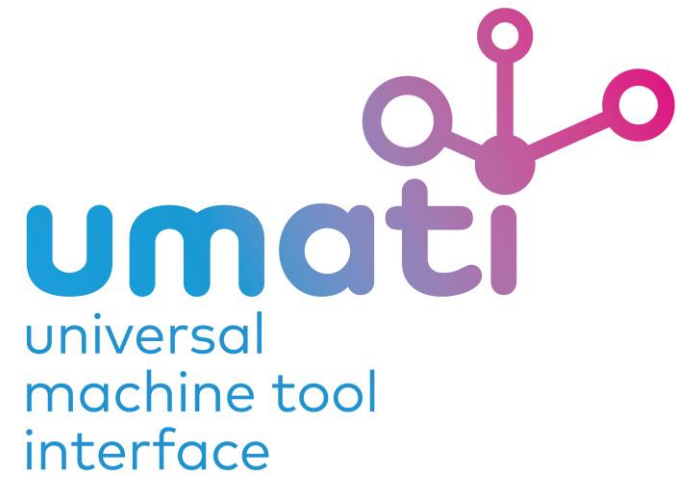


connecting the world of machine tools

An introduction

Nov. 08th, 2019

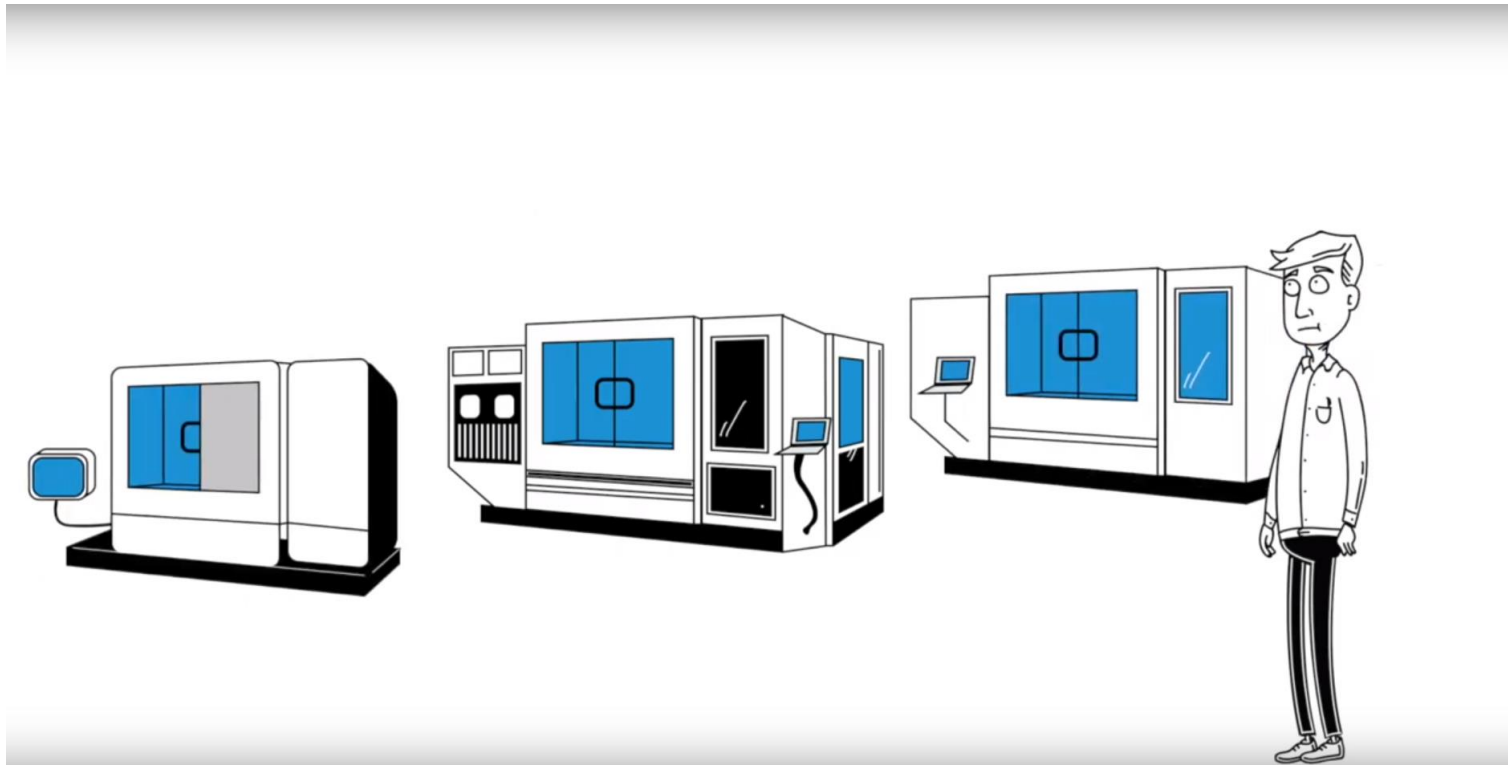
www.umati.info



Eine Initiative des
An Initiative by **VDW**



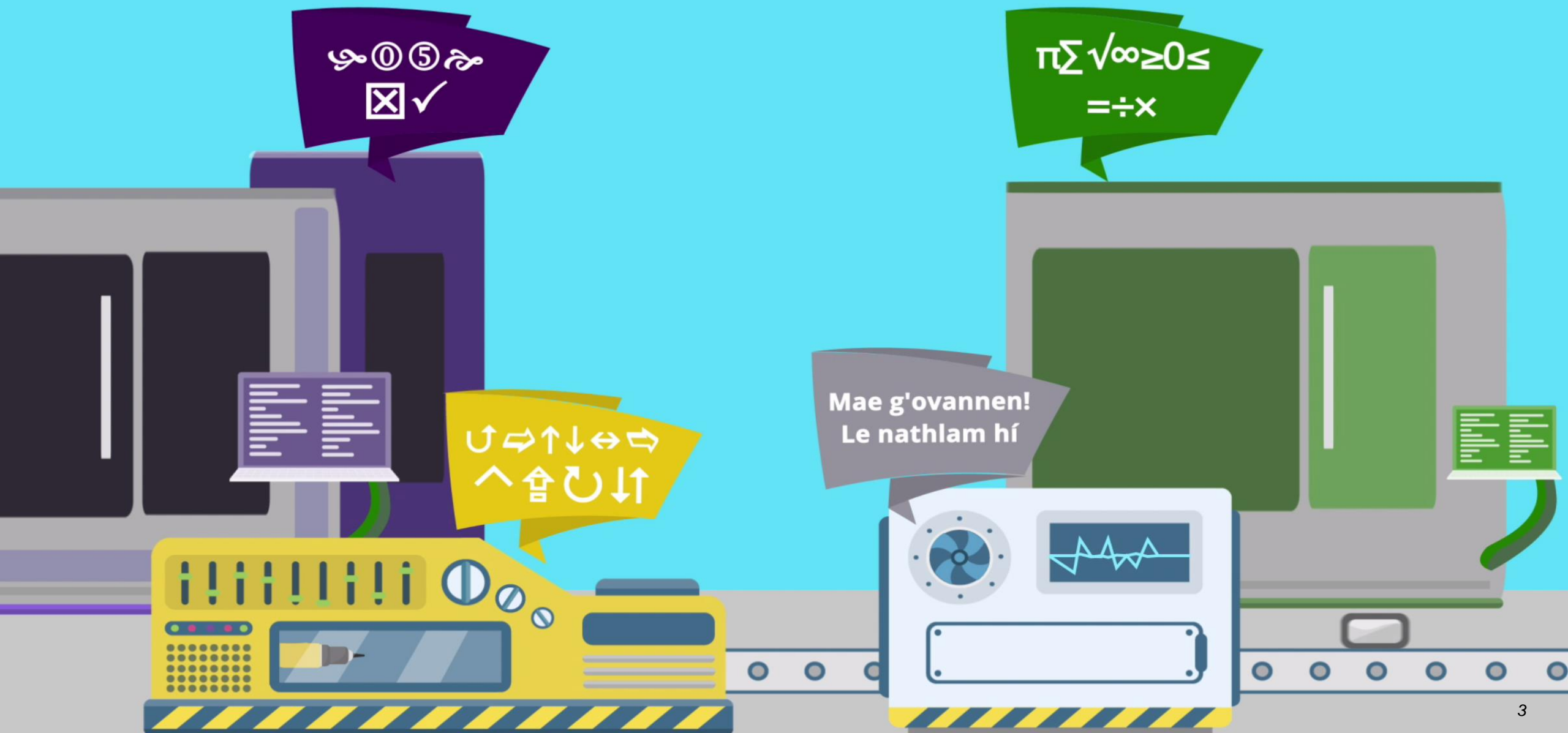
umati in a nutshell



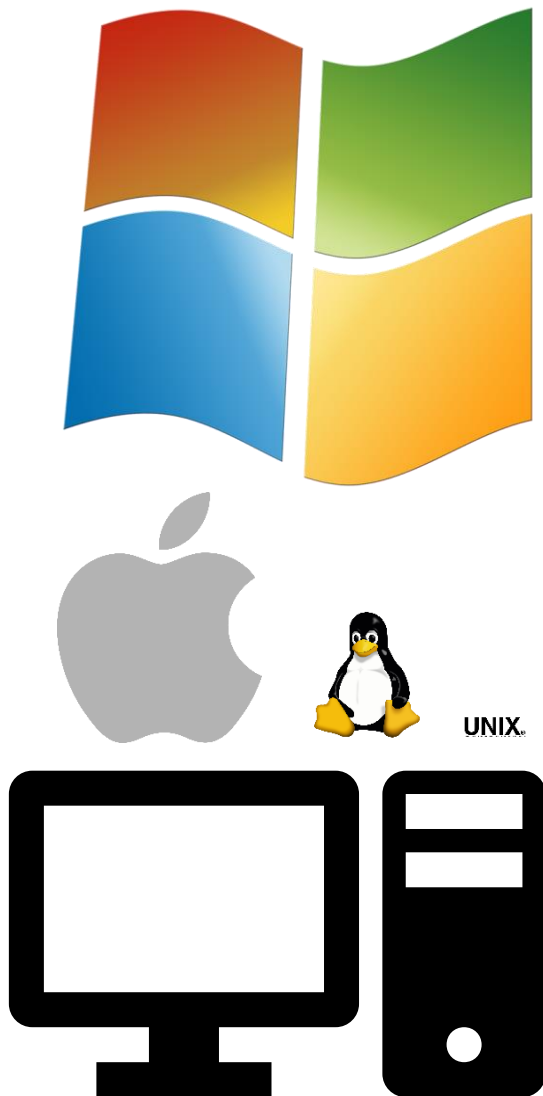
Video

<https://vdw.de/umati-in-a-nutshell>

Current situation



But why...?



Universal connectivity (USB) in personal computers could be introduced because of a very limited small group of dominating companies.



In the mobile industry this group is even smaller.



CNCs

10+

PLCs

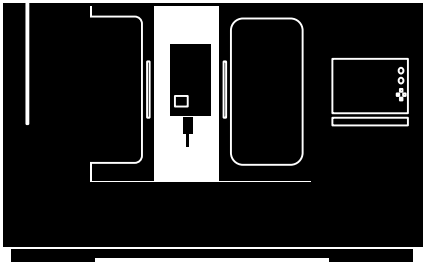
20+

HMIs

~ ∞

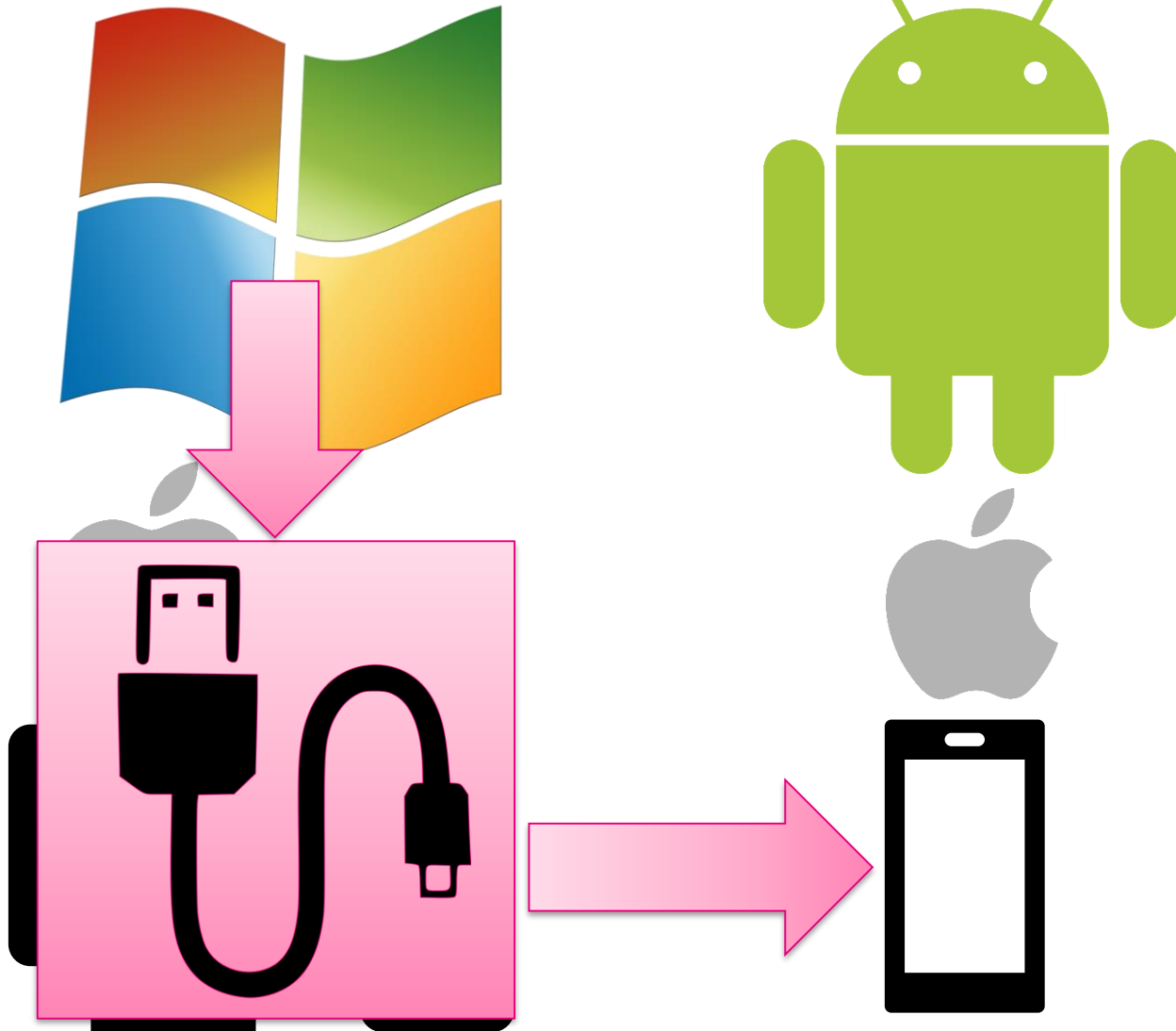
+X

∞+



