Ingenuity for life – Driving the Digital Enterprise
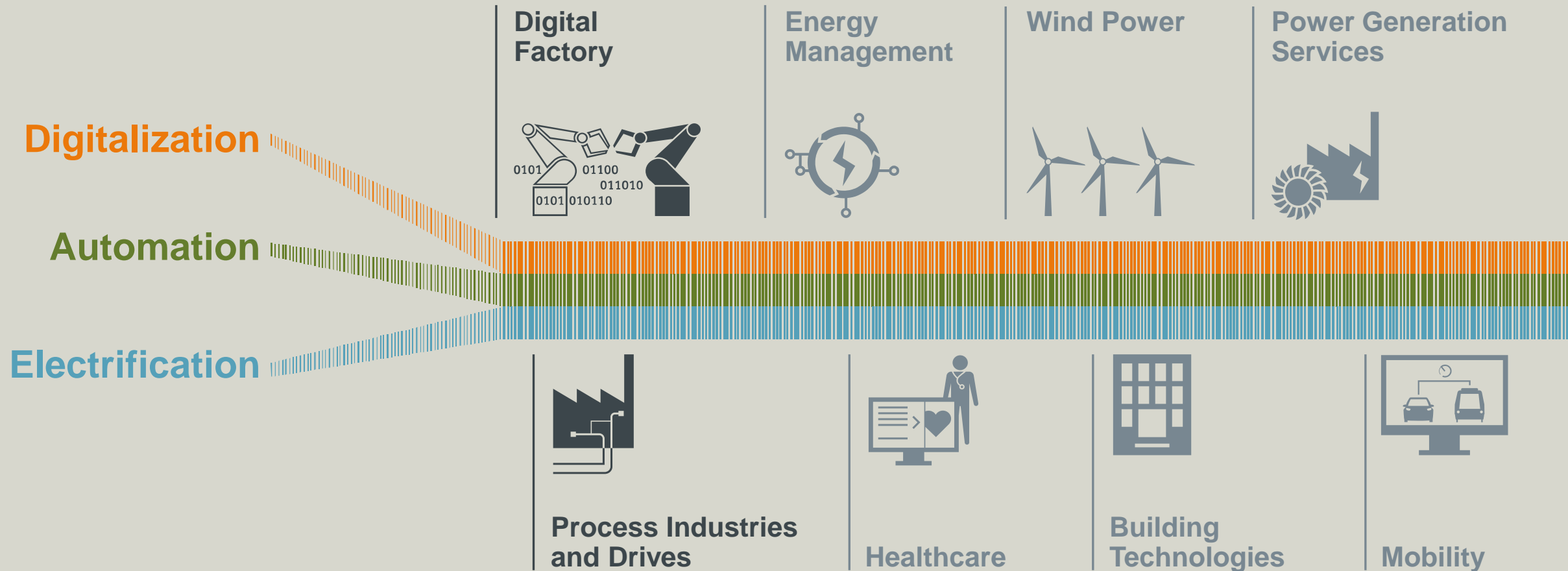
Klaus Helmrich, Member of the Managing Board of Siemens AG

siemens.com

SIEMENS
Ingenuity for life

Electrification, automation, digitalization – Siemens offers solutions along the entire value chain

Digitalization

Automation

Electrification

Digital Factory

Energy Management

Wind Power

Power Generation Services

Process Industries and Drives

Healthcare

Building Technologies

Mobility

Hanover, April 25, 2016

Klaus Helmrich, Member of the Managing Board of Siemens AG

Digital Enterprise is our portfolio of solutions for the digital transformation – in both discrete industry and process industry

Design and engineering → **Operation** → **Service**

Digital Enterprise
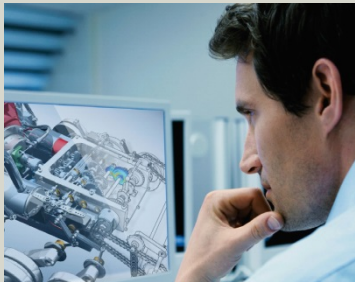
Discrete industry

Product design → Pro-duction planning → Pro-duction engi-neering → Pro-duction → Service

Process industry

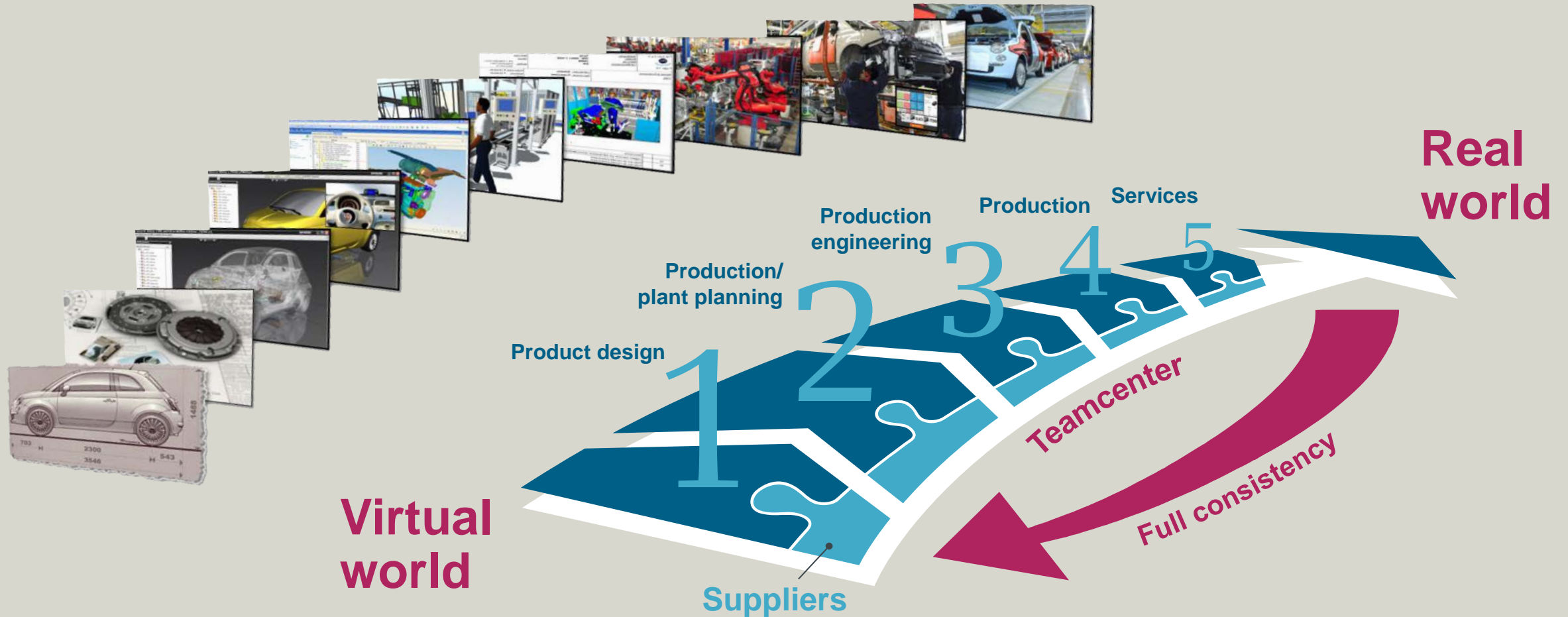Product design → Process and plant design → Engineer-ing and commis-sioning → Operation → Service

