OPC UA for Robotics

VDMA Webinar Series

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The VDMA OPC UA Robotics Initiative Working Group

- approximately 35 companies in the total working group
- members of the core working group are vendors and users
- Kick-off in February 2017 – workshop for identifying the requirements
- 13 face-to-face two-days core working group meetings, clarifications and preparations in sub-groups in between and several online conferences (for Part 1)
- Work on Part 2 started in September 2019 and is currently underway

Already achieved:

- OPC UA Companion Specification Robotics (OPC Robotics) – Part 1: Vertical integration
- Release May 2019

OPC Robotics Core Working Group

Scope of the VDMA OPC Robotics Information Model

Purpose

» the creation of an OPC UA Robotics Information Model which
- enables access to standardized data structures of robot systems
- is useable independent of robotic type characteristics

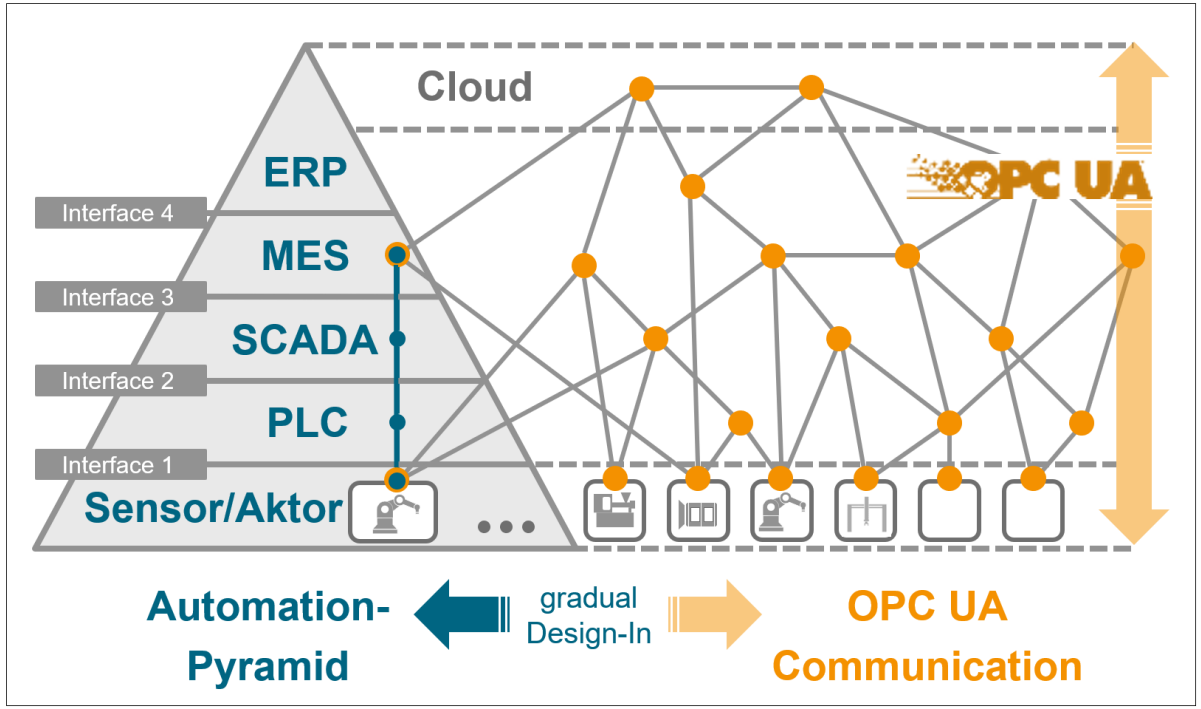
Agreement to proceed stepwise

» **Part 1:** vertical information provisioning for higher-level controls, SCADA systems, MES and Cloud

➔ **Asset Management**

➔ **Condition Monitoring**

Part 1 describes the components of a robotic system in the information model and further parts will extend this components with more features



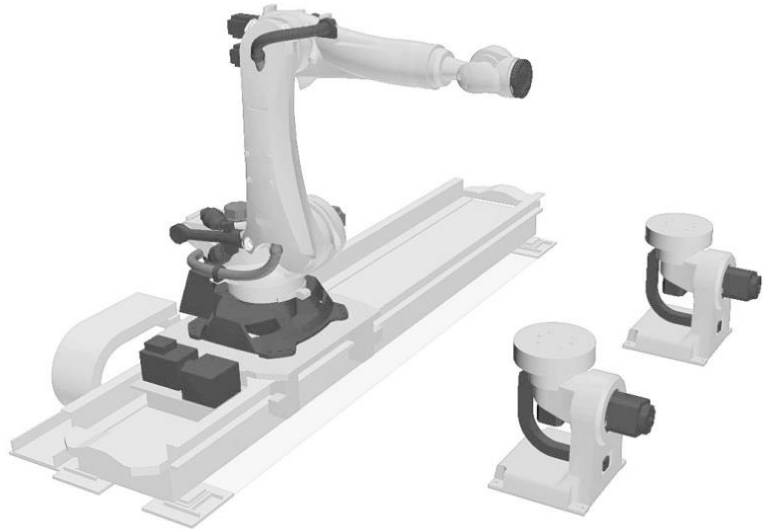
Definition of Robotics for the Companion Specification

The OPC UA Robotics CS describes an information model which aims to cover all current and future robotic systems