But in machine tools, or factory automation, the group is far bigger and more heterogeneous. That's why there has not been anything that compares to an "USB interface" yet.

But why...?



CNCs

10+

PLCs

20+

HMI

~∞

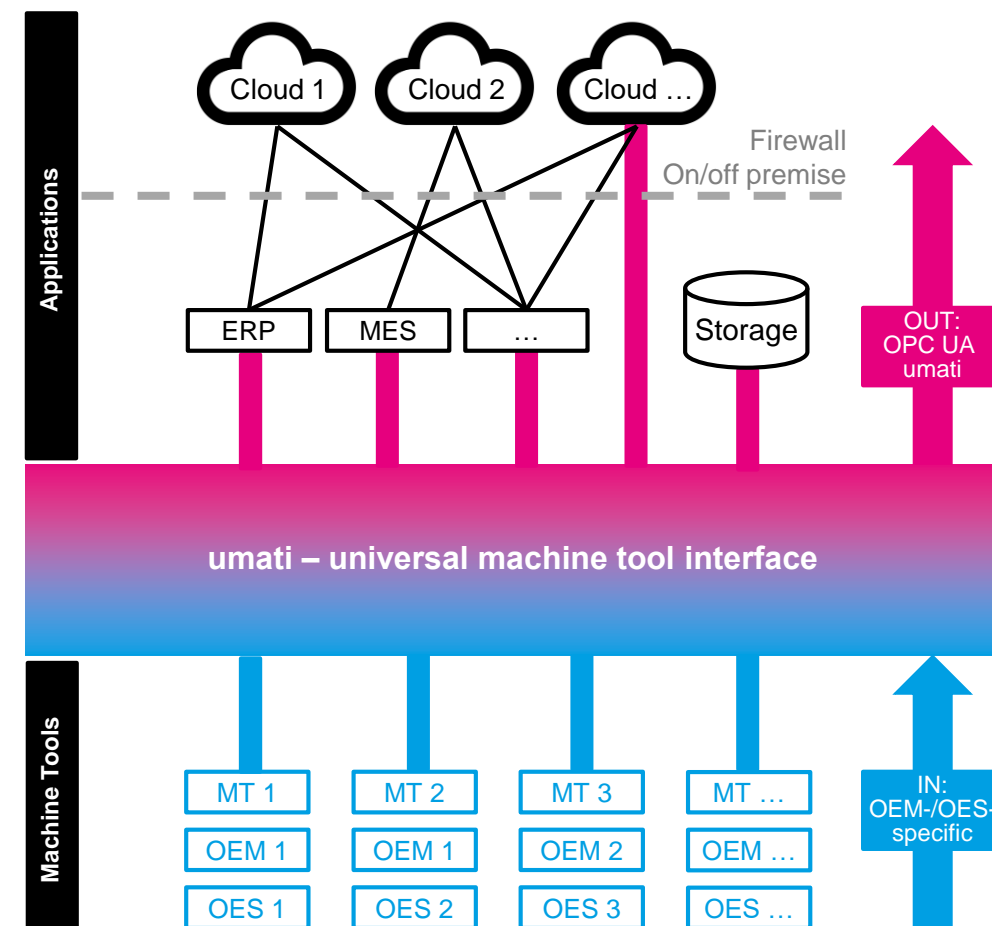


umati mission



There's no better connection than that of a common language – also for machine (tools)

- enable machine tools and peripherals to connect to customer-specific IT ecosystems
- inside and outside the production environment
- via an open, universal interface
- easy, secure, and seamless
- create standardized **semantics**, embedded in an **information model** based on the **open communication standard OPC UA**.
- support **specific extensions** for manufacturers and customers of machine tools.
- establish a **worldwide standard** for the connectivity of machine tools.



