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# OPC UA for Machinery

## Harmonization within the VDMA

# OPC UA within the VDMA

- » 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
- » Electrical Automation
- » Electronics, Micro & New Energy Production Technologies

- » Engines
- » 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
- » Weighing Technology
- » 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

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



Plastics & Rubber Machinery



Robotics



Machine Tools



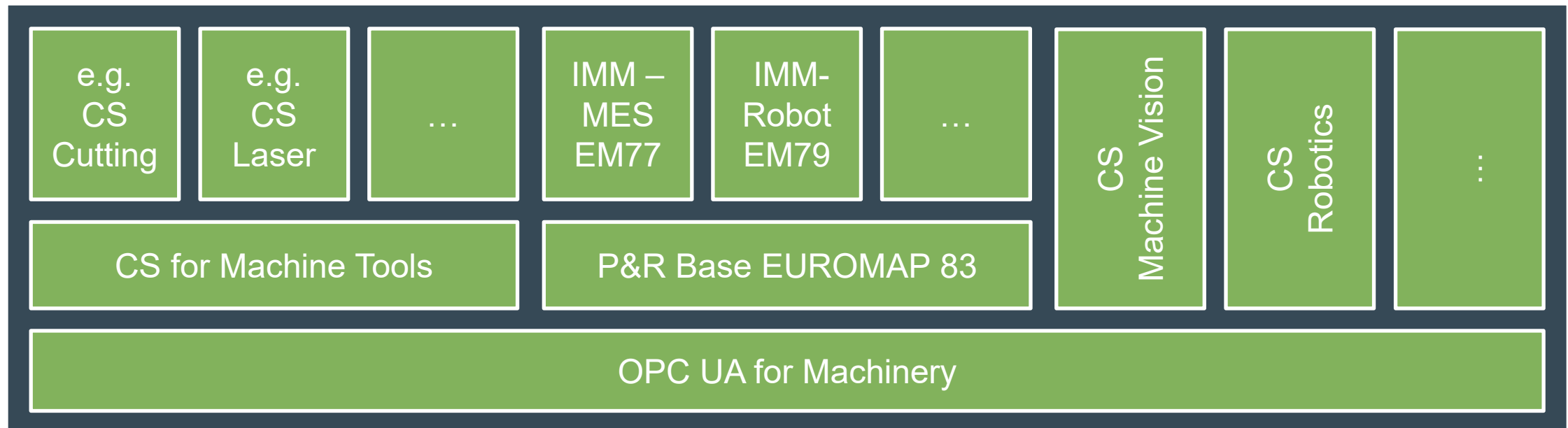
Many more

→ 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 the whole engineering industry
  - Use-Case specific Building Blocks for base-functionality
  - 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:



Federal Ministry  
for Economic Affairs  
and Energy

on the basis of a decision  
by the German Bundestag

# General Informations

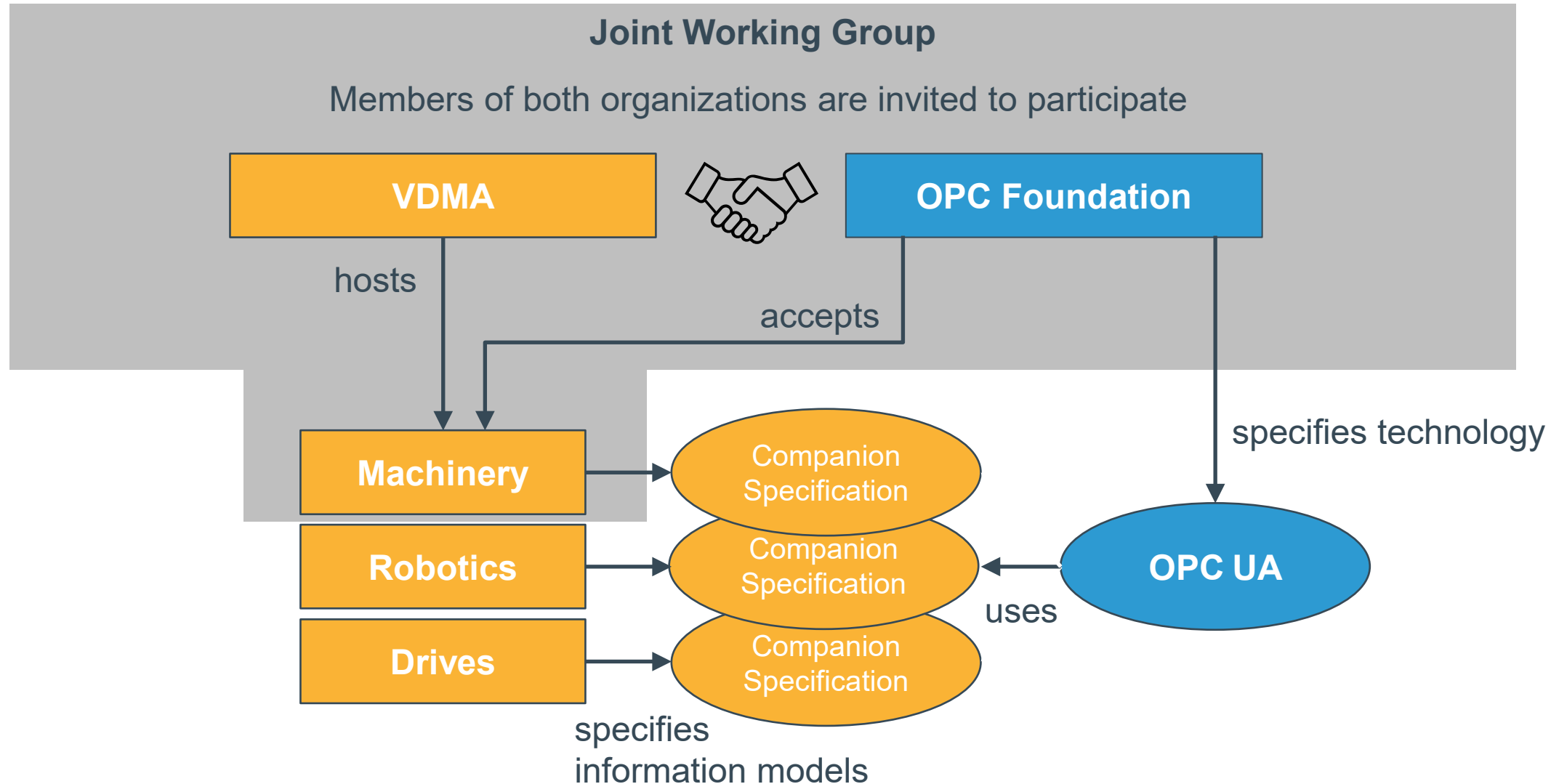


Modelling Expert: Dr. Wolfgang Mahnke

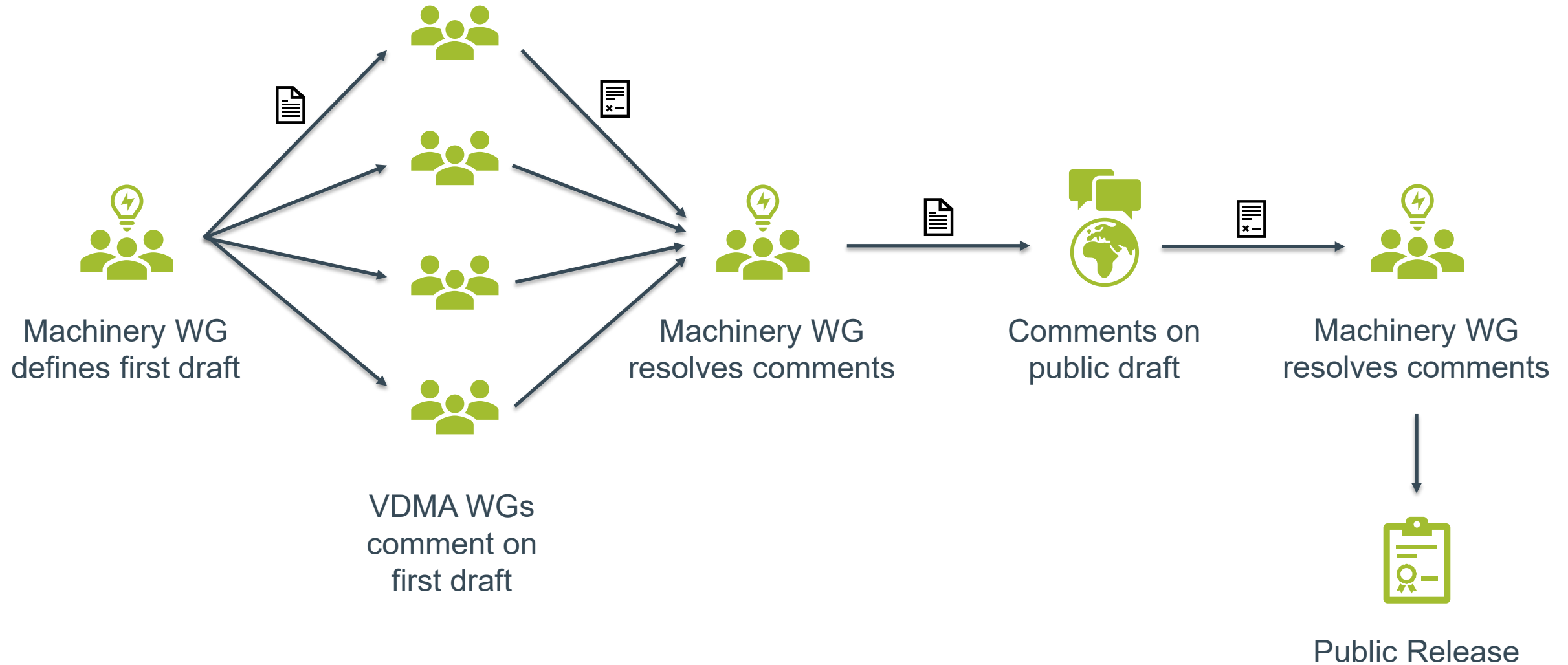
Representatives from: Robotics, Machine Tools, Metallurgy, Drives, Plastics & Rubber Machinery

Recently added: Machine Vision, Woodworking Machinery, Weighing

# Joint Working Group





# Feedback on Draft





# First results

VDMA Specification <i>Draft</i>		June 2020
	VDMA 40001-1	
ICS 25.020; 35.240.50		Comments by 2020-09-01
<b>OPC UA for Machinery – Part 1: Basic Building Blocks</b>		
OPC UA for Machinery – Teil 1: Basic Building Blocks		
<p>VDMA 40001-1:2020-06 is identical with OPC 40001-1 (Release Candidate 1.0.0)</p>		
<b>Application Warning Notice</b>		
<p>This draft with date of issue 2020-06-01 is being submitted to the public for review and comment. Because the final VDMA Specification may differ from this version, the application of this draft is subject to special agreement. Comments are requested</p> <ul style="list-style-type: none"><li>– preferably as a file by e-mail to <a href="mailto:heiko.herden@vdma.org">heiko.herden@vdma.org</a></li><li>– or in paper form to VDMA e.V., Forum Industry 4.0, Lyoner Straße 18, 60528 Frankfurt.</li></ul>		
VDMA		Document comprises 33 pages

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## First Building Blocks already released:

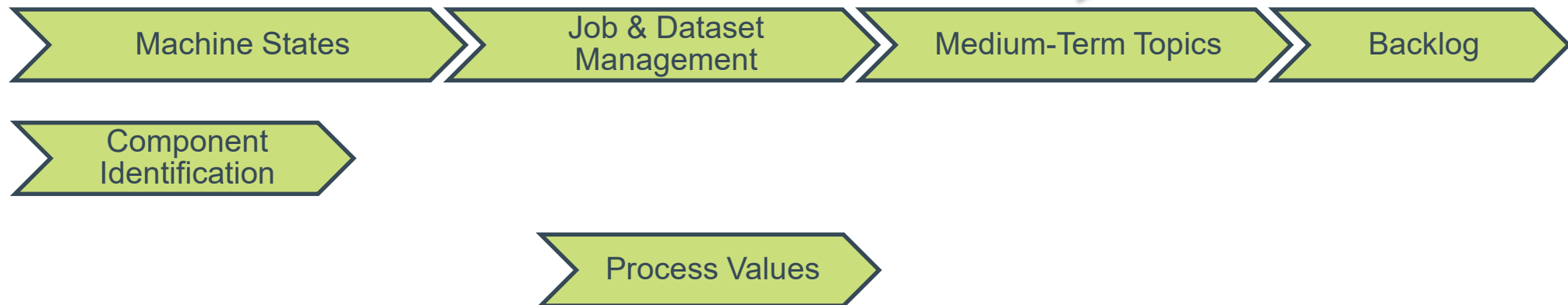
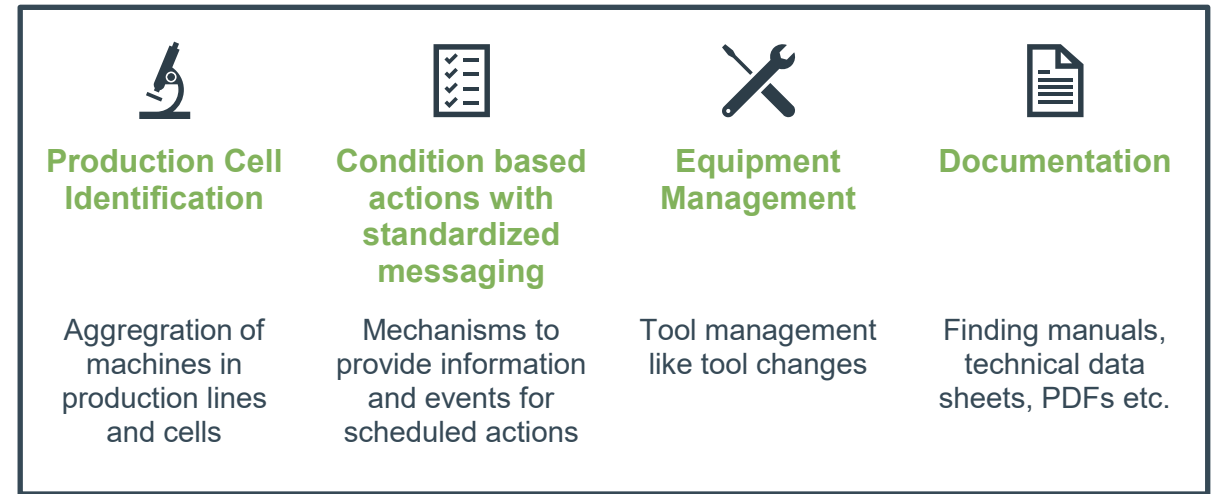


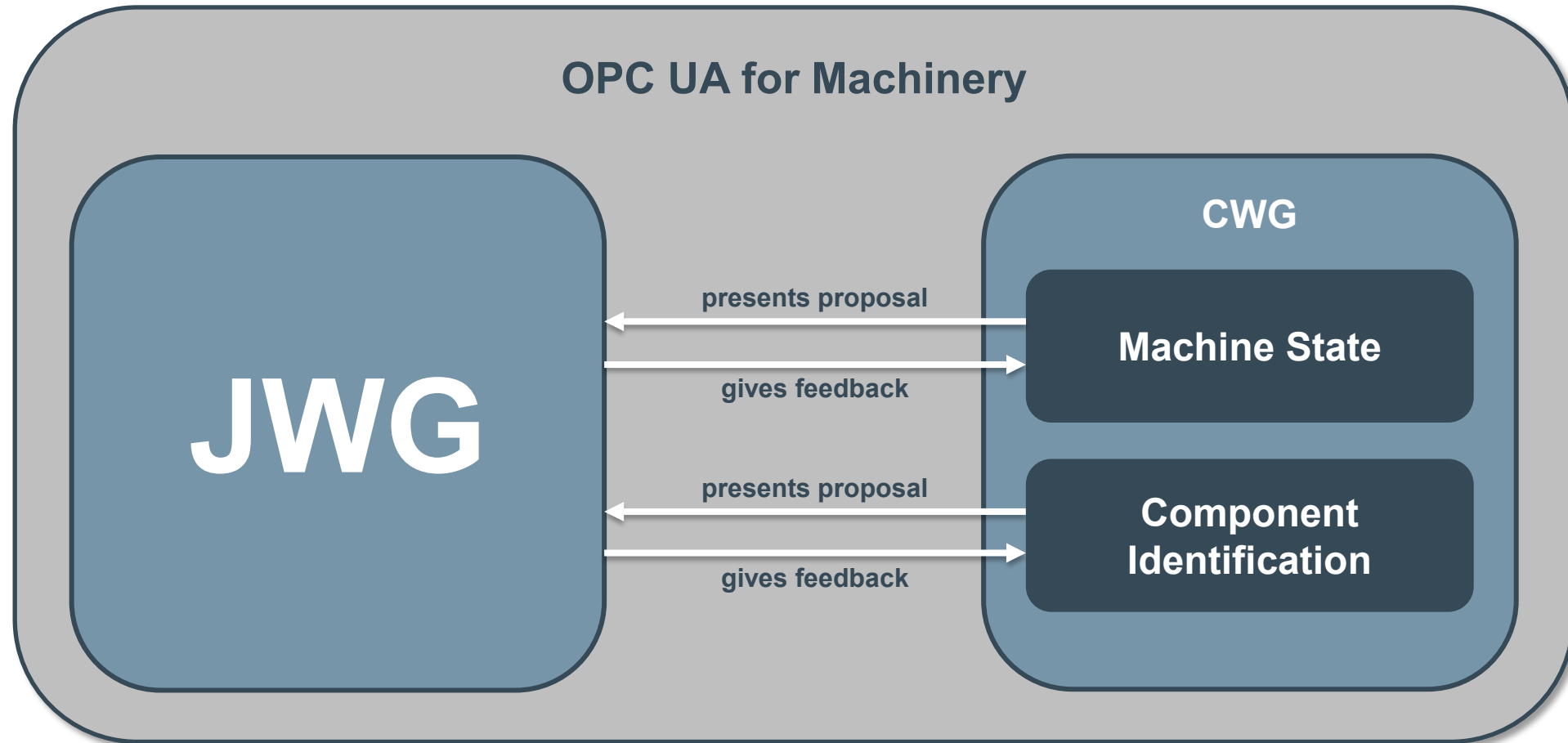
Machine Identification & Nameplate



Finding all machines in a server

1. **Component Identification**
2. **Machine States**
3. **Job & Dataset Management**
4. **Process Values**
5. **Medium-Term Topics**
6. **Backlog-Topics**







