Microsoft

Big Data – und was nun?

Die Bedeutung einer Innovationsplattform im Produktlebenszyklus eines Fahrzeuges

Frank Möring, PTC
05.06.2018, München



ptc


Microsoft
Wer ist PTC?
Kontext Microsoft Automotive Summit
„Driving Innovation in a Digital World“ – Innovationsplattform von PTC
Industriebeispiele
Dialog
Frank Möring, PTC
05.06.2018, München
ptc

ptc

- Software Company, $1B+ Umsatz
- Design, Fertigung, Betrieb, und Wartungen von “Produkten”
- Marktführer im Bereich “Industrial Innovation Platform” sowie CAD/PLM und ALM Lösungen
- Globales Netzwerk mit 400K+ Entwicklern und 1K+ Partnern

The Boston Globe
TOP PLACES TO WORK
2017



PTC KUNDEN IN AUTOMOTIVE (AUSSCHNITT)
(ALLE PTC LÖSUNGEN – CAD, PLM, ALM, SLM, IOT)

Commercial Vehicles

VOLVO, Mack, RENAULT, LEYLAND, KRONE, KENWORTH, 东风汽车公司, LIEBHERR, PACCAR, HINO, CATERPILLAR, Atlas Copco, WRIGHTBUS, KRAZ, Peterbilt, JOHN DEERE, rosenbauer, DAIMLER, MAN

Sports / Luxury Vehicles

Ferrari, LAMBORGHINI, ASTON MARTIN RACING, CALLAWAY, MITSUBISHI MOTORS, Racing Development TRD, PENSKE RACING, MASERATI, Audi, dallara, SEAT SPORT

Volume Market Passenger Vehicles

HYUNDAI, KIA, KIA MOTORS, Audi, ŠKODA AUTO, BMW, PORSCHE, TOYOTA, TATA

New Market Players

e.GO, STREET SCOOTER, CHERY, CHANA, Bosch Mahle TurboSystems, FAW, DFM

System Suppliers

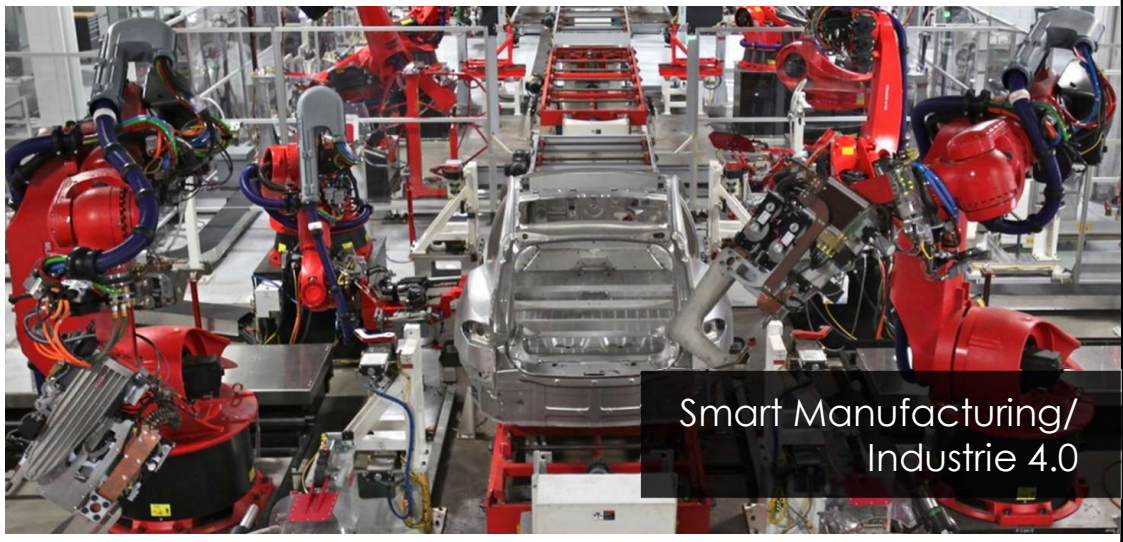
brembo, BOSCH, Continental, COOPER STANDARD AUTOMOTIVE, FEDERAL MOGUL, HARMAN, DANA, EATON, KNORR-BREMSE, LEONI, ThyssenKrupp, VOLKE, WABCO, ZF, Webasto, GKN

Component Suppliers

LUK, INA, FAG, SCHAEFFLER GRUPPE, SKF, TRW, FCI, HOERBIGER, MAHLE

DIGITALE TRANSFORMATION BRAUCHT INNOVATION





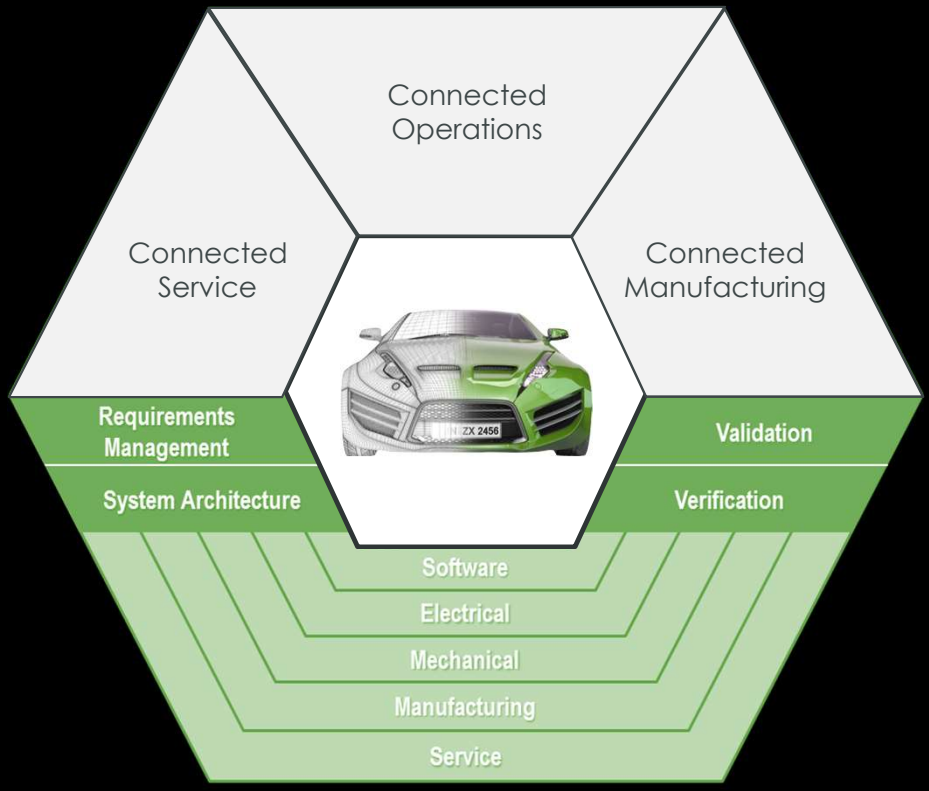




AUTOMOBILINDUSTRIE IM WANDEL



VERKAUFTES PRODUKT	BETRIEBSLEISTUNG / MOBILITÄTSSERVICE
SINGULÄRES PRODUKT	PRODUKT IM ECO-SYSTEM
MEHRJÄHRIGE ZYKLEN	KONTINUIERLICHE VERÄNDERUNG



CLOSED LOOP LIFECYCLE MANAGEMENT

… ermöglicht agiles, schnelles Handeln in Bezug auf sich verändernde Kundenbedarfe.

