FESTO

AutomationML for automation components

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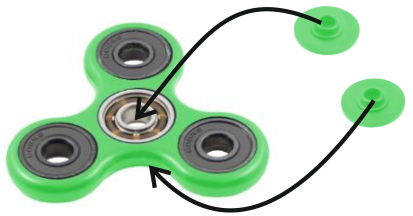
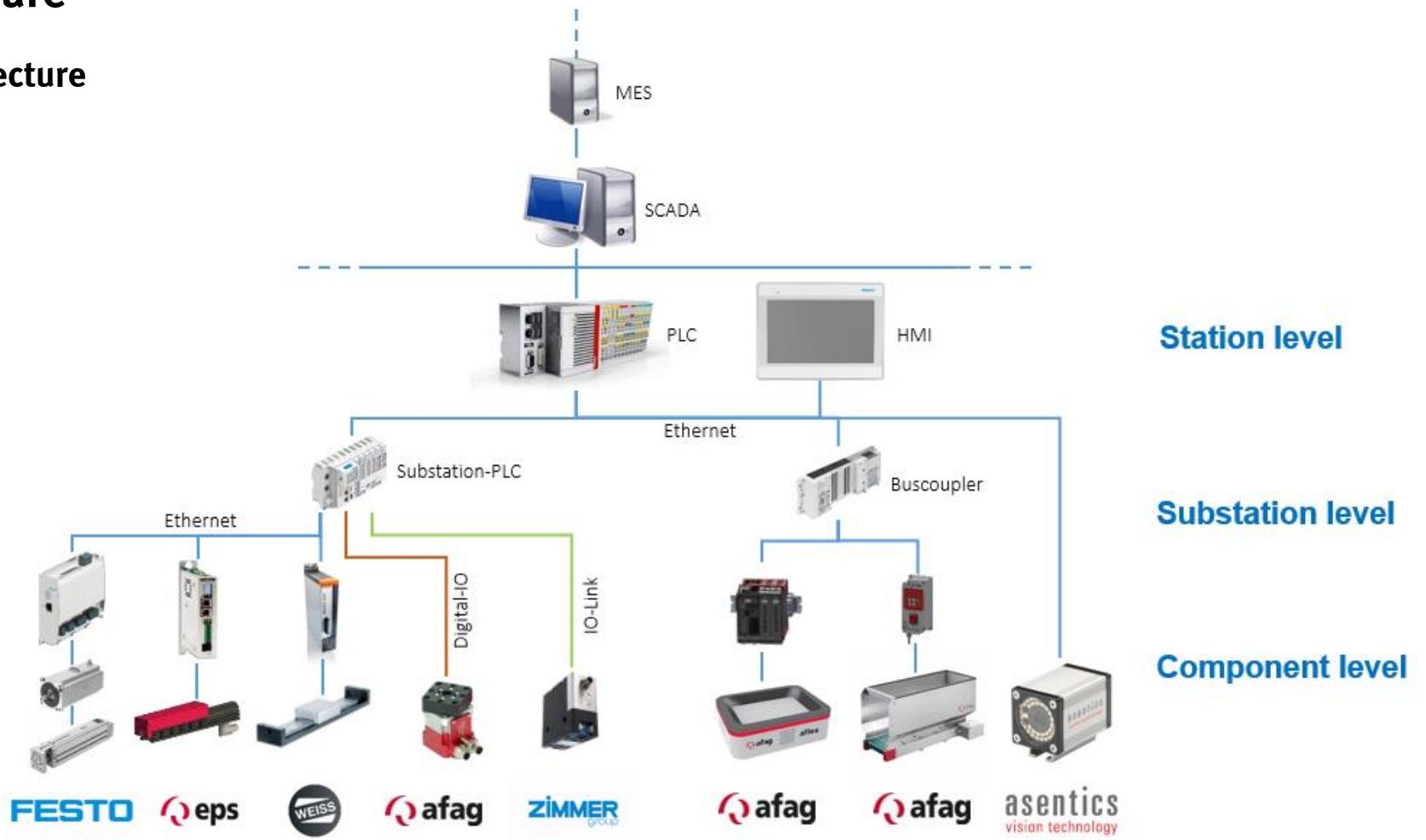
Specialist System Architecture

Festo AG & Co. KG - Headquater, Esslingen am Neckar

Machine architecture

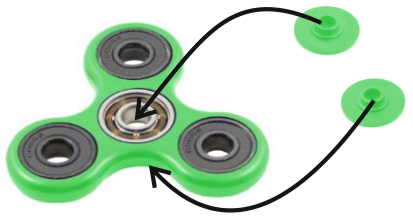
Classical control architecture

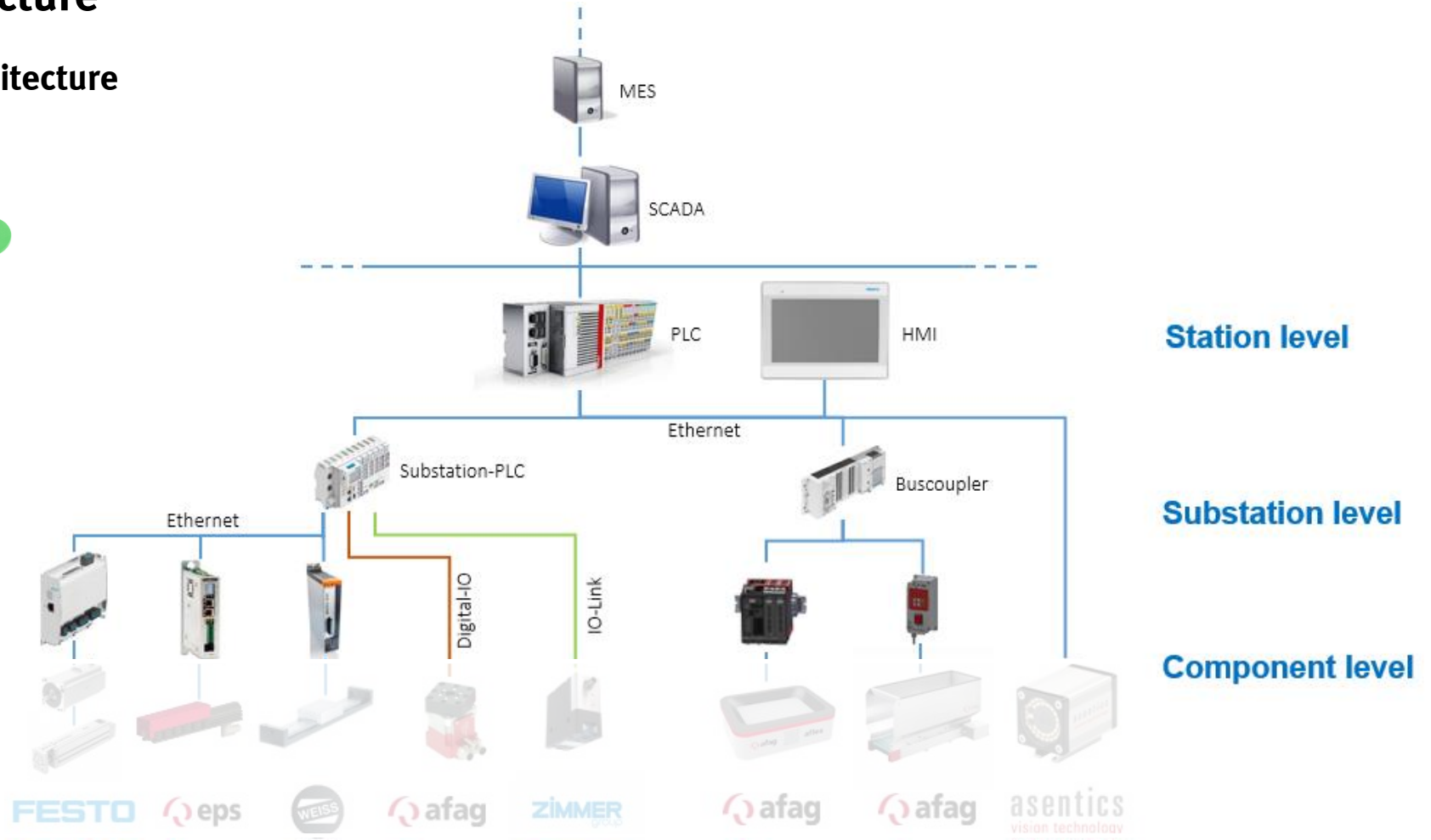




Machine architecture

Classical control architecture



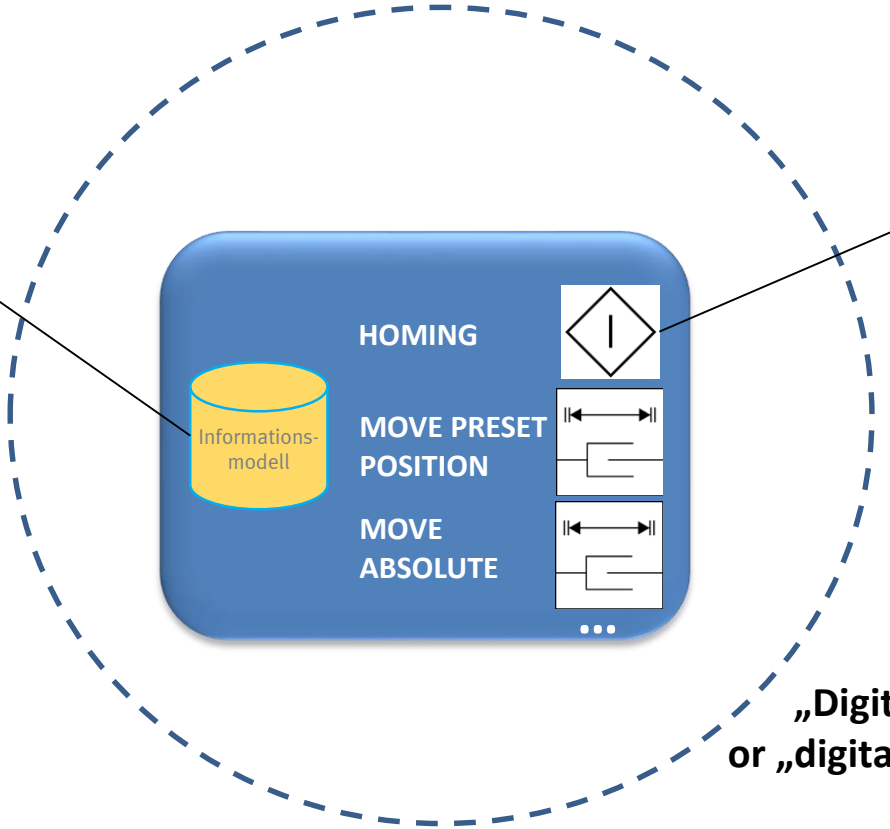


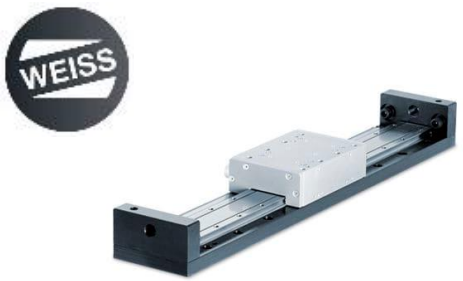
Object and capability based machine architecture