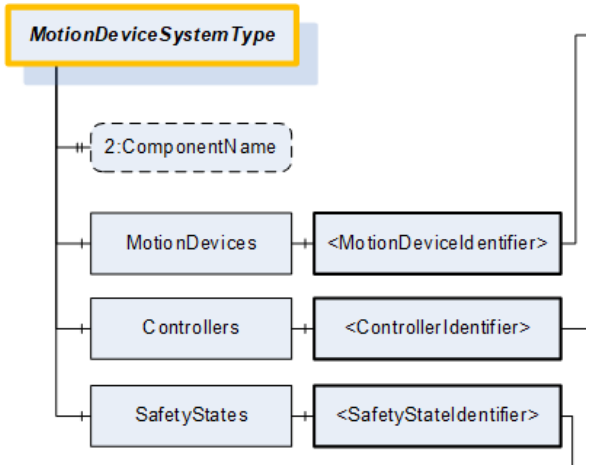
- industrial robots
- mobile robots
- additional axes
- control units
- peripheral devices, which do not have their own OPC UA server

A so-called *Motion Device System* can consist of several manipulators and controllers

- a robot on a linear unit working with two turntables controlled by one control unit
- a mobile platform with to robot arms



Component oriented modelling approach – abstract view



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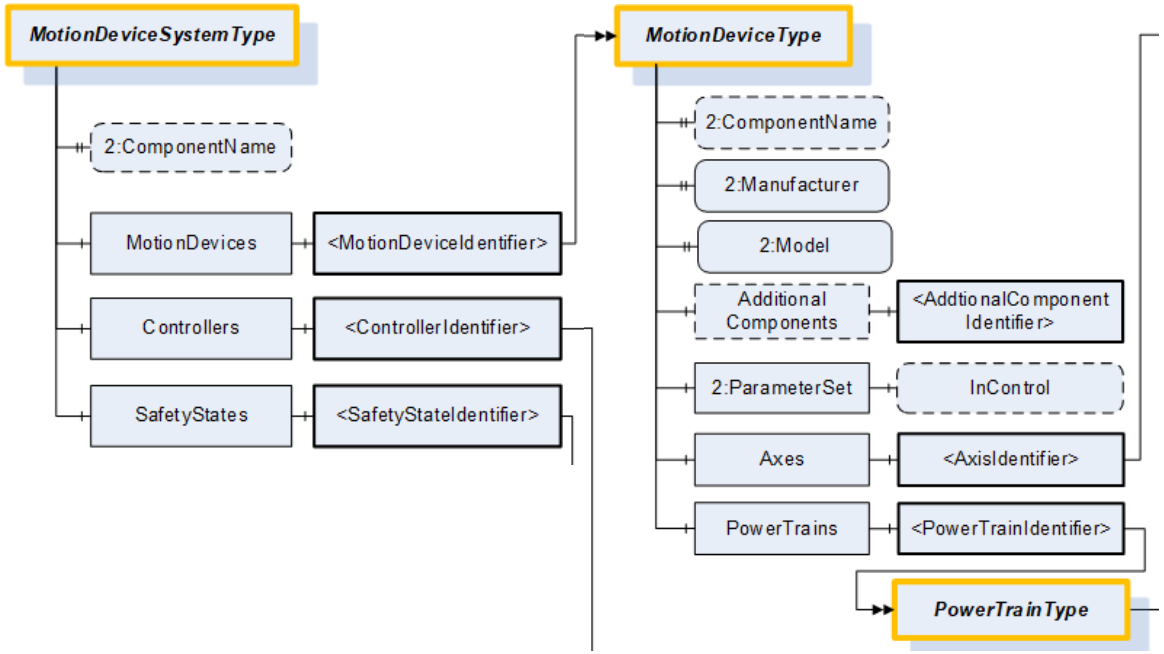

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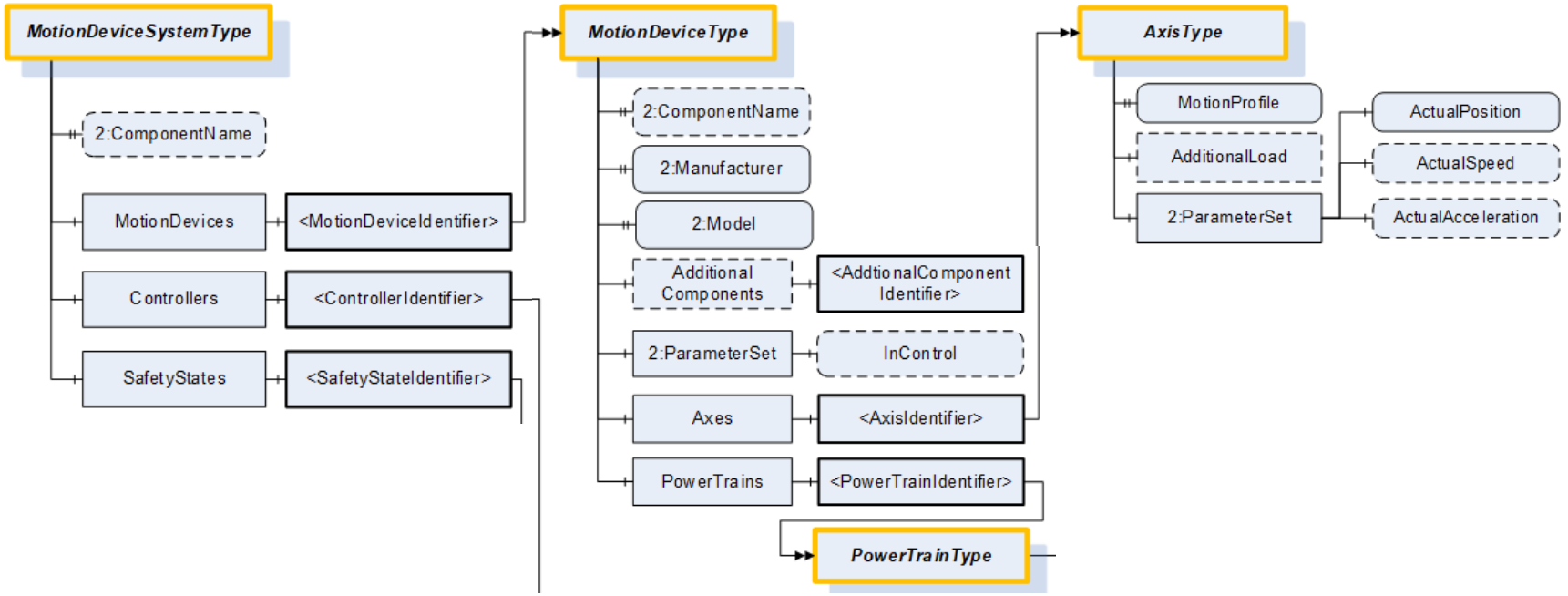