PHYSICAL
WORLD



DIGITAL
WORLD

PHYSICAL
WORLD

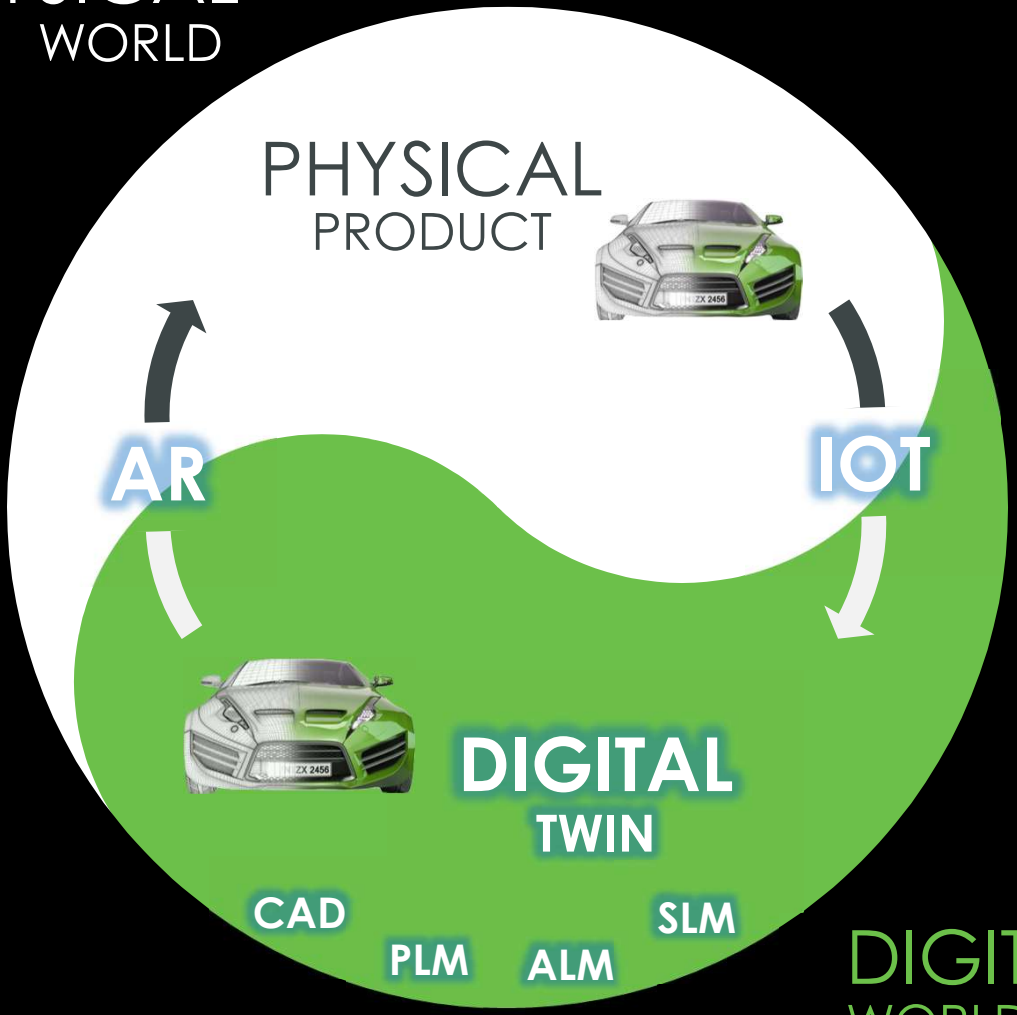


DIGITAL
WORLD

ptc

SMART CONNECTED PRODUCTS

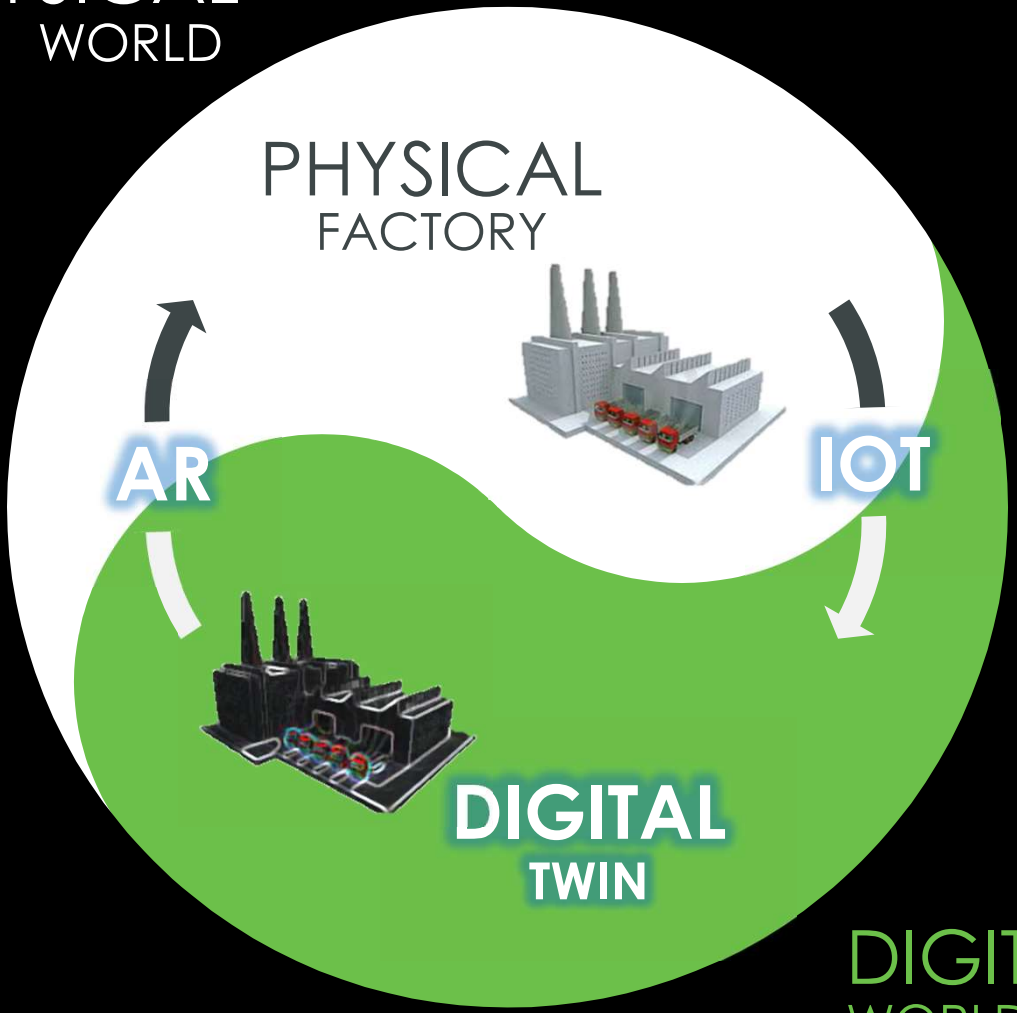
PHYSICAL WORLD



DIGITAL WORLD

PHYSICAL
WORLD

SMART
Manufacturing



DIGITAL
WORLD

ptc

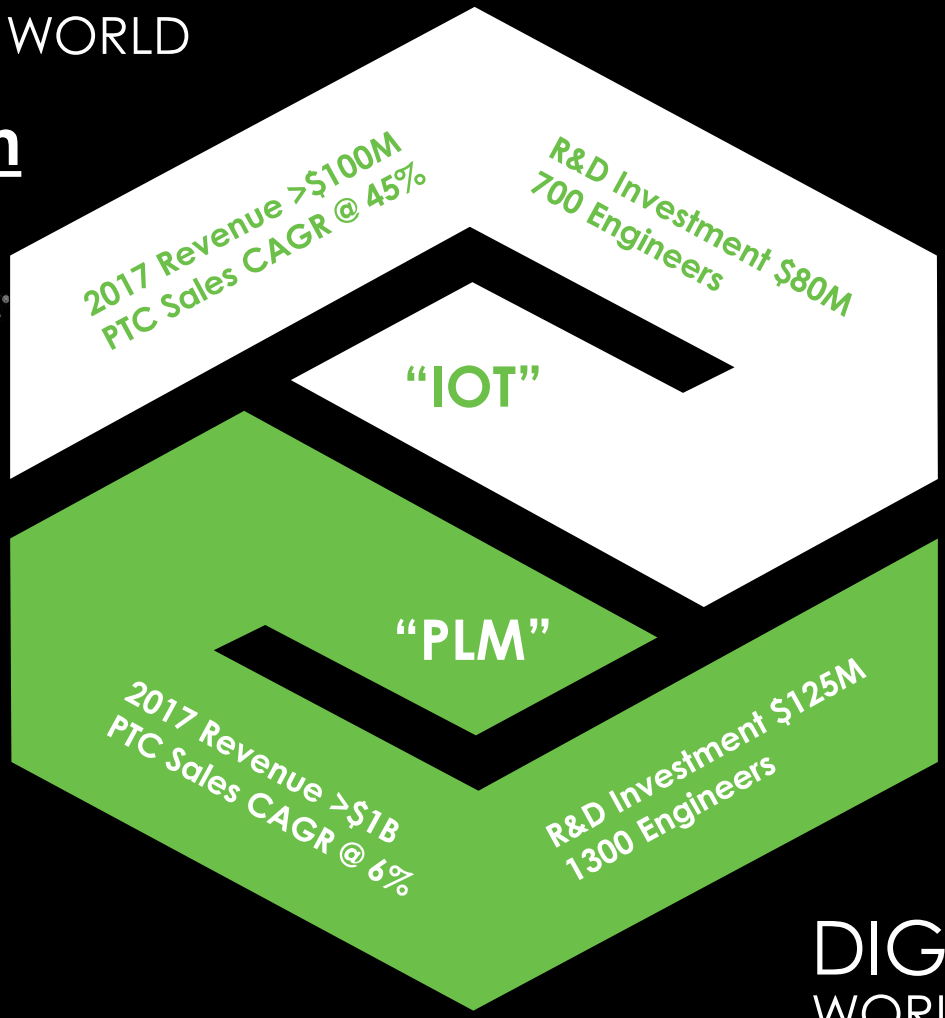
PHYSICAL WORLD

Innovation Platform

IoT & Analytics | thingworx

AR/VR | vuforia

Industrial Connectivity | kepware



PLM Solutions

CAD | creo

PLM | windchill

ALM | integrity

SLM | servigistics

DIGITAL WORLD

LÖSUNGSPORTFOLIO FÜR INNOVATION

PARTNER SOLUTIONS

Microsoft · Hewlett Packard Enterprise · GE · accenture · Deloitte. Digital · NATIONAL INSTRUMENTS · vodafone

INDUSTRIAL INNOVATION PLATFORM

thingworx® navigate™ · thingworx® studio
thingworx® asset advisor · thingworx® production advisor

thingworx® · vuforia™ · kepware®

PRODUCT LIFECYCLE MANAGEMENT

creo® · windchill® · integrity™ · servigistics®

CLOUD | HYBRID | ON-PREM

LÖSUNGSPORTFOLIO FÜR INNOVATION BRAUCHT PARTNER

MICROSOFT TECHNOLOGIES



INDUSTRIAL INNOVATION PLATFORM

thingworx navigate
thingworx asset advisor
thingworx studio
thingworx production advisor

thingworx
vuforia
kepware

PRODUCT LIFECYCLE MANAGEMENT

creo
windchill
integrity
servigistics

CLOUD | HYBRID | ON-PREM

INNOVATIONSPLATTFORM – SYSTEMARCHITEKTUR

System of Engagement









thingworx

Engineering Connected Apps | Manufacturing Connected Apps | Service Connected Apps | Partner Apps

Integration Layer

thingworx

End-to-End Technology Platform | Edge Connectivity

3rd Party Service Bus

System of Records

windchill

Smart Connected PLM

Product Data Management | Project Execution Management | Manufacturing Process Management | Component & Supplier Management | …