Digital representation

Attributes
= data/information model

Methods
= Capabilities

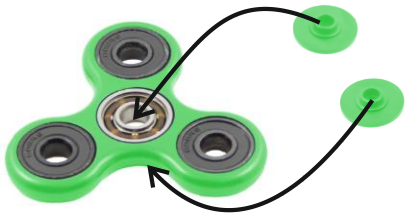


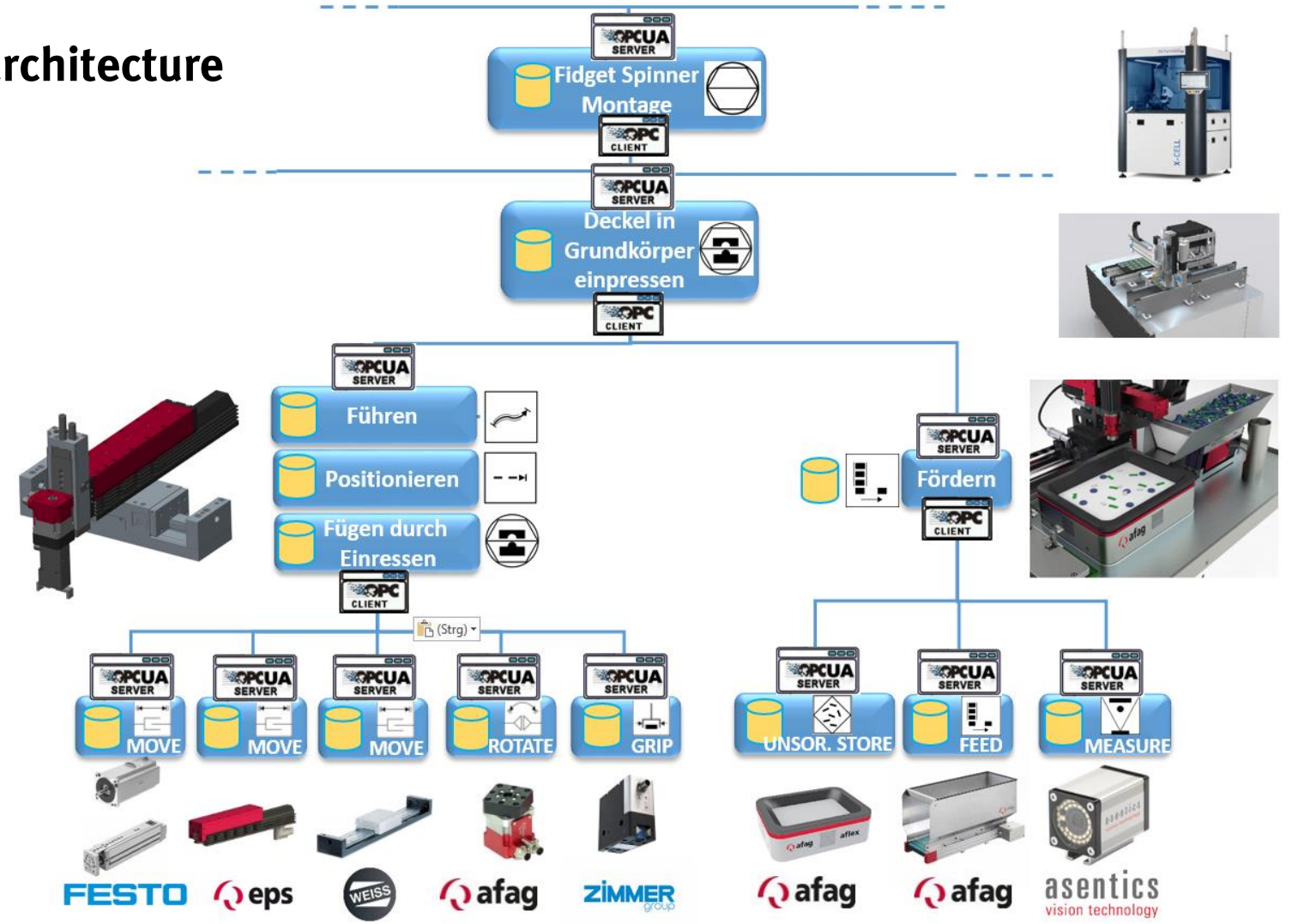


„Digital representaion“
or „digital represented object“

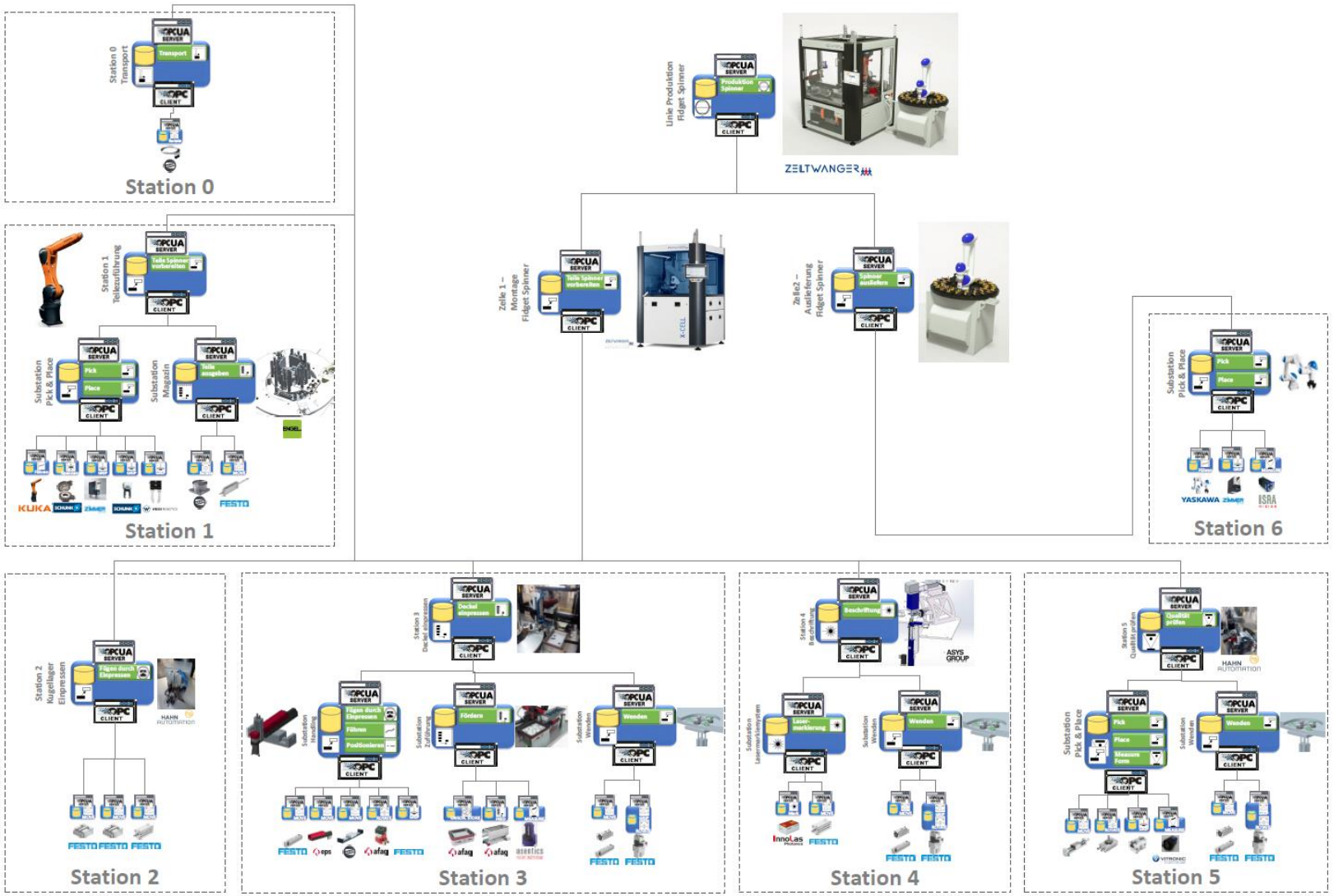
Object and capability based machine architecture

