Call to Order

General Session and 17th Annual Meeting of Members

October 15, 2015
Welcome Back

Call to Order

General Session and 16th Annual Meeting of Members
March 13, 2014

www.odva.org
8:15 AM  17th TERM IN REVIEW: REPORT ON THE ACTIVITIES OF THE ASSOCIATION

with special report on the
OPTIMIZATION OF INDUSTRIAL CYBERSECURITY: UPDATE ON ODVA’S TECHNICAL APPROACH

9:30 AM  MEMBERSHIP: PRESENTATION OF CANDIDATES FOR ELECTION

9:45 AM  Election and Break

10:15 AM INTEGRATING ETHERNET/IP™

10:45 AM THE INTELLIGENT FACTORY OF THE FUTURE: INDUSTRIE 4.0 AND THE SMARTFACTORYKL PROJECT

11:30 AM 18TH TERM: LOOKING AHEAD

12:00 PM Adjourn

Member Luncheon immediately following in the Cypress Room.
First, a look back at ODVA...

20 Years Old

March 24, 2015
Founded in Wisconsin USA on March 24, 1995

by

Square D and Westinghouse Cutler-Hammer
Founded for the purpose of promoting the adoption of DeviceNet including the promulgation of standards, establishment of compliance criteria and conformance testing.
Pioneer in the use of COTS for ICT applied to industrial automation - adapting CAN to a viable industrial network -
CIP’s producer-consumer communication model laid the ground work for the adaptation of TCP/IP to automation.

## EtherNet/IP

Based on IEEE 802.3 and the TCP/IP Suite, EtherNet/IP proved that COTS can work for industrial automation applications as a result of standards, compliance criteria and conformance testing.
EtherNet/IP™

Its ascent during the same time frame has ideally positioned it for the 4th Industrial Revolution... the world of integrated cyber-physical systems.
REFLECTIONS ON THE ODVA EXPERIENCE
from the “Historians”
AND NOW THE 17TH TERM IN REVIEW

by
Katherine Voss, president & executive director
Rich Harwell, chief technology officer
Mix by Principal Place of Business

USA/Canada: 48%
Germany: 16%
Japan: 13%
China: 3%
Other Europe: 12%
Other Asia: 5%
All Other: 3%

305 and counting
Membership by Areas of Activity

HQ Staff & local PR supporting North & Latin America
HQ Staff & local PR supporting European in-country resources
RIC Germany
RIC Italy
TAG Korea
TAG Japan
ODVA ATS with TAG China
HQ Staff supporting Asian in-country resources
Leadership in the 17th Term: Board of Directors

Michael Höing  
Weidmüller Interface

Fabrice Jadot  
Schneider Electric

Dr. Jürgen Weinhofer  
Rockwell Automation

Kent Howard  
Balluff

Tony Shakib  
Cisco Systems

Dr. Thomas Bürger  
Bosch Rexroth

Dr. Rolf Birkhofer  
Endress+Hauser

Ikuo Tateishi  
Omron
Leadership in the 17th Term: Officers

- President and Executive Director – Katherine Voss
- Chief Technology Officer – Rich Harwell
- Secretary – Christopher Lynch
- Treasurer – Jürgen Weinhofer
Since Sunny Phoenix in March 2014 . . .
Deployment of New Brand Architecture

New Brand Assets Launched at Hannover Fair 2014
Deployment of New Brand Architecture

Brand Standards+Identity Guidelines
Published August 2014

Declaration of Conformity
New Template Released Q2 2015
Including Hannover Fair 2014, the EtherNet/IP exhibit by ODVA has appeared at five industry tradeshows:

- Hannover Fair 2014 (Hannover, Germany)
- Industrial Automation Show 2014 (Shanghai)
- SPS IPC Drives Show 2014 (Nuremberg, Germany)
- Hannover Fair 2015 (Hannover, Germany)
- ACHEMA 2015 (Frankfurt, Germany)

At each of these shows, ODVA members participate with products in the Product Gallery, displays in the Member Gallery and a multi-member interoperability demonstration.
ODVA Community in Action

Territory Alliance Groups and Regional Interest Communities have driven additional local presence with

- Seminars
- Webinars
- Tradeshow Support for ODVA Exhibits.

