

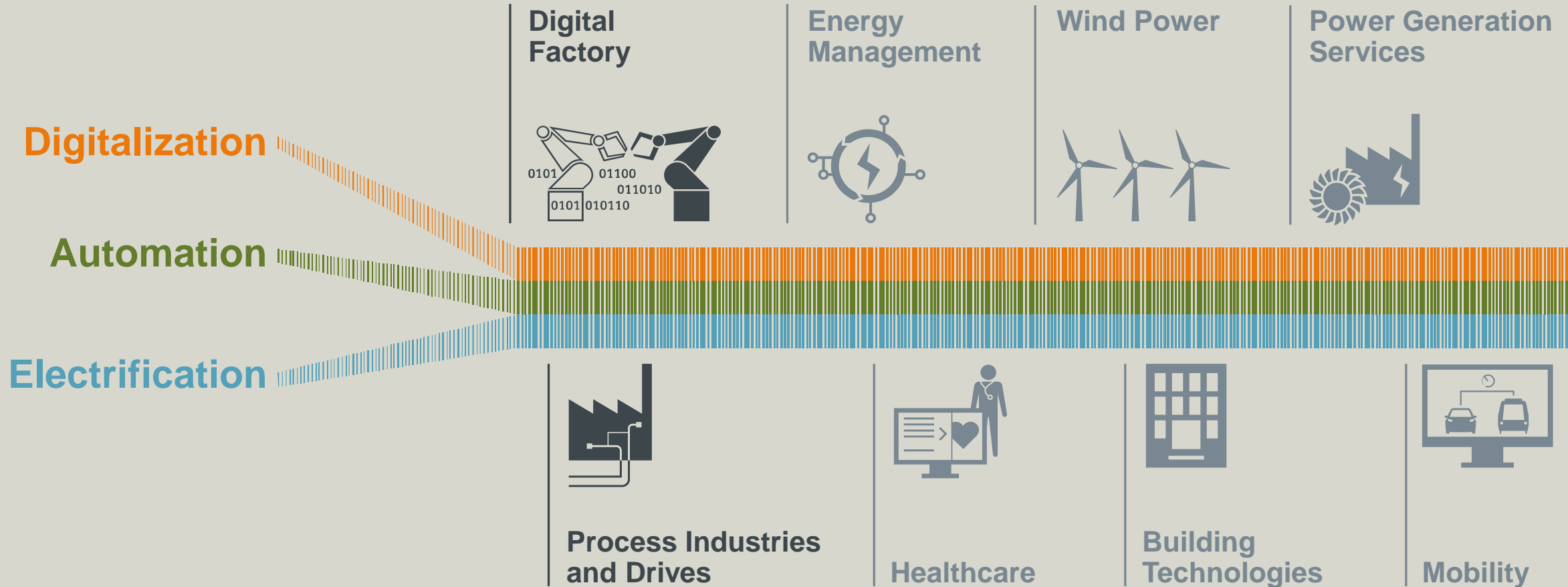


# Ingenuity for life – Driving the Digital Enterprise

Klaus Helmrich, Member of the Managing Board of Siemens AG

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

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

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Design and engineering

Operation