Digital representaion as architectural element



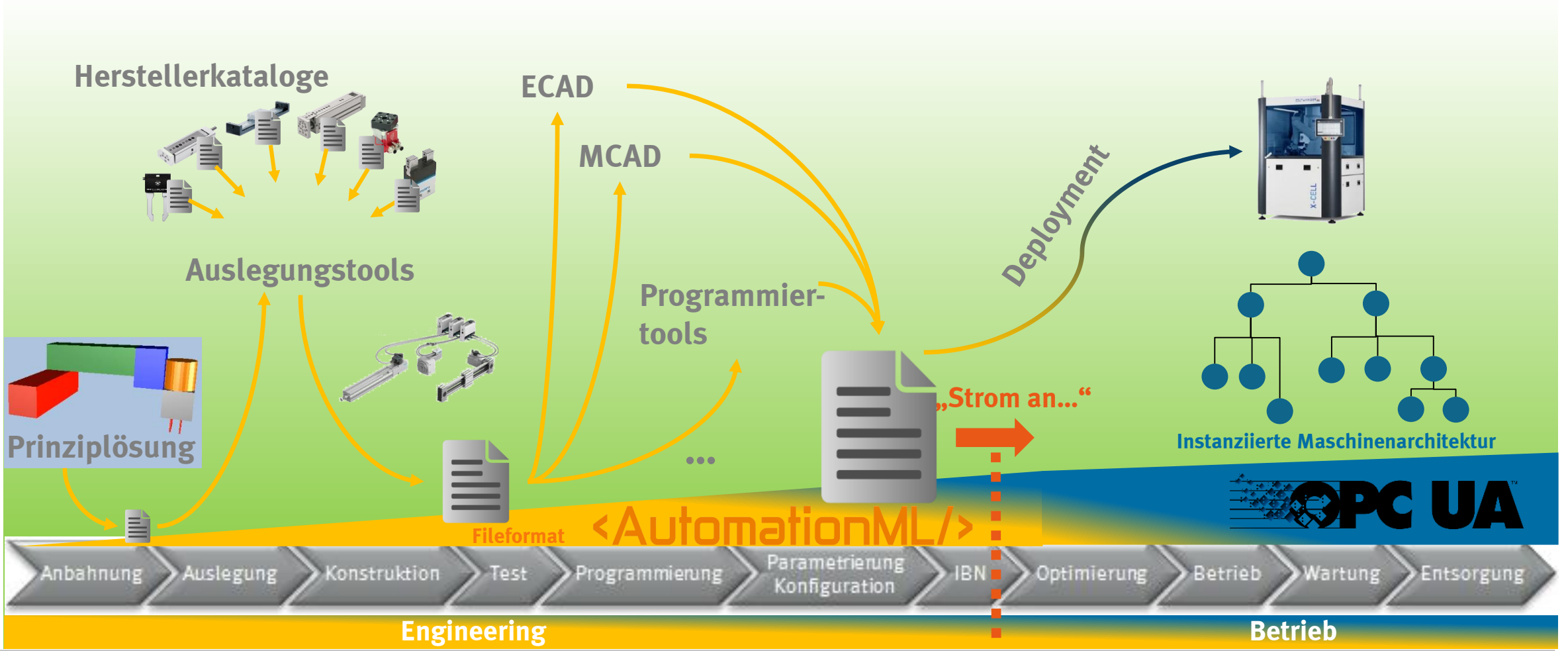


Realised with OPC UA

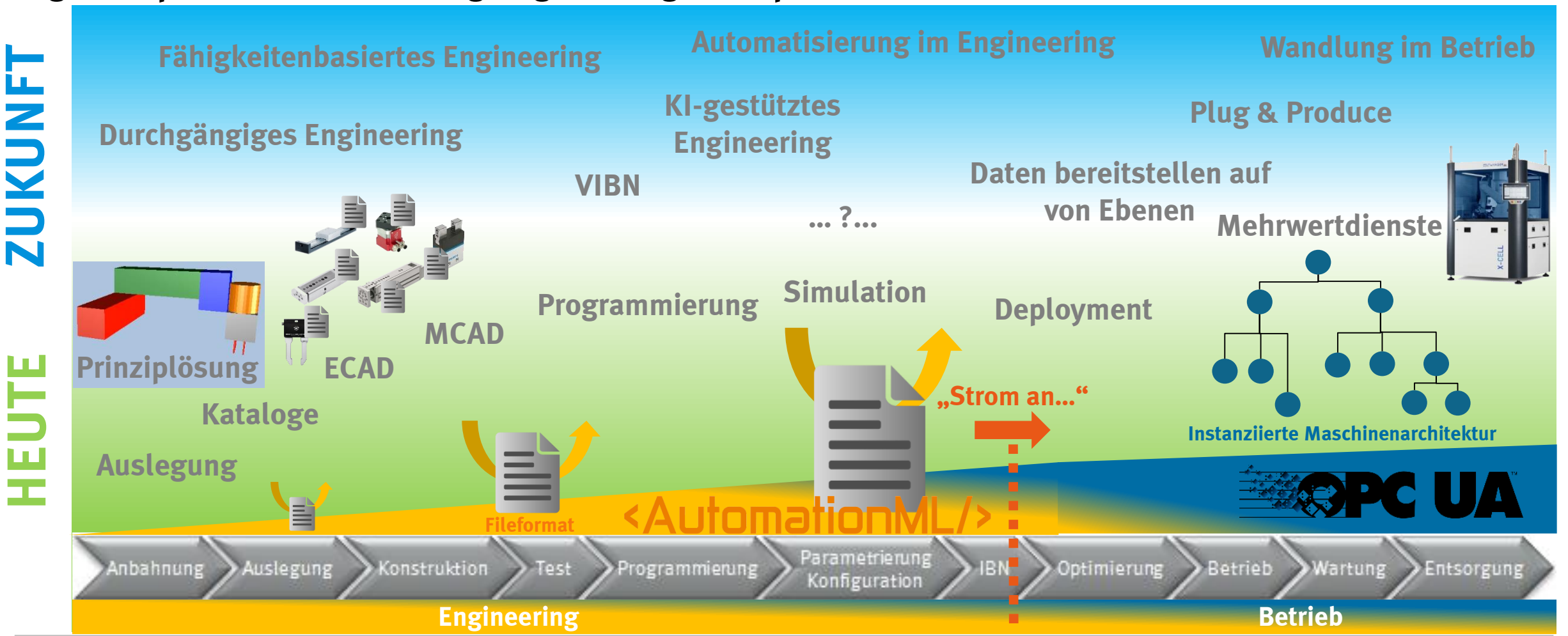

Station 0
Station 0 Transport
Transport
Station 1
Station 1 Teilezuführung
Teile Spinner vorbereiten
Substation Pick & Place
Pick
Place
Substation Magazin
Teile ausgeben
KUKA
FESTO
Station 2
Station 2 Kugellager Einpressen
Fügen durch Einpressen
HAHN AUTOMATION
FESTO FESTO FESTO
Station 3
Station 3 Deckel einpressen
Deckel einpressen
Substation Handling
Fügen durch Einpressen
Führen
Positionieren
Substation Zuführung
Fördern
Substation Wenden
Wenden
FESTO eps afag FESTO
afag afag
FESTO FESTO
Station 4
Station 4 Beschriftung
Beschriftung
ASYS GROUP
Substation Lasermarkierung
Laser-markierung
Substation Wenden
Wenden
InnoLas Photonics FESTO
FESTO FESTO
Station 5
Station 5 Qualität prüfen
Qualität prüfen
HAHN AUTOMATION
Substation Pick & Place
Pick
Place
Measure Form
Substation Wenden
Wenden
VITRONIC
FESTO FESTO
Linie Produktion Fidget Spinner
Produktion Spinner
ZELTWANGER
Zelle 1 – Montage Fidget Spinner
Teile Spinner vorbereiten
Zelle2 – Auslieferung Fidget Spinner
Spinner ausliefern
Station 6
Substation Pick & Place
Pick
Place
YASKAWA
ISRA

New machine architectures on the basis of digital repesentations
→ for engineering and operation

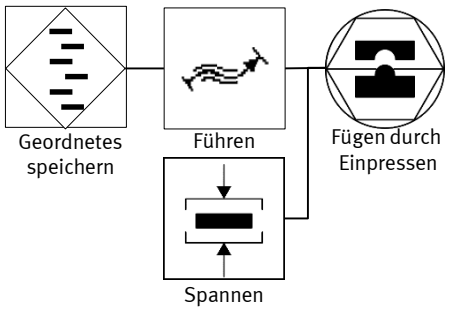
Digital representation – during Engineering and operation



Digital representation – during Engineering and operation



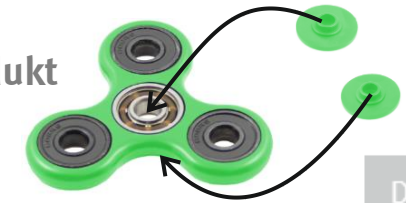
Capability based engineering



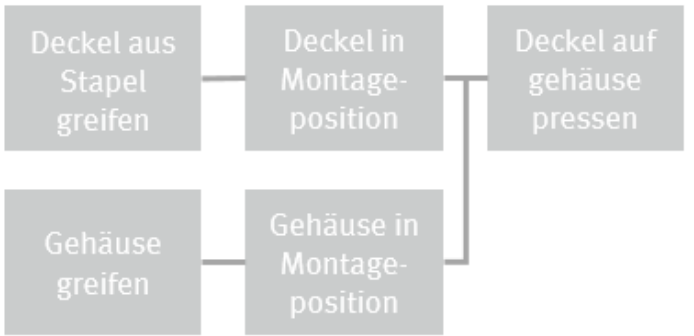
Capability based engineering

Capability based engineering

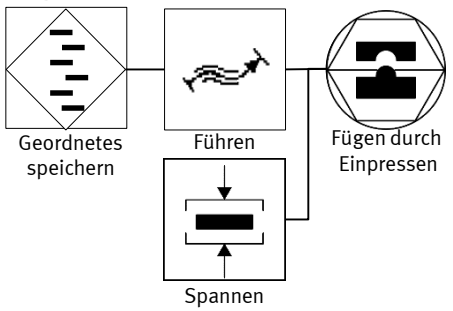
1 Produkt



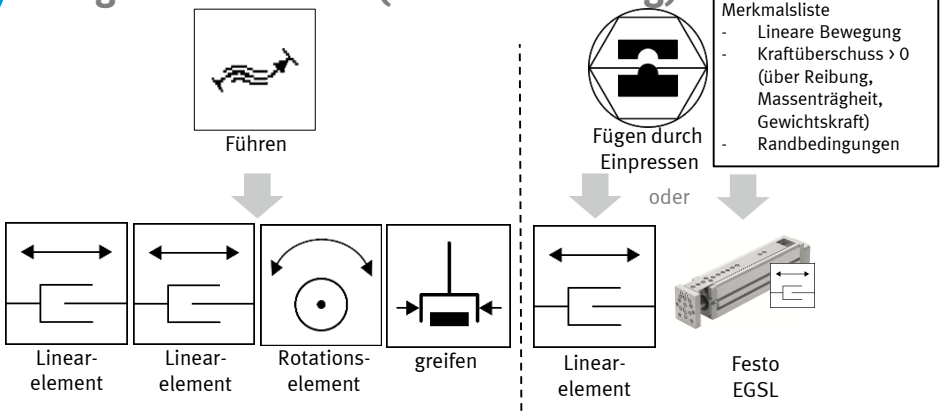
2 Montage-Vorranggraph



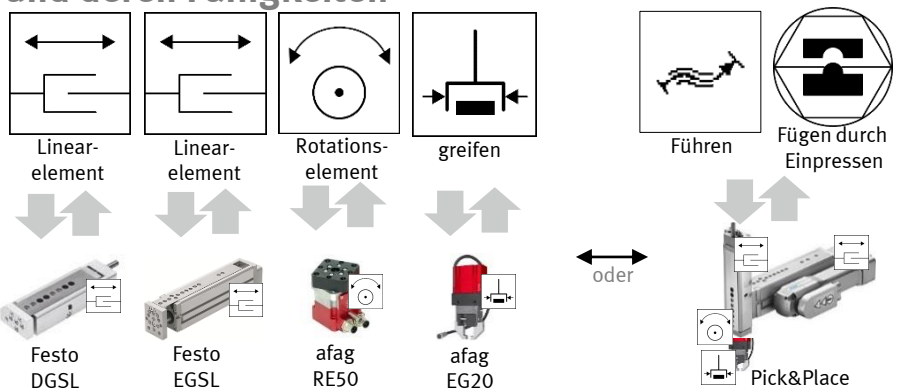
3 Fähigkeitenauswahl (1. Näherung)



4 Fähigkeitenauswahl (Ausdetailierung)



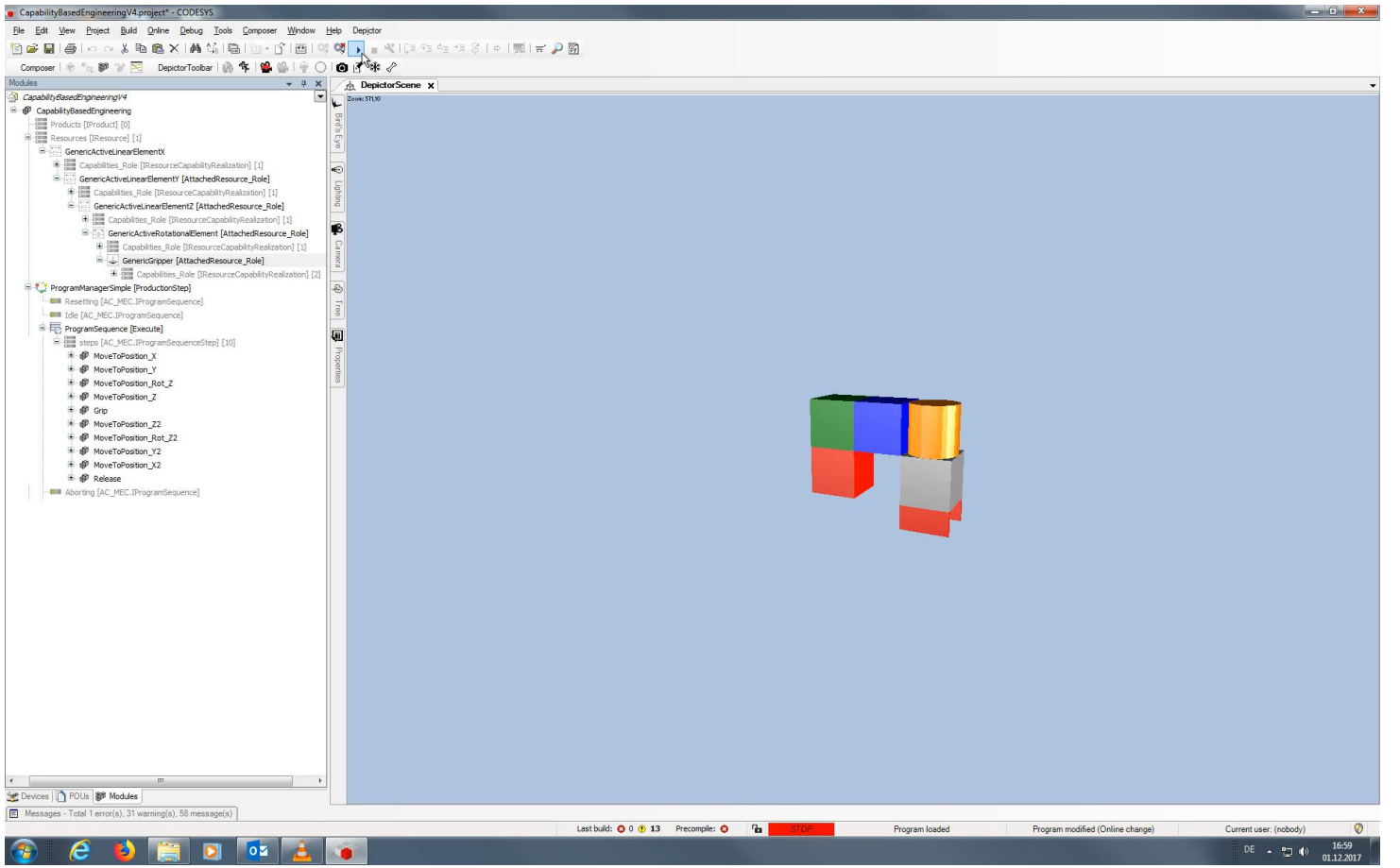
5 Matching mit konkreten Komponenten und deren Fähigkeiten



Capability based engineering

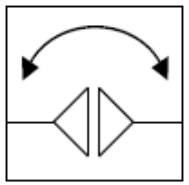
Realised with CODESYS

1. Generic solution
2. Virtual comissioning of generic solution
3. Exchange with real products
4. Virtual comissioning of real comissioning

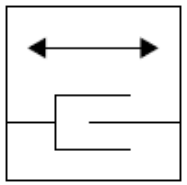


Capability based engineering

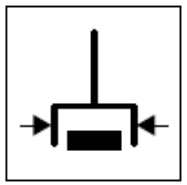
Manufacturer independent categorisation of mechatronic capapilities