China
Standardization Administration of China approved CIP Safety as Chinese National Standard July 2015

Blended effort by staff, members and ODVA’s standardization partner in China, ITEI
Territory Alliance Groups and Regional Interest Communities have driven additional local presence with

- Seminars
- Webinars
- Tradeshow Support for ODVA Exhibits.
ODVA Community in Action

Territory Alliance Groups and Regional Interest Communities have driven additional local presence with

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Italy
ODVA Community in Action

Territory Alliance Groups and Regional Interest Communities have driven additional local presence with

- Seminars
- Webinars
- Tradeshow Support for ODVA Exhibits.

Japan
Territory Alliance Groups and Regional Interest Communities have driven additional local presence with

- Seminars
- Webinars
- Tradeshow Support for ODVA Exhibits.
Other Activities of Note

• EtherNet/IP QuickStart

• Functional Safety Week in July 2015
REPORT ON ODVA TECHNICAL ACTIVITIES
Agenda

- ODVA technology development overview
- Technical Review Board (TRB) roster
- Special Interest Group (SIG) roster
- Key Accomplishments in the 17th Term
- Planned Activities in the 18th Term
Technical Review Board

1. Rudy Belliardi
2. Paul Didier
3. Dr. Jörg Hähniche
4. Rich Harwell, chairperson
5. Rich Jackson
6. Dr. Ludwig Leurs
7. Eric Scott
8. Dave VanGompel
9. Joakim Wiberg
Special Interest Groups

- EtherNet/IP In Process Industries – Mirko Brcic (Endress+Hauser) (new SIG)
- CIP Safety – Bruce Brown (Rockwell) (new chair)
- IO-Link Integration – Frank Moritz (SICK)
- DeviceNet of Things – Thomas Peter (Weidmueller)
- Machinery Information – Rainer Beudert, Steve Zuponcic, Ludwig Leurs
- EtherNet/IP Physical Layer – Bob Lounsbury (Rockwell)
- DeviceNet Physical Layer – Brad Woodman (Molex)
- EtherNet/IP Infrastructure – George Ditzel (Schneider)
- EtherNet/IP System – Brian Batke (Rockwell)
- Distributed Motion – Steve Zuponcic (Rockwell)
- CompoNet – Tianbing Li (Omron)
- Conformance – Qi Zeng (ODVA)
- Modbus Integration – Todd Snide (Schneider)
- Energy Applications – Rick Blair (Schneider)
- CIP System – Dave VanGompel (Rockwell)
- EtherNet/IP Roundtable – Kevin Knake (HMS) in North America, Ulrich Kaemmerer (Schneider) in Europe
### Specification Enhancement Summary

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CIP Common (V1)</td>
<td>12</td>
<td>11</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>EtherNet/IP (V2)</td>
<td>7</td>
<td>4</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>DeviceNet (V3)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CIP Safety (V5)</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Modbus Integration (V7)</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>CIP Security (V8)</td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

74 specification enhancements over 4 publication cycles with a focus on extending CIP Common features and EtherNet/IP.
### Key Accomplishments Since Last Annual Meeting

<table>
<thead>
<tr>
<th>Topic</th>
<th>SIG</th>
<th>Volume</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIP Security</td>
<td>EtherNet/IP System : Cybersecurity WG</td>
<td>New CIP Security Volume 8</td>
<td>First Step (Doggett presentation)</td>
</tr>
<tr>
<td>Gigabit Ethernet Support</td>
<td>EtherNet/IP system</td>
<td>Vol 2</td>
<td>Supporting Slide</td>
</tr>
<tr>
<td>EtherNet/IP CT12 and DeviceNet CT26 released</td>
<td>Conformance</td>
<td>Conformance Test Enhancements</td>
<td>Supporting Slide</td>
</tr>
<tr>
<td>CIP Motion Device Axis Object Updates</td>
<td>CIP Motion</td>
<td>Vol 1</td>
<td>Updated Frequency Control, feedback types and start and stop control</td>
</tr>
<tr>
<td>Dual Channel Safety Feedback</td>
<td>Safety</td>
<td>Vol 5</td>
<td>Extended safety product support</td>
</tr>
</tbody>
</table>
Gigabit Ethernet Enhancements