Service

## Digital Enterprise

Discrete industry

Process industry

Product design

Pro-  
duction  
planning

Pro-  
duction  
engi-  
neering

Pro-  
duction

Service

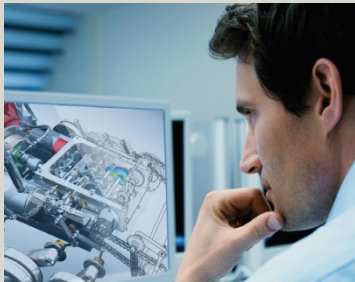
Product design

Process  
and  
plant  
design

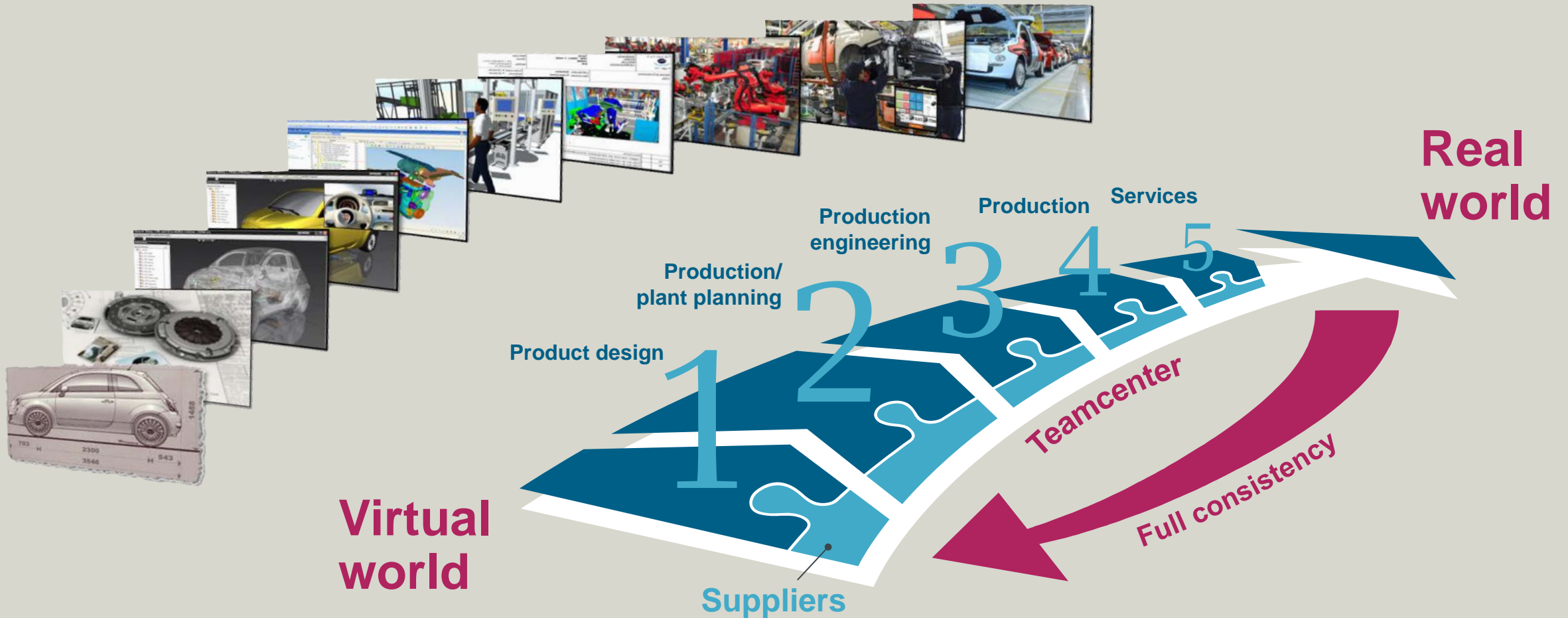
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Operation