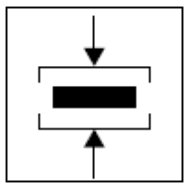
Rotative Movement



Linear Movement



Gripping

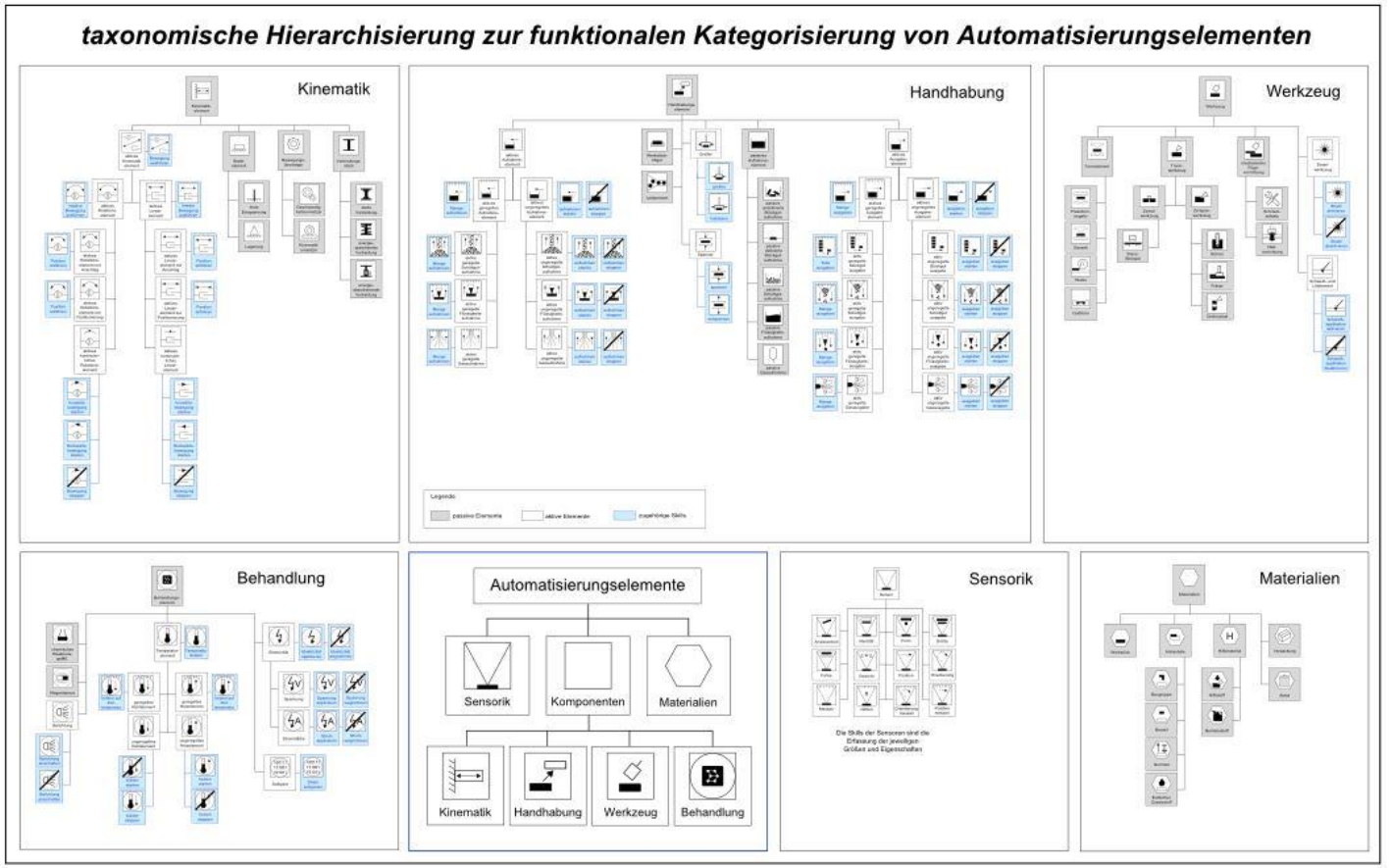


Clamping

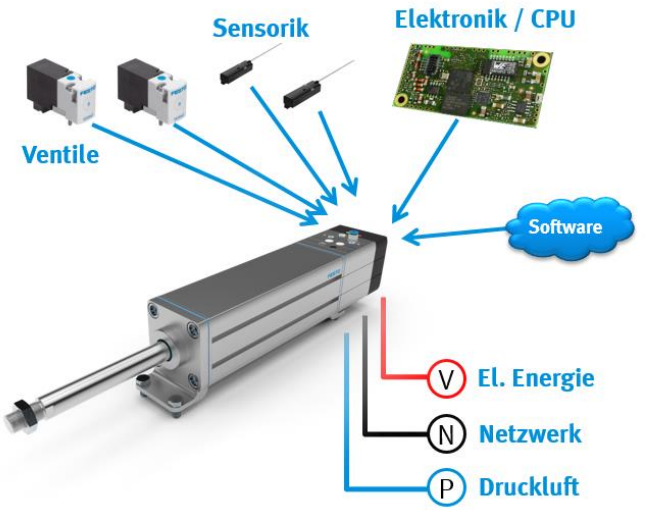
Standardisation

VDI 2860
Montage und Handhabung

DIN 8580
Fertigungsverfahren



Physical digital representation of automation components



Physical digital representation

Mechatronic object oriented systems

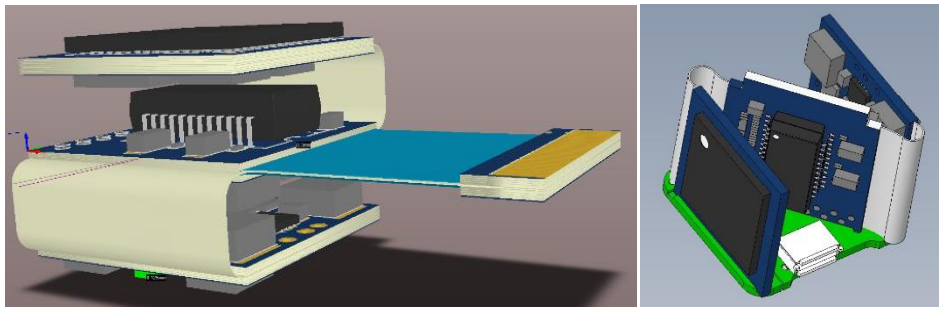


Abb.: EMC2xx gefaltet

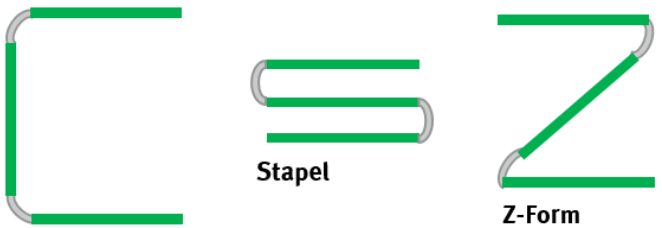


Abb.: Flexibler Einbau durch Faltung

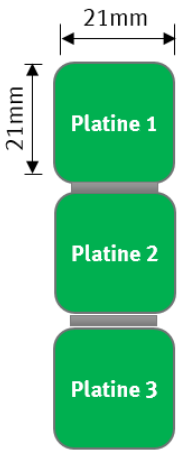
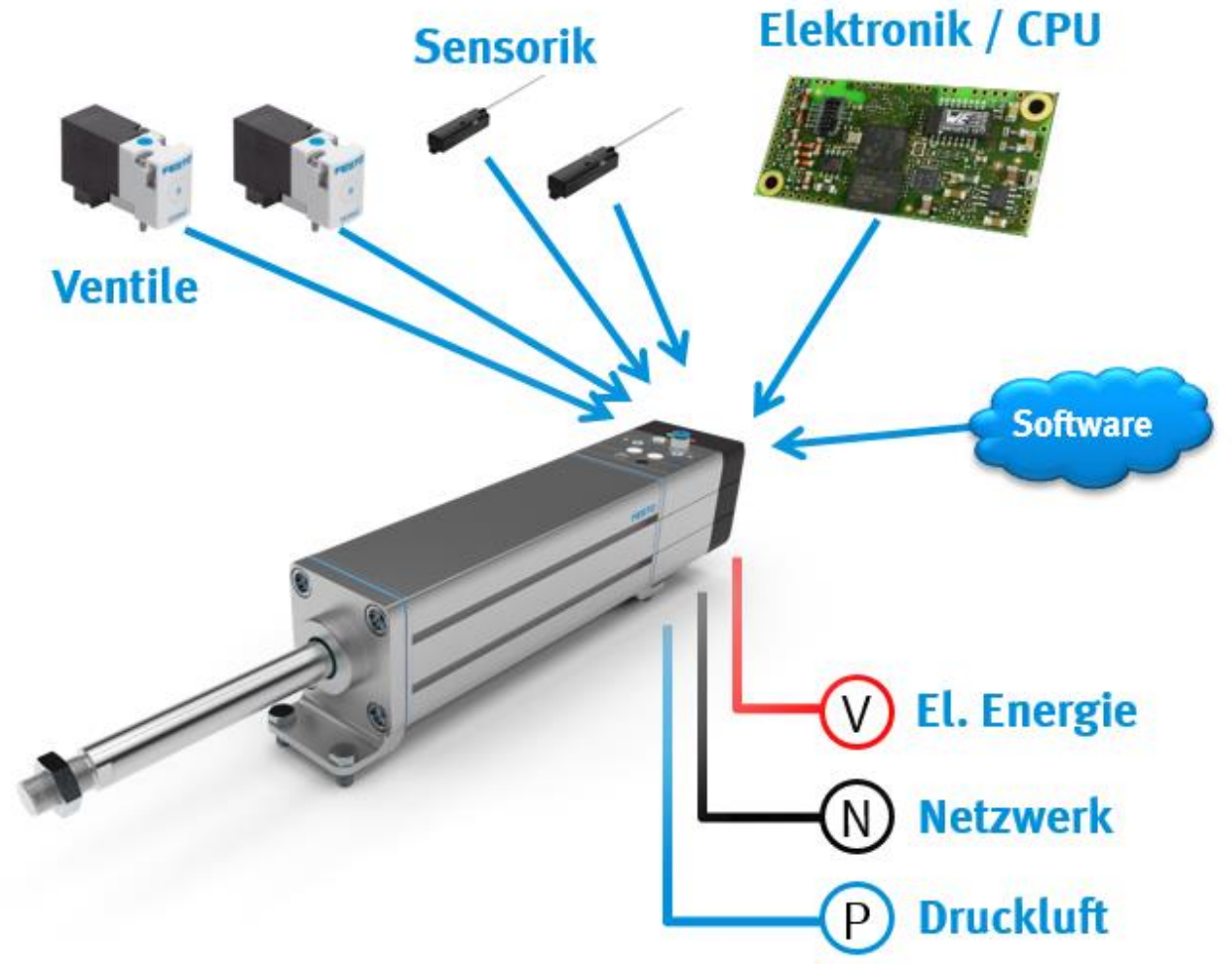
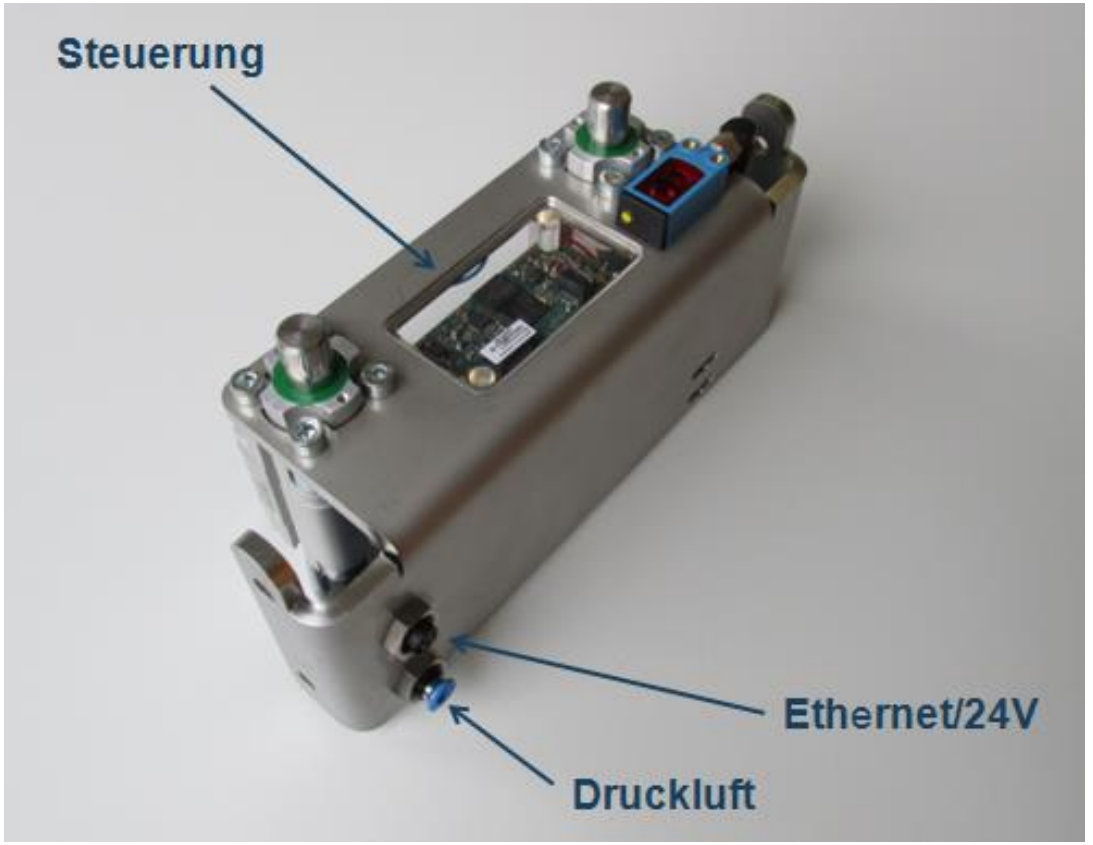