• Benefit of Leveraging Standard Unmodified Ethernet

• Related Specification Activity
  - ESE-001-051: Gigabit Ethernet support in Ethernet Link Object (EtherNet/IP System SIG)
  - 1 Gbit Industrial Ethernet cable study (EtherNet/IP Physical Layer SIG)

• Positive Impact Across EtherNet/IP applications
  - CIP Motion
    - Ability to handle many more axes per millisecond
    - Easier to intermix CIP Motion devices with non-CIP Motion devices
Conformance Test Updates

- EtherNet/IP CT12 and DeviceNet CT26 released (December 2014)
  - Significant Enhancements in key object testing
    - Port object, identity object, connection manager object...
  - Improved DLR testing

- Test Plans for Conformance Test extensions:
  - TCP Socket Cleanup Test Plan
    Author: Jamin Wendorf (Real Time Automation)
  - CIP Transport IO Packet Injection Test Plan
    Author: Christoffer Lind, Björn Otterdahl (HMS Industrial Networks)
  - PRP Test plan
    Author: Sunita Patel (Schneider Electric)
### Key Future Activities

<table>
<thead>
<tr>
<th>Topic</th>
<th>SIG</th>
<th>Volume / Revision</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>EtherNet/IP for Process enhancements</td>
<td>EtherNet/IP for process</td>
<td>Vol 1 and Vol 2, White Paper</td>
<td>Supporting Slide</td>
</tr>
<tr>
<td>Roundtable Diagnostic activities</td>
<td>EtherNet/IP Roundtable/ CIP System/ EtherNet/IP System</td>
<td>Vol 1 and Vol 2</td>
<td>Supporting Slide</td>
</tr>
<tr>
<td>CIP Security Parts 1.5 &amp; 2</td>
<td>EtherNet/IP System</td>
<td>Vol 2 and Vol 8</td>
<td>Step 1.5 and Step 2 (Doggett Presentation)</td>
</tr>
<tr>
<td>CIP Motion Reorganization</td>
<td>CIP Motion</td>
<td>New CIP Motion volume</td>
<td>Reorganize the material from current volumes</td>
</tr>
</tbody>
</table>
EtherNet/IP in the Process Industries

Plans for next 12-18 months

- Follow-up Reference Architecture for Process Industries
  - Provide implementation examples of 'X in the cloud' or 'as a service' developments, e.g. SCADA implementation in the cloud (either public or private) based on the logical architecture.

- Finalizing Input Assembly structure including device diagnostics
  - Standardized access to process data from EtherNet/IP devices including device diagnostics
  - Definition of device diagnostics for native EtherNet/IP devices that are compliant with NAMUR NE-107

- Finalizing HART mapping on CIP
  - Standardized CIP object structure to get access to HART

- Define PoE adaptation for EtherNet/IP
Change in structure, scope of work and mission of the Roundtable allows much better alignment with ODVA objectives with the TRB directed topics to the group and approval of work products.

- Work in progress:
  - **Diagnostics project** - Common diagnostic method and parameters that can be consistently implemented across all EtherNet/IP devices. Complete Diagnostics Scope drafted and submitted to relevant SIGs.
  - **LLDP investigation** – How LLDP can be applied to EtherNet/IP
  - **Interoperability Conformance Testing** - Assisting Conformance Authority to add interoperability testing to a future Conformance Test offering.
  - **PlugFest** - ACD test improvements, prove out tests for multi-port devices and DLR Performance Profile.
  - **Vendor education** - EtherNet/IP technology tutorials, presenters for Quick Start training
  - **CIP Security** – supporting adoption of these key new capabilities
THANK YOU
Optimization of Industrial Cybersecurity
Update on ODVA’s Technical Approach

David Doggett, Schneider Electric
Cliff Whitehead, Rockwell Automation

October 15, 2015
Increasing need for security is common knowledge…are we delivering?

- Oct 2012 Presentation to the members and whitepaper.
  - Harden Devices
  - Protect CIP
  - Secure CIP

- Cybersecurity a subgroup of the Systems and Architecture SIG.
  - New Volume 8 of the CIP Networks Library addresses security.
ODVA’s Role in Security

• Environment:
  – Cybersecurity weaknesses will always exist.
  – The future is a convergence of production and other systems.
  – Secure Protocols form a key element of a Defense in Depth strategy.