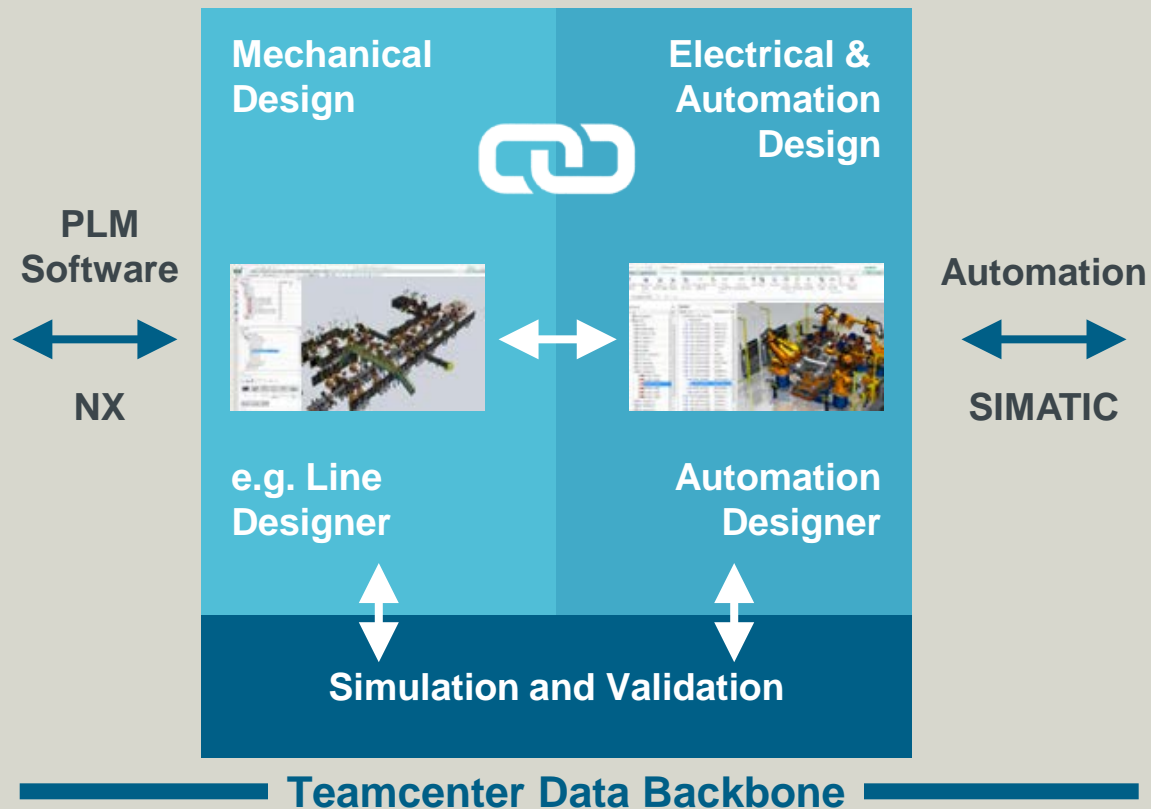# Full consistency between virtual and real production worlds – From a digital model to real production

Real world

Services

Production

Production engineering

Production/ plant planning

Product design

1 2 3 4 5

Teamcenter

Full consistency

Virtual world

Suppliers

Hanover, April 25, 2016   Klaus Helmrich, Member of the Managing Board of Siemens AG
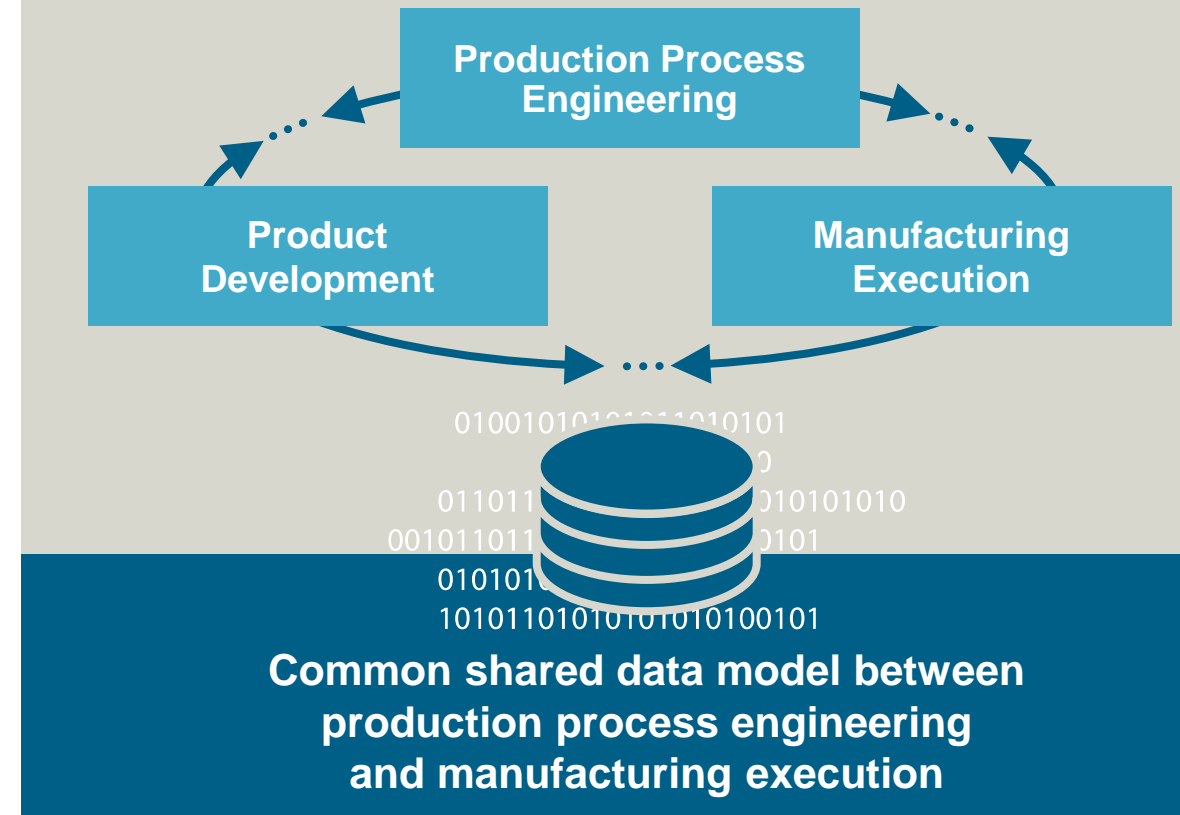
Full consistency between virtual and real production worlds – through software integration and comprehensive networking

SIEMENS

Integrated Mechatronics Engineering for Automation

Mechanical Design

Electrical & Automation Design

PLM Software

NX

Automation

SIMATIC

e.g. Line Designer

Automation Designer

Simulation and Validation

Teamcenter Data Backbone

Closed Loop Manufacturing

Production Process Engineering

Product Development

Manufacturing Execution

0100101010101011010101
011011 010101010
001011011 0101
0101010
10101101010101010100101