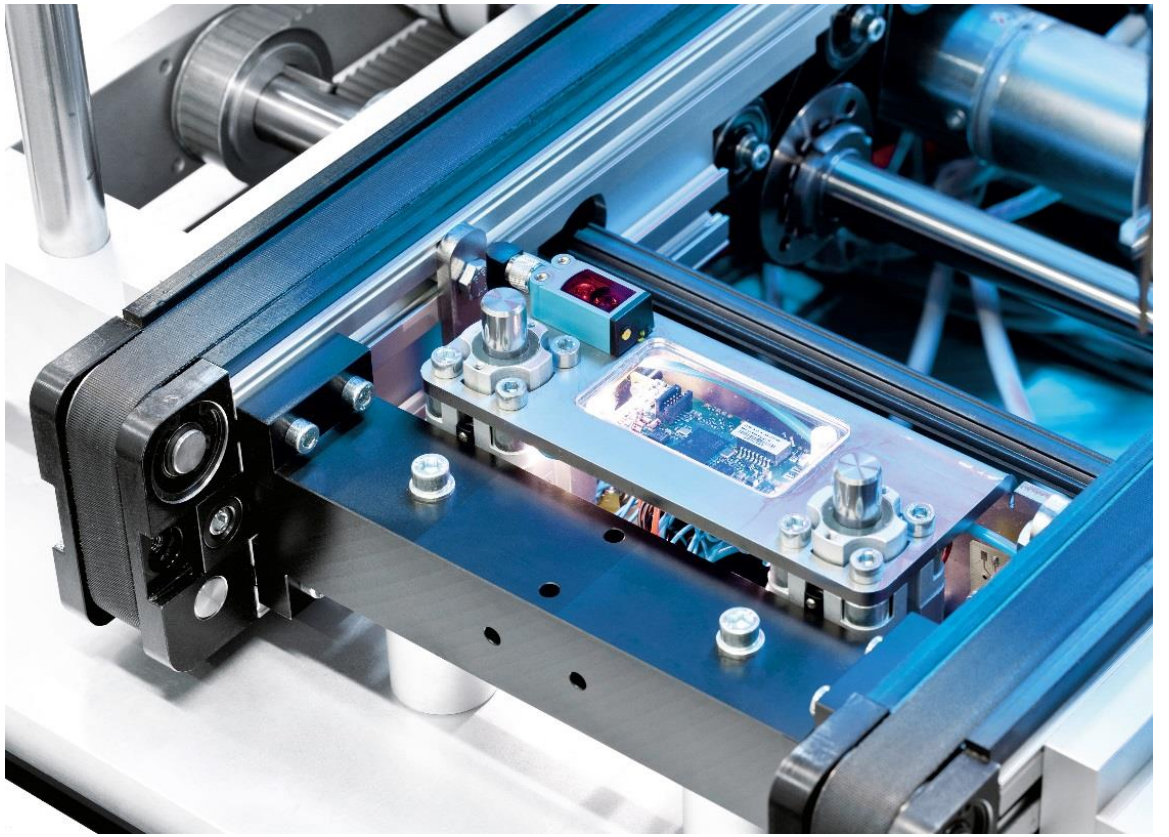
Abb.: Abmessungen



Physical digital representation

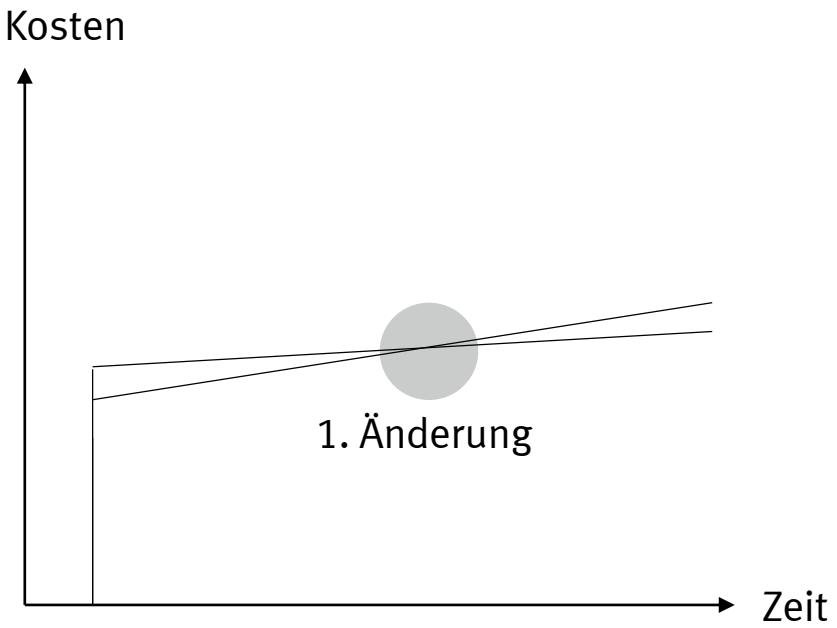
Example logistic module (stopper) machine builder ASYS

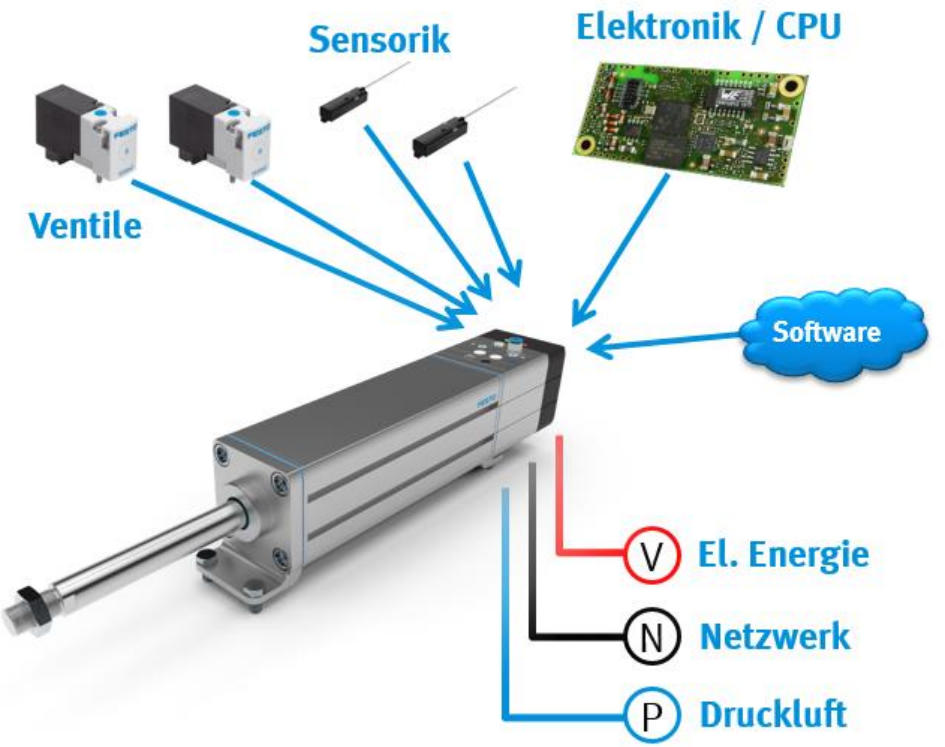




Physical digital representation

Economical analysis





VDMA OPC UA Demonstrator

VDMA OPC UA Demonstrator

Montage Fidget-Spinner

- All devices of all manufacturers described in **AutomationML**
- All devices offer **standardised capabilities**
- **Capability based control software:**
- All **devices present with OPC UA** in the system (data & control)