• Assumptions:
  – The networks should be considered to have very limited trust.
  – All entities on the network should be considered untrusted until they can be authenticated.
  – Access to a device should not be allowed until authorized by the device itself.
  – Physical access to a device will be limited to only trusted individuals.

• A secure device should:
  • Reject data that has been altered in any way (data integrity).
  • Reject messages sent by unknown/untrusted people or devices (authenticity).
  • Reject messages that request actions that are not allowed (authorization).
ODVA’s Role in Security

• ODVA’s Role:
  – Secure protocol on which secure devices and systems can be built.
  – Recommendations for implementation of a secure system.
Elements of CIP Security

- Secure CIP
- Protect CIP
- Harden Devices

Protected Mode

2014

Device Authentication
Message Integrity
Message Confidentiality

2015

User Authentication Authorization (CIP object)

2016

Device Robustness
Default Services and Settings

2017

General Session
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2015 Industry Conference & 17th Annual Meeting

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Harden Devices

- Protection Mode
  - Attribute of the Identity Object.
  - Rejects disruptive CIP services when attribute is set.

- Network Robustness
  - Further analysis being done of how ODVA will interact with existing standards/certifications.

- Recommended/Required Security Settings
  - More work to be done to ensure a secure by default installation.
## Protect and Secure CIP ™ Based on Threats, using Proven Technologies

<table>
<thead>
<tr>
<th>Threat Type</th>
<th>Threat Description</th>
<th>Security Property</th>
<th>Volume 8: CIP Security™</th>
<th>Future enhancement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spoofing identity</td>
<td>E.g. illegally accessing and then using another user’s or devices authentication information, such as username and password.</td>
<td>Device authorization</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>User authorization</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Tampering with data</td>
<td>The malicious modification of data, including unauthorized changes made to persistent data, such as that held in a database, and the alteration of data as it flows between two computers over an open network, such as the Internet.</td>
<td>Message integrity</td>
<td>x (Ethernet)</td>
<td>x (CIP)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data integrity (at rest)</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Repudiation</td>
<td>Threats associated with users or devices who deny performing an action without other parties having any way to prove otherwise. Non-repudiation refers to the ability of a system to counter repudiation threats. E.g. a user who purchases an item might have to sign for the item upon receipt. The vendor can then use the signed receipt as evidence that the user did receive the package.</td>
<td>Non-repudiation (audit of events)</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Information disclosure</td>
<td>IExposure of information to individuals who are not supposed to have access to it. E.g. the ability of users to read a file that they were not granted access to, or the ability of an intruder to read data in transit between two computers.</td>
<td>Message confidentiality</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Denial of service</td>
<td>Denying service to valid users for example, by making a Web server temporarily unavailable or unusable. Certain types of DoS threats must be protected against to improve system availability and reliability.</td>
<td>Availability</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Elevation of privilege</td>
<td>An unprivileged user gaining privileged, and thereby sufficient, access to compromise or destroy the entire system. Elevation of privilege threats include those situations in which an attacker has effectively penetrated all system defenses and become part of the trusted system itself, a dangerous situation indeed.</td>
<td>Authorization</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>
- **Device Authorization**
  - Preshared Keys.
  - Device Certificates.
  - TLS/DTLS with Mutual Authentication.

- **Message Integrity/Confidentiality**
  - TLS/DTLS (with encryption).
  - Null Cipher for speed / HMAC

- **Performance, will vary but initial test is**
  - 400ms connection times (from 100ms)
  - Minimal impact on data exchange (Null Cipher).
Device Authentication

- Group of trusted devices (IEC62443 security zone) based on sharing common keys or Certificates signed by a trusted end user CA.

- Pre shared key
  - Simple implementation for users of smaller systems.

- Certificate Based
  - Proven cryptographic identity per device (X509 Cert)
  - More robust and secure for large systems.
  - Certificate Handling covered as part of specification.
    - Default certificate (vendor installed or device self signed) available on startup.
    - Local PKI support for installing end user certificates to ensure uniqueness of devices at an end user site.
      - Push mode for end user device certificates defined in 2015 specification.
      - Pull mode (EST/SCEP) to be defined later but can be implemented now.
• UCMM and Class 3 - EtherNet/IP over TLS (Port 2221/tcp)

• Class 0/1 – EtherNet/IP over DTLS (Port 2221/udp)
  – Forward_Open and Forward_Close moved to DTLS/UDP.