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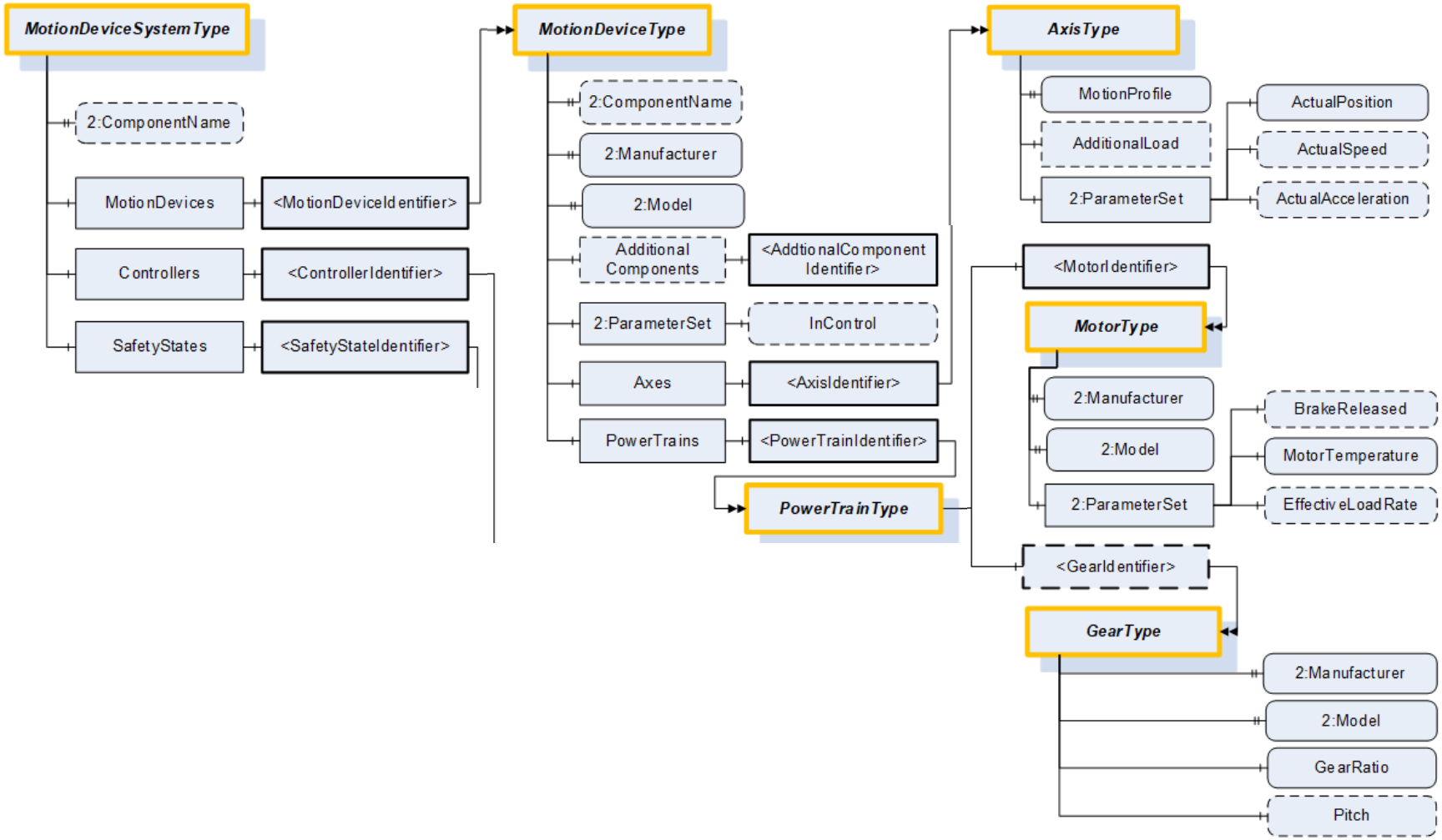