More than just a specification

umati =

OPC UA Companion Specification



- OPC UA: Standardized communication platform („HOW to communicate“)
- Comp. Spec: Standardized „Dictionary“ („WHAT to communicate“)

+ Communication Default Requirements



- Standardized settings for the implementation of an OPC UA environment (e.g., encryption, authentication, server settings (ports, protocols))

+ Quality Assurance



- Provide testing specifications and tools
- Serve as ombudsman for supplier-client disputes („watchdog“ for brand/label abuse)

+ Marketing



- Global community of machine builders, component suppliers, and added value services
- Label for visibility in the market

Purpose of umati as a label/brand

Address

- 1) **CUSTOMERS** who buy machine tools or software
- 2) **SUPPLIERS** of components for machine tools or software

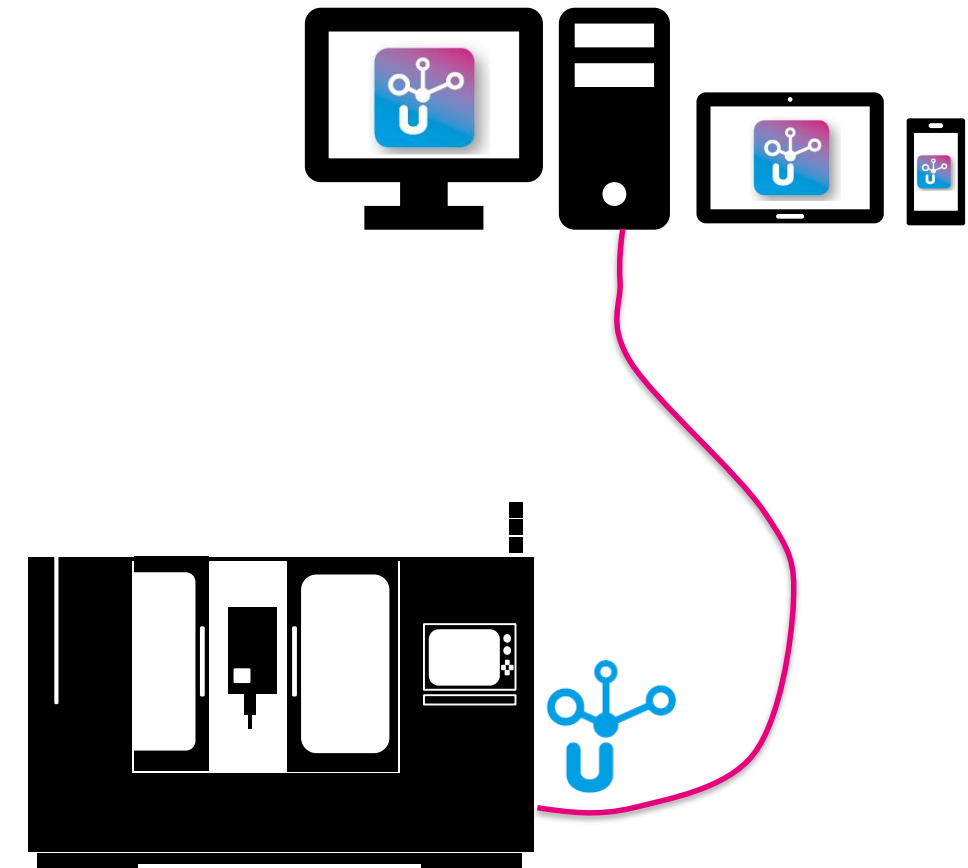
The focus is on parties who are contract partners!

- 1) The MT Builder or the software producer have a **contract** with the customer

umati promise: if both MT and Software have “umati inside”, there is seamless communication (plug and produce)

- 2) The MT Builder acts as **system integrator**, i.e., he buys components and integrates them, which includes customer specific components or subsystems (dito for Software producers, they include third party functionality (code, apps, programs, drivers, ...))

umati promise: components which are compliant to umati specifications facilitate system integration (preferred supplier)



A large, thick circular ring with a gradient from pink at the top to blue at the bottom, partially visible on the left side of the slide.

development up to now



First steps

- Initiated by the board of **VDW**, the German Machine Tool Builders' Association (15 leading machine tool builders)
- Started by a core group of 10 machine tool builders + 1 research institution + VDW staff
- Vision:
 - exploiting data creates an **added value for customers**, thus leading to new, trendsetting business models for the sector
 - open interfaces to exchange data between machines and IT systems are the **basic requirement for Industrie 4.0 / IIoT**
 - specification of open interfaces **must be undertaken by the machine tool industry itself**, to cover the specific needs of its customers
 - collaboration yields no **competition**, does not oppose individual advantage in the market
 - get interested participants **from all over the world** involved from the start
- Announced at EMO Hannover 2017

chiron

DMG MORI



HELLER +GF+

GROB



cPffner

LIEBHERR



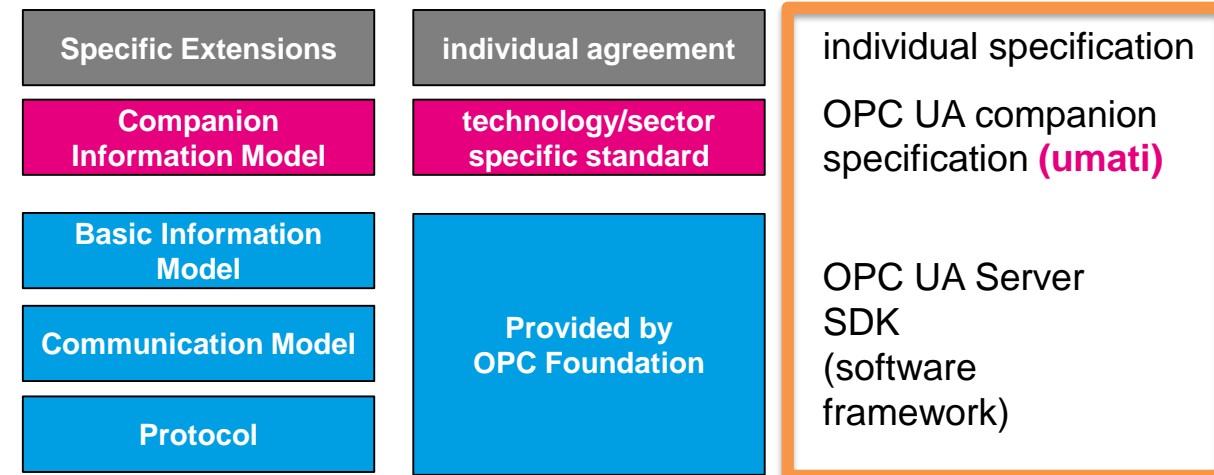
Eine Initiative des
An Initiative by **VDW**

Why OPC UA?



