Interoperability in machinery industry

The global production language
Need of standardized interfaces

The requirements of mechanical engineering:

- Communication on an open platform
- Security by design
- Support of different Protocols
- Semantical machine description
- Global acceptance
No replaceability due to OPC UA

Vendor Specific Extensions

OPC UA Companion Specifications

OPC UA Technology
Global Collaboration

Joint Working Group

Global Partners
VDMA
OPC Foundation

accept
hosts
accepts

specifies

Industry 1
Industry 2
Industry 3

Companion Specifications

OPC UA

use

specify semantics
Today's Overview of OPC UA Working Groups inside the VDMA

- Additive Manufacturing
- Agricultural Machinery
- Air Conditioning & Ventilation
- Air Pollution Control
- Automated Guided Vehicles
- Battery Production
- Building Control and Management
- Building Materials
- Ceramic Machinery
- Cleaning Systems
- Compressors, Compressed Air and Vacuum Technology
- Construction Equipment
- Continuous Conveyors
- Cranes
- Die & Mould
- Drying Technology
- Electronics, Micro & New Energy Production Technologies
- Electrical Automation
- Engines & Systems
- Fire Fighting Equipment
- Fluid Power
- Food Processing and Packaging Machinery
- Foundry Machinery
- Glass Machinery
- Hydro Power Plants
- Industrial Trucks
- Integrated Assembly Solutions
- Intralogistic Systems
- Lasers and Laser Systems for Material Processing
- Length Measurement Technology
- Lifts & Escalators
- Machine Tools and Manufacturing Systems
- Machine Vision
- Metallurgical Plants and Rolling Mills
- Micro Technologies
- Mining
- Photovoltaic Equipment
- Plastics & Rubber Machinery
- Power Transmission Engineering
- Precision Tools
- Printing & Paper Technology
- Process Plant & Equipment
- Productronic
- Pumps & Systems
- Refrigeration & Heat Pump Technology
- Robotics
- Security Systems
- Software & Digitalization
- Surface Technology
- Testing Technology
- Textile Care, Fabric and Leather Technology
- Textile Machinery
- Thermal Power Plants
- Thermo Process Technology
- Valves
- Waste Treatment & Recycling
- Welding & Pressure Gas Equipment
- Wind Power Plants
- Woodworking Machinery

- OPC UA CS released
- Release Candidate
- Joint Working Group with OPC Foundation
- OPC UA CS in work
- Aware of OPC UA

Andreas Faath | Management Interoperability OPC UA
Rapid increase of new OPC UA CS working groups

» More than 23 VDMA sector branches under discussion

» Over 25 VDMA sector branches in active (international) implementation

» About 35 OPC UA CS working groups existing

» Over 600 companies are involved
  » ME, PA, ET, IT, Automotive, ...

Candidate Joint Working Group with OPC Foundation
OPC UA CS in work
OPC UA CS released
Phases of the development of an OPC UA CS

1. Preliminary work
   • Notification of demand from industry
   • Involvement of all interested parties

2. Content work
   • Unification of terms, functions and properties

3. Design in OPC UA
   • Transfer of contents to OPC UA CS

4. Publication
   • VDMA
   • DIN
   • OPC-Foundation

5. Use in industry
   • Implementation of OPC UA CS in products

Internationalization
   • Activities to reduce market barriers
   • International trade fair activities and B2B events

Consistency
   • Development of a generalizing architecture
   • Interaction of the industry-specific CS
Levels of Interoperability

OPC UA for Machinery

Cross domain harmonized information models

Domain specific harmonized information models

Meshed communication network

Proprietary communication
The VDMA organizes the development of Companion Specifications for various sectors:

- Plastics & Rubber Machinery
- Robotics
- Machine Tools
- Many more

The usage of OPC UA in the context of the mechanical engineering industry needs to be harmonized.