Common shared data model between production process engineering and manufacturing execution

Hanover, April 25, 2016

Klaus Helmrich, Member of the Managing Board of Siemens AG

Investing in Industrie 4.0 today with Digital Enterprise – Our solutions along the entire value chain

SIEMENS

1 Industrial software and automation portfolio — Specifically for discrete or process industry
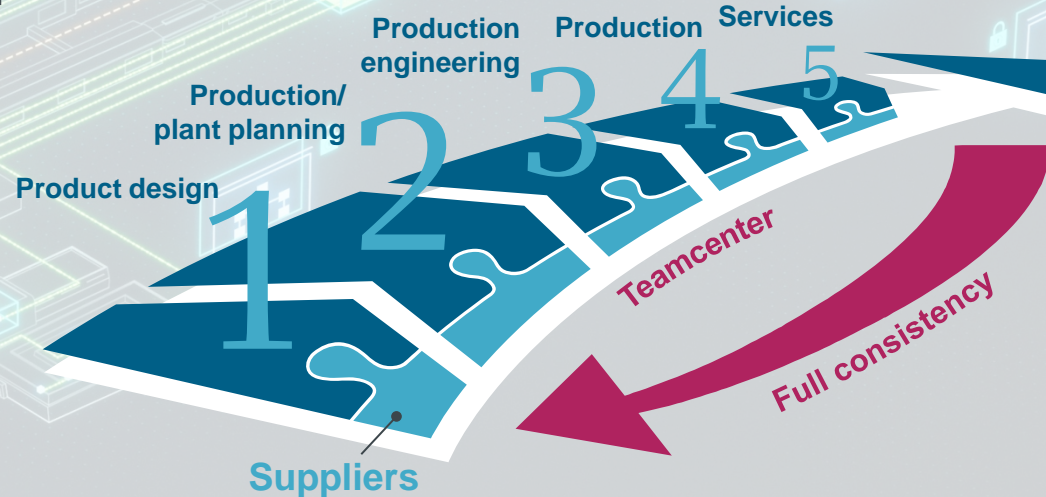
2 Industrial communication

3 Industrial security

4 Industrial services

Joint platforms for discrete and process industry

Real world

Virtual world

Product design

Production/ plant planning

Production engineering

Production

Services

1 2 3 4 5

Teamcenter

Full consistency

Suppliers

We are rigorously refining the Digital Enterprise – Our innovations for discrete industry at the Hannover Messe trade show

SIEMENS

Industrial software and automation portfolio

NEW: CD-adapco for flow simulation, new functions in the TIA Portal V14, integration of additive manufacturing with NX

Industrial services

NEW: MindSphere – Siemens Cloud for Industry

Industrial security

NEW: Holistic Security Concept

Industrial communication

NEW: Expanded portfolio for industrial communication, OPC UA

Industrial software – Systematic expansion of our portfolio for design, simulation and testing

CAD system (NX), PLM software (Teamcenter)

UGS
The PLM Company

– Shared environment for optimizing the product development process

– Multidisciplinary CAE environment

– Uniform data management for all stages of the value chain
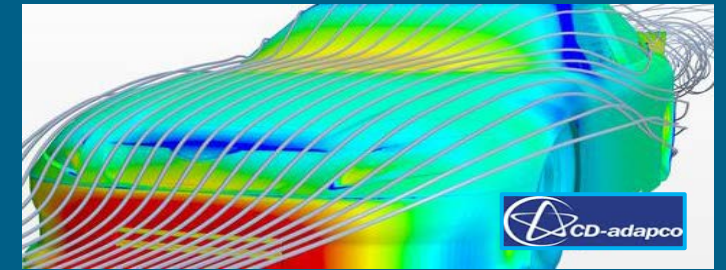
Year of acquisition: 2007

Simulation and testing (LMS Virtual.Lab, Imagine.Lab, Test.Lab)

LMS
ENGINEERING INNOVATION

– Behavioral simulation:
  1D comprehensive simulations

– 3D mechanical simulation,
  e.g. stiffness, noise and vibration

– Testing: Solutions for prototype testing (stationary and mobile)

Year of acquisition: 2012

Flow simulation (STAR-CCM+ and others)

CD-adapco

– Computational Fluid Dynamics (CFD) for flow analysis

– Heat transfer simulation

– Wide range of optimization possibilities: 3D simulation and automated feedback to CAD/CAE

Year of acquisition[1]: 2016

1 Closing expected for H2/2016

Industrial software – CD-adapco acquisition –
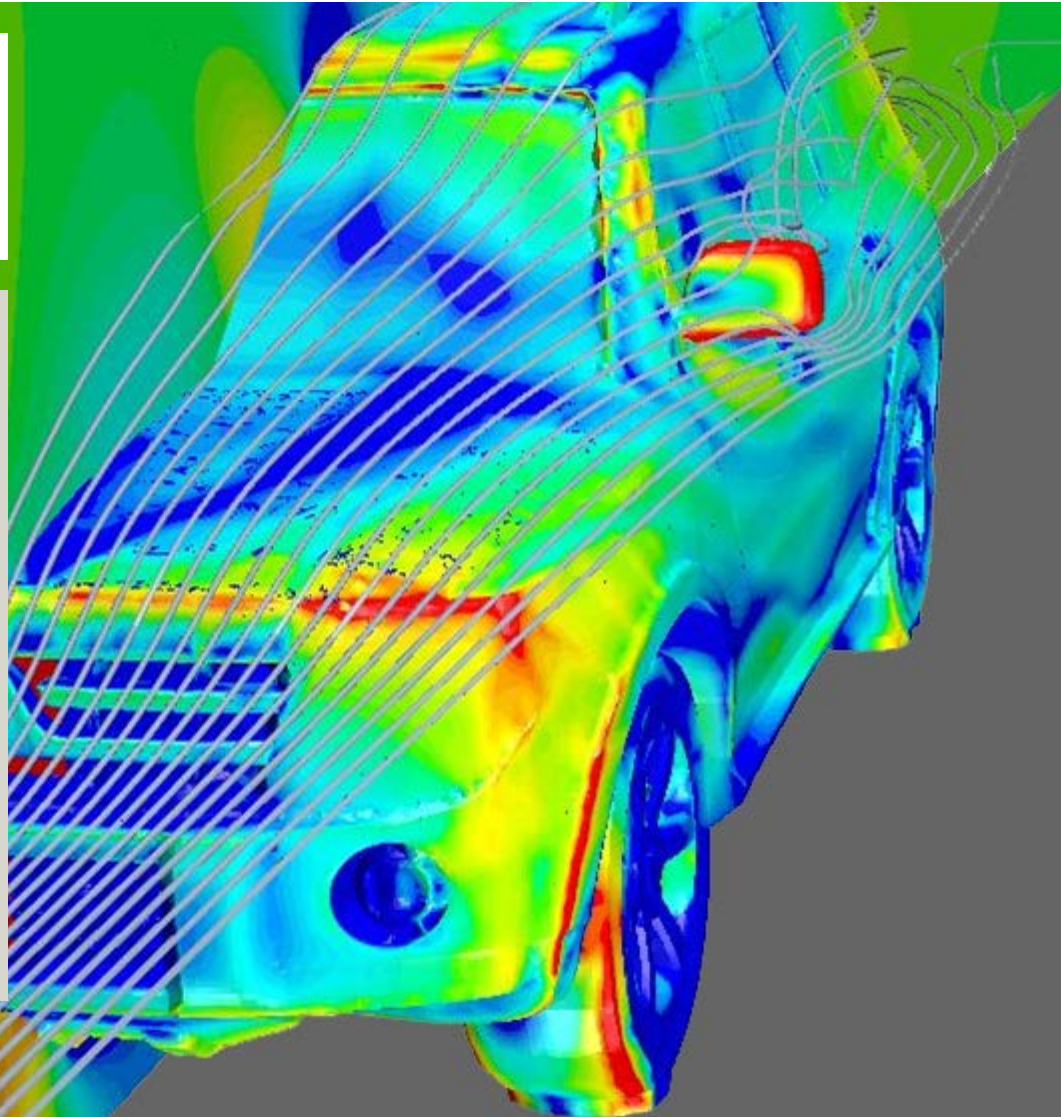## High-performance simulation solutions for design and engineering