• Identity and Integrity of communications in all use cases.
  – Confidentiality of communications optional.

• Authorization based on possession of preshared key or trusted certificate.
  – CIP object security to be covered in 2017+
Elements of CIP Security

Secure CIP
Protect CIP
Harden Devices

User Authentication Authorization (CIP object)
Device Authentication (x509 Cert)
Message Integrity (TLS/DTLS)
Message Confidentiality (TLS/DTLS)
Certificate Handling (EST/SCEP, CSP/OCSP)
Protected Mode
Device Robustness Default Services and Settings

2014 2015 2016 2017
THANK YOU
INTEGRATING WITH ETHERNET/IP™

Gary A. Hida
Applied Control Engineering, Inc. (ACE)
October 15, 2015
“Great minds discuss ideas, average minds discuss events, small minds discuss people.”

-- Eleanor Roosevelt
Independent Systems Integrator

Established in 1991

Genesis based in:
- Chemical
- Specialty Chemical
- Air Separations

100+ Fulltime employees

Privately Owned

Internally Financed
Engineering Offices

- Delaware Valley
- Chesapeake Region
- Greater Boston
- Gulf Coast
- Lehigh Valley
- New England
- Ohio Valley
Automation Services

- Projects from $500-$2M
- Greenfield, Brownfield, Legacy migration
- New systems
- 24/7 Service Support
Integration Opportunities

- $65B worth of existing process control systems nearing end of useful life
- Migration opportunities

“If you must have motivation, think of your paycheck on Friday.”

--Noel Coward
The World Before EtherNet/IP

- Closed networks
- Everything "owned" by hardware vendors
- Severe limits on integrating pieces
- Playground for integrators
- Views on Ethernet evolved in the '90's
- EtherNet/IP eliminates these issues
- Less work for integrators but higher value

"The future ain't what it used to be."

-- Yogi Berra
That new process equipment is arriving next month. Send out the drawings to five integrators and let’s get quotes…”

Process control project execution networks are no longer predetermined

- Control Platform
- Instrumentation
- Valves
- Electrical Distribution Equipment
- VFD Vendors
- Regulatory Equipment and Interfaces

EtherNet/IP enables and simplifies these communications
Networking has impacts throughout the system life cycle

- Requirements Definition
- Architecture
- Vendor Selections
- Detailed Design
- Implementation and Testing
- Infrastructure
- Installation and Commissioning
- Operation and Maintenance
Network Requirements

- Interoperability and support
- Data availability
- Reliability
- Compliance to standards
  - Conformance testing
- Secure
- Ease of use
Project Examples
Chemical Process Industry Application

- Migration from legacy DCS
  - Existing system:
    - Proprietary I/O bus and controller bus networks
    - No other devices were networked
  - Migrated System:
    - Control XHF "cpf "uqhv"uvctgtu"eqppgevgt "xk"EtherNet/IP and ring architecture
    - All I/O on EtherNet/IP
    - All data available to Historian and enterprise
Chemical Process Industry Application

- Terminal Servers
- Engineering Workstation
- HMI Server
- Historian
- Virtualized
- Thin OWS
- Twin OWS
- DLR Network
- Remote IO
- MCC
- Switch
- Hopper Weigh Scale

General Session
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Chemical Process Industry Application
Consumer Products / Process Application

- Upgrade from legacy hardware
- Mixed vendor and vintage hardware
- Two HMI platforms
- Multiple remote I/O networks
- Gateway linking device to serial MODBUS devices
- Some obsolete hardware
- Limited documentation

Migrated System:
- Customer received multiple proposals; some with multiple networks
- Final design moved to EtherNet/IP with resilient and redundant networks
Consumer Products / Process Application
Life Science Application

• Converged Network
  • Core switches used to connect entire campus
  • Distribution switches used to connect to the Core
  • Access switches
  • Local access switches

• Server rooms host resources for the DMZ and Level 3 networks

• PCN allows for Process Control elements to communicate across campus

• Having all devices on network allows for OT functions
Life Science Application
Process Utility Application