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# OPC UA for Machinery

Part 1 – Basic Building Blocks  
Machine Identification

# VDMA 40001-1 Draft

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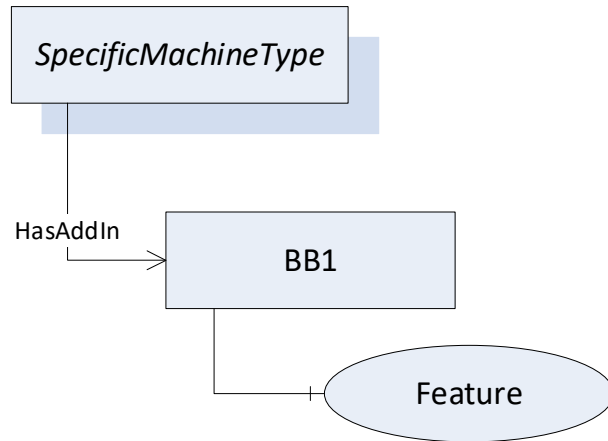
- First Draft released
  - Download: [opcua.vdma.org](http://opcua.vdma.org)
  - Comments until 1<sup>st</sup> of September 2020
- Containing 2 use cases
  - Machine Identification and Nameplate
  - Finding all Machines in a Server

The content of this specification is applicable for **any piece of equipment that converts energy** (e.g., electricity, steam, gas, human power, pressure) **to mechanical movements, heat, electrical signals, pressure etc.** to do a particular task in the mechanical engineering industry. This includes for example:

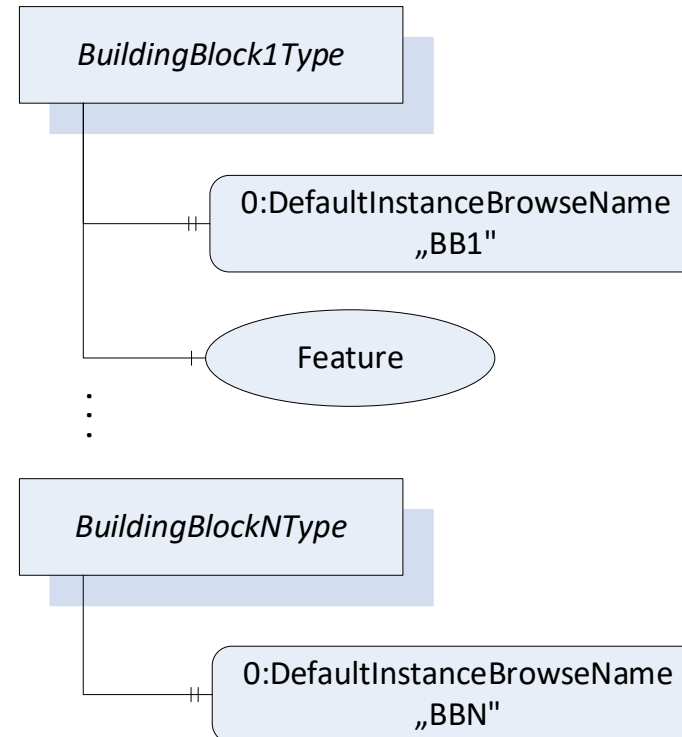
- a. Different types of Machines (see ISO 12100:2010), e.g. machine tools, injection moulding machines, woodworking machines, packaging machinery
- b. Partly completed machines, e.g. robotic systems
- c. Accessory and auxiliary equipment, e.g. interchangeable equipment, load-carrying equipment
- d. Devices and modules for the process industry, e.g. ovens, power systems
- e. measuring, analysis and testing equipment, e.g. machine vision systems
- f. control systems
- g. the environment with which entities are energetically and/or communicatively connected
- h. Installations consisting of multiple entities

- Using AddIn concept, defined in OPC 10001-7

Example usage



Building Blocks defined in this specification





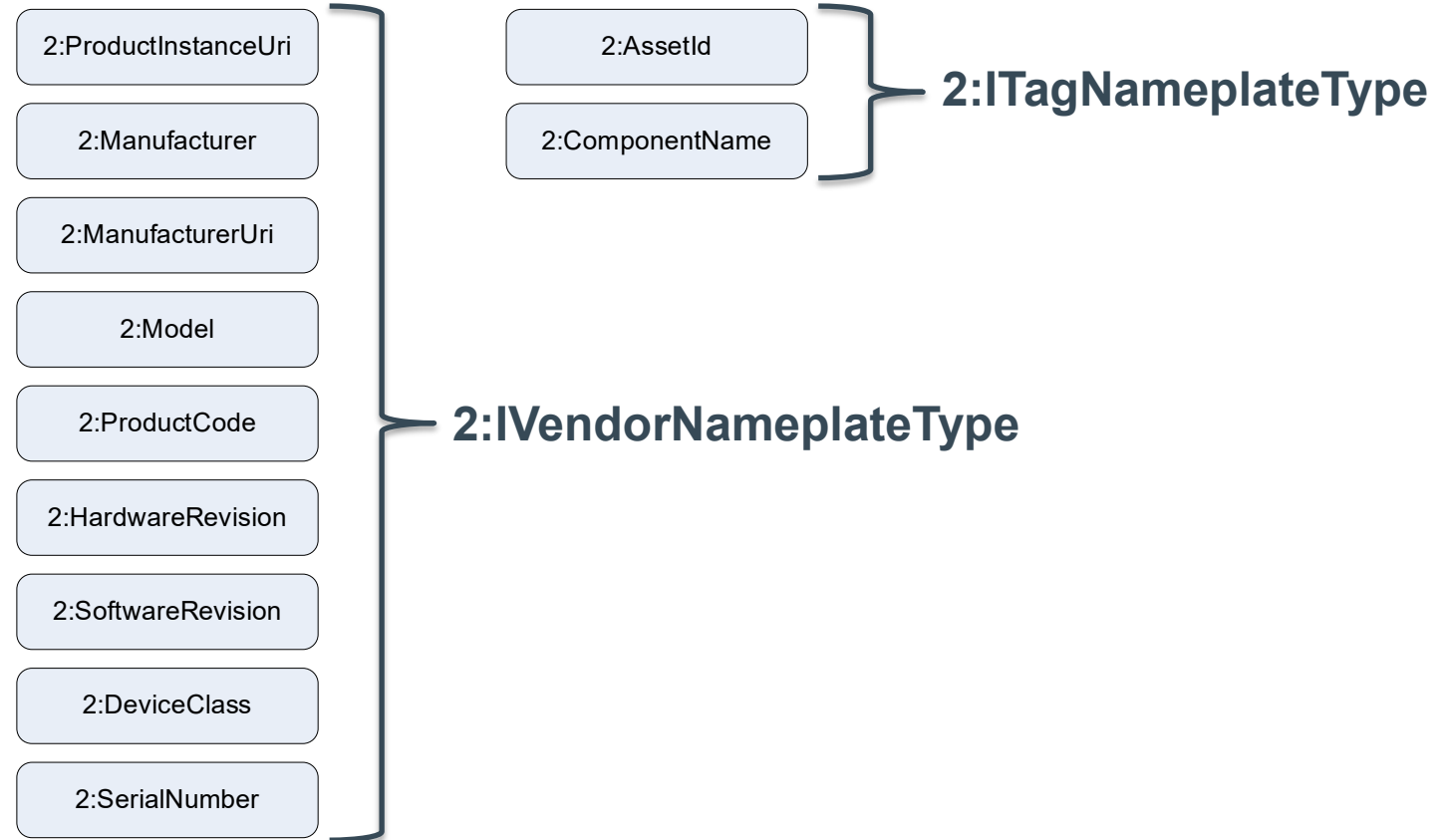
## Objective:

The user wants to

- Uniquely identify machines
  - Across OPC UA Servers
- Get Standardized information about the machine
- Set user-specific information in order to simplify the usage of the machine



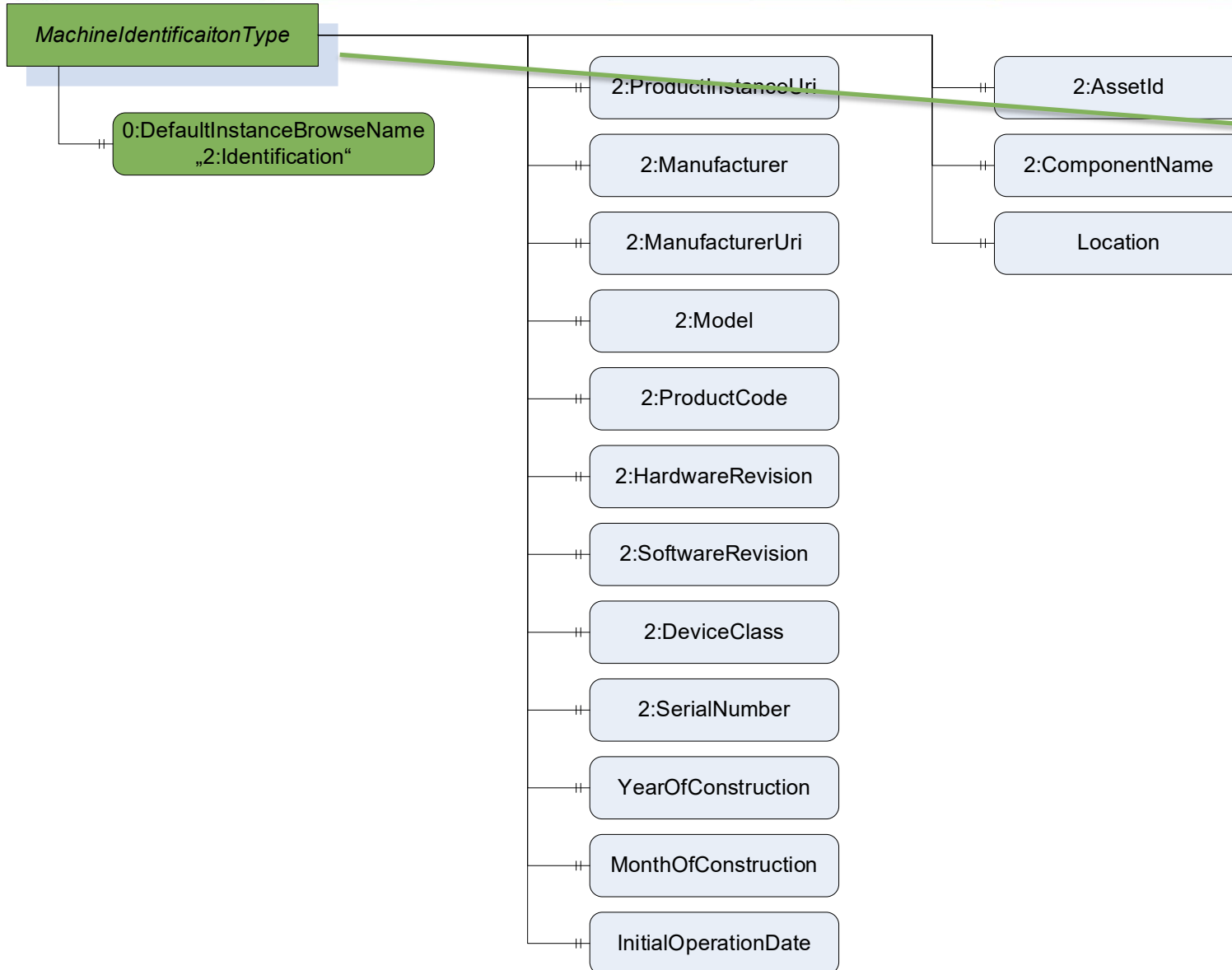
# MachineIdentificationType



Meaning of „2:“  