Any Factory Assets
Any Device Clouds

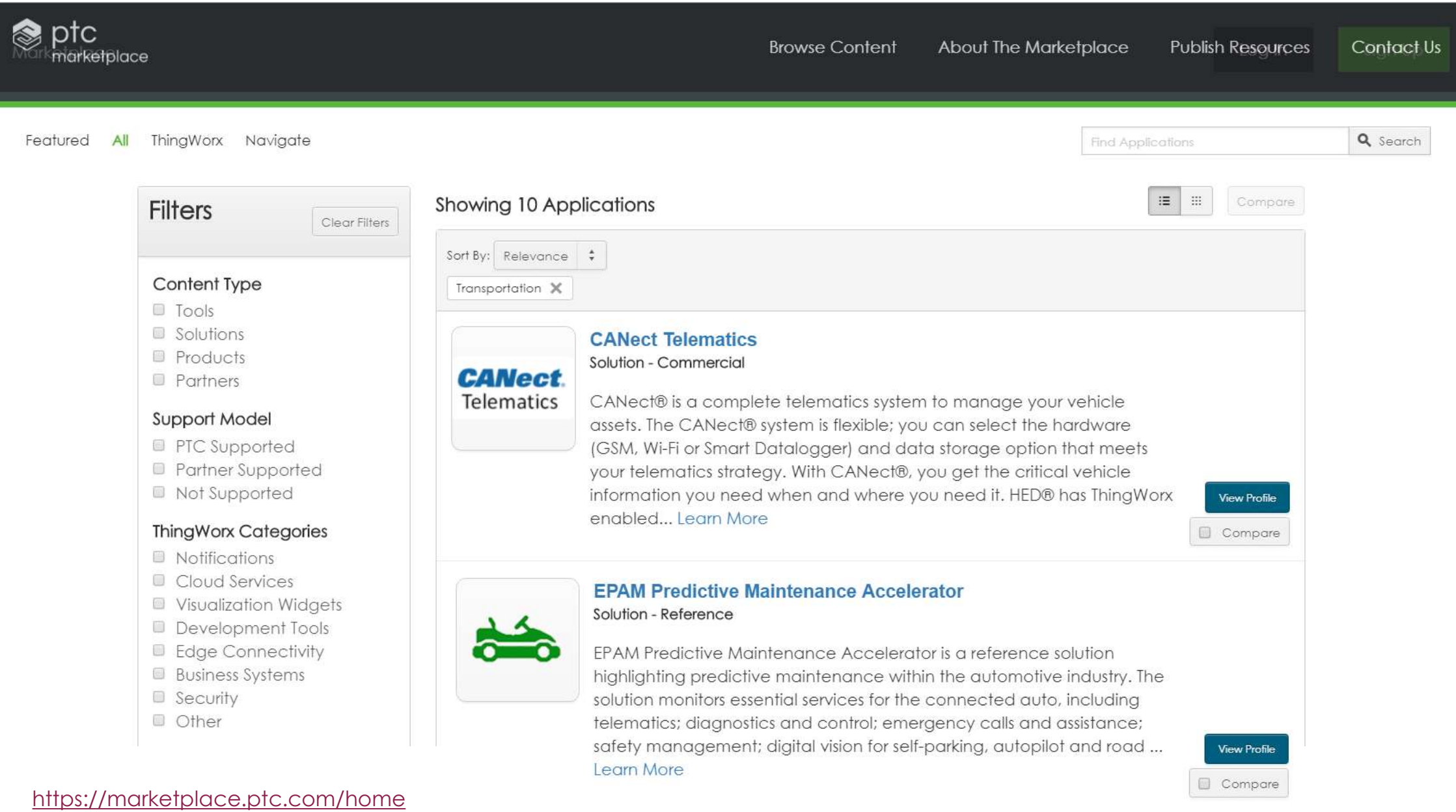
Physical Systems/ Products

ERP | MES | CRM | …

3rd Party Systems

Openness and Standards

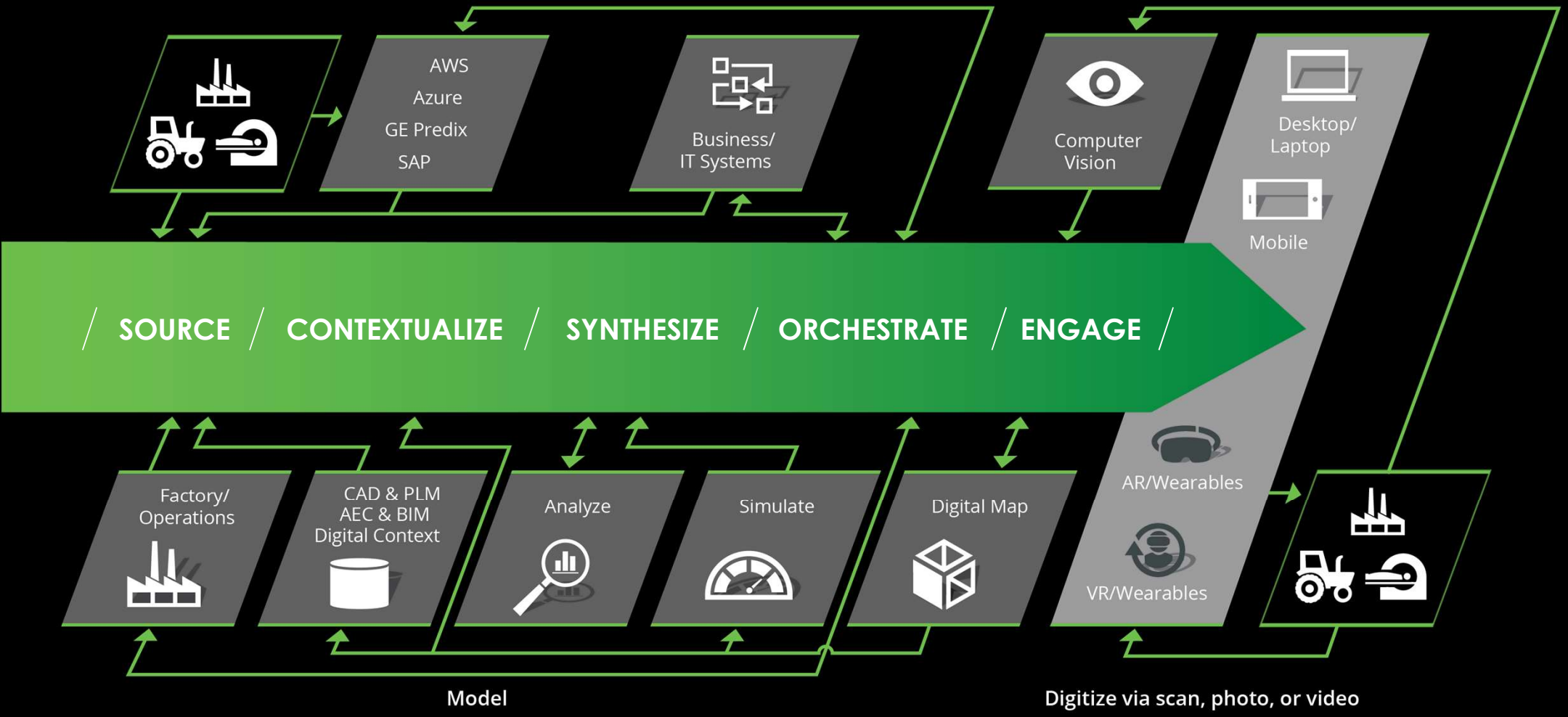
INCOSE | OMG OBJECT MANAGEMENT GROUP | OSLC | industrial internet CONSORTIUM | SPEDiT | CRYSTAL | ProSTEP iViP cpo CODE of PLM OPENNESS | AUTOSAR Enabling Innovation



https://marketplace.ptc.com/home

FUNKTIONSWEISE DER INNOVATIONS PLATFORM THINGWORX

ptc

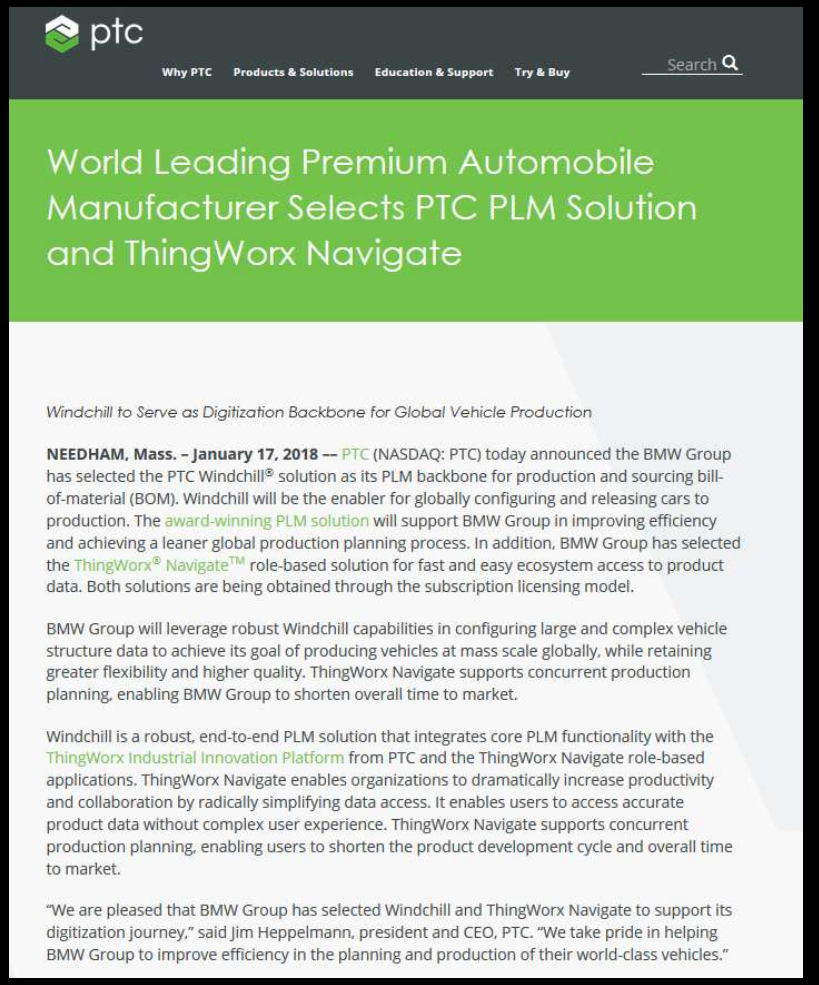


PTC PLM FOR PRODUCTON @ BMW

- **PTC Windchill** will be the future solution for BMW's PLM backbone for production and sourcing bill-of-material (BOM)
- **PTC ThingWorx Navigate** supports concurrent production planning and enables users to shorten the product development cycle and overall time to market

