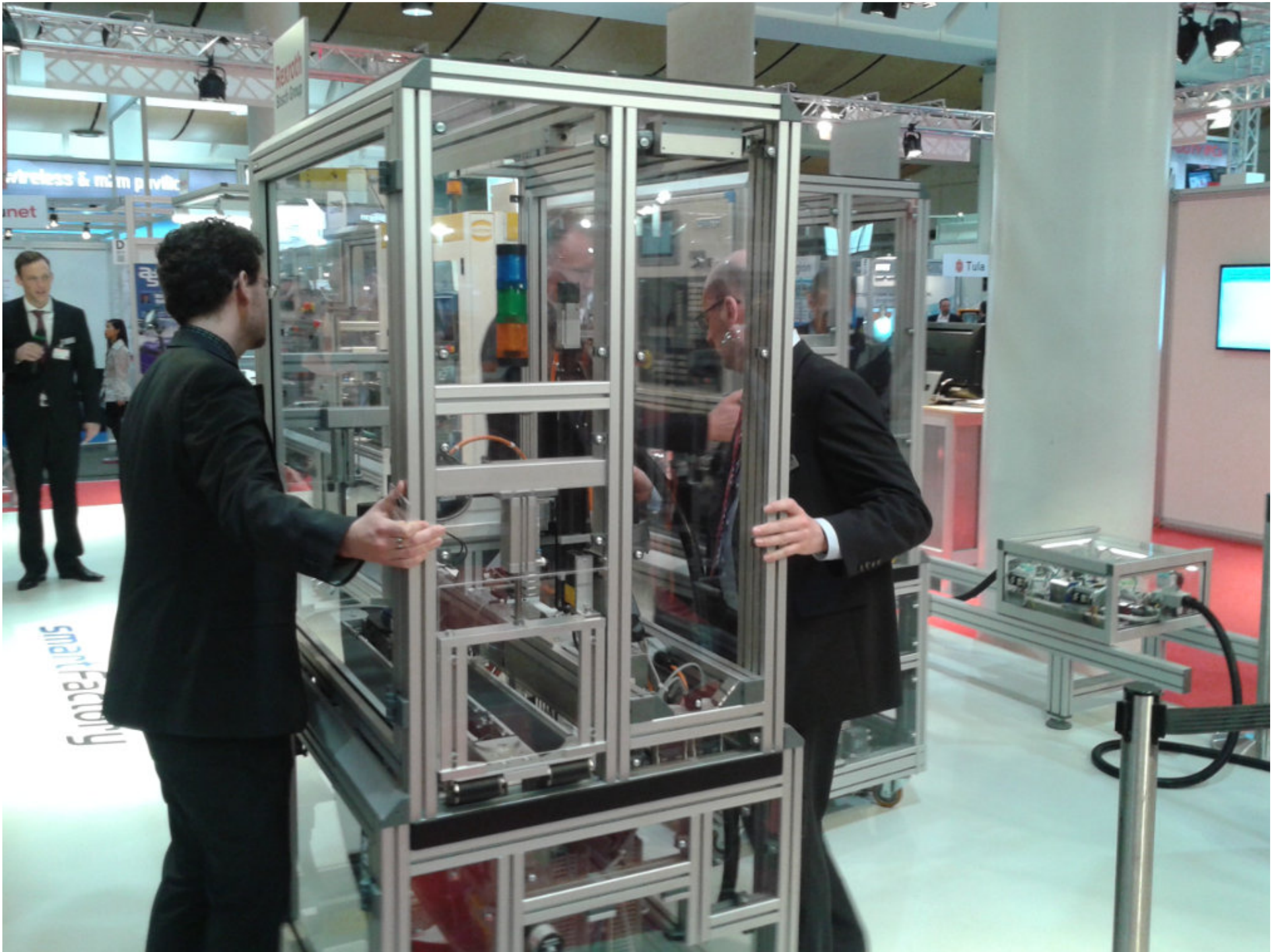
© smartfactory-KL 2014-30













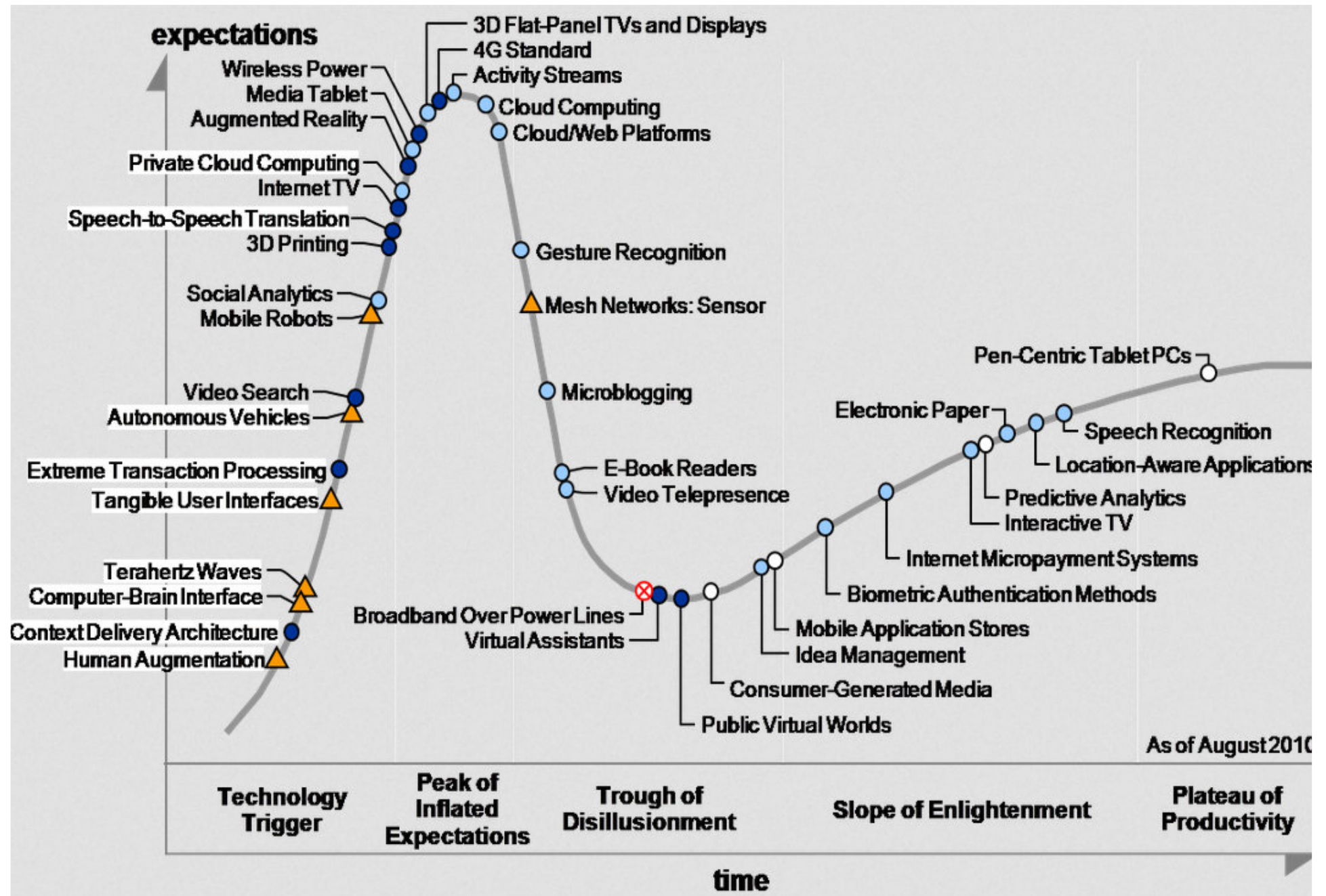












Years to mainstream adoption:

○ less than 2 years

● 2 to 5 years

● 5 to 10 years

▲ more than 10 years

⊗ obsolete before plateau

Google

Trends

Industrie 4.0

Suchbegriff





Peter Seeberg
Market Segment Manager,
Factory Automation

Softing Industrial Automation GmbH
<http://industrial.softing.com>

OPC Unified Architecture

Pioneer of the 4th industrial (r)evolution