Inherited from  
Part 100: Devices

→ using OPC UA common models (DI) to gain higher interoperability

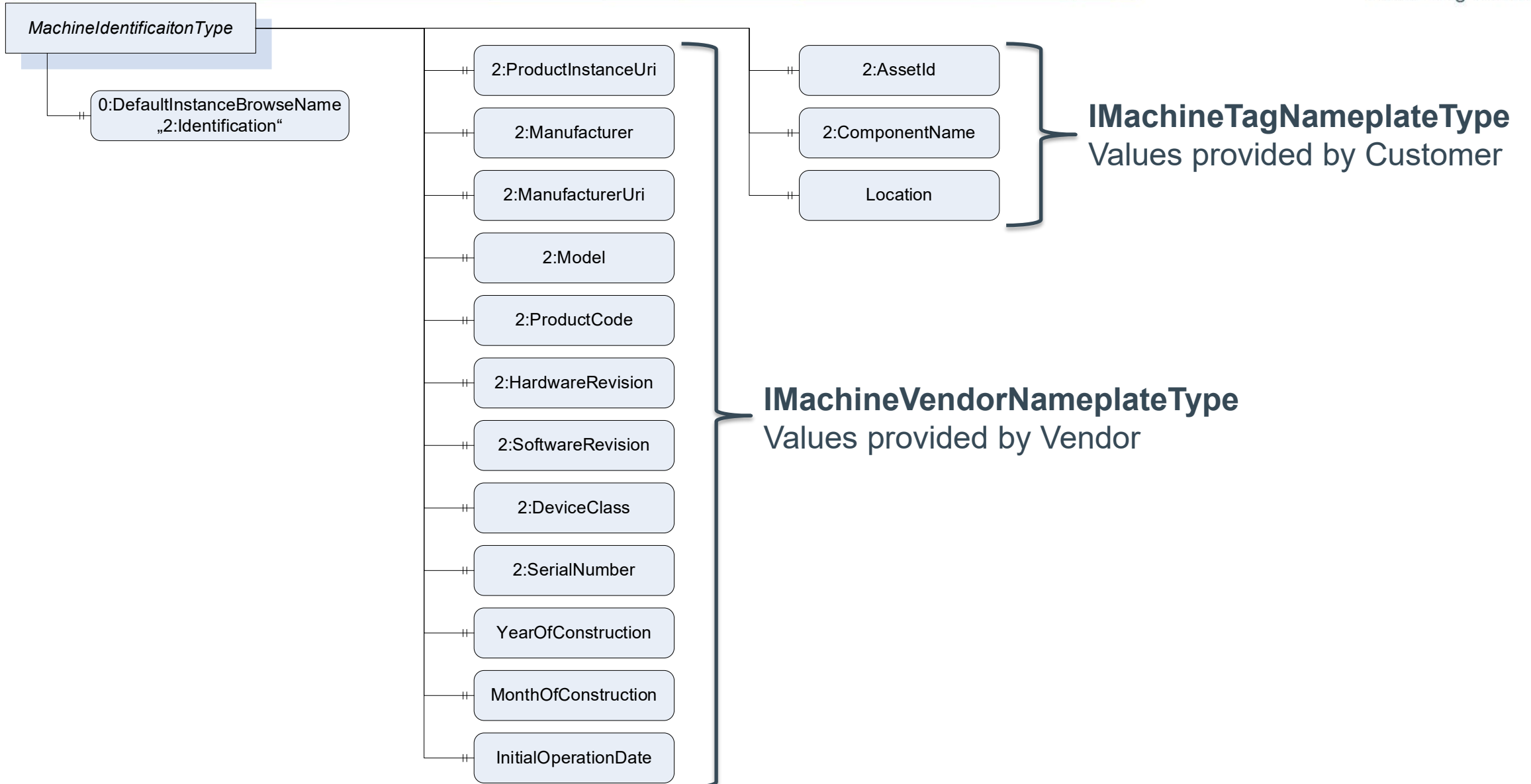
# MachineIdentificationType



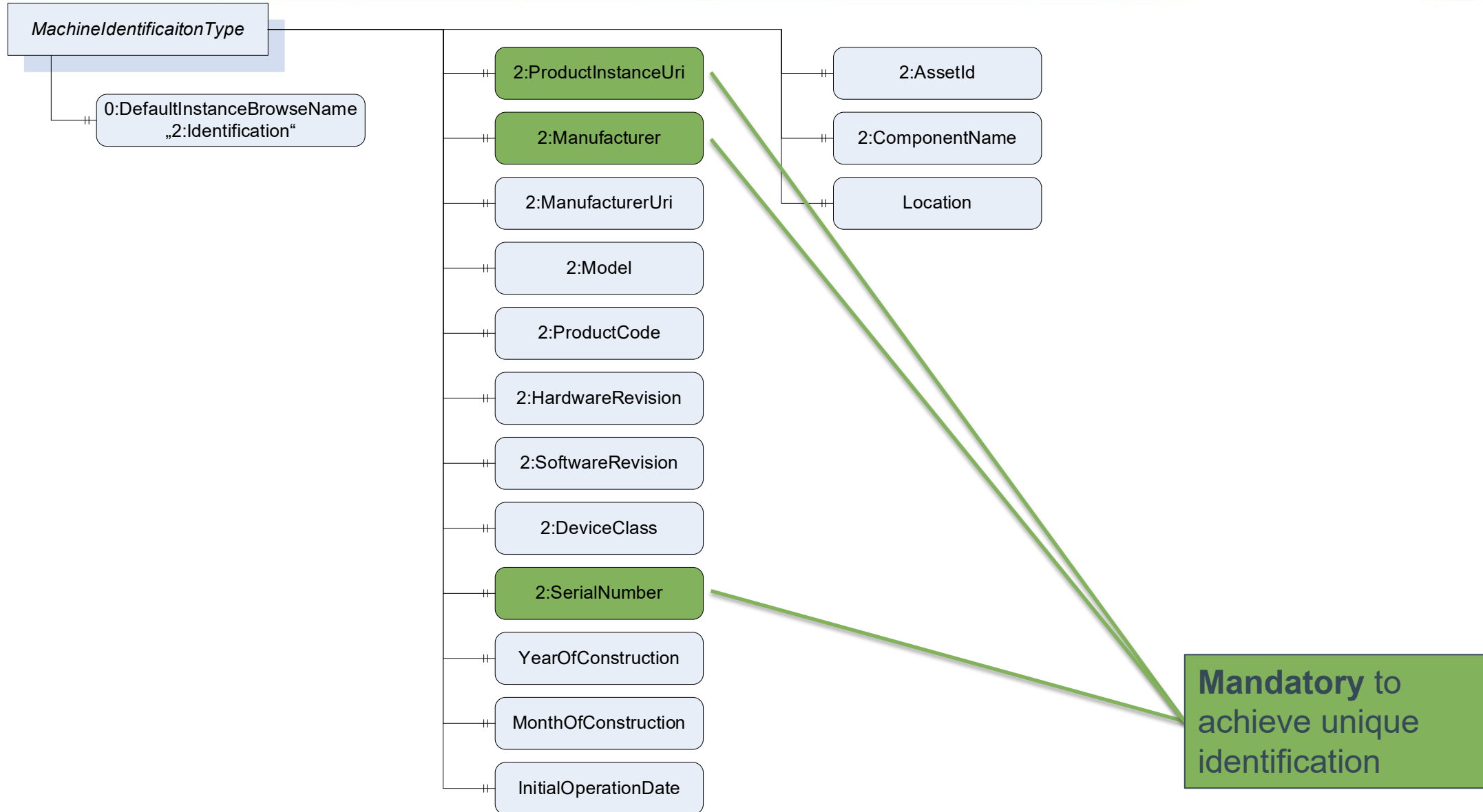
MachineIdentificationType is an **AddIn**