Strategic Partnership





ptc

Why PTC | Products & Solutions | Education & Support | Try & Buy | Search

World Leading Premium Automobile Manufacturer Selects PTC PLM Solution and ThingWorx Navigate

Windchill to Serve as Digitization Backbone for Global Vehicle Production

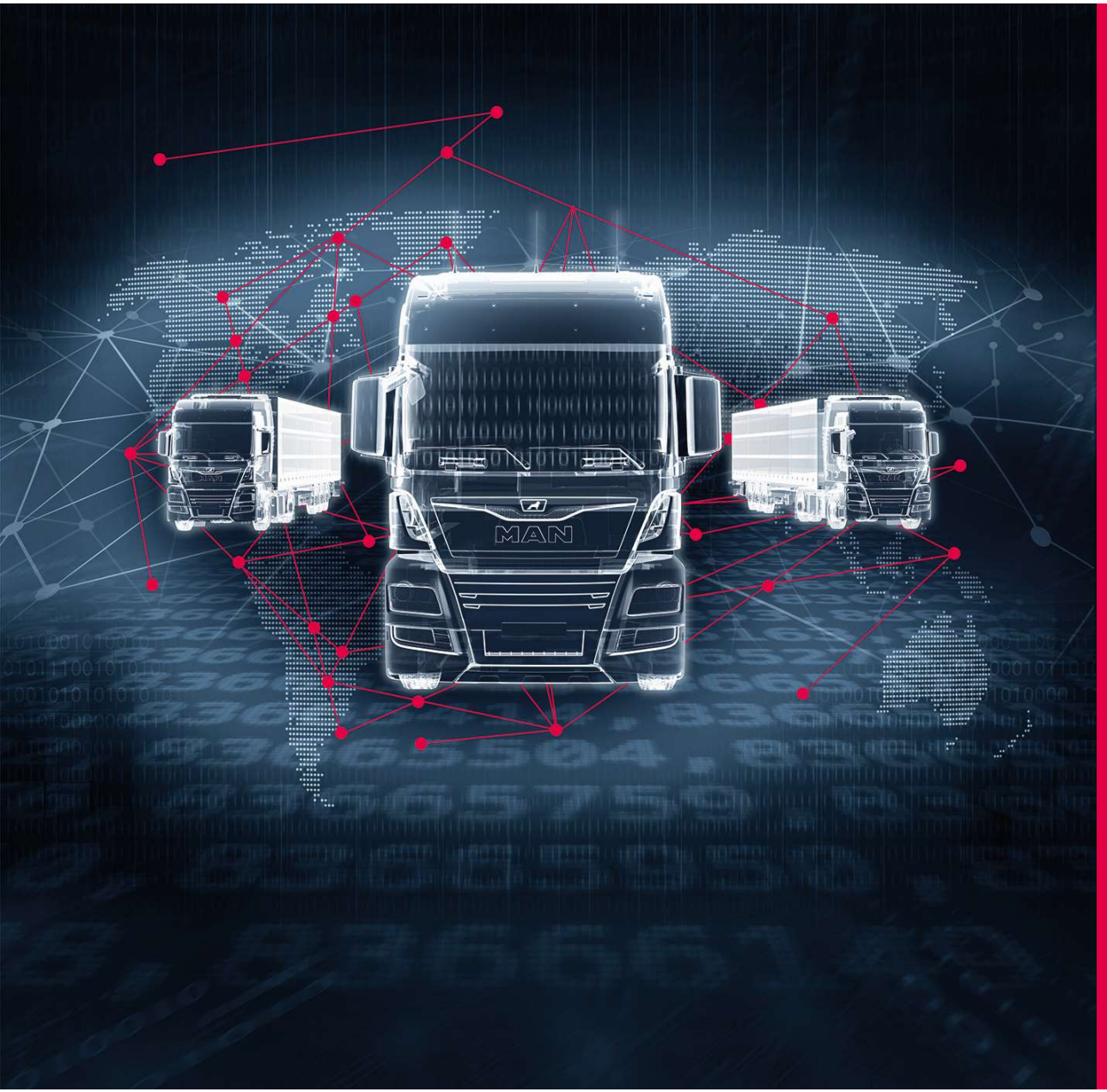
NEEDHAM, Mass. – January 17, 2018 –- PTC (NASDAQ: PTC) today announced the BMW Group has selected the PTC Windchill® solution as its PLM backbone for production and sourcing bill-of-material (BOM). Windchill will be the enabler for globally configuring and releasing cars to production. The award-winning PLM solution will support BMW Group in improving efficiency and achieving a leaner global production planning process. In addition, BMW Group has selected the ThingWorx® Navigate™ role-based solution for fast and easy ecosystem access to product data. Both solutions are being obtained through the subscription licensing model.

BMW Group will leverage robust Windchill capabilities in configuring large and complex vehicle structure data to achieve its goal of producing vehicles at mass scale globally, while retaining greater flexibility and higher quality. ThingWorx Navigate supports concurrent production planning, enabling BMW Group to shorten overall time to market.

Windchill is a robust, end-to-end PLM solution that integrates core PLM functionality with the ThingWorx Industrial Innovation Platform from PTC and the ThingWorx Navigate role-based applications. ThingWorx Navigate enables organizations to dramatically increase productivity and collaboration by radically simplifying data access. It enables users to access accurate product data without complex user experience. ThingWorx Navigate supports concurrent production planning, enabling users to shorten the product development cycle and overall time to market.

"We are pleased that BMW Group has selected Windchill and ThingWorx Navigate to support its digitization journey," said Jim Heppelmann, president and CEO, PTC. "We take pride in helping BMW Group to improve efficiency in the planning and production of their world-class vehicles."