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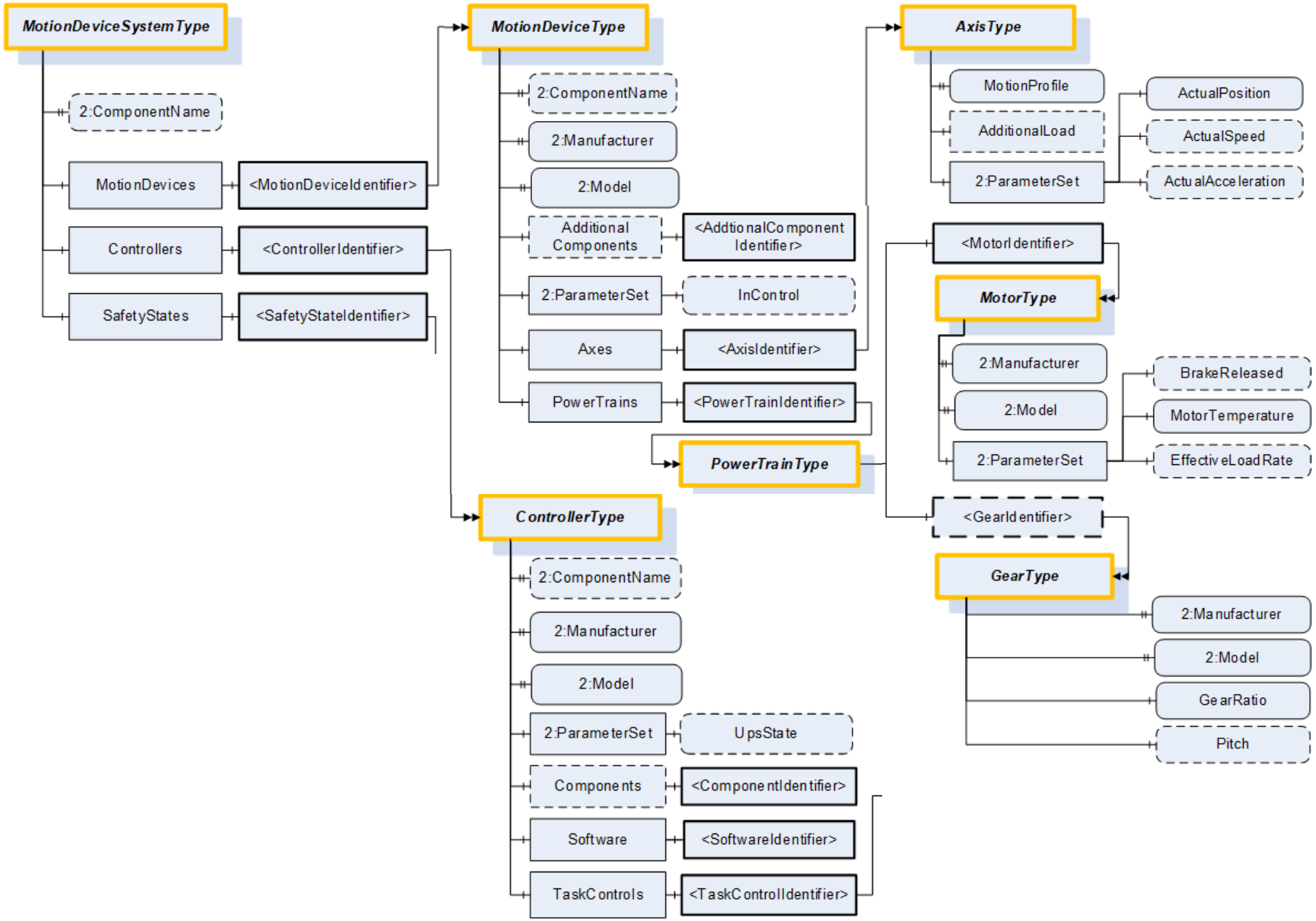

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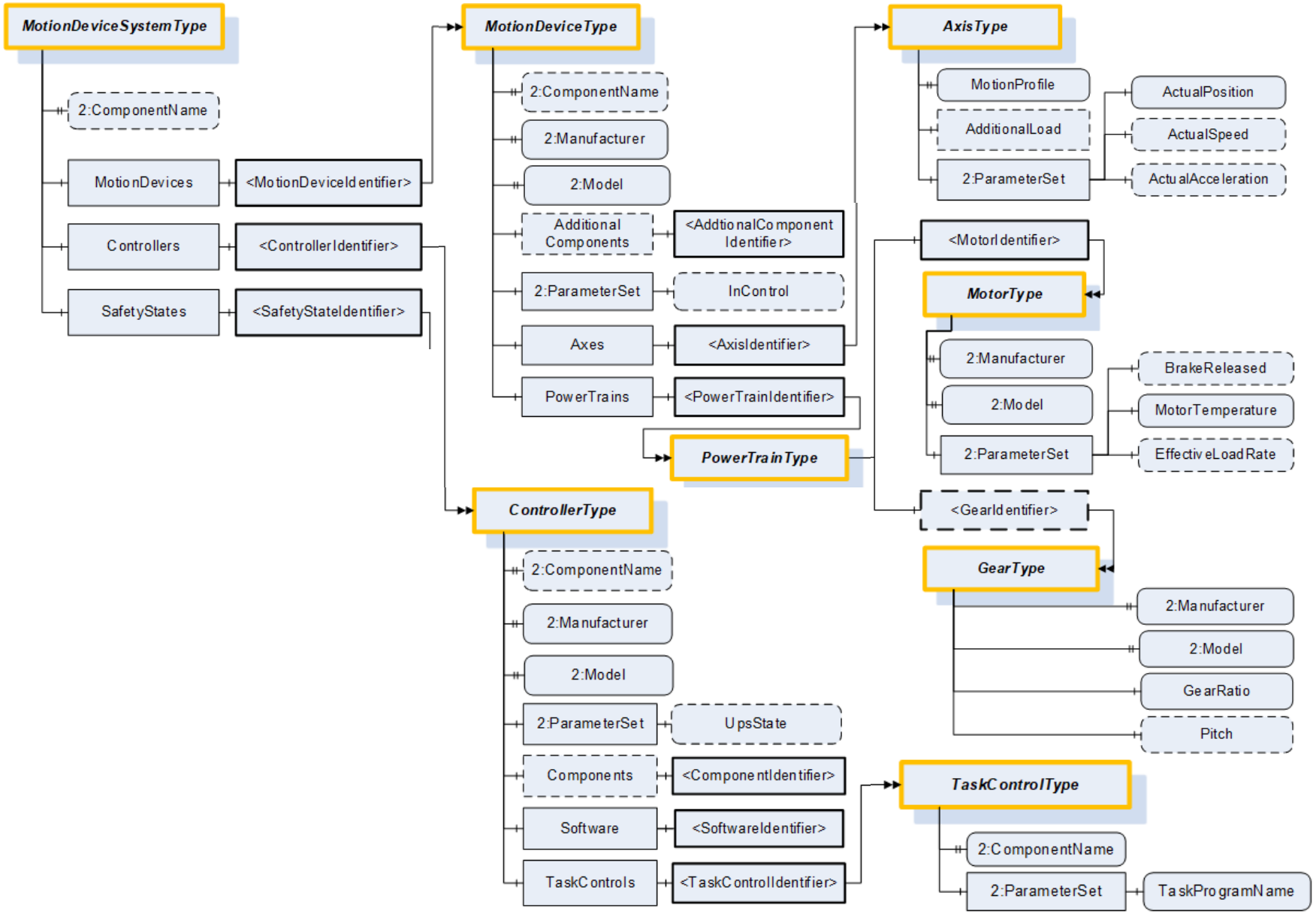