**OPC UA for Machinery**

- OPC UA Companion Specification for Machines & Components of Machines in the discrete manufacturing.
- Addressing specific Use Cases
• **OPC UA for Machinery** defines building blocks for specific Use-Cases

  - Building Blocks can be used if seen fit
  - Companion Specs use required Building Blocks
Part of the Project **II4IP** - Interoperable Interfaces for Intelligent Production

**Objective:**
- Harmonized Interoperability for OPC UA Companion Specifications
  → **OPC UA for Machinery**
- Integration of other Sectors
- Transfer of Knowledge
- Internationalization

Supported by the Ministry

Federal Ministry for Economic Affairs and Energy

on the basis of a decision by the German Bundestag
General Informations

- Modelling Expert: Dr. Wolfgang Mahnke
- Representatives from: Robotics, Machine Tools, Metallurgy, Drives, Plastics & Rubber Machinery
- Recently added: Machine Vision, Woodworking Machinery, Weighing, Food & Packaging

Timeline:
- Sep 2019: Preliminary work
- Oct 2019: Definition of first Use-Cases
- Feb 2020: Kick Off JWG
- Apr 2020: First public draft
- May 2020: Roadmap
- Sep 2020: Release of Part 1
- Nov 2020: Release Candidate for next Use-Cases
Feedback on Draft

Machinery WG defines first draft

VDMA WGs comment on first draft

Machinery WG resolves comments

Comments on public draft

Machinery WG resolves comments

Public Release
First Building Blocks already released:

- Machine Identification & Nameplate
- Finding all machines in a server

Next Building Blocks published as draft:

- Component Identification
- Finding all components of a machine
1. Component Identification
2. Machine States
3. Job & Dataset Management
4. Process Values
5. Medium-Term Topics
6. Backlog-Topics

- Production Cell Identification: Aggregation of machines in production lines and cells
- Condition based actions with standardized messaging: Mechanisms to provide information and events for scheduled actions
- Equipment Management: Tool management like tool changes
- Documentation: Finding manuals, technical data sheets, PDFs etc.
Thank you for your attention!
Plug and Play Powered by a Global Community

Communication technology and basic functionalities universal with open options → **HOW to communicate**

Companion Specifications defining contents for different applications → **WHAT to communicate**

Plug & play
Identical Implementation of Companion Specifications for the machinery sector

Global community
Promoting the use of common standards

Plug and Play
Powered by a Global Community
Bringing Machine Builders and Users Together

**Machine Builders**
Associations
Working Groups

**Users**
Various Sectors
Multiple Machinery

- Joint promise: „Plug & play“
- Agreement on identical implementation
- International acceptance
- Best Practices
- Lessons learned
- Joint proof of "Functionality" in showcase
- Feedback from users
- Lessons learned
- Agreement on identical implementation
- International acceptance

**Joint proof of "Functionality" in showcase**
a network of strong partners

core partners

association partners

consortium partners

research partners

130 Partner (Sept '20)
What is the „umati live demonstration“

- One of the most important aspects of umati is to make the data flow a "user experience" for customers and interested parties.
- This is achieved through live demonstrations at trade fairs.
- E.g., at EMO Hannover 2019: 70 partners from 10 countries; 110 machines connected 28 software solutions.
- Infrastructure (DataHub with T-Systems) and a neutral dashboard (web app) have already been developed.
- This can be used and refined by all partners.
- The aim is to bring the umati community to trade fairs worldwide.
- Permanent operation is planned in order to demonstrate the efficiency of the community.

➢ Experience connectivity live:

➢ Follow the data flow at https://umati.app:

Every connected machine features a sticker. Scan the QR code or type the shortcut link to access the live data streaming from the machine.

Get an overview of all the connected machines at https://umati.app.
How do I connect to the „umati live demonstration“

- **Machines**
  - must be equipped with an OPC UA server according to an OPC UA specification* “endorsec” by umati
  - connect 1:1 to the data hub
  - Connection currently via VPN, OPC UA Reverse Connect in planning

- **Data openness**
  - the data of all connected machines is currently available to all partners for use in dashboards or software

- **Architecture**
  - At the heart of this is the "Data Hub" with T-Systems,
  - this serves the data handling,
  - it aggregates the incoming data of all connected machines and makes the data available to all connected clients.

- **Showcase Specification** is available at https://showcase.umati.org

* At this point in time (Sept 2020), the infrastructure currently capable for OPC UA for Machinery and Machine Tools. The plan is to make OPC UA for Machinery and the specifications currently developed by VDMA and its affiliated groups available as soon as possible.
How does umati affect OPC UA standardization?

- The standardization work in the existing working groups or joint working groups continues in parallel as before.
- OPC UA standards remain freely available to the public.
- No "obligation" for participating companies to use umati.
- umati represents an offer for common visibility.

- Closer interaction of the individual groups through comprehensive feedback from the market to be expected.

- Internationalization is strengthened by the visibility of a common brand (e.g., with/towards partners and competitors in America and Asia)

- The relationship to OPC UA visible through logo "based on OPC UA" in the brand communication
Contact Information

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