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PLM process digitalization based on an IoT platform strategy

Franz | Mundinus | 20.06.2017

We are using the PTC solution architecture as a scalable basis for digitalization

Applications layer for defined purposes using data across domains, e.g.:

App: Engineering Cockpit



App: Test data analysis



App: Dashboards



App: Augmented / Virtual Reality



Scalable integration layer

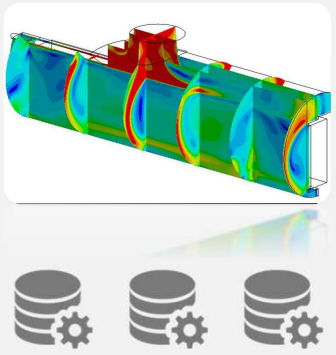
thingworx

thingworx

Product development



Simulation, validation



Digital twin



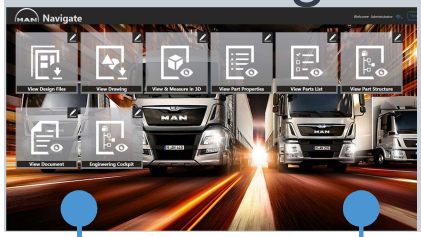
Product data

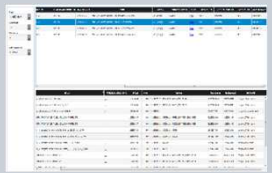


Test vehicle connectivity

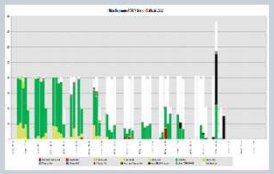


PLM Navigator









ThingWorx

Apps with defined roles & rights of access
Presentation layer for PLM data

Engineering

- Requirements Link
- Windchill
- CATIA
- LCA
- Integrity
- eASEE
- EBCABLE
- ELDorado
- EZIS
- ELANIS
- STÜLIS
- EMCOS
- AVIS
- SADIS

Sales, Production & Logistics

- STÜLIS
- AVIS
- SAP MP1
- SAP ESA
- Configurator

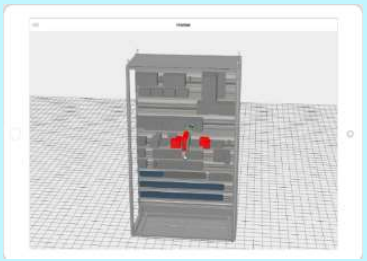
VOLKSWAGEN - SMART, CONNECTED MAINTENANCE

Smart, connected Maintenance – Macro Localisation



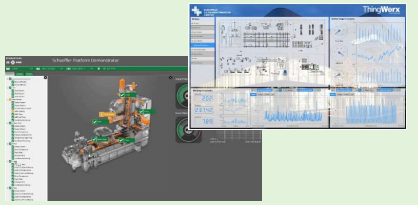
thingworx

Smart, connected Maintenance – Guided Activities



vuforia

Supplementary, role-based Dashboards & Views

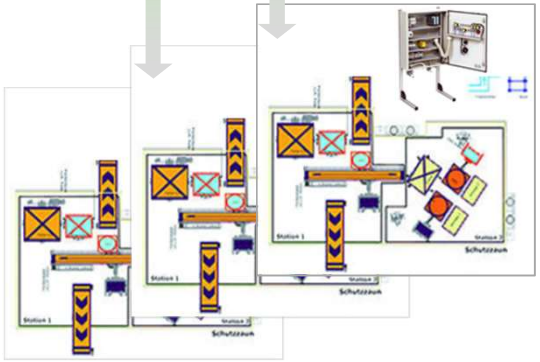


thingworx

Skalierbarer Integrations-Layer thingworx

thingworx

kepware



ECAD-AR-Repository

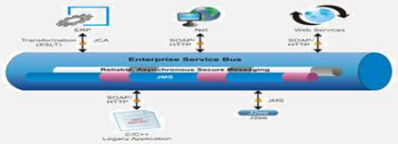
windchill



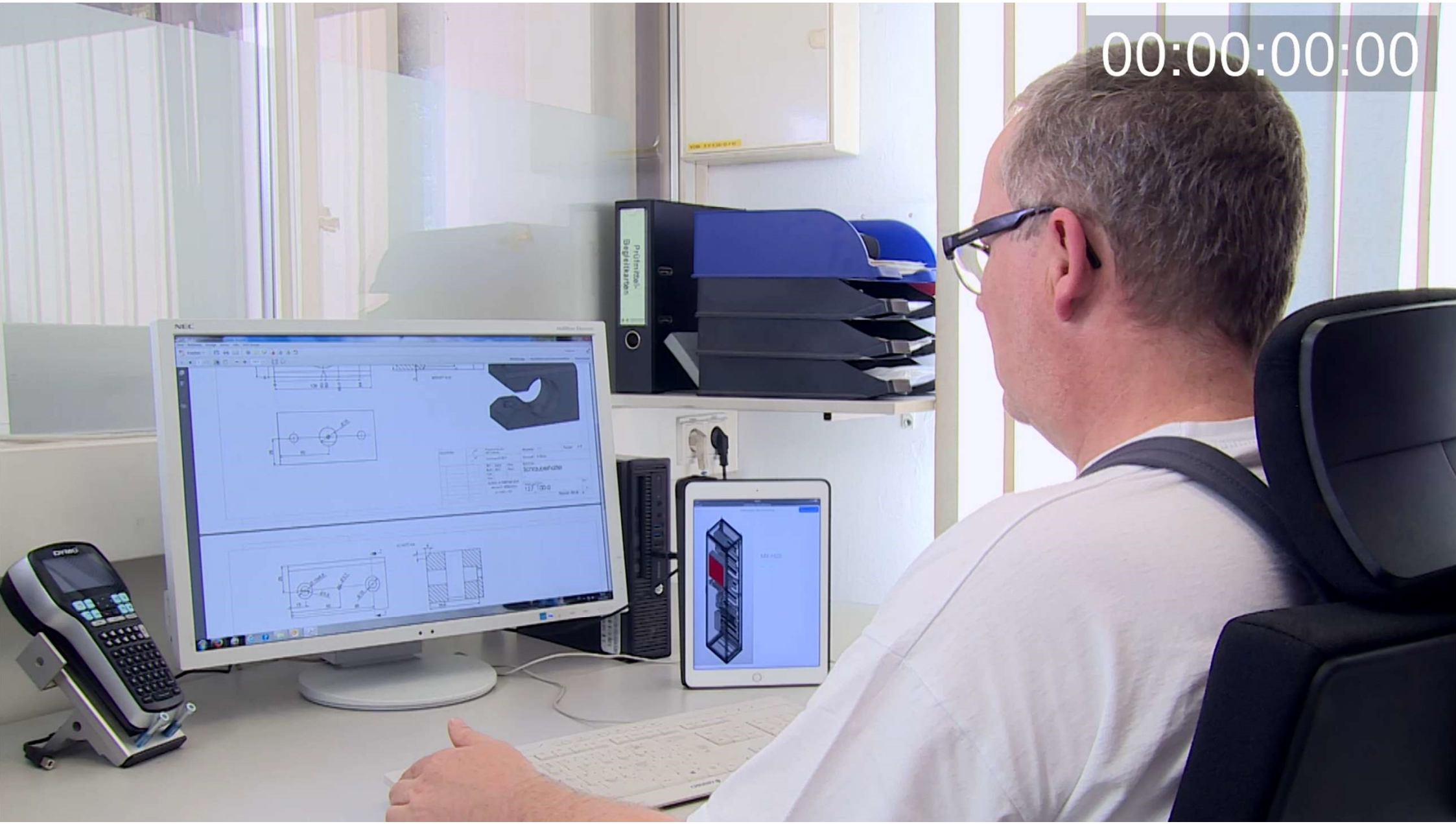
System from...

1) Engineering
2) ERP
3) Production

Other Enterprise Integration solution, like ESB, PSB, Data-Lakes, etc.