SIEMENS

CD-adapco

Employees
approx. 900

Revenue
approx. $200 million

Industry sectors
– Automotive and transportation
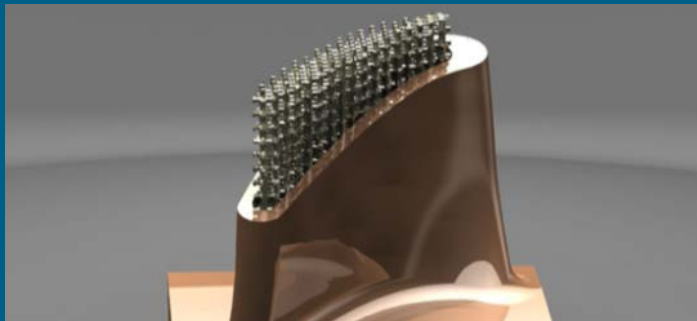– Process industry
– Energy
– Aviation and aerospace
– Marine

Simulation software for fluid dynamics (CFD), solid mechanics (CSM), heat transfer, etc.

Simulation shortens time to market by up to 35%

Industrial software – Seamless integration and simulation of additive manufacturing processes (3D printing) with NX
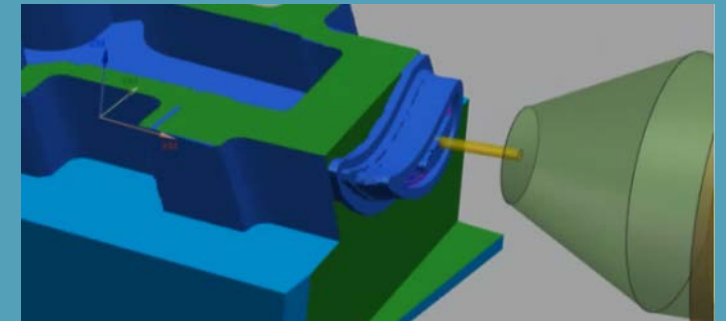
Development (CAD)

- Design rules and conditions
- Design of lightweight structures (grilles/ honeycombs)
- Support structures
- Multi-material support

Computation (CAE)

- Thermal and structural analysis
- Layer-based heat and strength computations
- Laser power control
- Topology optimization

Manufacturing (CAM)

- Additive multi-axis solution
- Multi-laser solution
- Model slicing
- Layer patterns
- Orientation of parts in the installation space

Data management and line integration

Siemens production software and MES systems

Hanover, April 25, 2016

Klaus Helmrich, Member of the Managing Board of Siemens AG

Industrial software and automation –
Consistency also in the automation world with TIA Portal V14