- Mission critical application - one customer is data center
- System has lived >25 years
- Redundant controllers
- ControlNet™ I/O network providing segregation from controlled Ethernet network
- Dual EtherNet/IP networks for HMI and data collection
- OEM package equipment on ControlNet
- MCC included DeviceNet™

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Process Utility Application

Dual Screen Computer
Dual Screen Computer
Dual Screen Computer
Dual Screen Computer
Dual Screen Computer

Redundant PLC

ControlNet

Legacy Network

Remote I/O

ControlNet

Remote I/O

Remote I/O

Remote I/O

Motor Control Center

VFD

Power Monitor

Device Net

Air Dryers

Remote I/O

Remote I/O

Remote I/O

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Future from Integrators Perspective

- Physical
- Wireless
- Security (IEC 62351, IEC62443)
- Scalable Redundancy Options
- Network Set-Up
- Reduce the IT component
- Quantity of field devices
- Diagnostics
THE INTELLIGENT FACTORY OF THE FUTURE:
INDUSTRIE 4.0 AND THE SMARTFACTORYKL PROJECT

Prof. Dr.-Ing. Dr. h.c. Detlef Zuehlke

Director Innovative Factory Systems Dept. IFS
German Research Centre for Artificial Intelligence
DFKI Kaiserslautern
and
Executive Chairman, SmartFactoryKL e.V.

October 15, 2015
German Research Center for Artificial Intelligence (DFKI)

Kaiserslautern
- Augmented Reality
- Embedded Intelligence
- Knowledge Management
- Innovative Factory Systems

Since 07/1988

Saarbrücken
Since 07/1988

Bremen
Since 11/2005

Berlin
Since 05/2007

Lab Osnabrück
Innovation Drivers

**Yesterday**
- long delivery time
- increasing salaries
- cost driven

**Today**
- shorter product lifecycles
- shorter engineering time
- product individualization
- customer driven

**Advances in IT**

**Faster, better & cheaper**
Digitalization of the Industry

Automation structure

Field level

Control level

Enterprise level

2.5th Revolution

3rd Revolution

4th Revolution

Digitalization

1 Bytes

100 +x MegaBytes

100 000 +x TeraBytes

Enterprise level

Control level

Field level

EtherNet/IP
From Pyramid to Network

Cloud

Remote Maintenance

PLM → Log → ERP

MES

Complexity

Object orientation
Modularization
Standardization
Lean Thinking

3.0 → 4.0

IND 4.0 World - dynamic

Products

APP’s
Towards smart modules

Cyber-Physical System

Fundamental Principles

- **Self Identification**
  (who am I?)

- **Services Exploration**
  (what do I offer?)

- **Autonomous Networking**
  (who are my partners?)

---

**Controller**

**µWeb server**

**IP-Adress**

**Network Services**

**Field Bus**

**Electrical signals**

**Field Device**
The Rocky Road to Industrie 4.0

- New Business Models
- Training
- New Rules
- Safety and Security
- Worldwide Standards
- First Demonstrators
- First Industrial Systems
- Industrial Use

From Vision to Reality

Development

- 10 years
- 2 years
- Today

FDA, Emergency Stop, ANSI
Industrie 4.0 in the Lifecycle

Design | Engineering | Start-Up | Operation | Recycling

Information Backbone

PLM (Design) | Maintenance (Repair) | ERP (Planning) | MES (Control) | Resource Control (Optimization) | Change-Management (Rebuild) | Customer (Information) | Logistics (Delivery)

OPC UA

Cloud
From vision to reality – the SmartFactoryKL

Launch: June 2005
Legal form: registered non-profit association
Members: institutions only
Governance: general assembly, executive board
Fees: 12,000 / 3,000 € annual fee
Financing: fees, donations, projects
Employees: currently 16
Revenue: 1 Mio €

The SmartFactoryKL is the worldwide biggest and most popular manufacturer independent research and demonstration center for INDUSTRIE 4.0 technologies.
Development of SmartFactoryKL

- **Idea**: 2004
- **Study**: 2005
- **Launch**: 2006
- **Build up phase**: 2007

- **Demonstration systems**: 2008-2010
- **Research and development projects**: 2009

- **Innovation day**: 2011-2012
- **2015**: Innovation day 7
- **2016**: I4.0 Ctr., SRC KL