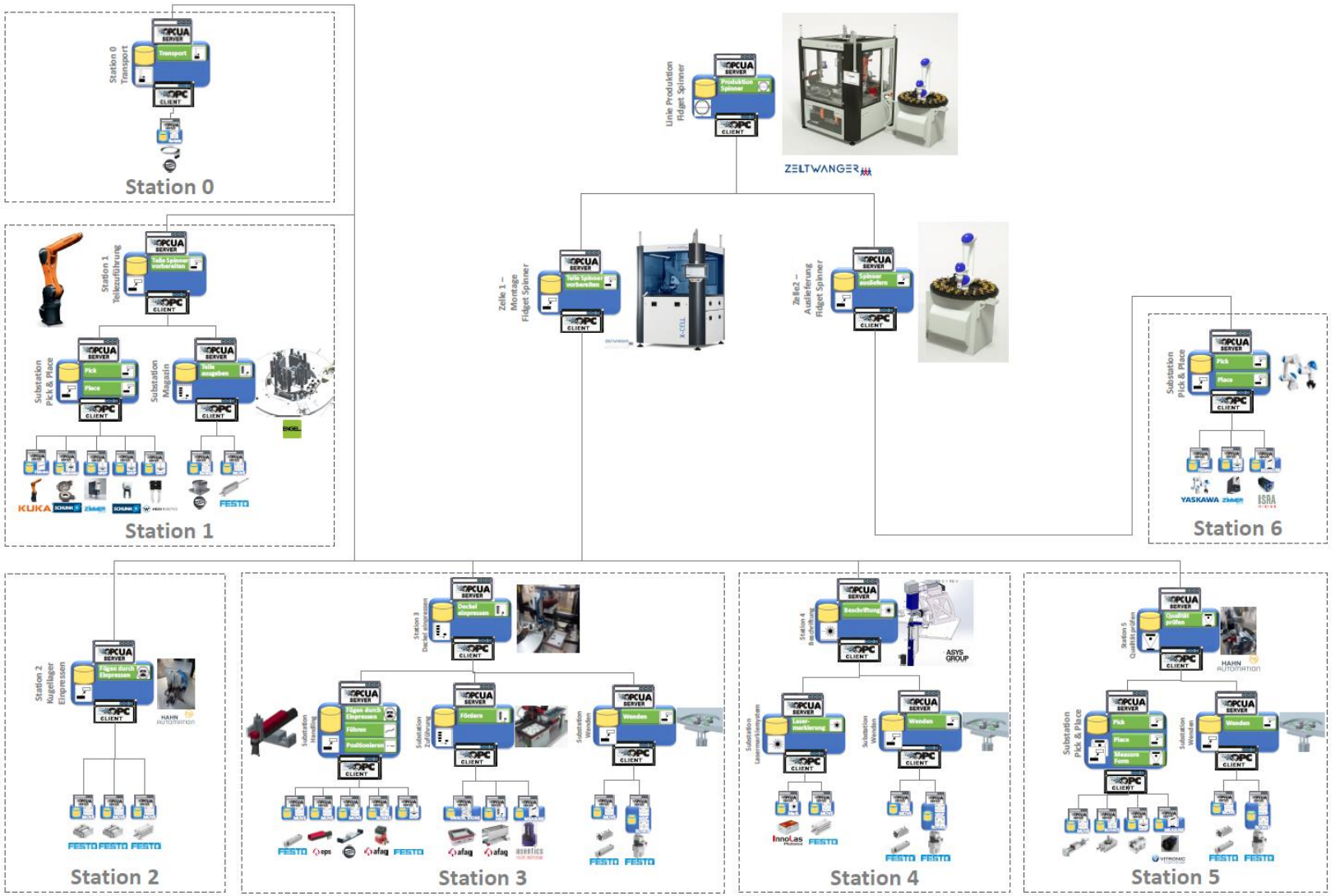
VDMA OPC UA Demonstrator

Hersteller

Maschinenbauer

Software/Kommunikation/ Sicherheit

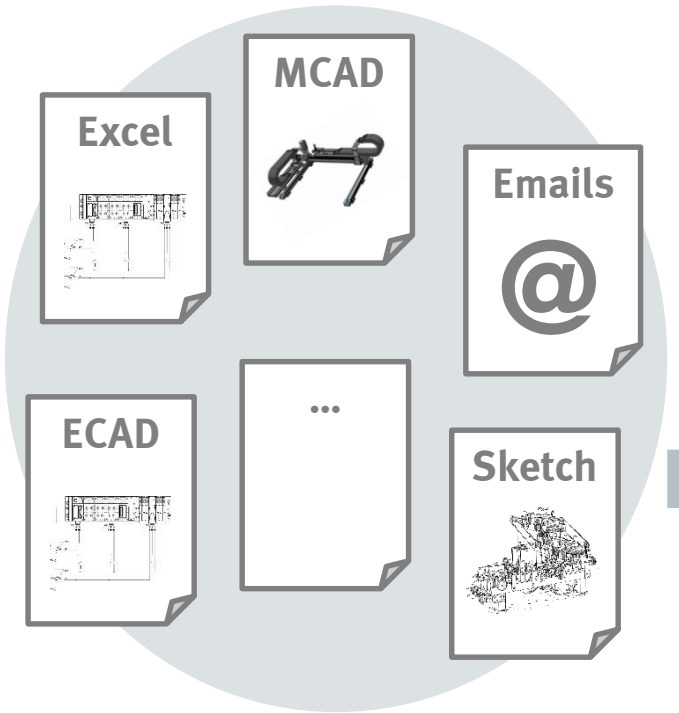
Steuerungs-hersteller


Station 0
Station 1
Station 2
Station 3
Station 4
Station 5
Station 6
ZELTWANGER
KUKA
FESTO
YASKAWA
ISRA
HAHN AUTOMATION
ASYS GROUP
InnoLas

FESTO

Vielen Dank
für Ihre
Aufmerksamkeit!

Pains in Engineering



Handbook

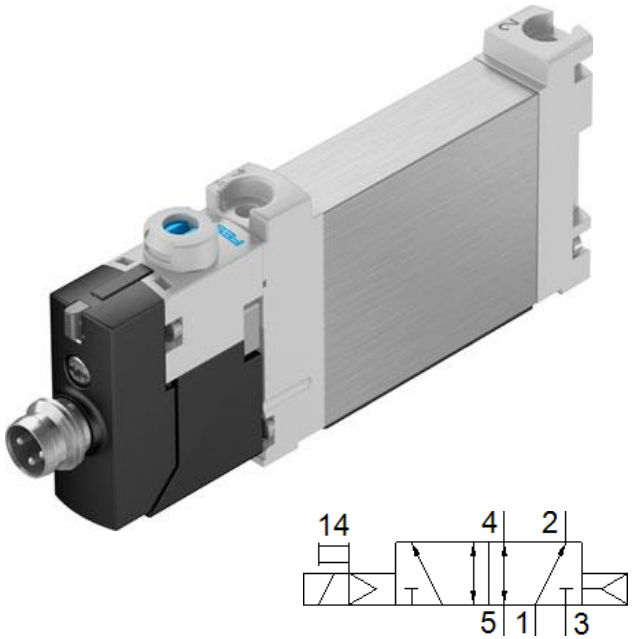
Task

e.g. Programmer

Realisation

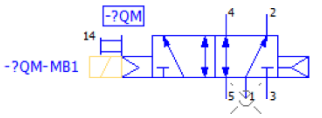
Digital Representation for Engineering – state of the art

Festo solenoid valve VUVG-BK10-M52-AT-F-1R8L-S

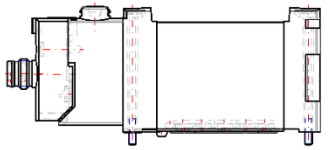


Data (excerpt)

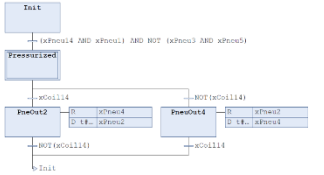
ECAD



MCAD/Kinematics

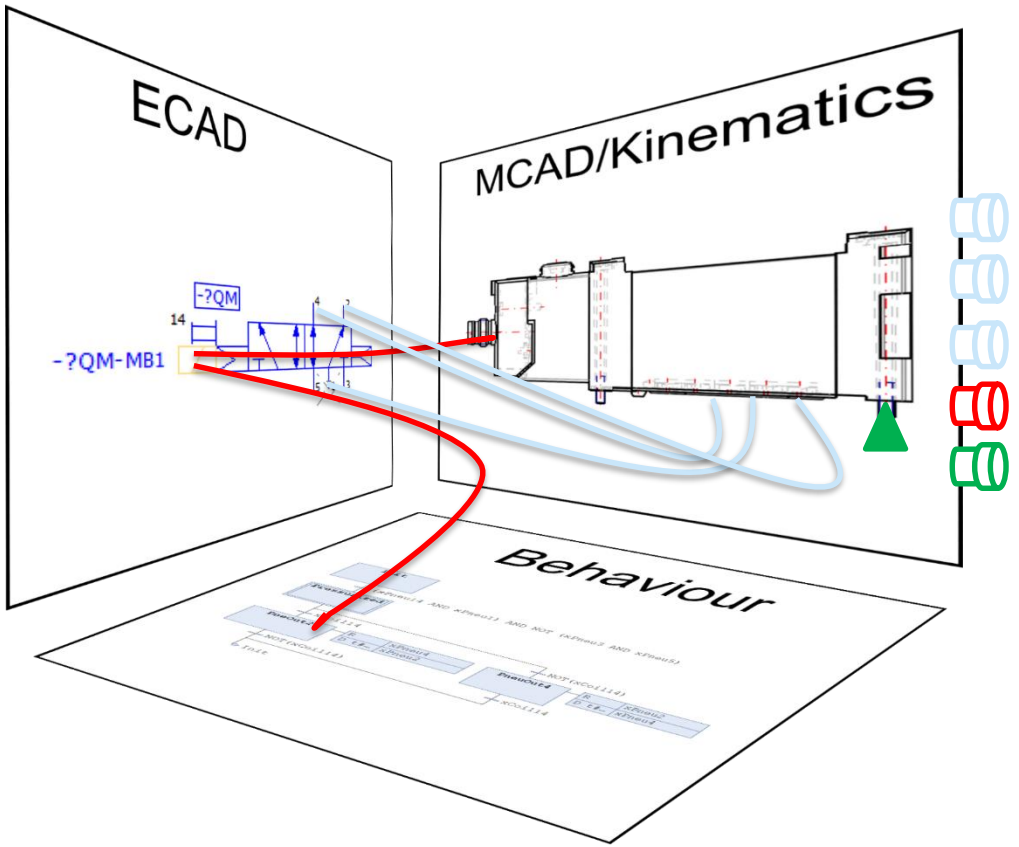


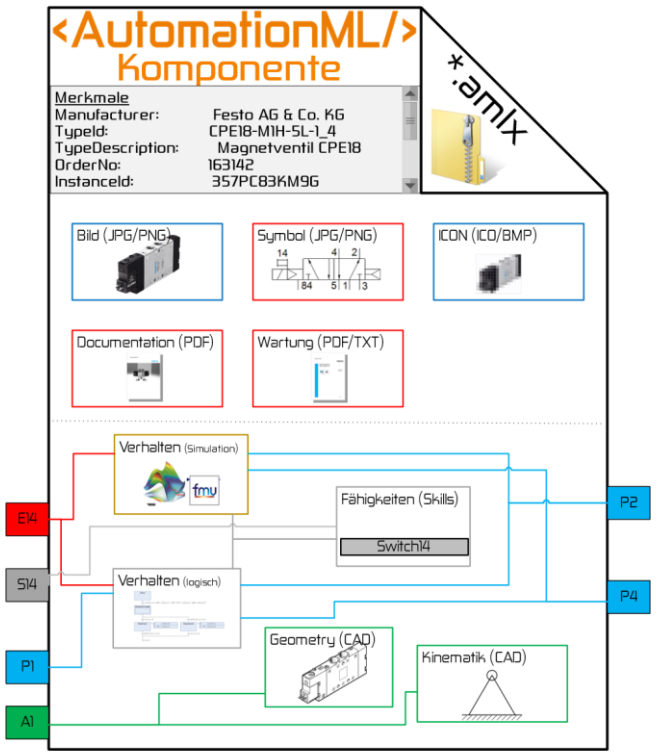
Behaviour



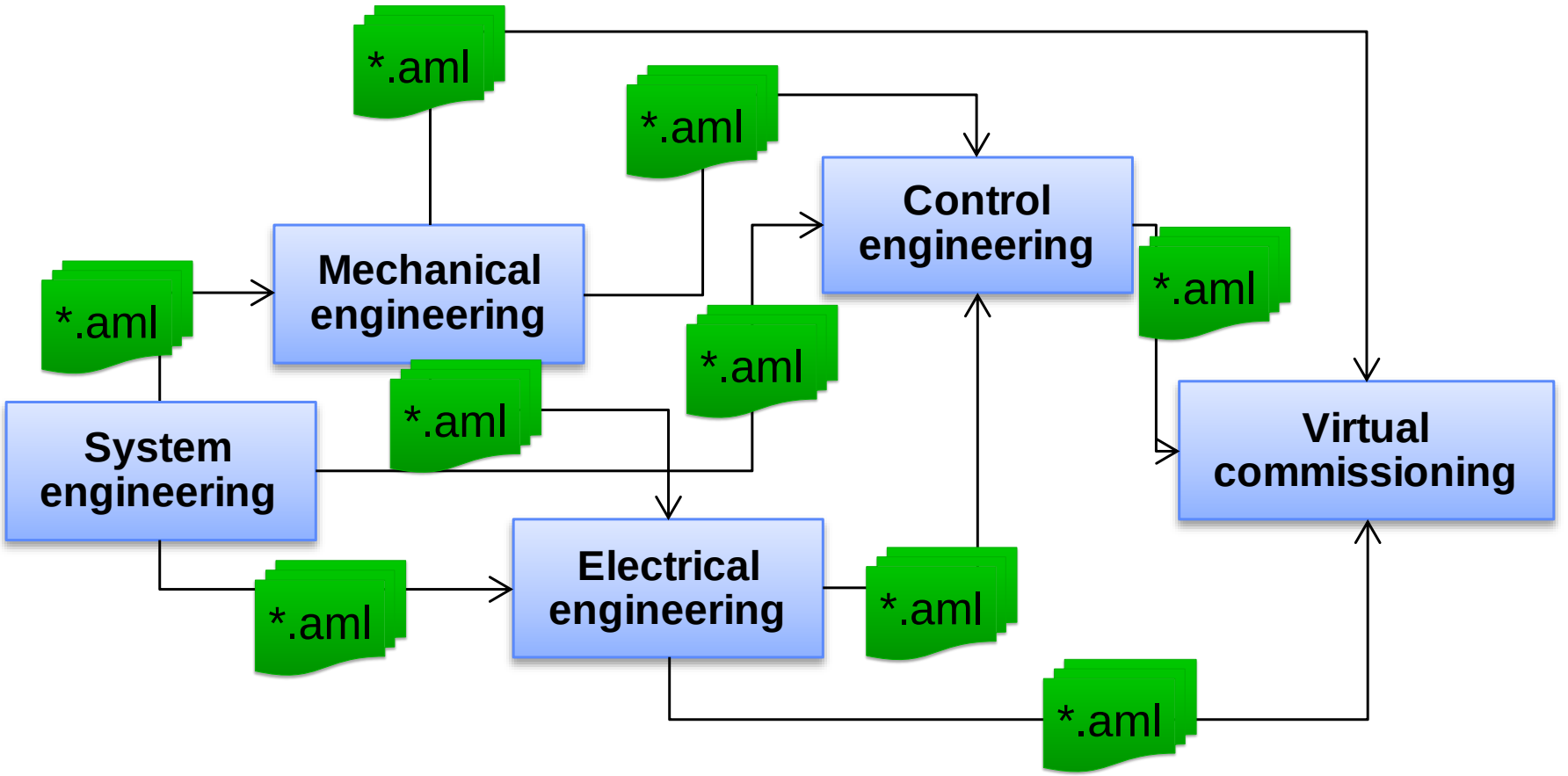
Manuals

Digital Representation for Engineering – future?