TIA Portal V14 – New functions

Cloud connection

Cloud Connector

Simulation of process control system

PLCSIM Advanced

Flexible, open communication

OPC UA

Multi-user environment

Multiuser

Energy analysis & management

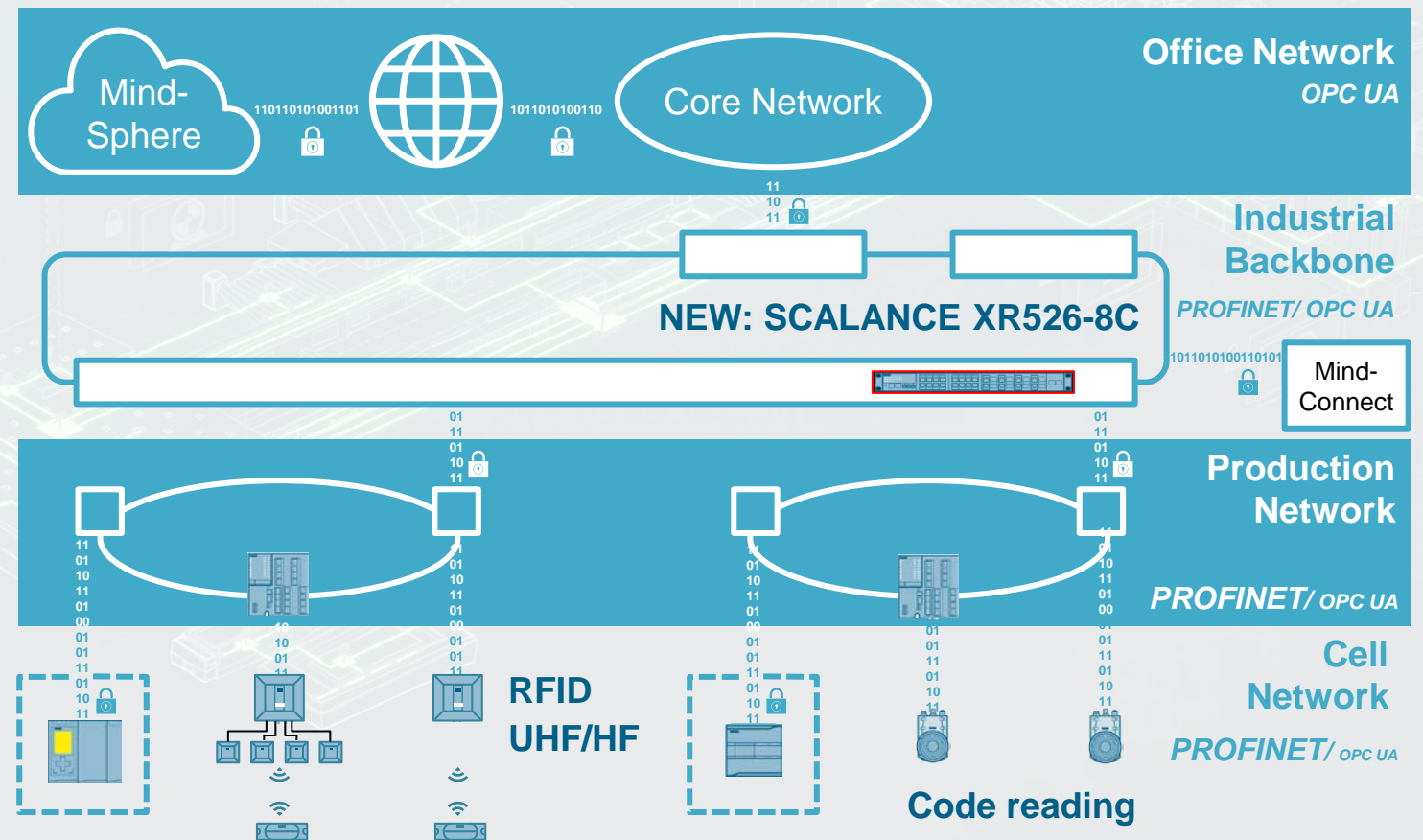Energy Suite

Integration of motion control

S7-1500T
SINAMICS V90PN

Industrial communication –
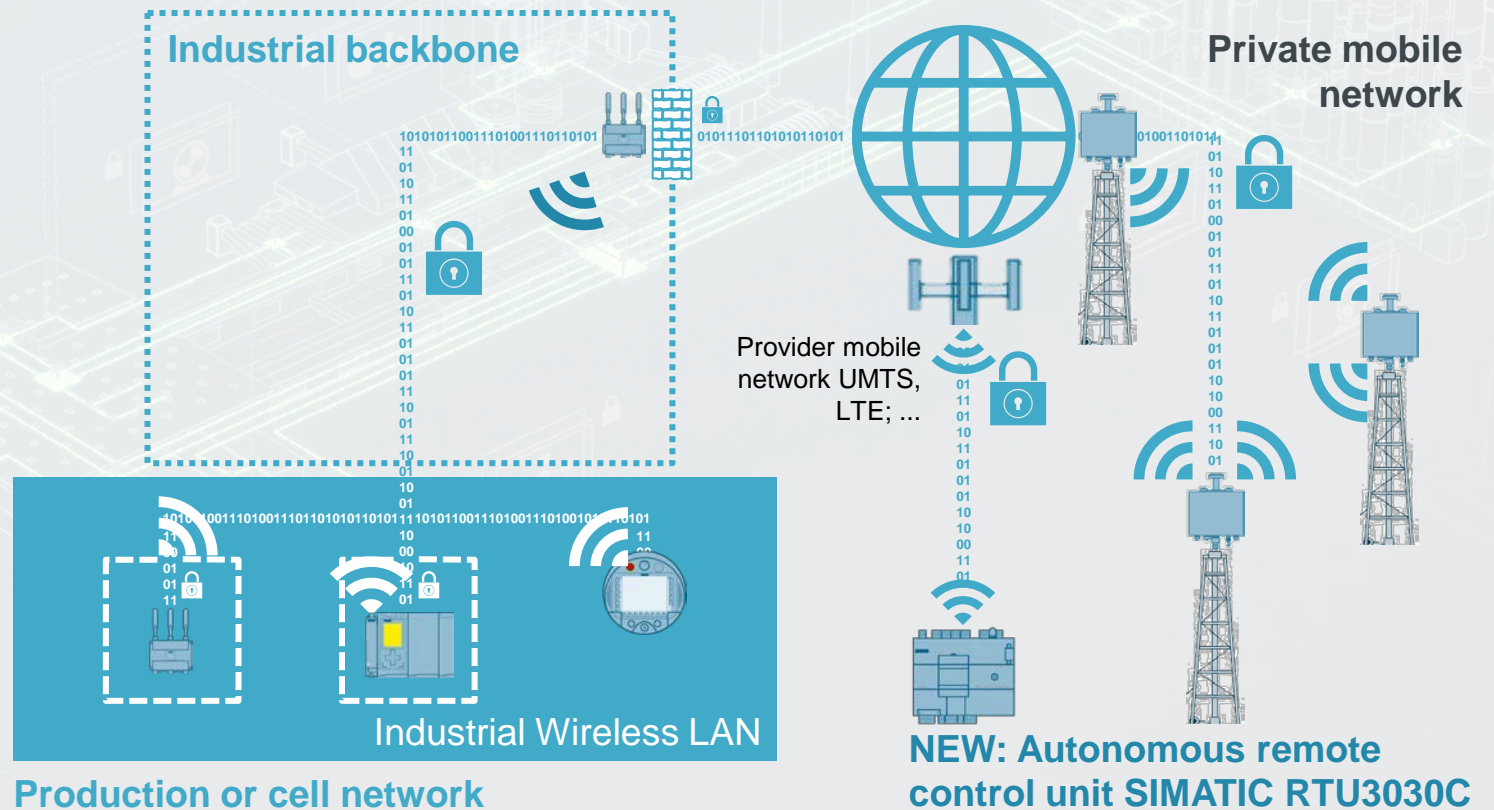# Consistent, secured communication from the field level to the cloud

🔒 Industrial communication and identification

Mind-Sphere

Core Network

Office Network
OPC UA

NEW: SCALANCE XR526-8C

Industrial Backbone
PROFINET/ OPC UA

Mind-Connect

Production Network
PROFINET/ OPC UA

RFID UHF/HF

Cell Network
PROFINET/ OPC UA

Code reading

Industrial communication –
Consistency and security also in wireless communication

🔒 From the field level to the world

Industrial backbone

Private mobile network

Provider mobile network UMTS, LTE; ...

Industrial Wireless LAN

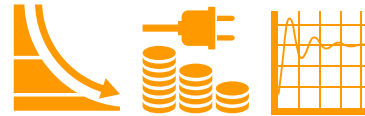**Production or cell network**

NEW: Autonomous remote control unit SIMATIC RTU3030C

MindSphere – Siemens Cloud for Industry offers our customers a solid foundation for new, data-based business models
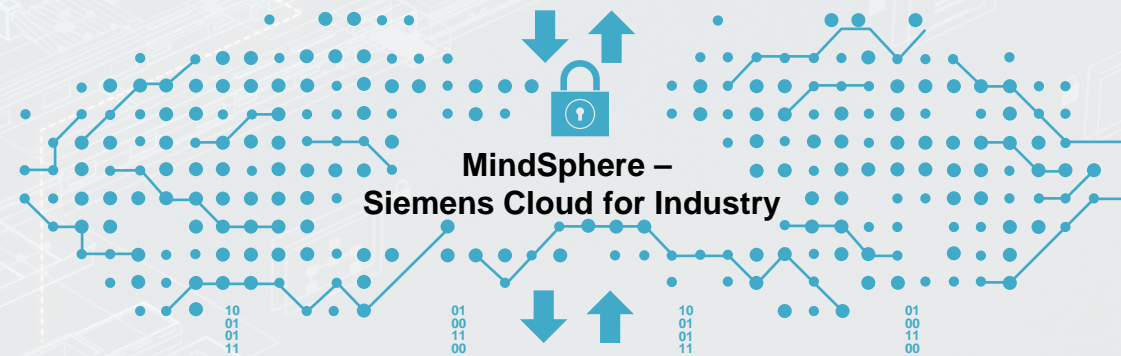
Siemens is leading the way with industrial security concepts – for comprehensive security on the production and process levels