Already done in Hall 25 and 54


00:00:00:00


... seamless connected with unique Industrie 4.0 reference products like
e.GO, to demonstrate digital & physical convergence
(1/10 of typical Budget & 1/2 of typical time to market)
ptc
KEY TAKEAWAY:
„there are productive, innovative products in production, operation & service behind“
„e.GO Life demonstrates Industrie 4.0 with PTC“

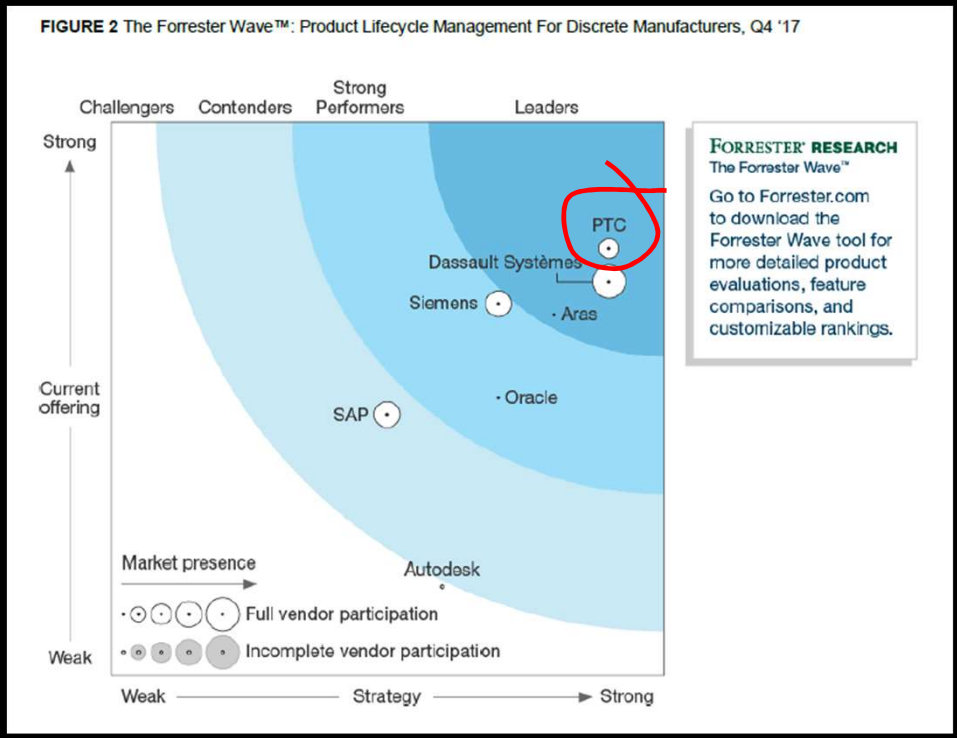

Closed Loop Simulation
ThingWorx &
Integrity Modeler SySim

PHYSICAL
WORLD

DIGITAL
WORLD

Windchill

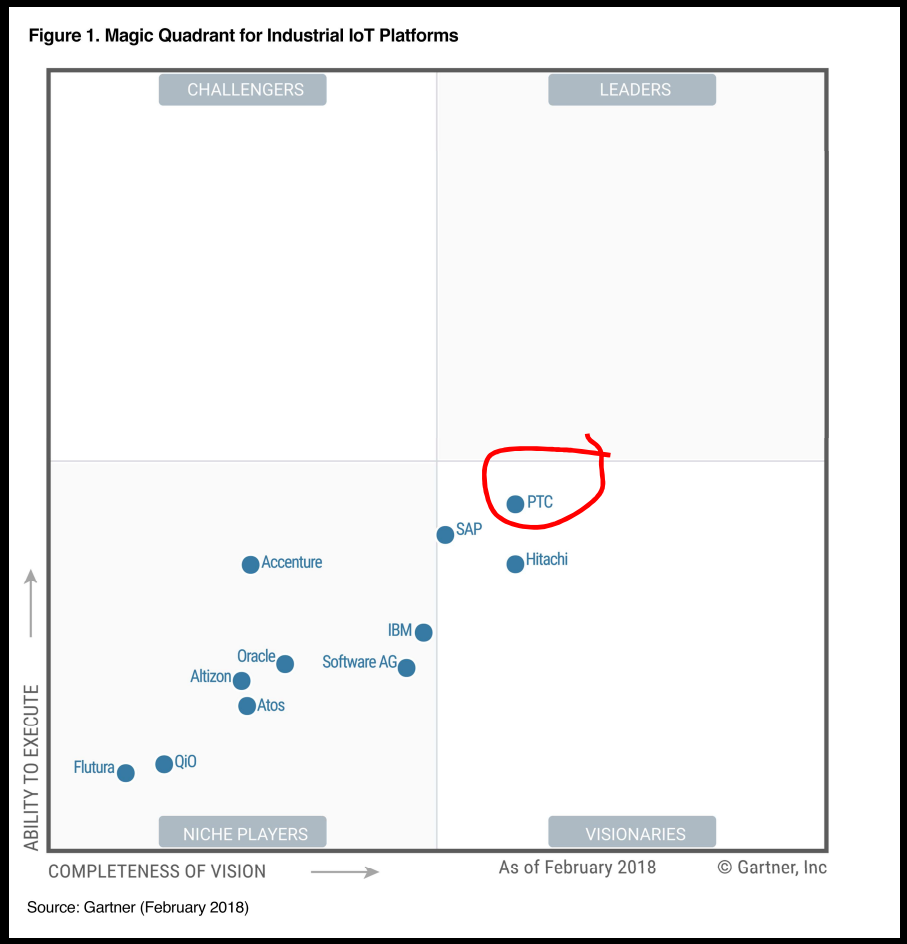
FORRESTER

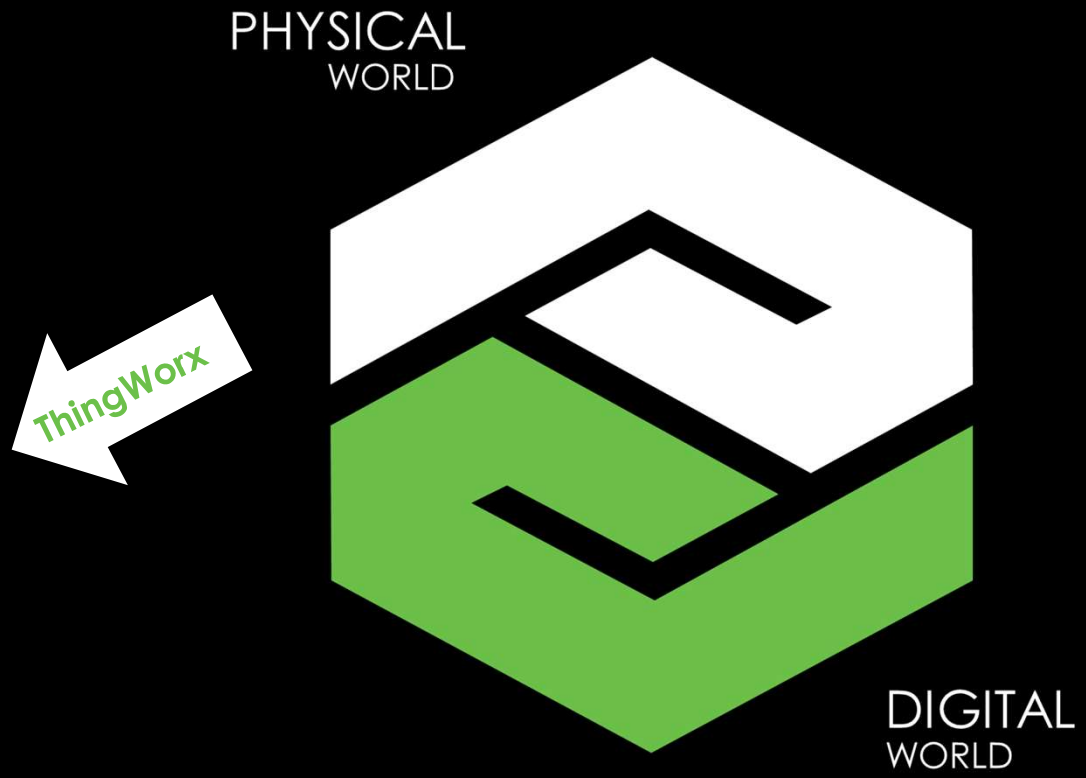


Forrester Wave™, PLM Software Platforms November 2017

Gartner Magic Quadrant for IOT Software Platforms

ptc





[Magic Quadrant for IOT Software Platforms February 2018]