- OPC UA provides a **standardized communication framework** for connecting different systems within the automation environment (**HOW** to communicate)
- **Parameters and semantics** (**WHAT** to communicate) are defined differently for different applications via **OPC UA Companion Specifications** („standards“ → umati), which include data files for easy setup of OPC Server/Client systems

- **Standardization work** is done within the **OPC Foundation** (global community)
- OPC UA is making a **huge impact on the machinery industry in general**



Multitude of OPC UA activities within the VDMA

- » Agricultural Machinery
- » Air Conditioning and Ventilation
- » Air Pollution Control
- » Air-handling Technology
- » Building Control and Management
- » Cleaning Systems
- » Compressors, Compressed Air and Vacuum Technology
- » Construction Equipment and Building Material Machines
- » Drying Technology
- » Electrical Automation
- » Electronics, Micro and Nano Technologies
- » Engine Systems for Power and Heat Generation
- » Engines and Systems

- » Fire Fighting Equipment
- » Fluid Power
- » Food Processing Machinery and Packaging Machinery
- » Foundry Machinery
- » Gas Welding
- » Glass Industry
- » Hydro Power
- » Integrated Assembly Solutions
- » Large Industrial Plant Manufacturing
- » Lifts and Escalators
- » Machine Tools and Manufacturing Systems
- » Machine Vision
- » Materials Handling and Intralogistics
- » Measuring and Testing Technology

- » Micro Technologies
- » Mining
- » Plastics and Rubber Machinery
- » Power Systems
- » Power Transmission Engineering
- » Precision Tools
- » Printing and Paper Technology
- » Process Plant and Equipment
- » Productronic
- » Pumps + Systems
- » Refrigeration and Heat Pump Technology
- » Robotics
- » Security Systems
- » Software and Digitization

- » Surface Treatment Technology
- » Textile Care, Fabric and Leather Technology
- » Textile Machinery
- » Thermal Process Industry
- » Thermal Turbines and Power Plants
- » Valves
- » Waste Treatment and Recycling
- » Wind Energy
- » Woodworking Machinery

OPC UA CS Release (Candidate)

OPC UA CS under development

Awareness existent

umati OPC Foundation Joint Working Group



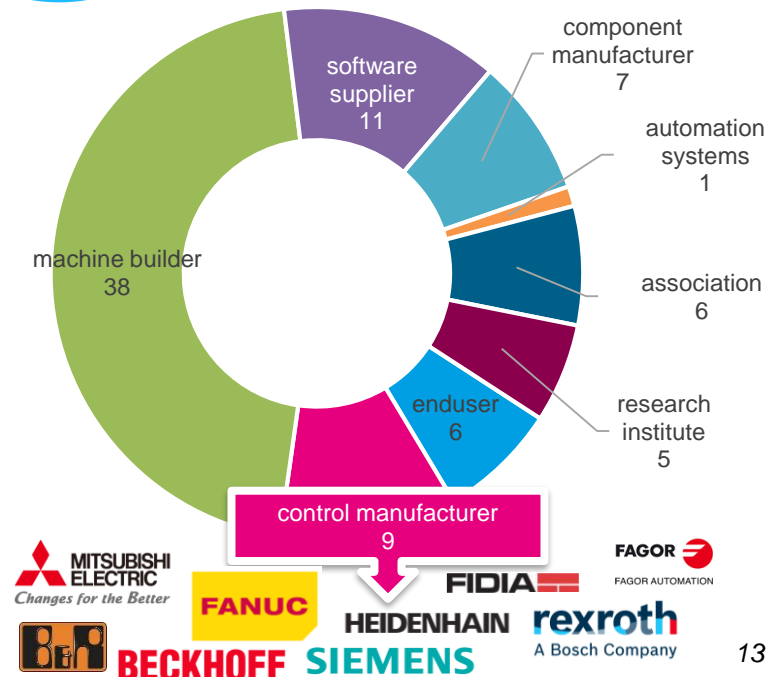
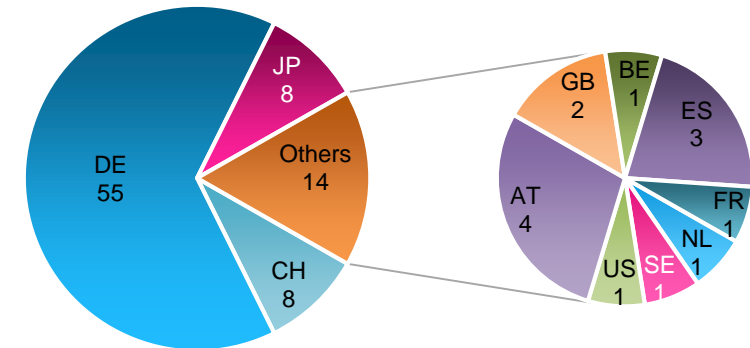
- 2019-02-22: Kickoff Meeting in Frankfurt
→ 55 participants (1 from US, 1 from JP)
- Initialization of the JWG
Election of Chairman (Götz Görisch, VDW)
- Various web and f2f meetings
average 50+ participants
- **85 member companies (per August 2019)**