SIEMENS

Holistic Security Concept

Plant security

Network security

System integrity

5 levers

– Plant security features

– Improved security processes

– Incident management

– Security awareness

– IT infrastructure

New level of energy efficiency through cloud-based services – Example pharmaceuticals company Alcon
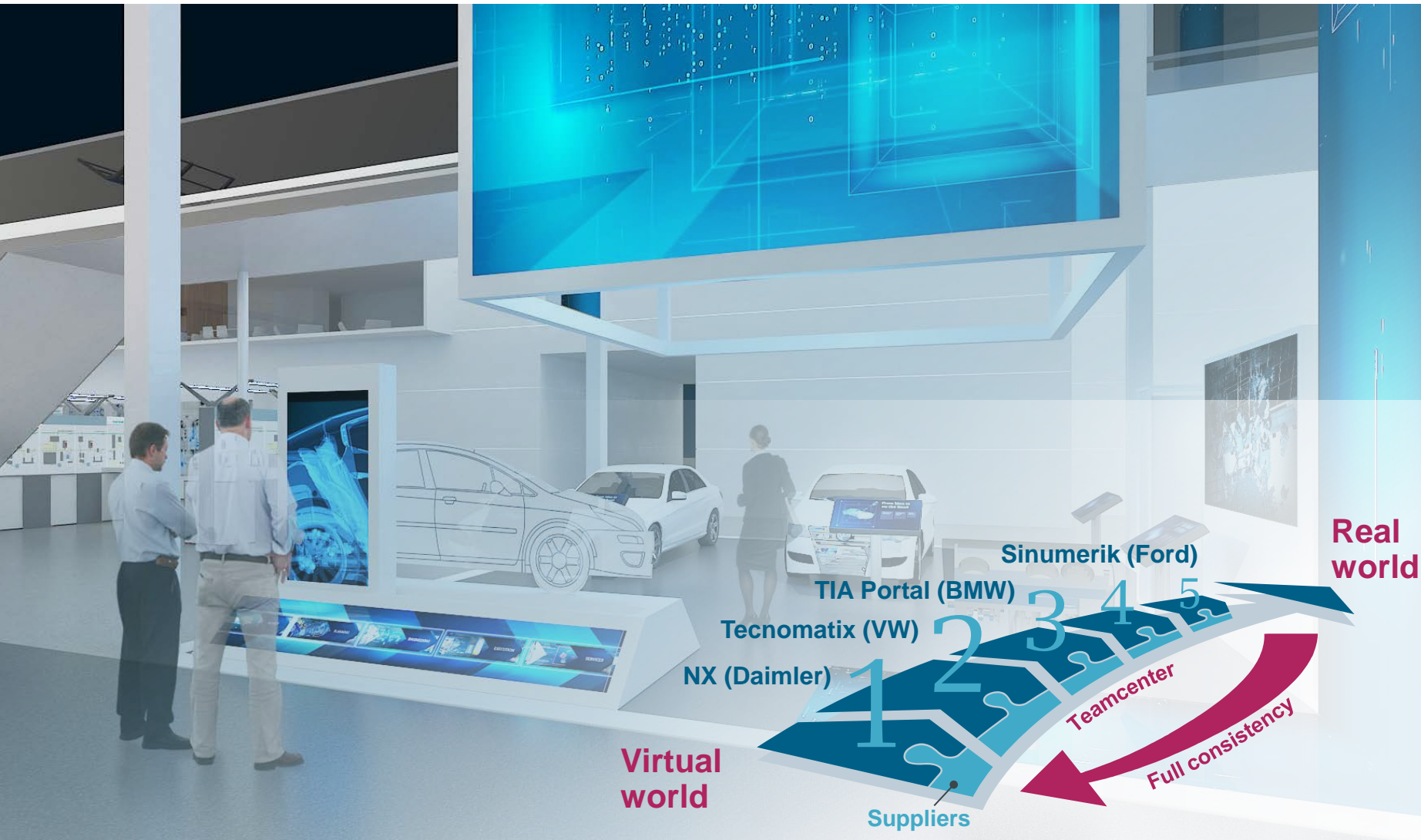
12% less energy consumption with Energy Analytics Service

– Worldwide access to dashboards for situational analysis of production equipment

– Data from > 400 measurement points

– Access to global network of experts via the cloud

Solutions across the entire value chain –
Example automotive industry

SIEMENS

**Integration
and optimization of
the entire product
and production
lifecycle**

– Close interlinking of
previously separate
processes

– Increased
flexibility

– Shorter time
to market

Real world

Sinumerik (Ford)

TIA Portal (BMW)

Tecnomatix (VW)

NX (Daimler)

1 2 3 4 5

Teamcenter

Full consistency

Virtual world

Suppliers

Digital Enterprise also meets the requirements of the process industry – From integrated engineering to integrated operation

Design and engineering	Operation	Service

Digital Enterprise
in the process industry

Product design	Process and plant design	Engineer-ing and commis-sioning	Operation	Services

From integrated engineering …   … to integrated operation

Hanover, April 25, 2016   Klaus Helmrich, Member of the Managing Board of Siemens AG

We are rigorously refining the Digital Enterprise –
Our innovations for process industry at the Hannover Messe trade show

SIEMENS

Industrial software and automation portfolio

NEW: COMOS V10.2 and SIMATIC PCS 7 V8.2 for integrated, efficient engineering, SIMIT Simulation V9.0 for virtual commissioning of systems and processes

Industrial services

NEW: MindSphere – Siemens Cloud for Industry, smart services for the process industry

Industrial security

NEW: Holistic Security Concept

Industrial communication

NEW: Expanded portfolio for industrial communication, OPC UA

From integrated engineering to integrated operation – With our solutions portfolio for industries

SIEMENS

Pharmaceuticals industry

Oil & Gas

Chemical industry

Food & Beverage

Industry-specific process know-how and solutions expertise

Integration across all process steps

- Seamless data flow with COMOS platform

- Integration of engineering all the way to service

- Drive systems embedded within the process control system

- Up to >10% shorter time to market

Example brewery – We guarantee the 500 year-old quality promise of the German Purity Law also in industrial production

SIEMENS

**Optimization of batch and discrete processes through simulation with Tecnomatix**

– Constantly high product quality

– Faster batch-changing times

Greater flexibility with the fully automatic process control system BRAUMAT

– Higher efficiency in plant operation

Services
Operation
Engineering and commissioning
Process and plant design
Product design

1 2 3 4 5

COMOS

Full consistency

Solutions for reliable, efficient, and decentralized energy supply – Example Energy for Industry