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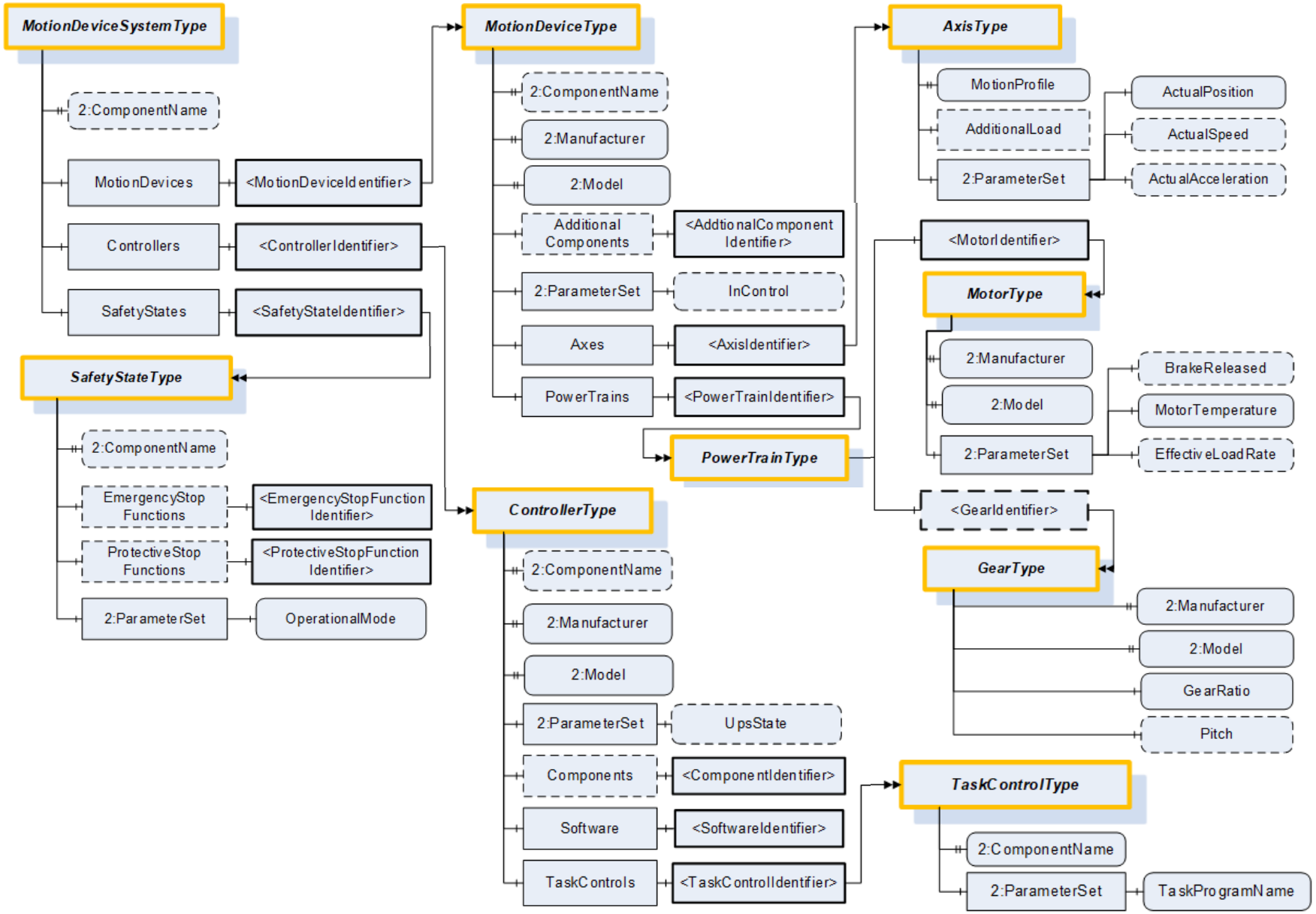