2019-11-08

umati | Connecting the world of machine tools | An introduction

of companies per country



MITSUBISHI
ELECTRIC
Changes for the Better



FANUC

BECKHOFF

HEIDENHAIN

SIEMENS

FIDIA

rexroth

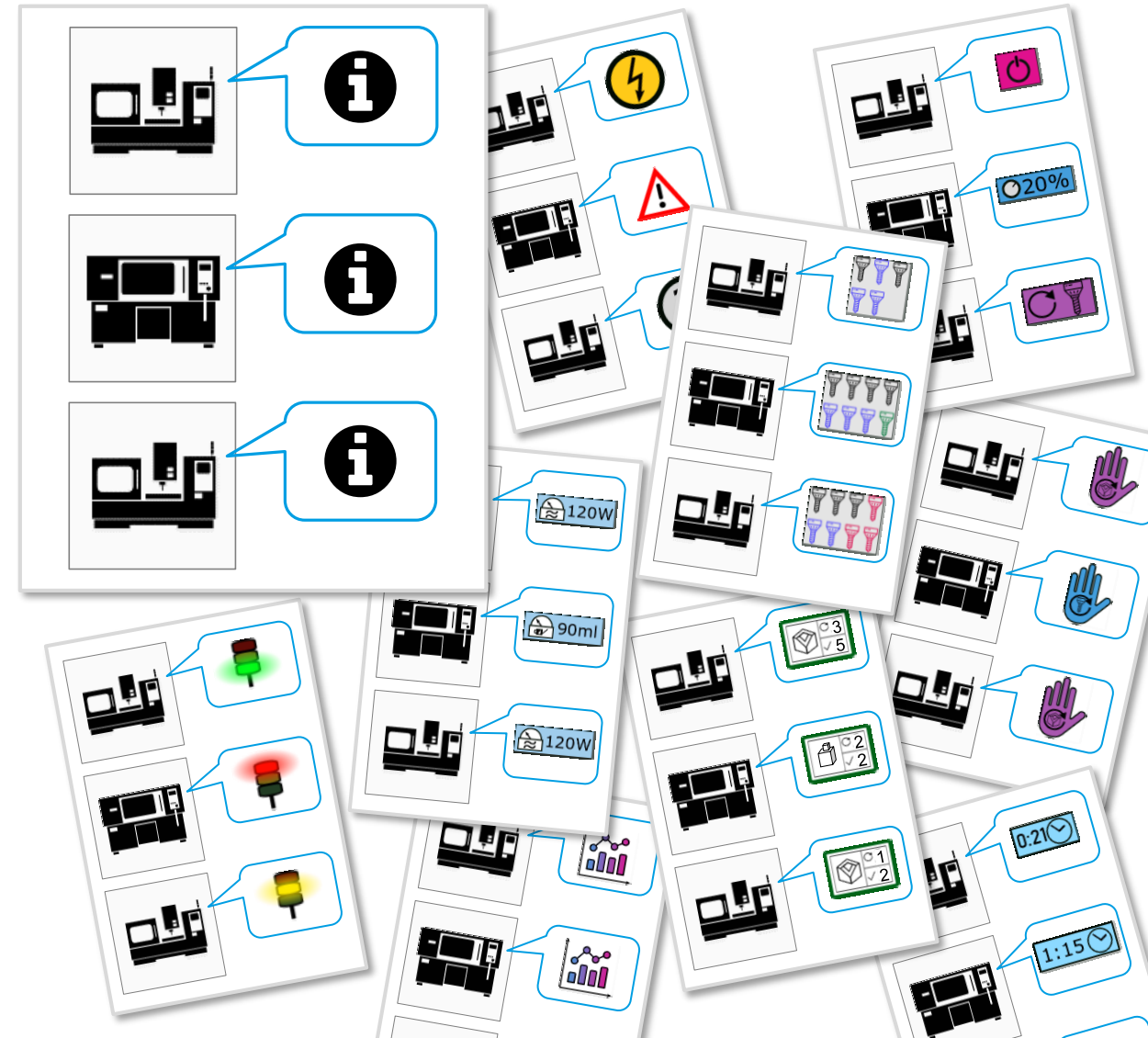
A Bosch Company

FAGOR
FAGOR AUTOMATION

umati Use Cases

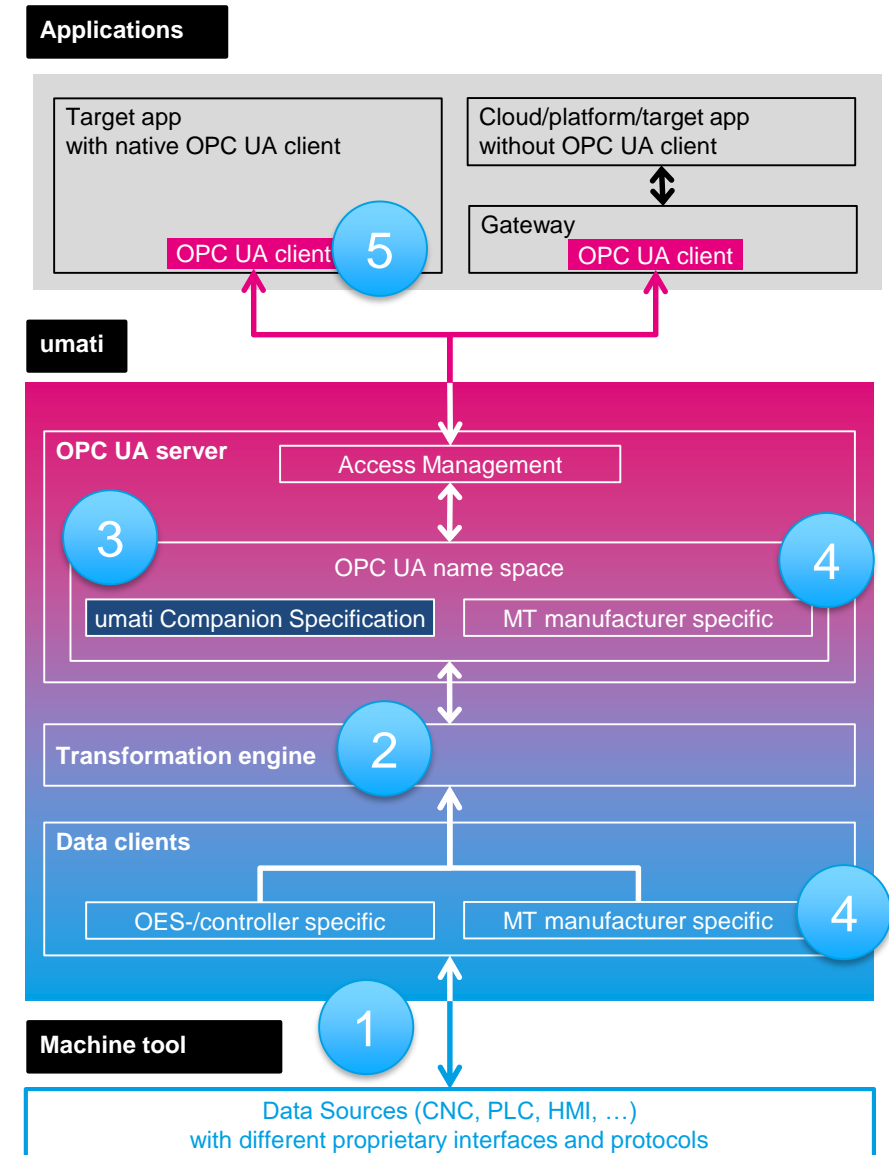


- 1 Identify machines of different manufacturers
- 2 Overview if production is running
- 3 Overview of parts in a job
- 4 Overview of runtimes for a job
- 5 Overview of machine tool state
- 6 Overview of upcoming manual activities
- 7 Overview of errors and warnings
- 8 Providing information for KPI calculations
- 9 Providing data for media and energy usage statistics
- 10 Providing an overview of tool data



Architecture

- 5 **Application Layer:** OPC UA clients enable unified access to data to create added value
 - 4 **Manufacturer-specific or customer specific extensions:** ensure the openness and flexibility required to include not (yet) standardized parameters and interfaces
 - 3 **OPC UA-server:** Communication „to the outside world“ is enabled through the standardized semantics and unified information model specified in the umati OPC UA Companion Specification
 - 2 **Transformation engine:** Data acquired from the machine needs to be mapped or tranformed (logically, mathematically) to the standardized targed semantics
 - 1 **Data Sources, Data Clients:** A machine tool (MT) comprises several data sources (CNC, PLC, HMI, ...). For each of these data sources protocols, a specific data client is require to connect to the existing interface
- ➔ (2), (3) an (4) are supposed to be **directly integrated into future versions of machine tools controllers**



First demonstration at AMB Stuttgart Trade Show (2018/09/18-22) – I



Partner	Hall/Booth	Machine type	Product name	Controller	Communication partner
Chiron	10/A51	Milling turning center	CHIRON FZ08 MT Precision+	Fanuc	IGH
DMG MORI	10/C11	Complete turning milling center	CTX Beta 800 TC	Siemens	ADAMOS, IGH
EMAG	4/B51	Vertical turning machine	VL2 10x (production)	Fanuc	EMAG MultiMachine Monitor
GF Machining Solutions	7/C31	Wire EDM	CUT P 350	Beckhoff	GFMS rConnect digital services, IGH
GROB WERKE	10/B11	Milling center	G352	Siemens	GROB-NET*Industry, IGH, GROB-NET*Industry, IGH, Siemens MindSphere
		Milling center	G352, G526, G550, G551 ...	various	
Heller	10/A31	Milling center	G352 (production)	Heidenhain	Siemens MindSphere, IGH
		Milling center	CP 4000 (production) CP 5000, HF 5500	Siemens	
Liebherr-Verzahntechnik	5/C51	Gear hobbing machine	LC 280 DC	Siemens	Liebherr Manufacturing System LMS 4.0 Liebherr Manufacturing System LMS 4.0
		Gear grinding machine	LGG 280	Siemens	
Pfiffner (FFG Group)	6/B11	Rotary transfer machine	Hydromat HC32-16 EPICplus	Bosch Rexroth	IGH
UNITED GRINDING Group	5/C12	Grinding machine	STUDER favorit	Fanuc	UNITED GRINDING Digital Solutions, IGH
Beckhoff	2/E23	Technology demonstrator		Beckhoff	Beckhoff TC3 OPC UA, IGH
Bosch Rexroth	2/C03	Technology demonstrator	Laser processing model	Bosch Rexroth MTX	Bosch Rexroth Active Cockpit, IGH
Fanuc	6/B51				
Heidenhain	2/D03				
Siemens	2/B03				
Trumpf	DW088				
IGH Infotec AG	DW088				
ISW	DW088				
VDW Forschungsinstitut	DW088				

15+ Machine tools
9 MT manufacturers
5 Controller manufacturers
10 Communication partners



First demonstration at AMB Stuttgart Trade Show (2018/09/18-22) – II



Live data acquired during the trade show: on-line for 5 days without interruption!

First demonstration at AMB Stuttgart Trade Show (2018/09/18-22) – III



Launching the brand „umati - universal machine tool interface“

A large, thick ring with a blue-to-pink gradient, partially visible on the left side of the slide.

connecting the world
of machine tools @



110

machines



28

software
solutions

70

companies

10

countries



a network
of strong partners

core partners



association partners



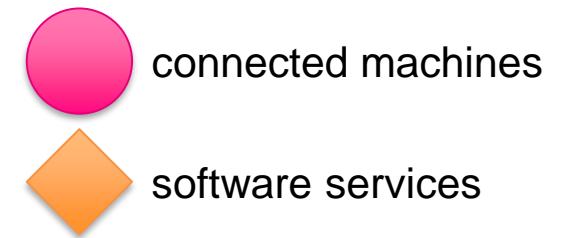
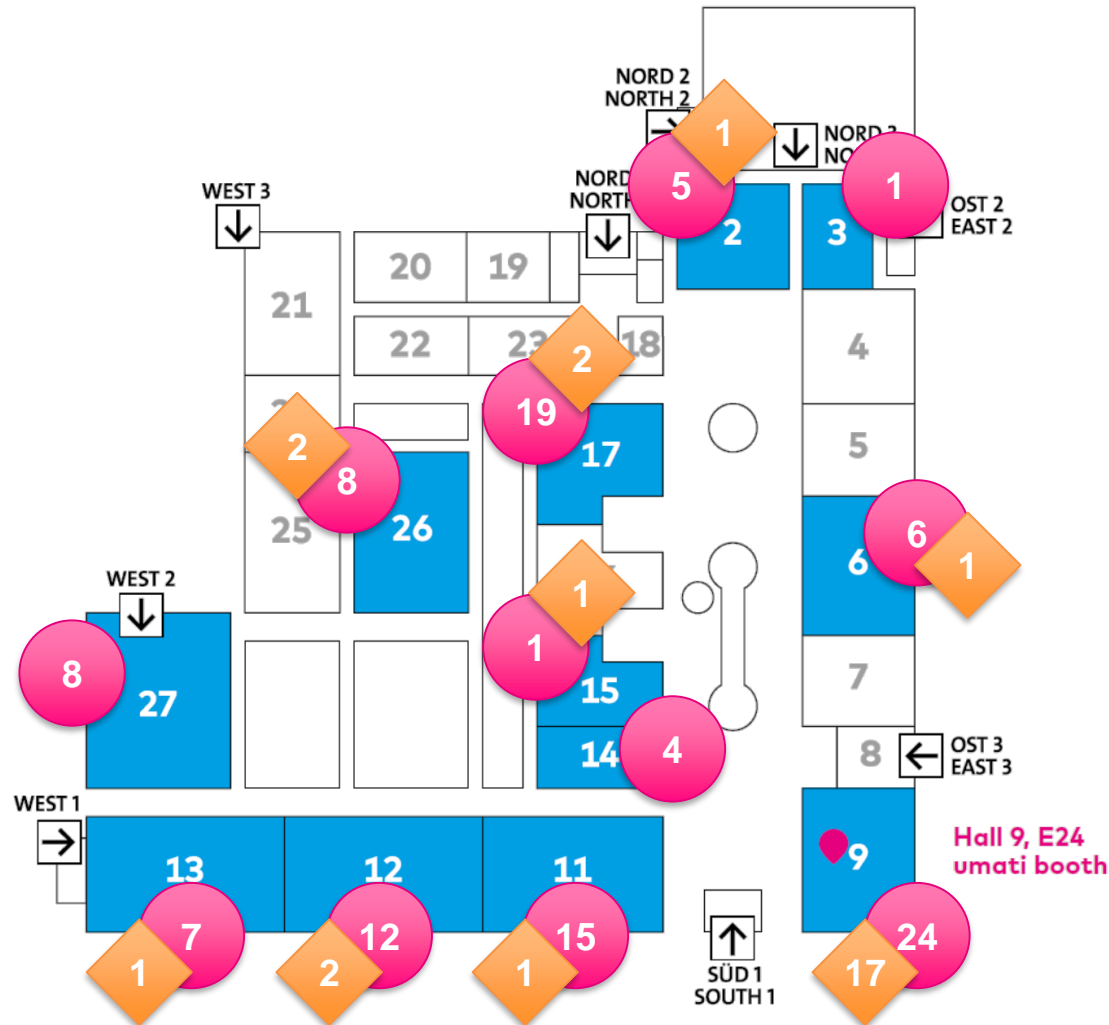
consortium partners