SIEMENS
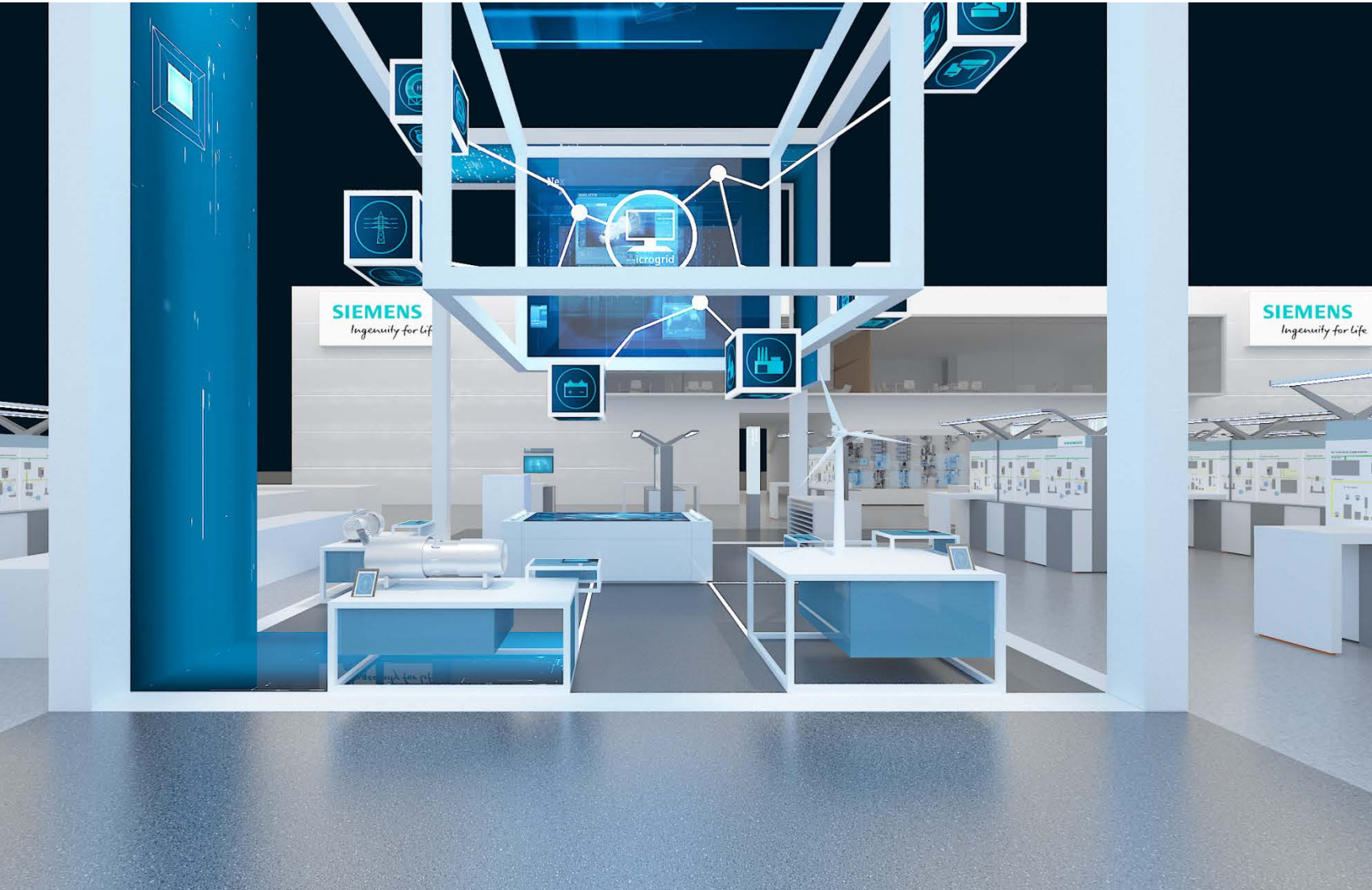
Flexible, Integrated energy systems for variable production capacity utilization and energy consumption

- Energy-optimized buildings
- Energy-efficient production
- Energy recovery and storage
- Distributed power generation

Customer benefits of the Digital Enterprise –
Also in our own Siemens factories

SIEMENS

Time to market
- Shorter innovation cycles
- More complex products
- Larger data volumes

Flexibility
- Individualized mass production
- Volatile markets
- High productivity

Quality
- Closed-loop quality processes
- Traceability and integrated genealogy

Efficiency
- Energy and resource efficiency as decisive competition factors
- Availability of machinery and systems

Example of the Amberg Electronics Factory

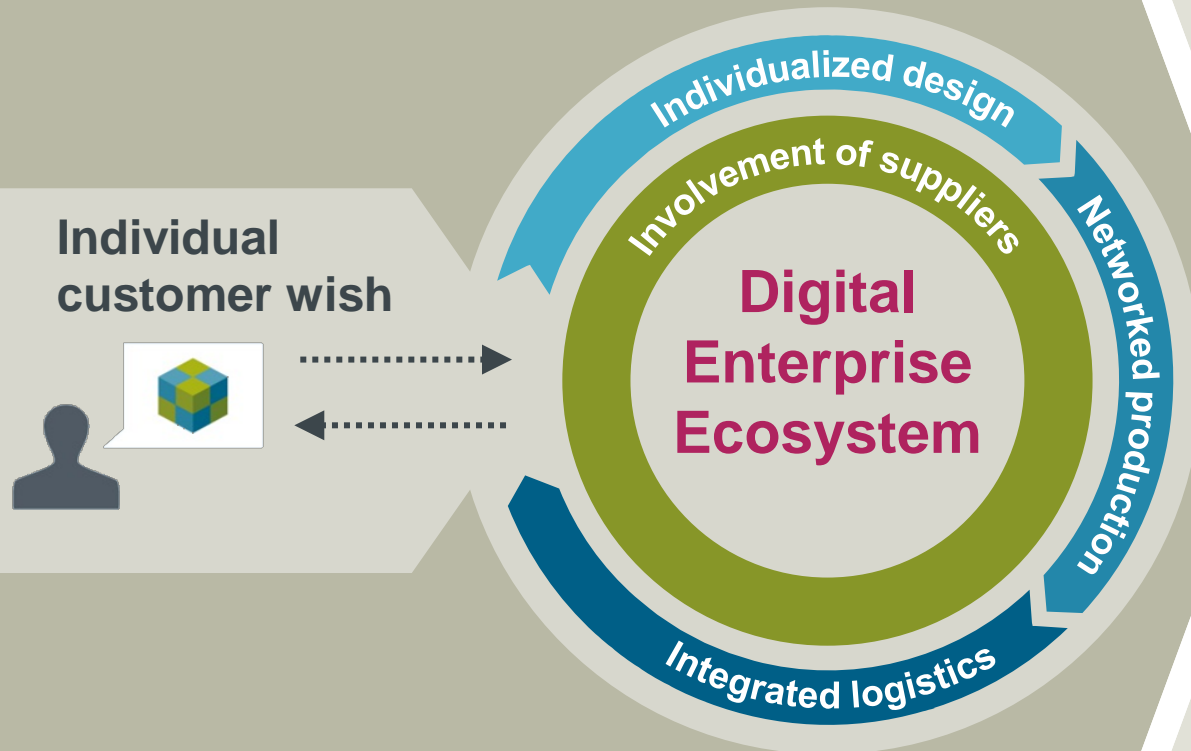Production of more than 120 variants per day, based on 75% automation

~350 change-overs per day to ensure 24-hour delivery reliability

Less than 11 defects per million (dpm) equal a quality rate of 99,9988%

More than 75% capacity utilization (20% greater flexibility)

Hanover, April 25, 2016

Klaus Helmrich, Member of the Managing Board of Siemens AG

Digital Enterprise –
An ecosystem for individualized customer wishes

SIEMENS

Individual customer wish

Digital Enterprise Ecosystem

Individualized design
Involvement of suppliers
Networked production
Integrated logistics