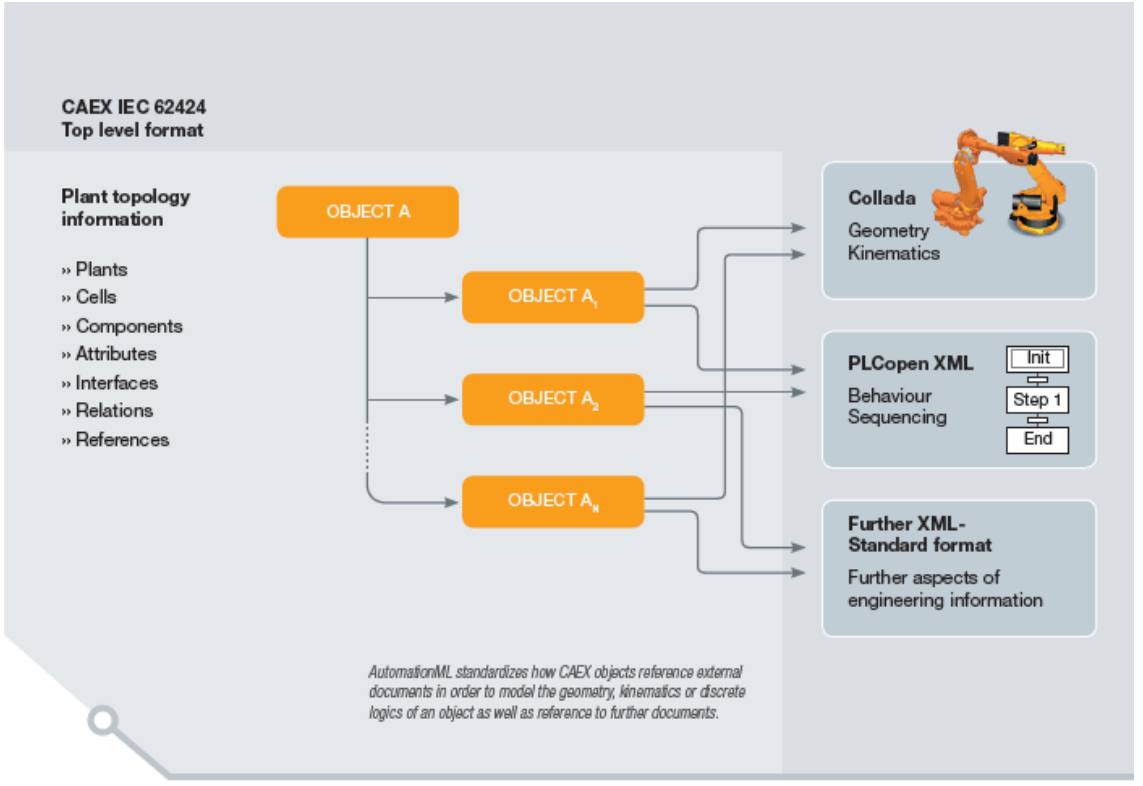


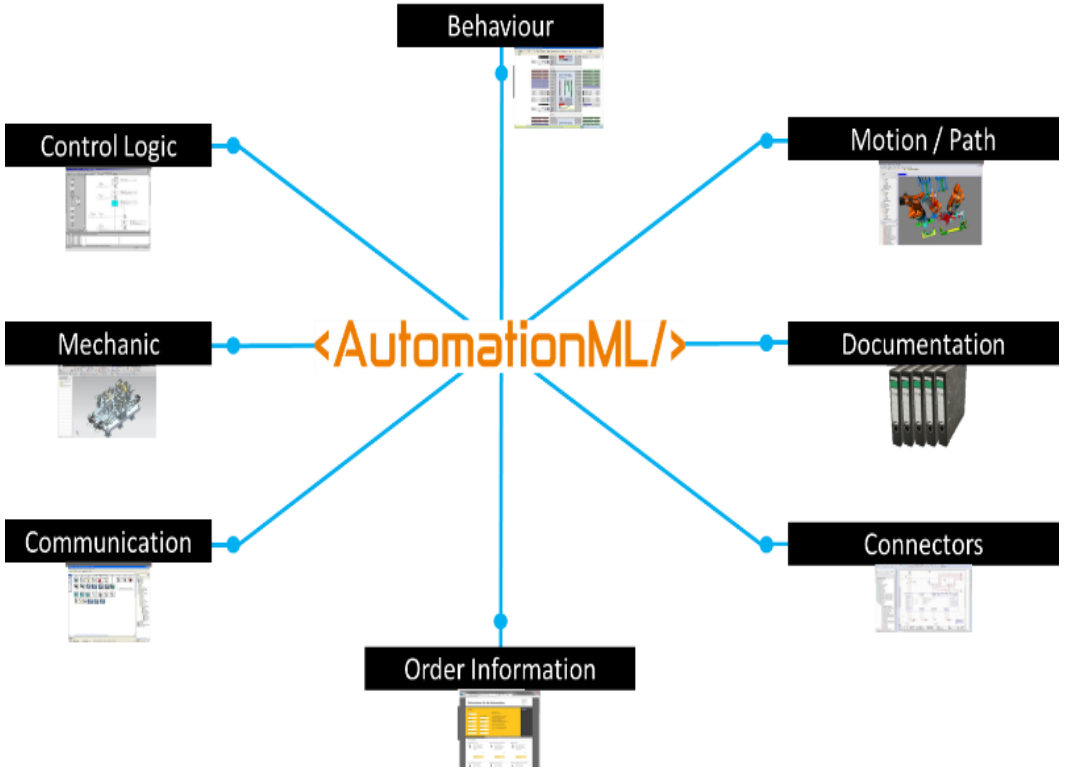


Filling Toolchain Gaps with AutomationML



AutomationML: Architecture und Content





FESTO

‹AutomationML_e_V_Members num=52 /›

PROMOTER

DAIMLER
SIEMENS
BMW GROUP
VOLKSWAGEN AKTIENGESELLSCHAFT
KUKA

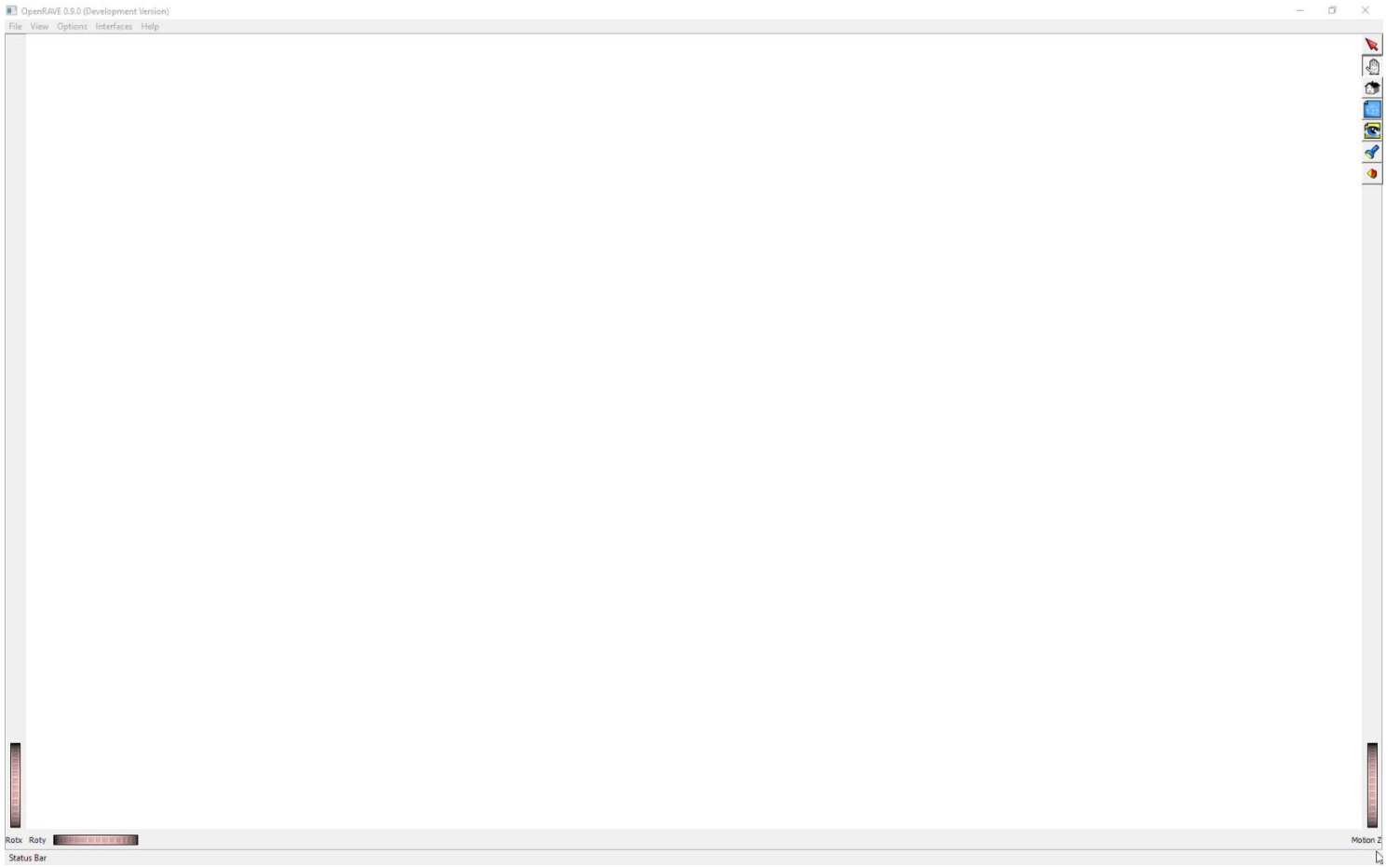
CONTRIBUTOR

ABB
Lenze
MURR ELEKTRONIK stay connected
AIRBUS
PHOENIX CONTACT
[SCIT] SALT SOLUTIONS
SMS group
cenit
AmpereSoft
FESTO
Paradigma Software GmbH
EDAG PRODUCTION SOLUTIONS
NETALLIED SYSTEMS
SICK Sensor Intelligence.
COMAN SOFTWARE GMBH
VISUAL COMPONENTS
EKS InTec GmbH
SAFETY NONSTOP HIMA
ThyssenKrupp System Engineering Drauz Nothelfer | Krause | EGM ThyssenKrupp
MITSUBISHI ELECTRIC Changes for the Better
OMRON
ePLAN
BALLUFF
hilscher COMPETENCE IN COMMUNICATION
Schneider Electric
inpro
tarakos Virtual made Reality
logi.cals all the more power
ICARUS

ACADEMIC

OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG
Fraunhofer IPA
HS PF
HELMUT SCHMIDT UNIVERSITÄT
Universidad del País Vasco Euskal Herriko Unibertsitatea The University of the Basque Country
fortiss
Fraunhofer IOSB
LPS LEHRSTUHL FÜR PRODUKTIONSSYSTEME
Lehrstuhl für Automatisierung und Informationssysteme
KETI Korea Electronics Technology Institute
TU WIEN
KIT Karlsruhe Institute of Technology
TECHNISCHE HOCHSCHULE NÜRNBERG GEORG SIMON OHM Nuremberg Campus of Technology
SBA Research
ifak
RWTH
FZI
HANYANG UNIVERSITY