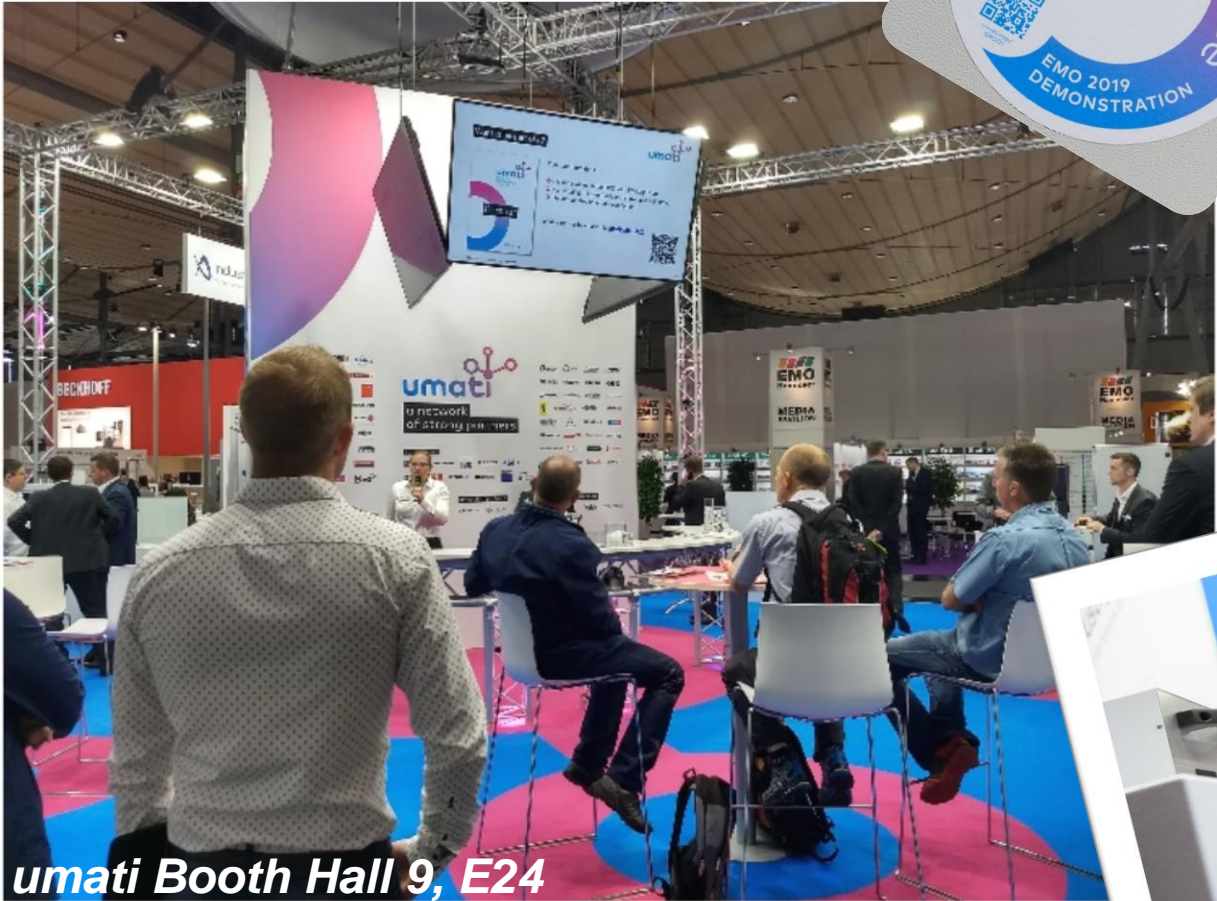
research partners



Showcase participants across the fairground



umati@EMO Impressions



Federal Minister for Transport and Digital Infrastructure
Andreas Scheuer

Social Media



TRUMPF
@TRUMPF_News

A common language unites. The easier the machines exchange information, the more efficiently they work. That's why @VDWonline developed #umati with #TRUMPF & other project partners. Our experts @AWohlfeld & @stedokro will inform you this afternoon @EMO_HANNOVER hall 9, booth E24.

[Tweet übersetzen](#)



ISW Uni Stuttgart
@IswUniStuttgart

Dr. Alexander Broos talks about machine tool connectivity with #umati at the New Technology Forum. More talks about umati follow suit, so come by to Hall 9, I 24 to listen in.

#EMO2019
@VDWonline @EMO_HANNOVER

[Tweet übersetzen](#)



10:48 vorm. · 20. Sep. 2019 · [Twitter for Android](#)

OPC Foundation
@OPCFoundation

They must feel like rockstars: congrats from @OPCFoundation specific to Goetz Goerisch, Caren Dripke, Dr. Alexander Broos and Christian von Armin (left to right) celebrating world adoption of #umati #EMO2019 @VDWonline @IswUniStuttgart

[Tweet übersetzen](#)

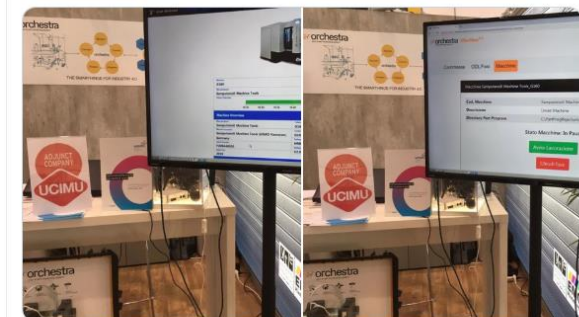


6:30 nachm. · 17. Sep. 2019 · [Twitter for Android](#)