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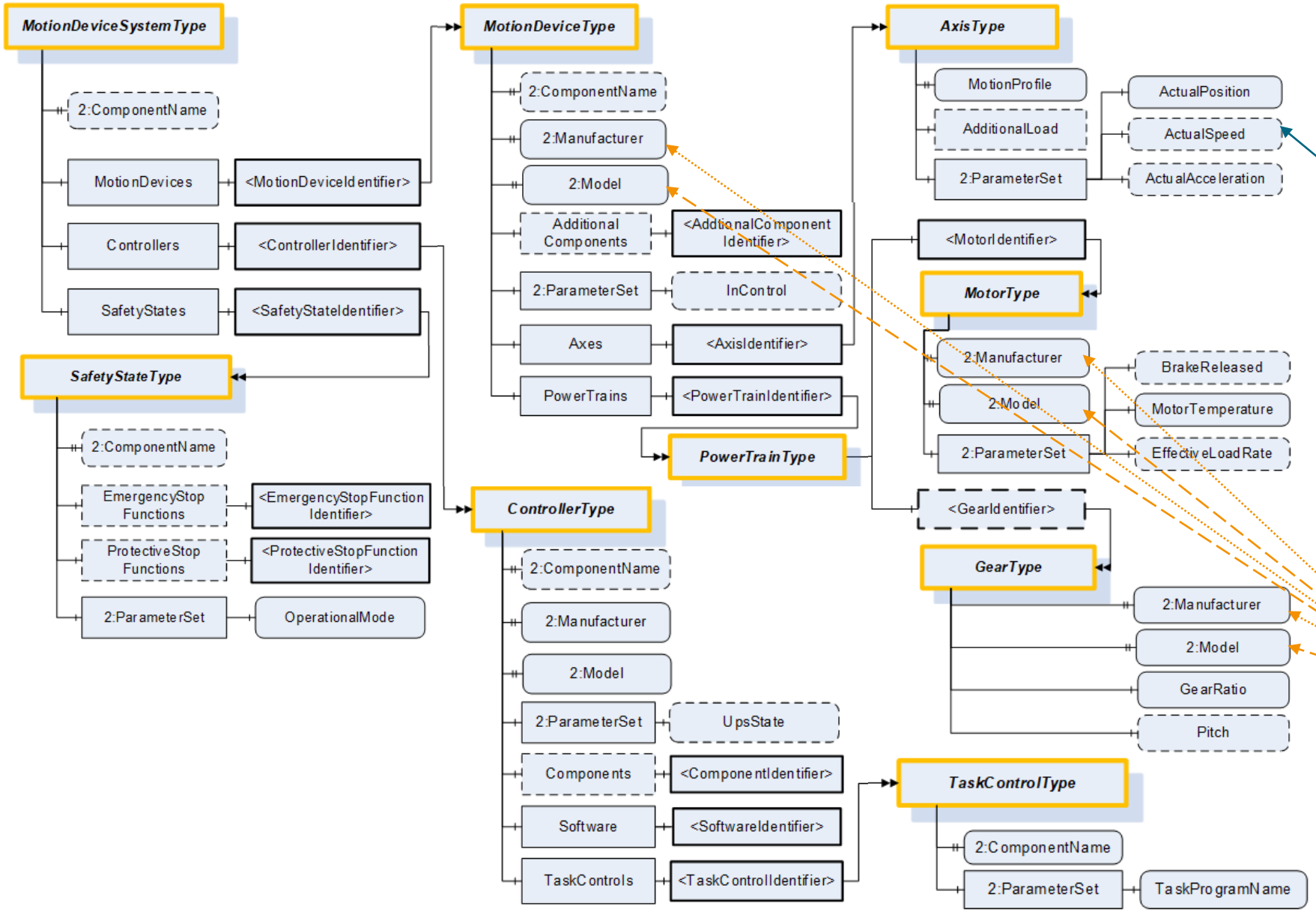
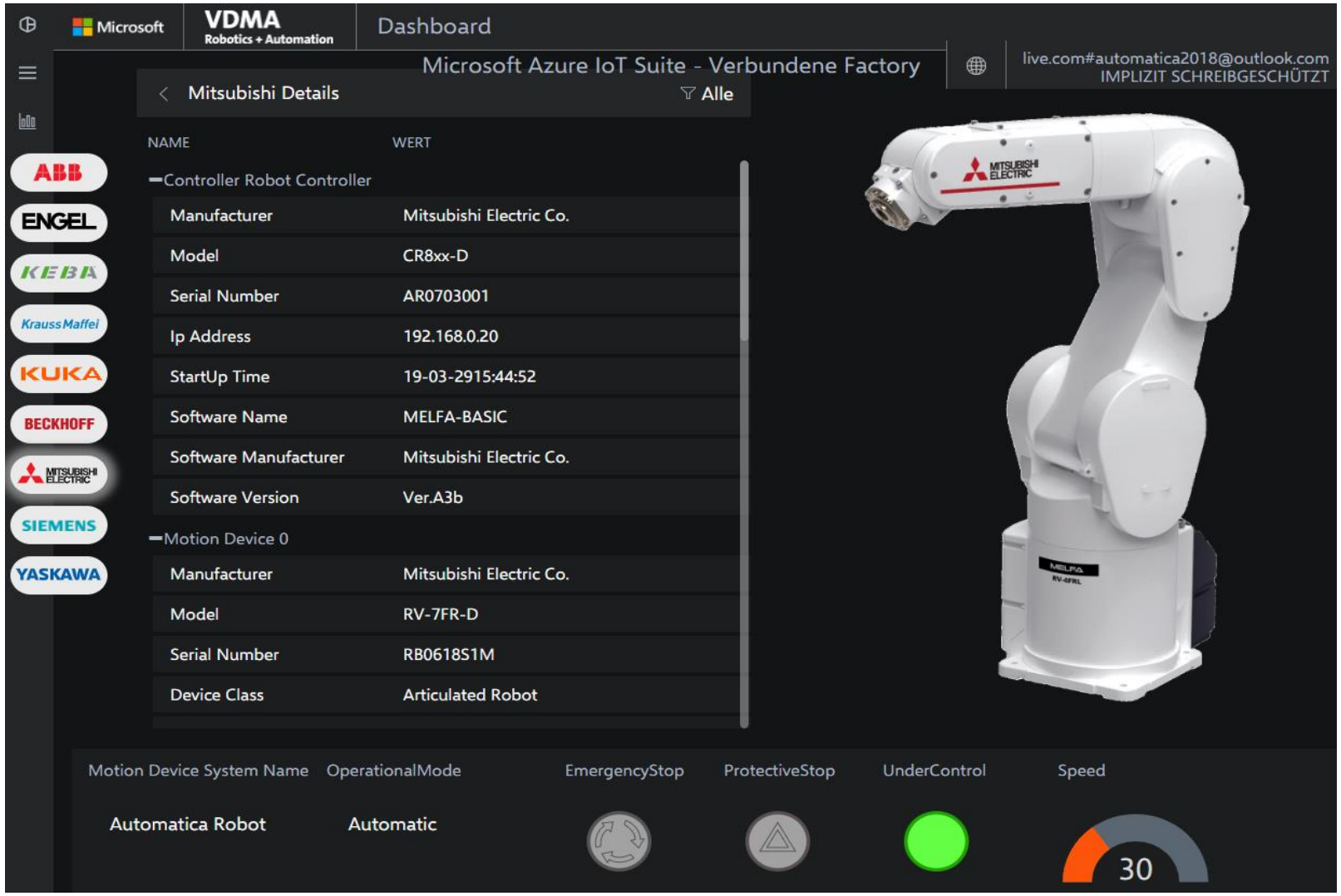


all variables of ParameterSets are Pub/Sub capable

SubType of 2:ComponentType (OPC UA DI Part100)

all asset-information properties are standardized by OPC UA DI

Proof of concept demonstrator:



» Nine vendors implemented the Robotics CS and all systems publish data to an HMI located hosted on an MS Azure Cloud

OPC UA Demo Server including the Robotics Information Model

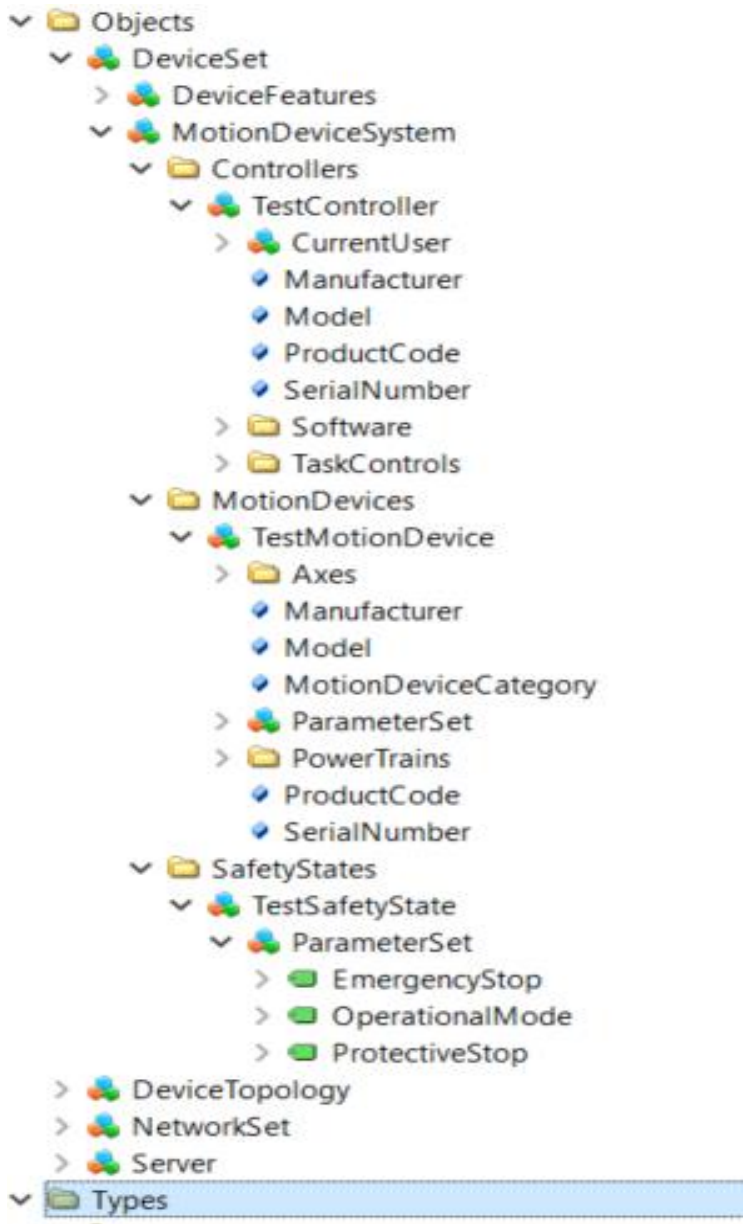
Connect via an OPC UA client to the Robotics Demo Server and discover a static minimal example implementation of the Robotics Information Model:

Endpoint Url:

opc.tcp://robotics.umati.app:4840

Authentification: Anonymous

Security Settings: None



Topics being covered in next parts

- **State machine for remote control on different levels:**

  TaskControl-Remote:

  - load, unload or reset a program
  - listing and up- and download of programs
  - start and stop of the taskcontrol
  - initiate jumps in sub routines

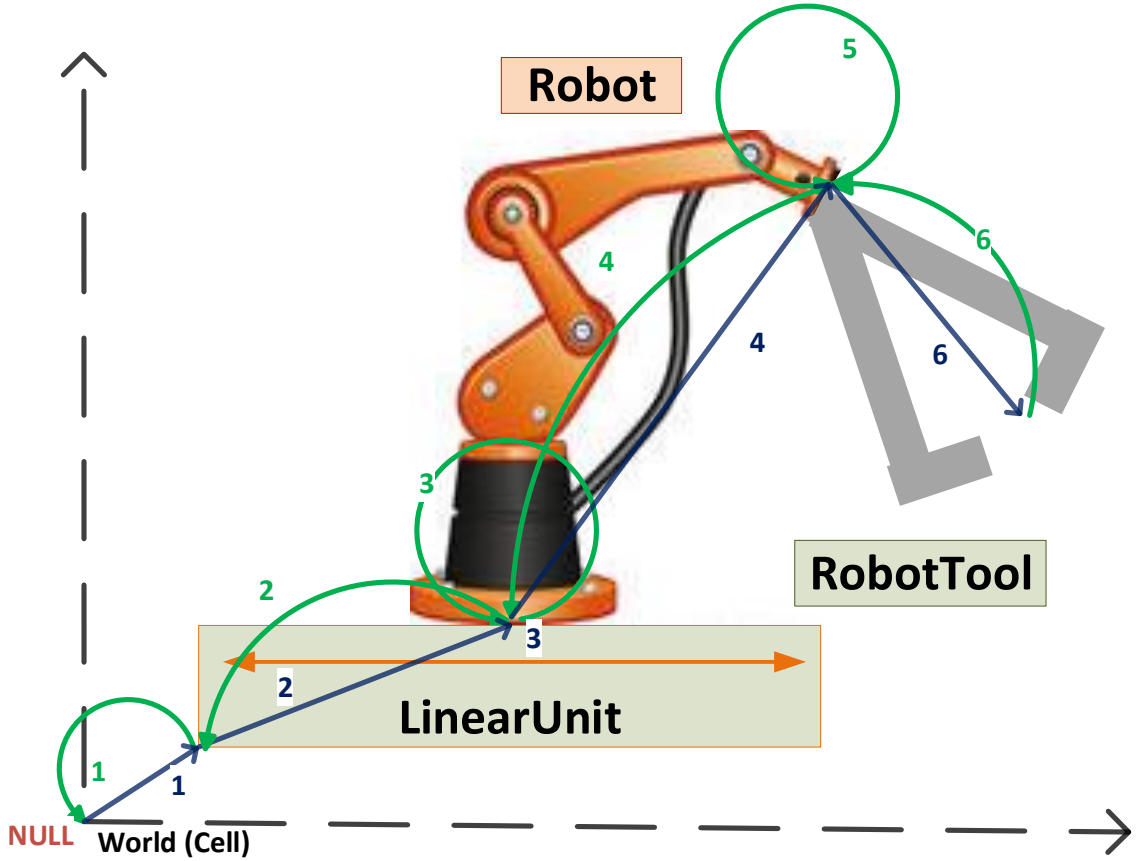
  Inclusive administrative access:

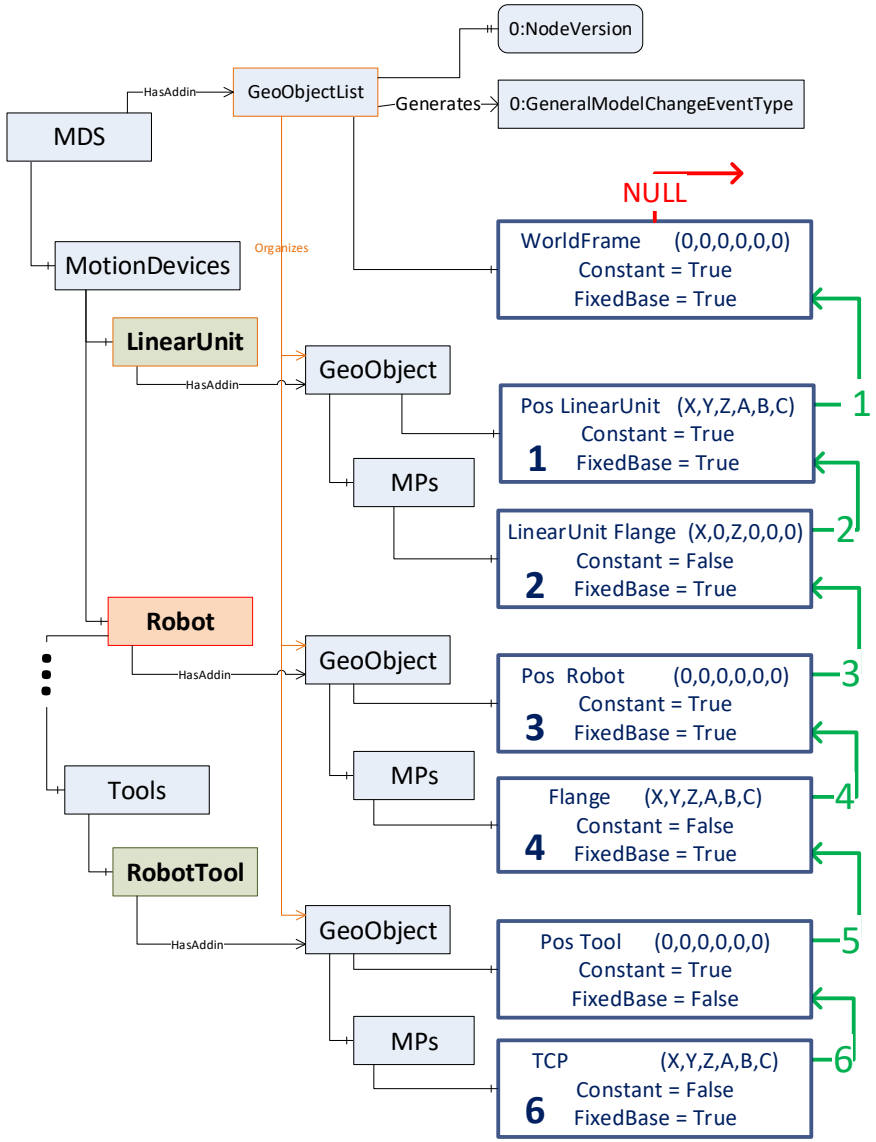
  - confirmation of system messages
  - switching drives on/off

- **Defined use of OPC UA Alarms and Conditions (harmonized over VDMA working groups) for standardized messaging and alarming of industrial devices**

Topics being covered in next parts

- Geo Object concept to describe cartesian position of objects in relation





Interoperability within Robotics + Automation and beyond

Interoperability between different OPC UA Working Groups

- Identified as an important topic where OPC Robotics plays a central role because of the dependency in the Machinery Industry upon Robotics

- The R+A Interoperability Task Force takes care of the Harmonization between the OPC UA Companion Specifications being developed within R+A i.e. OPC Robotics, OPC Machine Vision, and the current OPC UA Working Groups within the Integrated Assembly Solutions (Gripper CS, Tightening Solutions CS)

- The VDMA wide Harmonization Group worked on a more general CS called OPC UA for Machinery, which aims to define a generic CS defining the data structures common to all of the machinery industry. Here as well, OPC Robotics plays a primary role

OPC Robotics

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