- **Members**:
  - 7 Members: 2004
  - 10 Members: 2005

- **2004-2015**: Timeline with milestones and members.
The Members of SmartFactoryKL

*ODVA members

Industry

Science
SmartFactoryKL Lab
ResCom-CPS-Demonstrator  Ç 2012
Industrie 4.0 Demonstrator Line © 2015
Structure of Demo Line

- Modules are connected via transport system.
- Modules recognize neighbor modules.
- Infrastructure Boxes supply power, compressed air, network connection and safety (emergency stop).
- Data connection to supervisory systems via OPC UA.
Bosch Rexroth wants to evaluate the ODVA machine data model in the SmartFactory demo line at Hannover Fair 2016.

The MES / ERP system providers are very interested.

Next steps:
- Publication of data model, 10/14/2015
- Application to demo line
The Industrie 4.0 Demonstrator Ç in Detail

Infrastructure Box
- Energy Control
- Firewall
- Power Distribution

Product Memory
- Machine USB Connector

Module Localization

3x400V Emergency Stop

Air Network

SoA-PLC

Flexible Conveyor Lock

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Standards Used

Interoperability

<table>
<thead>
<tr>
<th>ISO-OSI</th>
<th>SEMANTIC SERVICE DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>?</td>
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<tr>
<td>6</td>
<td>SoA-Services</td>
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<tr>
<td>5</td>
<td>OPC-UA</td>
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<tr>
<td>4</td>
<td>IP</td>
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<tr>
<td>3</td>
<td>Ethernet</td>
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<td>2</td>
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</tbody>
</table>

Communication

- SoA
- OPC-UA
- TCP/IP
- RJ45, WiFi
- 3x400V
- 24V
- RJ45 Network
- Emergency Stop
- Compressed Air

Electromechanical

- Modular connector
Industrie 4.0 worldwide

- **USA**
  - 320 Mio$/5 yrs DMDII
  - 160 Mio$/5 yrs UILabs
  - IT-driven
  - Low production
  - Few skilled workers

- **Germany**
  - 470 Mio € / 5 J.
  - BKZ 28 Mio € / 3 J.
  - Production driven
  - High production
  - Many skilled workers
  - SME-structures

- **China**
  - Government driven
  - High production
  - No skilled workers

- **Japan**
  - Industry driven
  - High production
  - Many skilled workers
THANK YOU

Detlef Zuehlke
Director Innovative Factory Systems IFS
German Research Centre for Artificial Intelligence
DFKI Kaiserslautern
and
Executive Chairman SmartFactory KL e.V.
Trippstadter Straße 122
67663 Kaiserslautern / Germany
zuehlke@dfki.de
THE FUTURE OF INDUSTRIAL AUTOMATION

Looking Ahead to ODVA’s 18th Term
### 18th Term at a Glance

**Key Pacing Internal Activities**

<table>
<thead>
<tr>
<th>Event</th>
<th>2015Q4</th>
<th>2016Q1</th>
<th>2016Q2</th>
<th>2016Q3</th>
<th>2016Q4</th>
<th>2017Q1</th>
<th>2017Q2</th>
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</thead>
<tbody>
<tr>
<td>17th Annual Meeting of the ODVA Board of Directors</td>
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<td>2015 Industry Conference &amp; 17th Annual Meeting of Members</td>
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<td>ODVA Specifications: 2015PC2</td>
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<td>ODVA Specifications: 2016PC1</td>
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<td>2017 Industry Conference &amp; 18th Annual Meeting of Members</td>
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</tbody>
</table>

Remarks: Schedule for Regular Meeting of the Board TBD
Leadership in the 18th Term: Board of Directors

Michael Höing
Weidmüller Interface

Dr. Jürgen Weinhofer
Rockwell Automation

Dr. Thomas Bürger
Bosch Rexroth

Fabrice Jadot
Schneider Electric

Dr. Rolf Birkhofer
Endress+Hauser

Masuru Takeuchi
Omron

Tony Shakib
Cisco Systems
Leadership in the 18th Term: Officers

- President and Executive Director – Katherine Voss
- Chief Technology Officer – Joakim Wiberg
- Secretary – Christopher Lynch
- Treasurer – Jürgen Weinhofer
Leadership in the 18th Term: Technical Review Board