ORCHESTRA
@orchestraweb

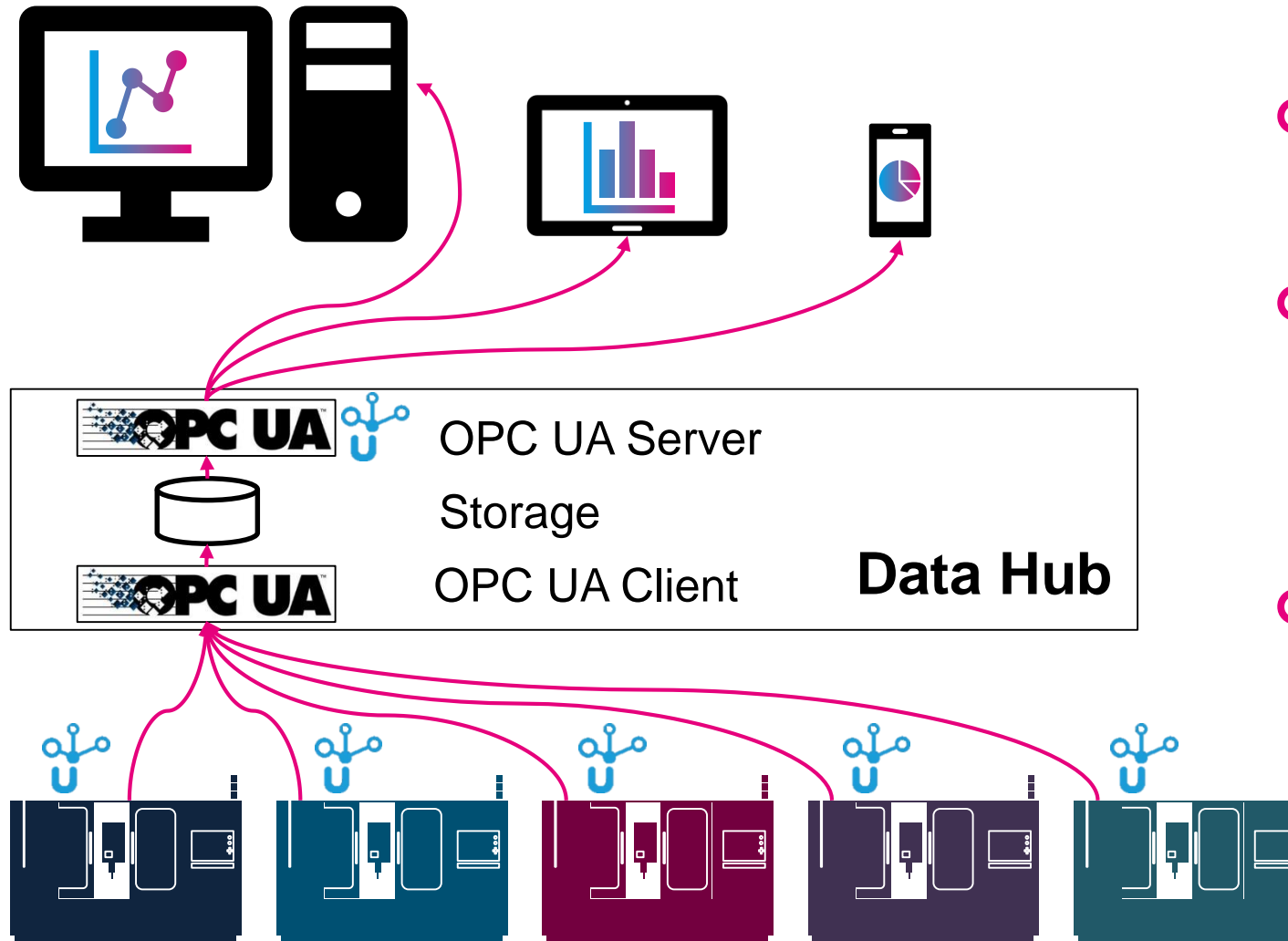
Make no #opcua machines #umati compliant for #Industry40. Come to our boot in @EMO_HANNOVER hall 9 A30 to see @SAMPspa G160 work ing on our #Minimes40 together with all other machines in #umati platform.

[Tweet übersetzen](#)



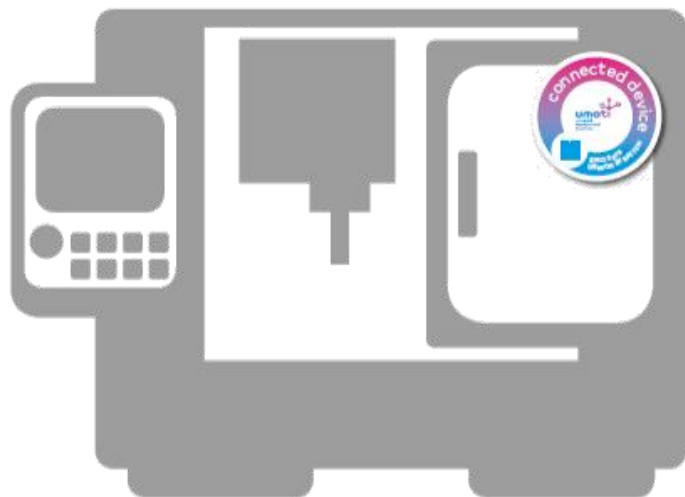
11:02 vorm. · 20. Sep. 2019 aus Hannover, Deutschland · [Twitter for iPhone](#)

EMO showcase connectivity scheme



- All connected machines support the OPC UA Specification „umati for EMO“
- The Data Hub gathers and stores the machine data and makes it available via an OPC UA Server using the OPC UA specification „umati for EMO“
- All software using the showcase data connects to the Data Hub with an OPC UA Client

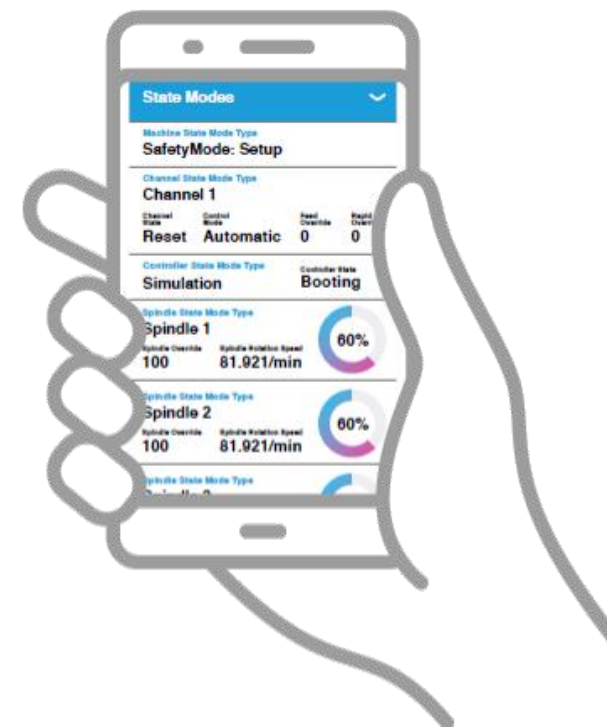
Visibility across the fairground



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>


Dashboard



umati dashboard




universal
machine tool
interface

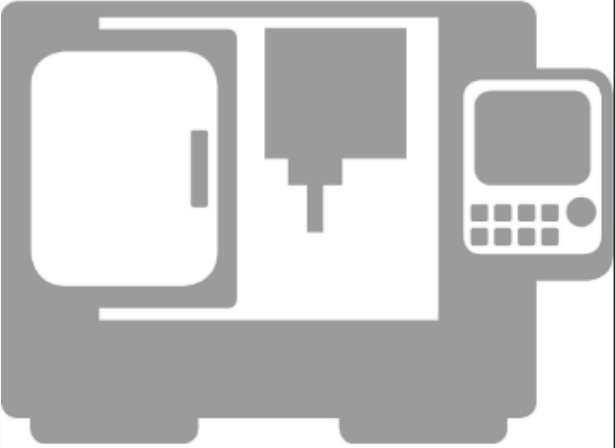

Browse by
map


Browse by list


View overall
status

Willkommen zur umati-Präsentation auf der EMO
Hannover 2019

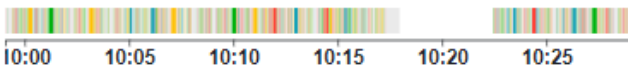

umati dashboard




Machine
Umati Example Server

Manufacturer
ISW Christian von Arnim


Hall/Booth
X DE

Status overview



umati dashboard

Umati Example Server
NameCustom
Simulation 1
SoftwareVersionsId
Local Umati Example Server
SoftwareVersionsComponentVersion
1.0.0