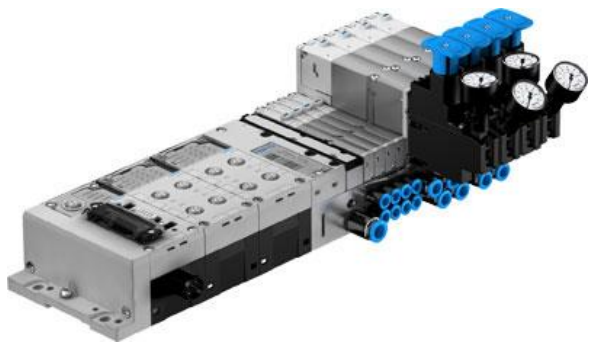
AutomationML Example of Use: Geometry und Kinematics

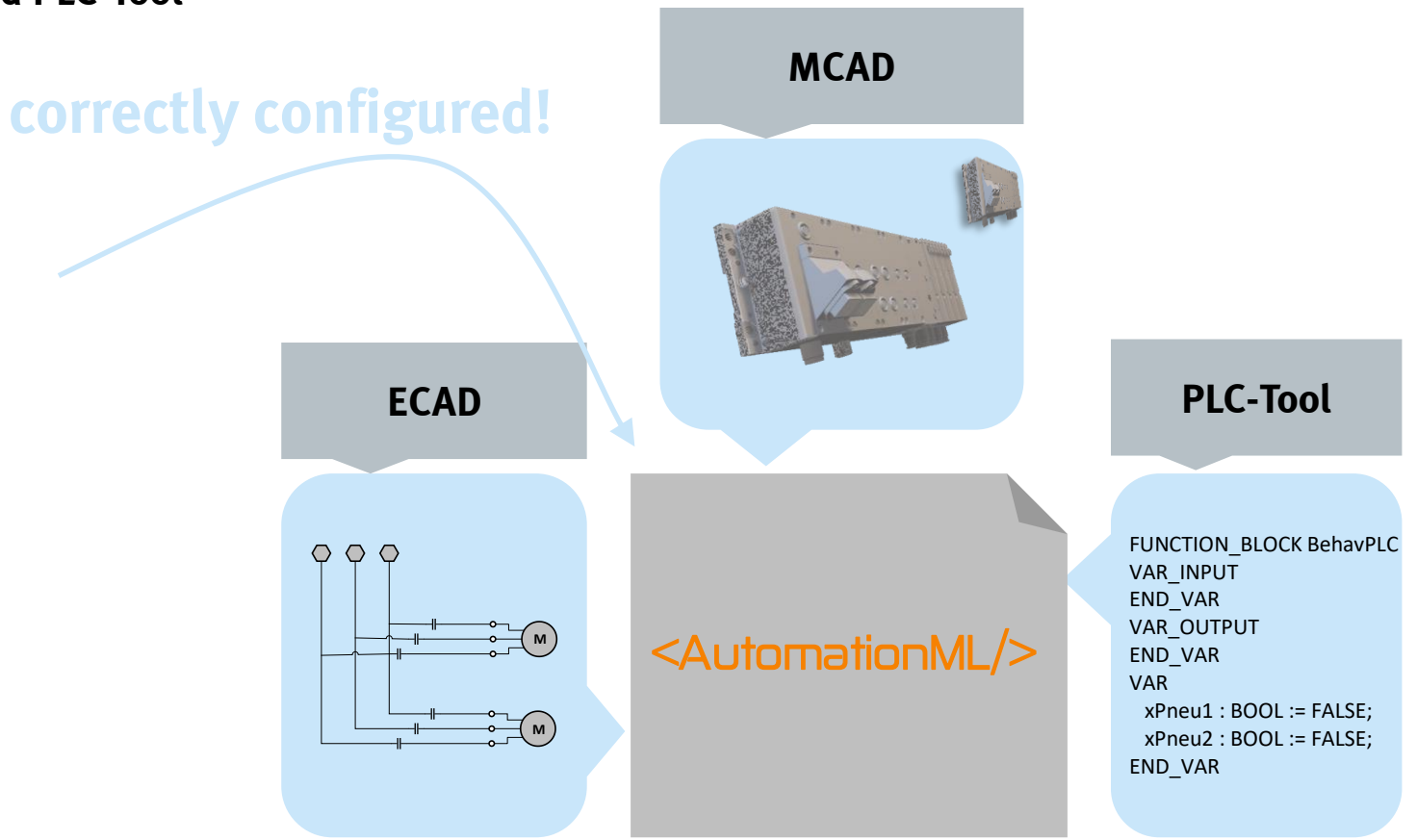


AutomationML Example of Use: Correctly Configured and Open Engineering Data

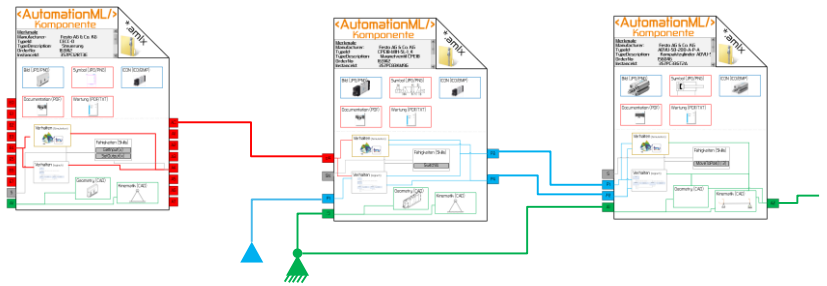
Exchange of PLC configuration between ECAD and PLC-Tool

FESTO





AutomationML Example of Use: Synthesis of PLC Code



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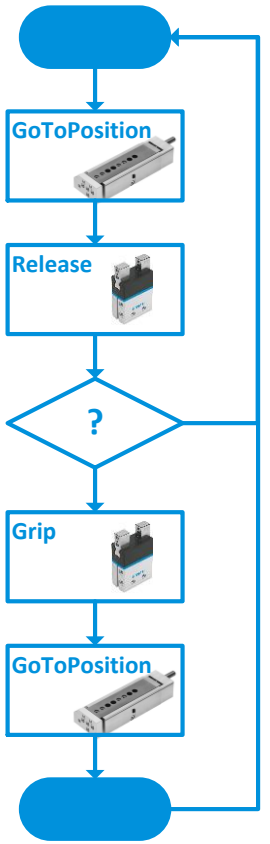

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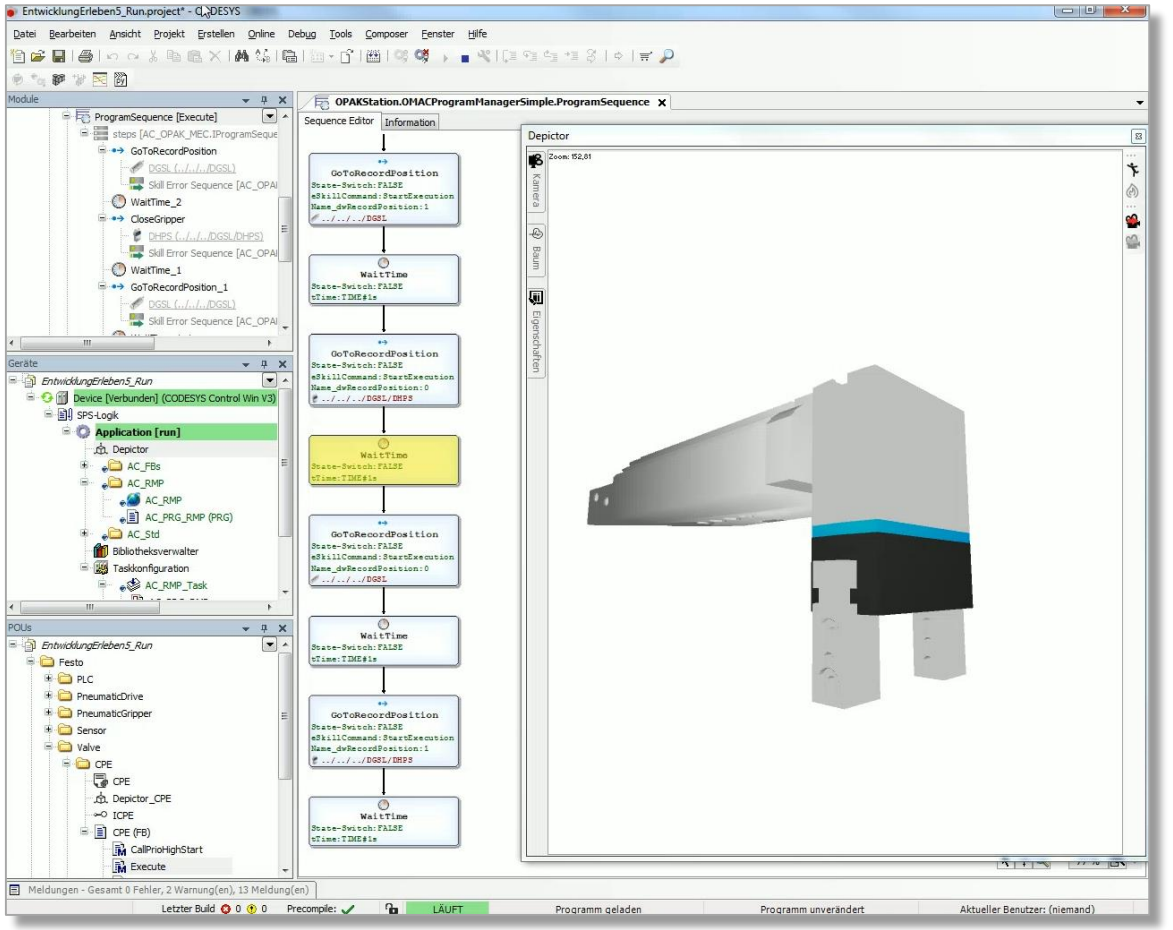
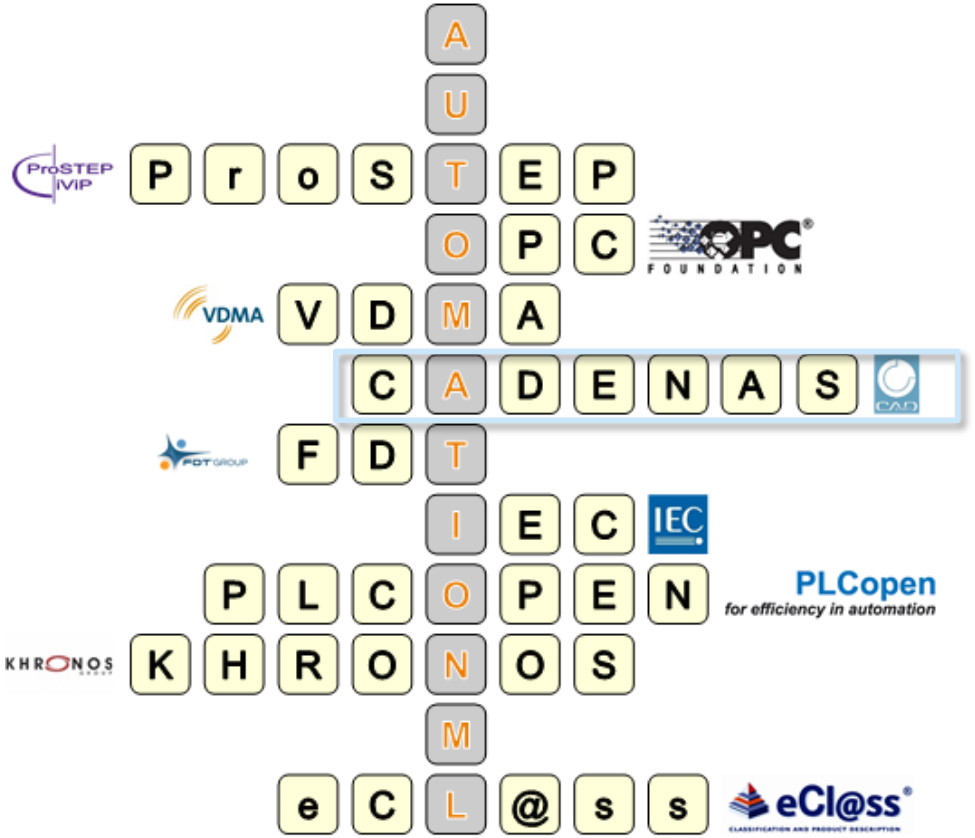


AutomationML e.V. cooperates with CADENAS




Thank You!