1. Rudy Belliardi – returning for a successive term
2. Paul Didier – returning for a successive term
3. Dr. Jörg Hähniche – returning for a successive term
4. Dr. Ludwig Leurs – returning for a successive term
5. Shinji Murayama – joining for an initial term
6. Eric Scott – returning for a successive term
7. Dave VanGompel – returning for a successive term
8. Joakim Wiberg, Chairperson – returning for a successive term
Leadership: Gone but Not Forgotten

- Ikuo Tateishi
- Kent Howard
- Rich Jackson

... and a special thanks to...
Leadership

Returning to his full-time day job as . .

. . .Manager of Connectivity Technology
Eaton Electrical

Rich Harwell
Leadership: Gone but Not Forgotten

Rich Harwell
extraordinary commitment
Refresher from 16th Annual Meeting of Members

Announcements

Brand Architecture and Logo Marks
Refresher from 16th Annual Meeting of Members

Announcements

Marketing Communications Plan

- Trade Shows
- Final party revelations
- Media relations

Brand Refresh

Pain Media

- ODVA Website as whole
- Virtual Developer's Community for EFEC/opener
- Virtual Tradeshows (products, content)
- Media releases
- Toolkits for EFEC/play
- Industry Conference and Annual Meeting
- B2B and B2C
- ODVA B2B
- ODVA Blog
- White papers and infographics
- Media relations & briefings
- Media relations
- Publications

Owned Media

Earned Media

Received media and annual meeting of members

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Refresher from 16th Annual Meeting of Members

Announcements
Web Presence in the 18th Term

Ending October 16, 2015 at 14:00 Eastern Daylight Savings Time
Web Presence in the 18th Term

Timeline

<table>
<thead>
<tr>
<th>October 9</th>
<th>October 12</th>
<th>October 13</th>
<th>October 14</th>
<th>October 15</th>
<th>October 16</th>
<th>Oct 19-31</th>
<th>Nov - Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review, Testing, Links, Final Content Additions</td>
<td>Site Reveal to Members at ODVA 2015 Industry Conference</td>
<td>LIVE preview to Board</td>
<td>LIVE demo to Members of MARKETPLACE</td>
<td>potential LIVE demo to Members of site</td>
<td>LIVE demo to TRB</td>
<td>Old odva.org goes DARK</td>
<td>New odva.org goes fully LIVE</td>
</tr>
<tr>
<td>Tuesday Oct 12</td>
<td></td>
<td>2:30p Oct 13</td>
<td></td>
<td>9:00a Oct 15</td>
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<tr>
<td>New odva.org and subdomains functional (except MEMBERPLACE)</td>
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<td>5:00p Tuesday Oct 12</td>
<td></td>
<td>5:00p Oct 14</td>
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</table>

Countdown to October 16, 2015 at 17:00 Eastern Daylight Savings Time
Web Presence in the 18\textsuperscript{th} Term

Objectives

- Refresh the look and messaging
- Project a voice that speaks to industry engagement and adoption first and talks about ODVA second
- Update the technology used to develop and manage the website
- Make the information easier to find
- Group information in areas that speak to different persona (e.g., users, developers)
Web Presence in the 18\textsuperscript{th} Term

Grouping of Content to Speak to Persona Groups

- Technology and Standards
- MARKETPLACE
- Optimization 4.0
- Happenings
- KNOW-HOW HUB
- Contact ODVA

Omnipresent

- About ODVA
- Submit Order
- Publication Download
- Join ODVA
- MEMBERPLACE
Web Presence in the 18th Term

Grouping of Content to Speak to Persona Groups

Technology and Standards

MARKETPLACE

Optimization 4.0

Happenings

KNOW-HOW HUB

Contact ODVA

Selective localization
In these areas

Omnipresent

About ODVA

Submit Order

Publication Download

Join ODVA

MEMBERPLACE
Web Presence in the 18th Term

Optimization 4.0™

The message platform in the 18th Term to bring together ODVA’s Optimization Initiatives under a unified framework

Industrial Cybersecurity • Energy Usage • Machine Integration • Process Integration
20 years in the making,

is now

THE FUTURE OF INDUSTRIAL AUTOMATION