Service



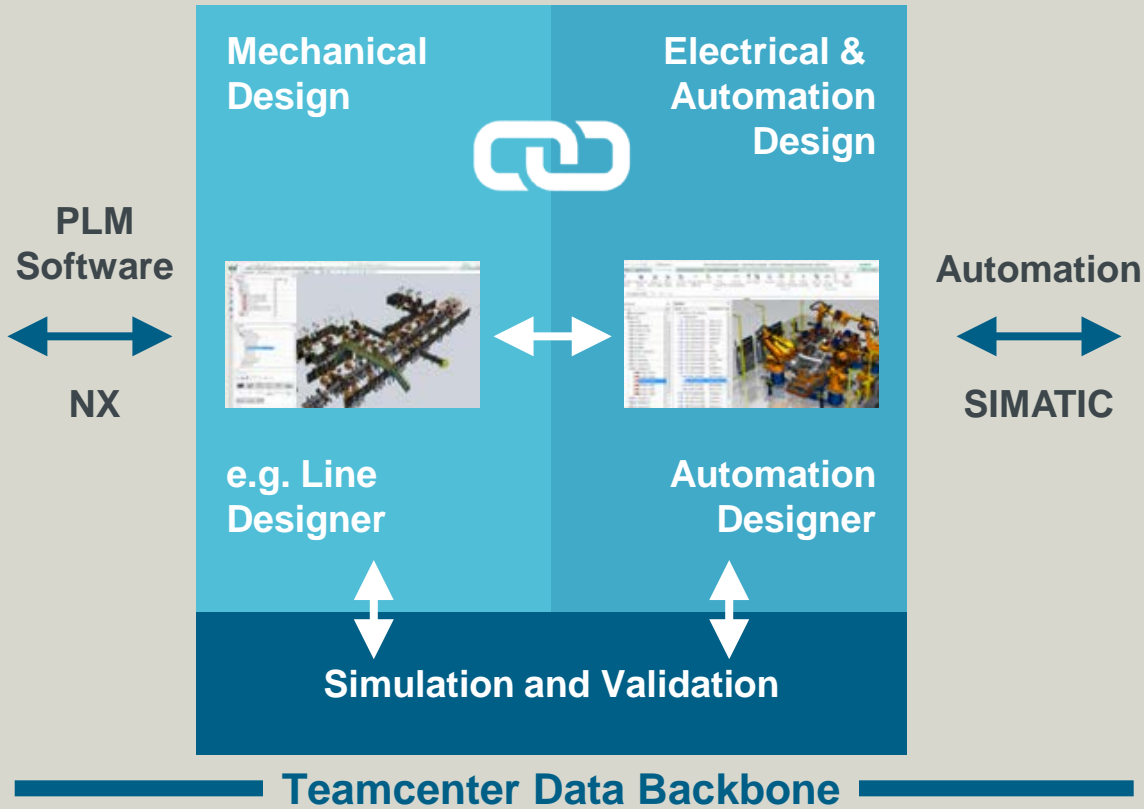
# Full consistency between virtual and real production worlds – From a digital model to real production



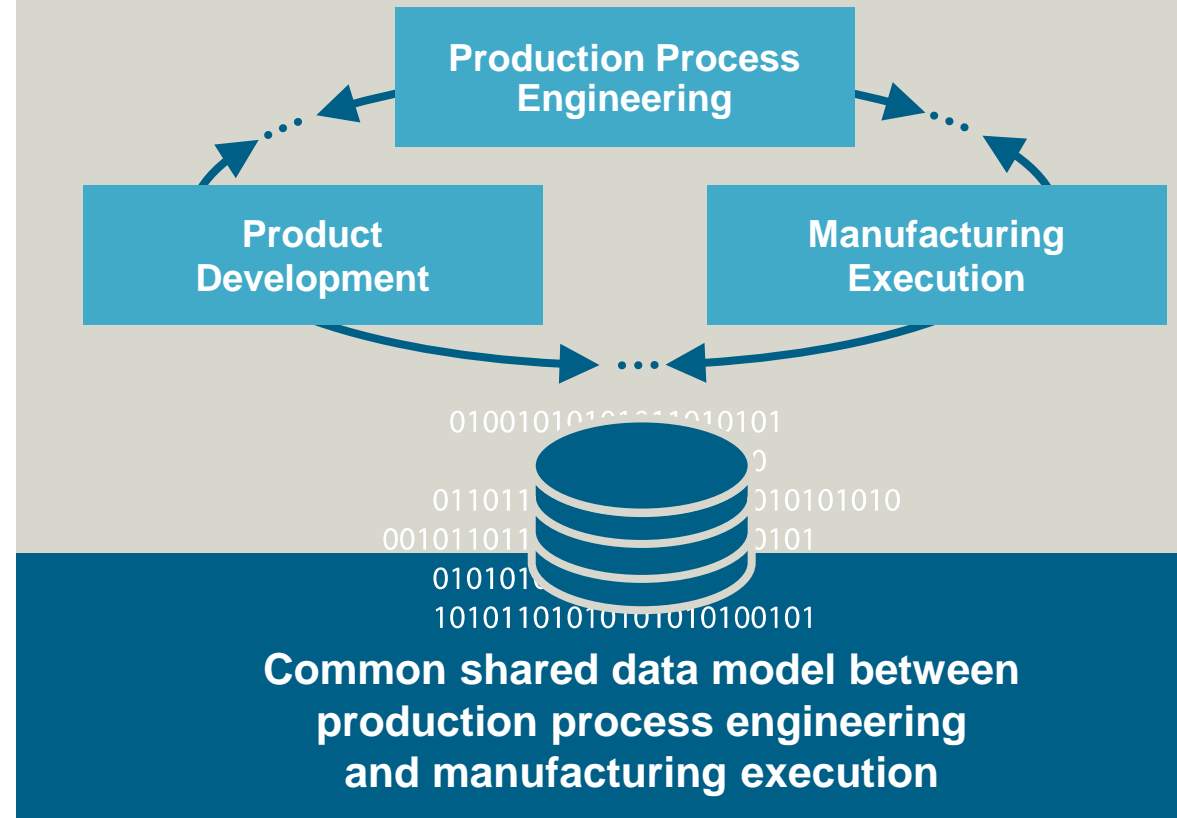
# Full consistency between virtual and real production worlds – through software integration and comprehensive networking