ptc
Microsoft
DELIVERING VALUE
TO ENTERPRISES
THROUGH
DIGITAL TRANSFORMATION

PTC Mobility Executive Exchange

June 26, 2018 | BMW Welt in Munich, Germany

https://www.ptc.com/en/mobility-executive-exchange

SAVE YOUR SEAT





Dr. Markus Buschmann, Head of Planning Division "Netzwerktechnik und innovative Systeme"

Volkswagen



Klaus Weber, IT Program Manager at BMW Group



Prof. Dr. Vahid Salehi, University of Applied Sciences Munich

EDMS Engineering Design Mechatronic Systems Product Lifecycle Management



Stefan Bernhardt, Vice President Information System Product Development at MAN Truck & Bus AG

MAN



Dr. Sebastian Grams, Head of IT Product Process at AUDI AG



Dr. Jochen Hechler, Head of Quality Systems at Continental

Continental The Future In Motion



res Seelbach, CEO at Tretbox

TRETBOX

RWTH AACHEN UNIVERSITY

Aachen University with 50.000 student, biggest technical University of Germany

WZL | RWTH AACHEN UNIVERSITY

Fo Founding Year: 1906 Engineering and production management for developing and optimizing solutions for modern production facilities

RWTH AACHEN CAMPUS

With 2billion invest on 16 Clusters biggest European Technology centres, where research & industry collaborate

KEX. Knowledge Exchange

Founding Year in 2012, Technology and market information provider

McKinsey&Company

Digital Capability center, for joint Goto Market

e.Go Flagship reference for digital transformation

e.GO

fir RWTH AACHEN

FIR - Institute for Industrial Management at RWTH Aachen, Founding Year: 1953 Industry-oriented research in the areas service, information and production management

acatech, influencer circle to provide guidance for research , Industry and government, invited the term Industrie 4.0

acatech NATIONAL ACADEMY OF SCIENCE AND ENGINEERING

streetscooter research

StreetSCoouter Research GmbH, Consulting boutique , to provide thought leading support

ptc

EXPONENTIAL

validated key industry practices implemented and continuous adopted in the closed loop based industry practice platform

BCG. joint multi client workshops

BCG The Boston Consulting Group

PEM Chair of Production Engineering of E-Mobility Components

PEM production process automation consulting boutique



e.GO new Car developed together with PTC (entire solution suite)

EUROPEAN 4.0 TRANSFORMATION CENTER

E4TC, founded 2014, Experience park, CLLMgmt, to connect Transformation to all Aachen ecosystem & Industry

STREETSCOOTER Deutsche Post DHL

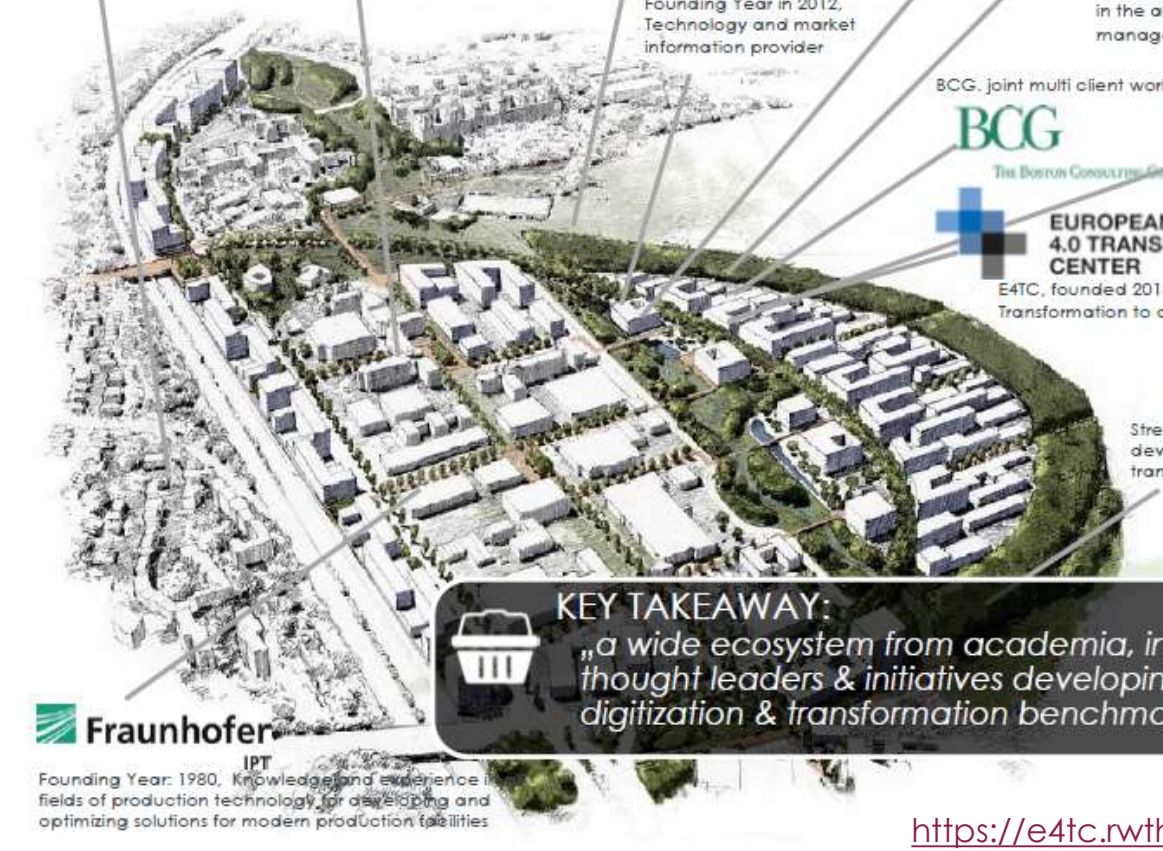
StreetScooter, 1 joint collaborative development showcase for digital transformation



StreetScooter CAD, ALM, PLM & production



PRYM, 500 years old company digitized with PTC



KEY TAKEAWAY:
„a wide ecosystem from academia, industry, thought leaders & initiatives developing digitization & transformation benchmarks“

full access to Demo factory all use cases



full access to DCC factory all use cases





Cart, AR, Service & assembly line

Fraunhofer IPT

Founding Year: 1980, Knowledge and experience in fields of production technology for developing and optimizing solutions for modern production facilities

https://e4tc.rwth-campus.com/



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