can be **integrated into any Type** using the HasAddIn-Reference

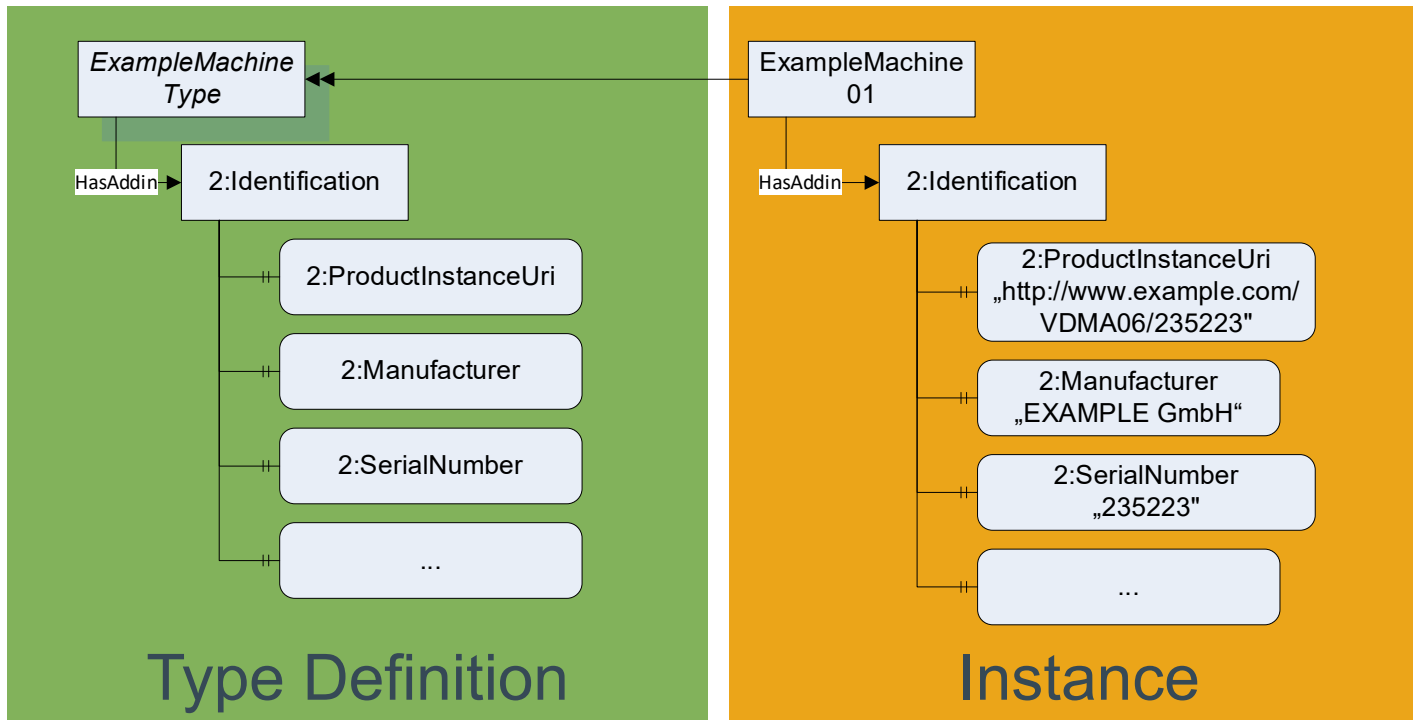
# MachineIdentificationType



# MachineIdentificationType



# MachineIdentification Example



# Use Case: Finding all Machines in a Server



## Objective:

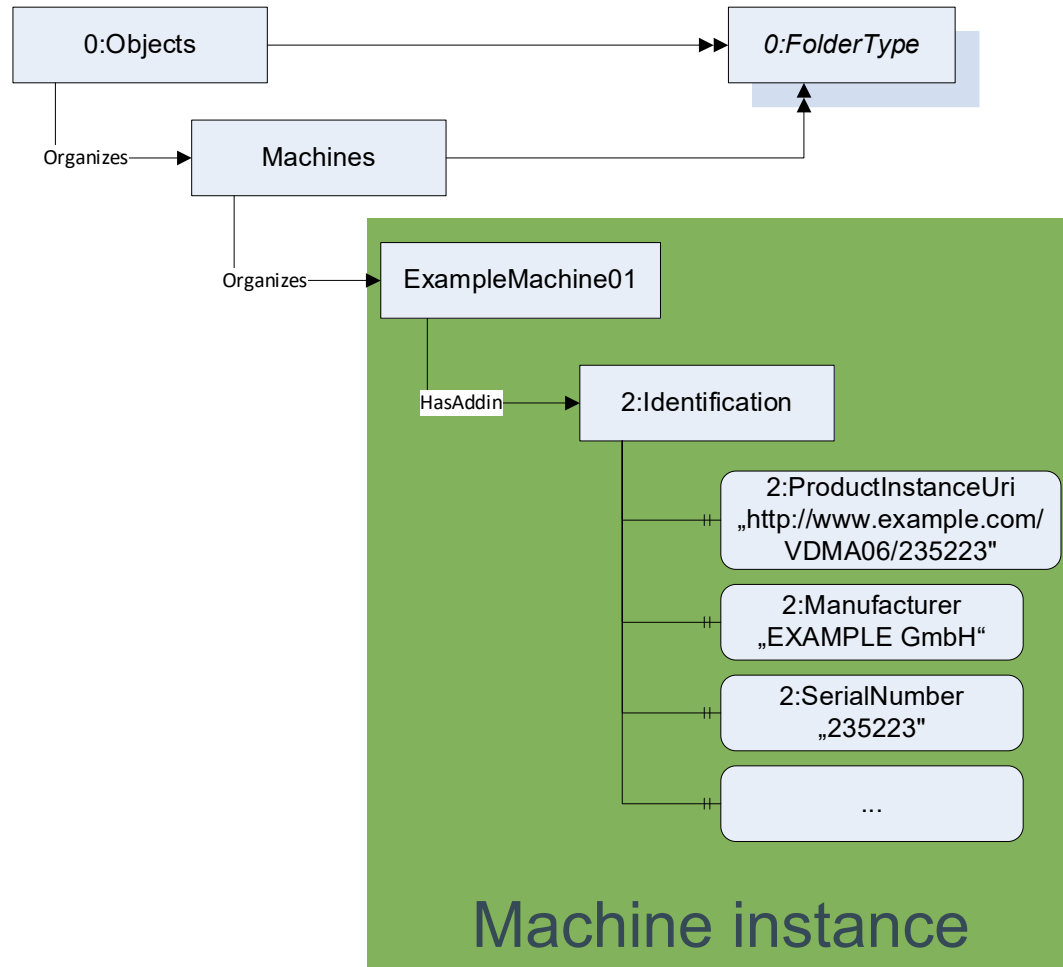
The user wants to

- Easily find all machines managed by an OPC UA Server

# Finding all Machines in a Server



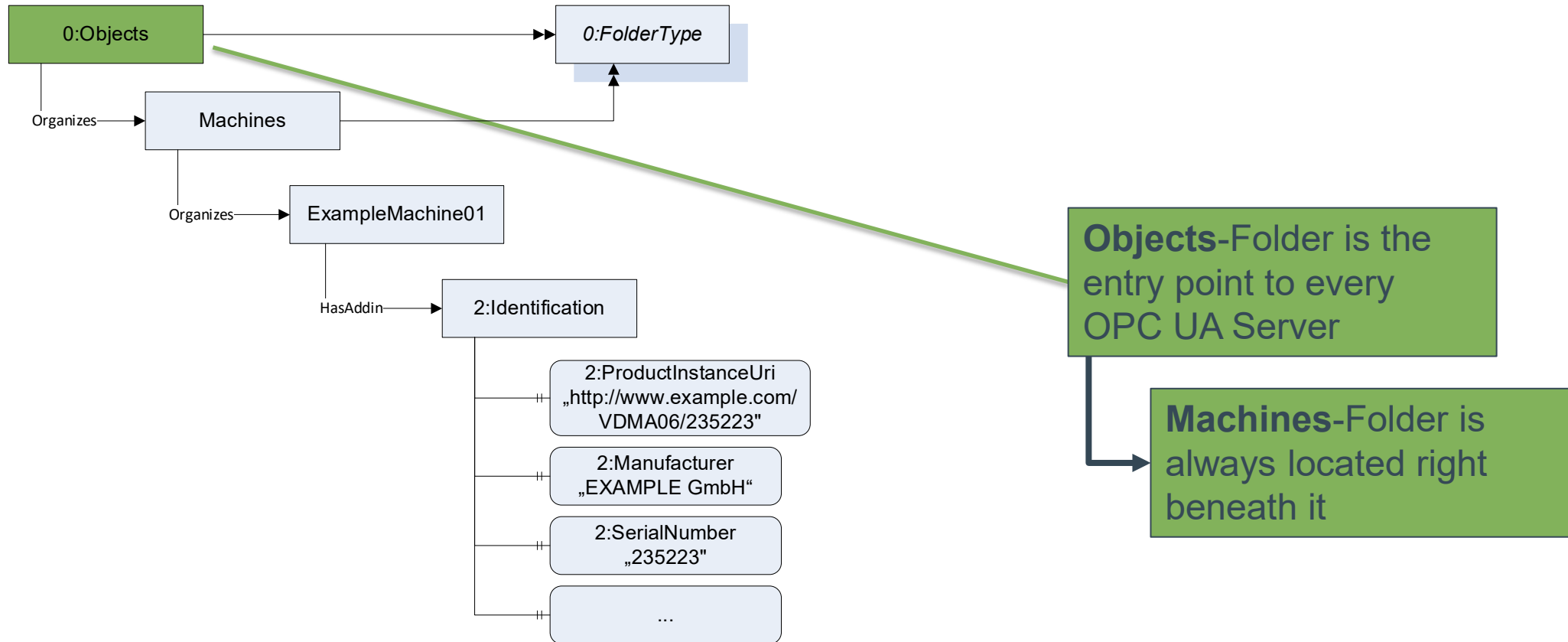
# Finding all Machines in a Server



**Machines-Folder** organizes any Machine that provides the MachineIdentificationType Addin



# Finding all Machines in a Server



Title	Description
Machinery Identification	Supports the MachineIdentificationType with all its mandatory InstanceDeclarations, and optionally the optional InstanceDeclarations with <b>read access</b> .
Machinery Identification Writable	Supports the MachineIdentificationType with all its mandatory InstanceDeclarations, and optionally the optional InstanceDeclarations, with <b>writable access</b> to all Variables defined as writable in this specification. The optional Properties 2:AssetId, 2:ComponentName and Location shall be provided.
Find Machines	Supports the Machines Object and references all Machines of the Server as defined by the Machines Object.



- Harmonizes OPC UA information models across the mechanical engineering industry
  - Achieving higher interoperability
  - Supported by the BMWi
- Defines Building Blocks
  - Easy to integrate
  - First Draft: Machine Identification & Finding All Machines
- Is a VDMA & OPC Foundation Joint Working Group