## Integrated Mechatronics Engineering for Automation



## Closed Loop Manufacturing



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



**1** Industrial software and automation portfolio

Specifically for discrete or process industry

**2** Industrial communication

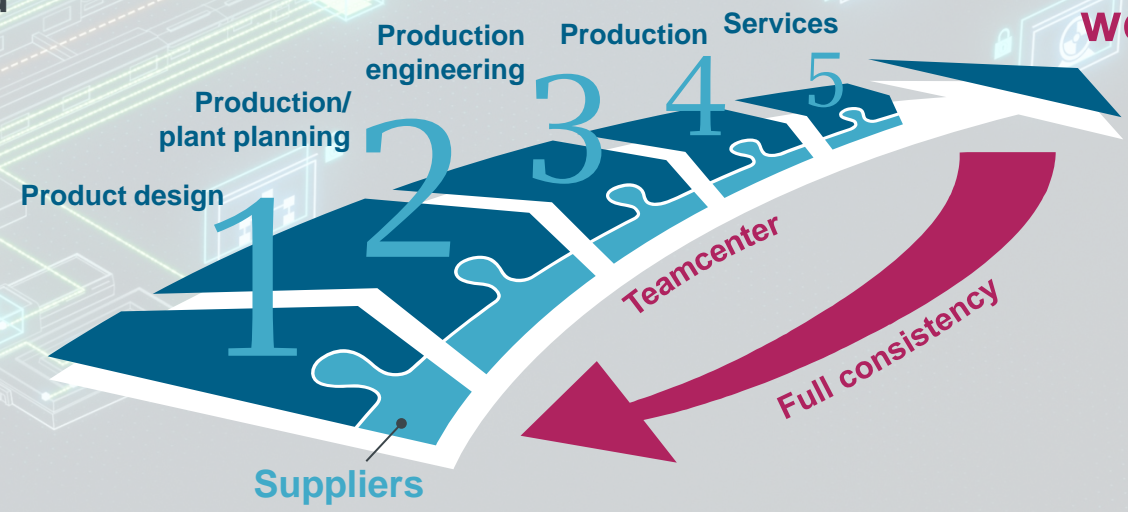
**3** Industrial security

**4** Industrial services

Joint platforms for discrete and process industry

Virtual world

Real world



**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

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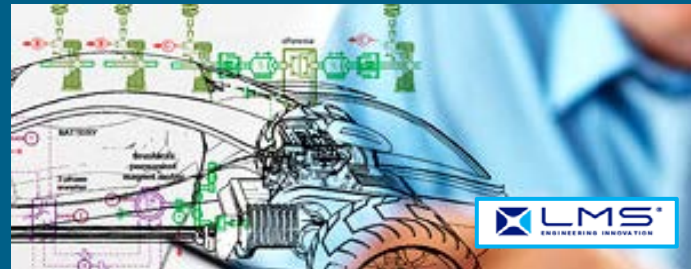
## CAD system (NX), PLM software (Teamcenter)



- 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

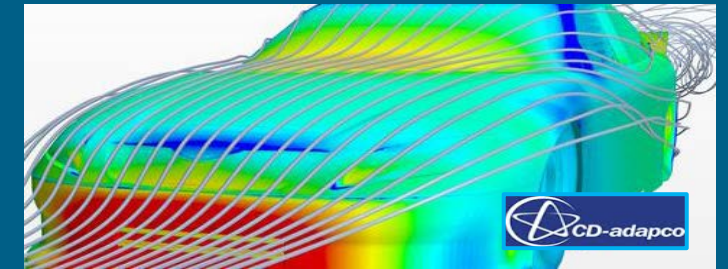
## Simulation and testing (LMS Virtual.Lab, Imagine.Lab, Test.Lab)