Design and engineering | Operation | Service

Digital Enterprise
for the discrete and the process industry

Real world

Virtual world

Suppliers

Full consistency

1 2 3 4 5

Hanover, April 25, 2016   Klaus Helmrich, Member of the Managing Board of Siemens AG
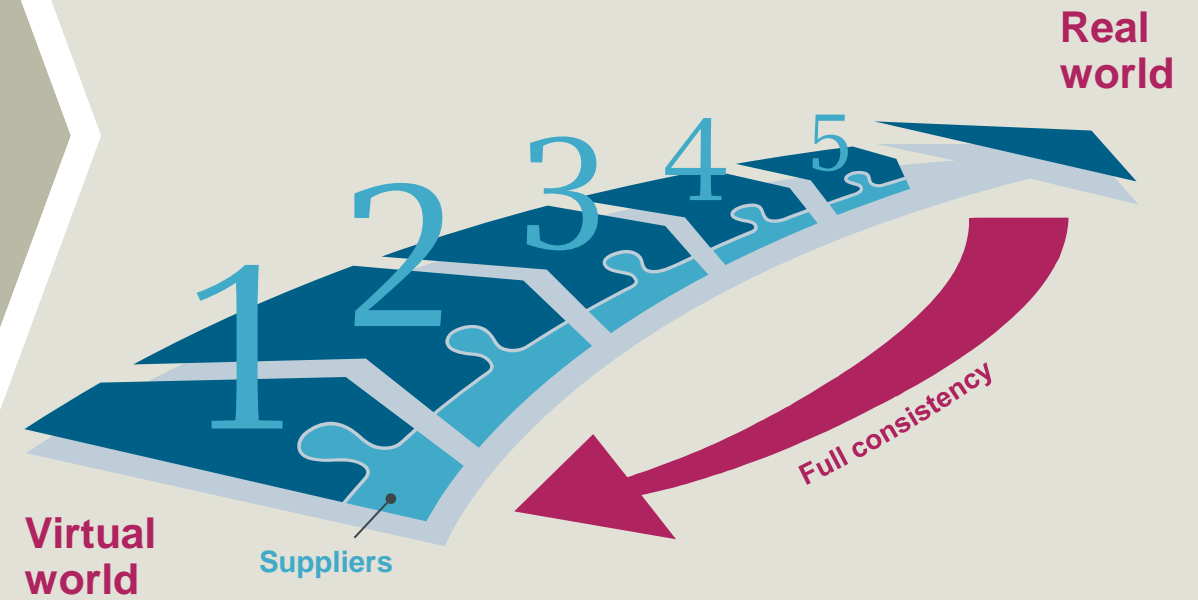
Siemens is offering solutions for the digital transformation of industry – Investing in Industrie 4.0 with Digital Enterprise today

SIEMENS

We have refined our portfolio of solutions for Industrie 4.0, the Digital Enterprise – With numerous innovations at Hannover Messe trade show

We're combining the virtual and real production worlds to create an ecosystem – for shorter time to market and higher flexibility, quality and efficiency

Digital Enterprise offers solutions to meet customers' requirements in the discrete and process industries
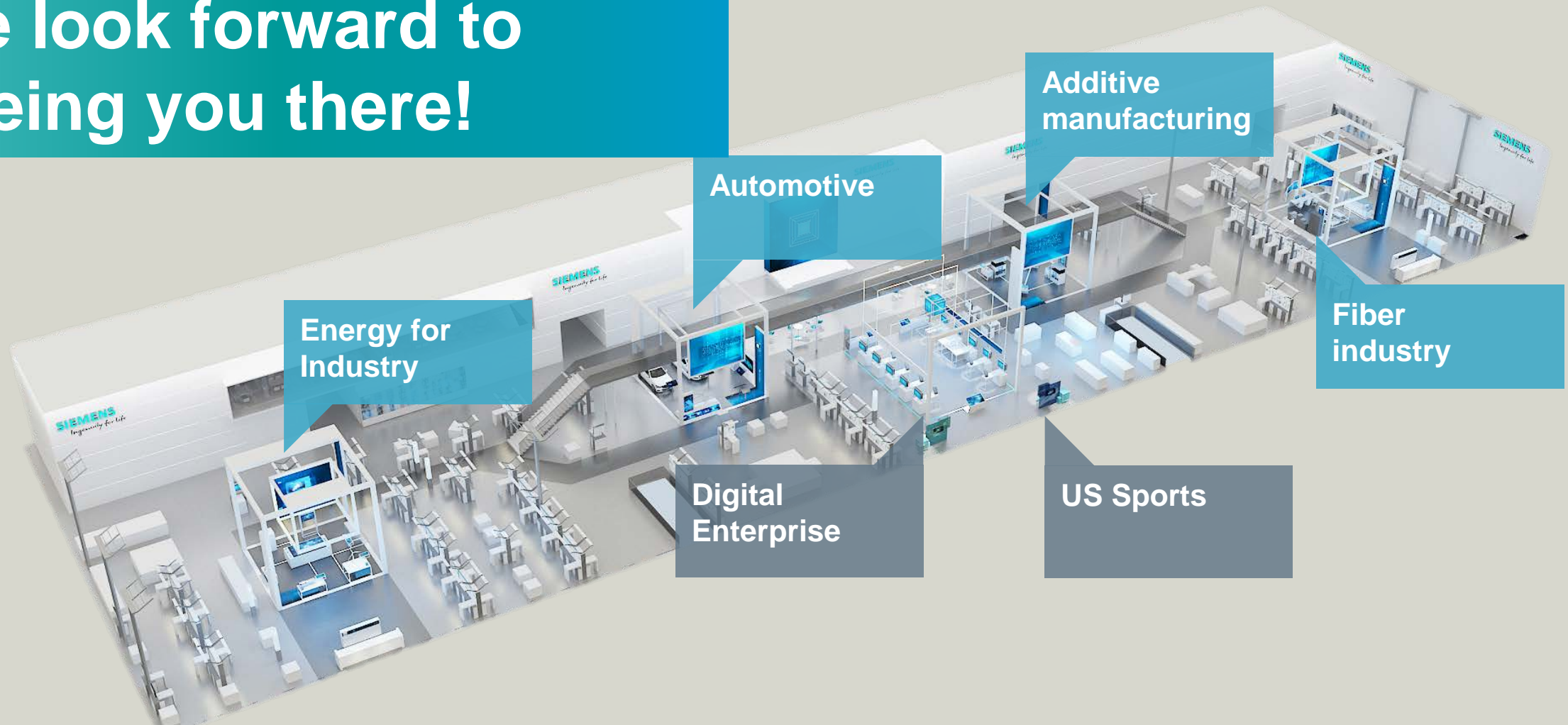
– Specific industrial software and automation portfolio
– Joint platforms for communication,
  security, and new data-based service business models

With our scalable solutions, enterprises of all sizes can invest in Industrie 4.0 today

Siemens at the Hannover Messe 2016 – Our Highlight Cubes allow visitors to experience the digital transformation firsthand

SIEMENS

Visit us in Hall 9.
We look forward to seeing you there!

Additive manufacturing

Automotive

Energy for Industry

Digital Enterprise

US Sports

Fiber industry

Your questions

siemens.com

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Ingenuity for life