Tools

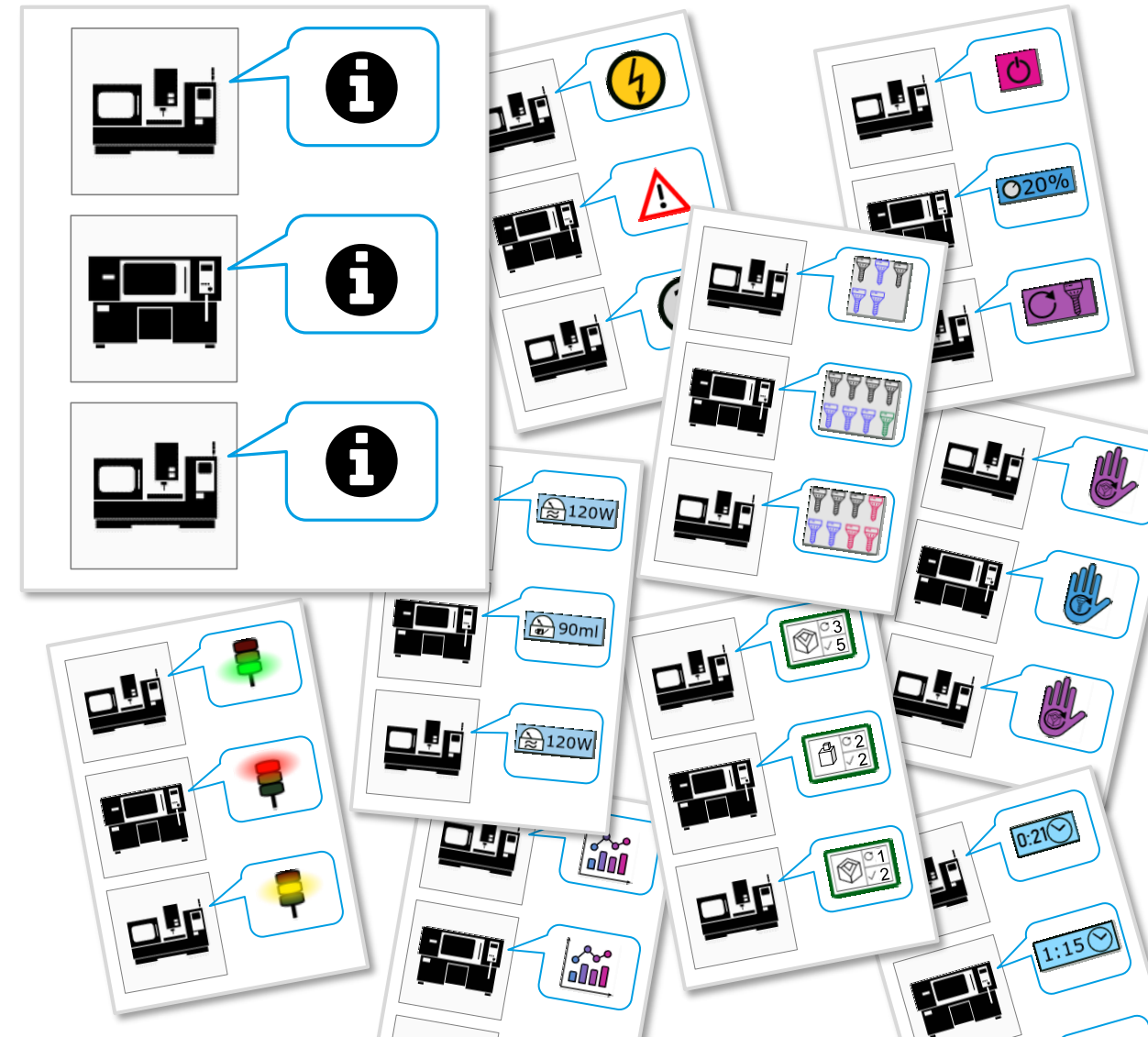

T_ISW_1000
T1000 : 1517

Jobs

Job 152
Ended
Runs 4/ 9

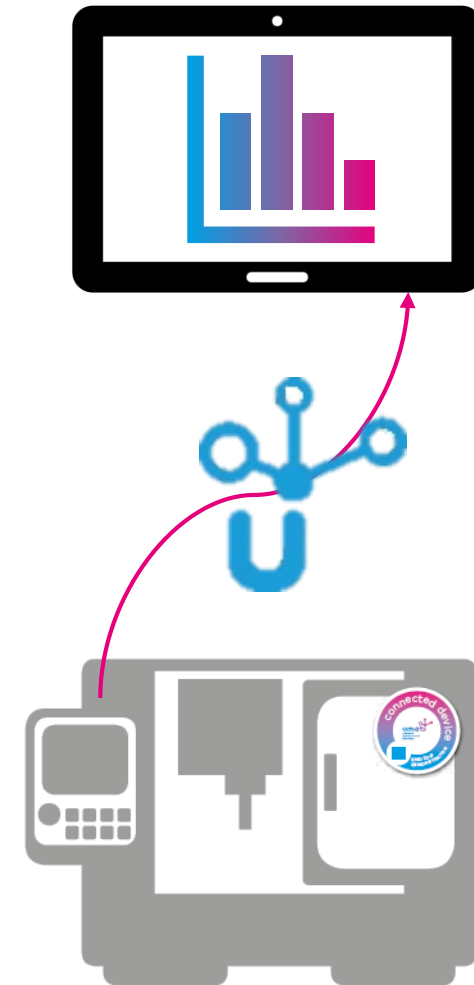
umati Use Cases @ EMO demonstration

- 1 Identify machines of different manufacturers
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umati@EMO Showcase Takeaways

- 110 machine tools connected with
- 28 software services
- under trade show conditions
- based on OPC UA
- no direct interaction between machine builders and software suppliers required at all → “plug and play”
- stable connection with data hub

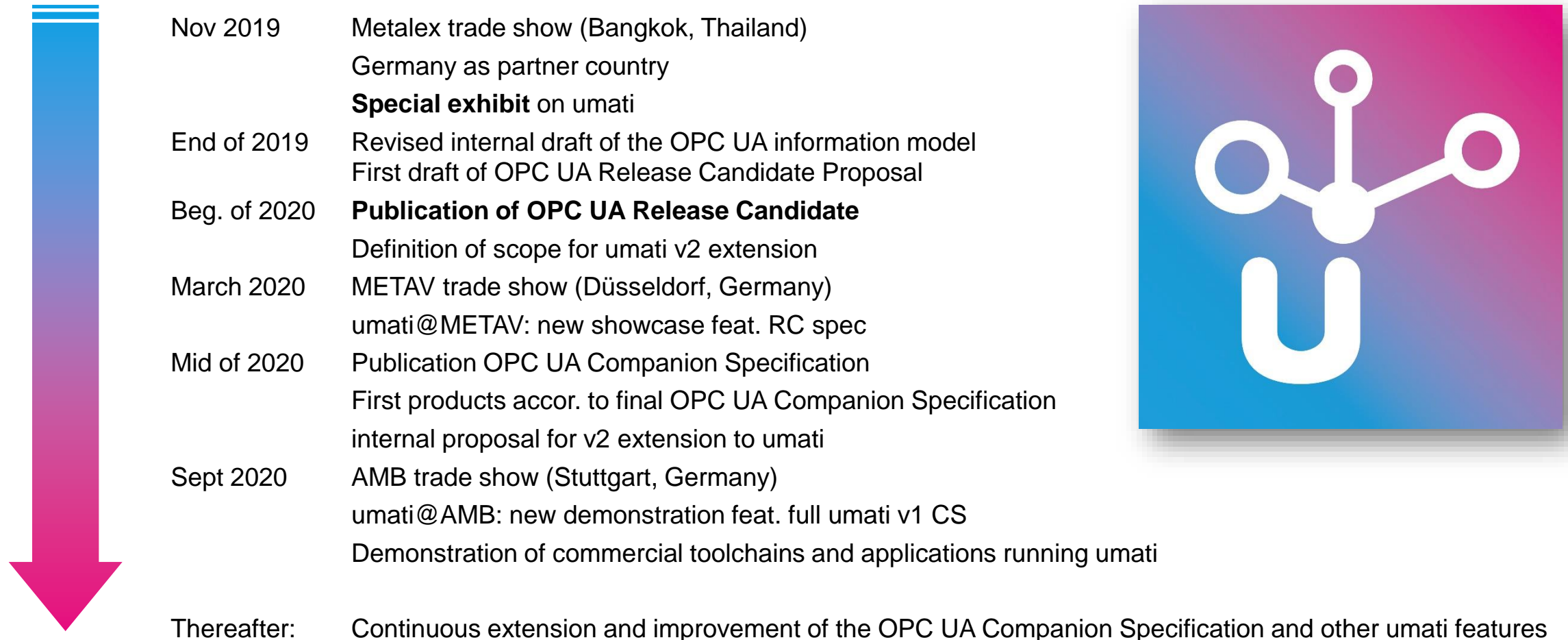


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into the future



Moving On...



How Can I Participate?



○ End user (buyer, operator)

- express interest in umati to suppliers (MT builders, software suppliers, etc.)

○ Machine tool builder or software system supplier

- wait until the release candidate for umati v1 is available.
Study the document, prepare for roll-out.

○ Component supplier (controllers, software routines, etc.)

- make sure the equipment is ready to load and use an umati information model.

○ Put in additional effort

- consider joining the OPC UA JWG*

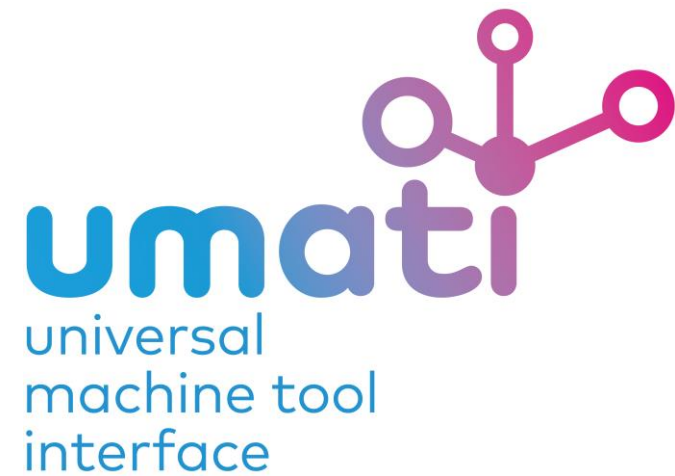
*) Restrictions may apply, e.g., being a member of OPC Foundation

register by
emailing to
info@umati.info





Need more info...?



www.umati.info

info@umati.info

 [#umati](https://twitter.com/umati)