- 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)



- 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<sup>1</sup>: 2016

<sup>1</sup> Closing expected for H2/2016



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

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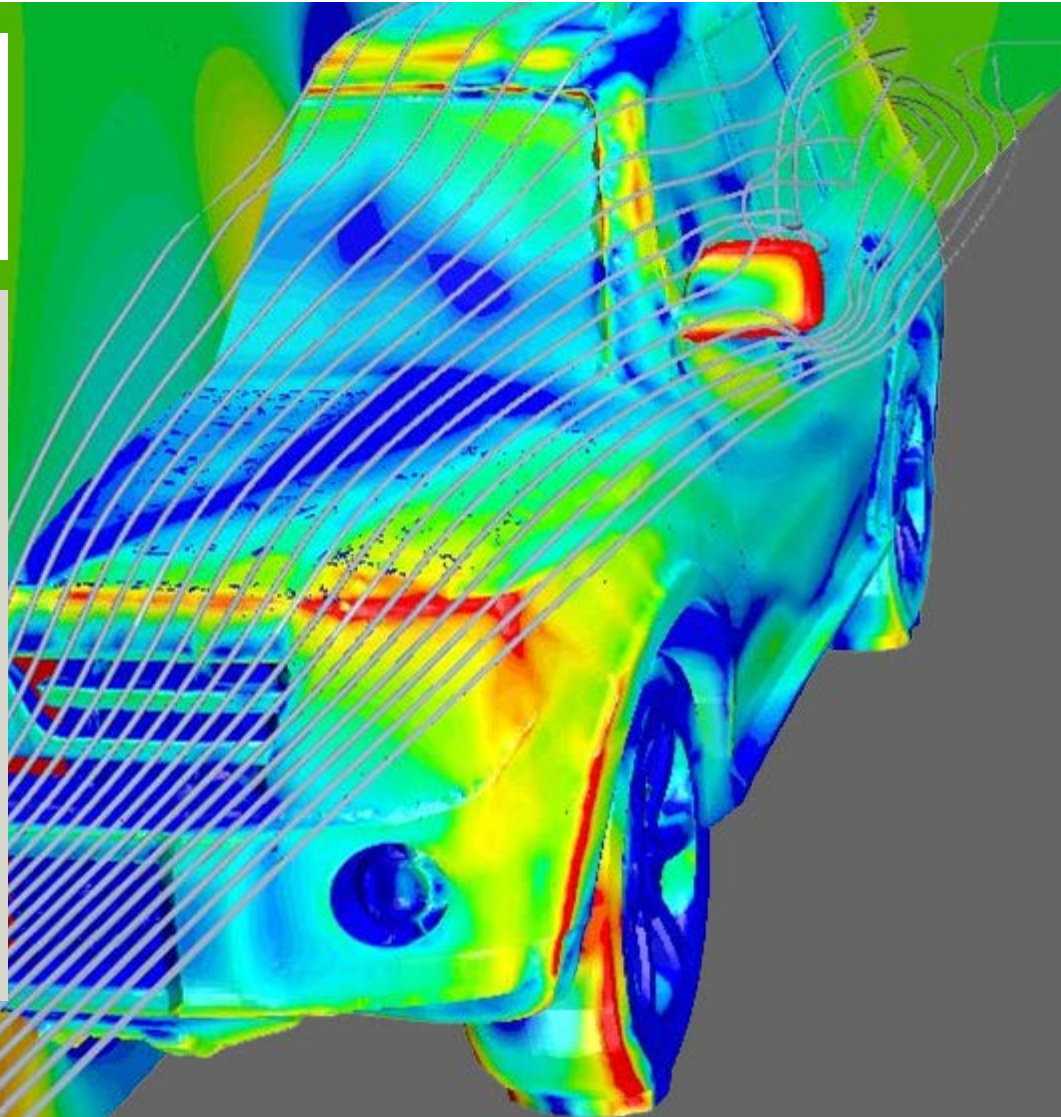


**Employees**  
approx. 900

**Revenue**  
approx. \$200 million

**Industry sectors**

- Automotive and transportation
- Process industry
- Energy
- Aviation and aerospace
- Marine



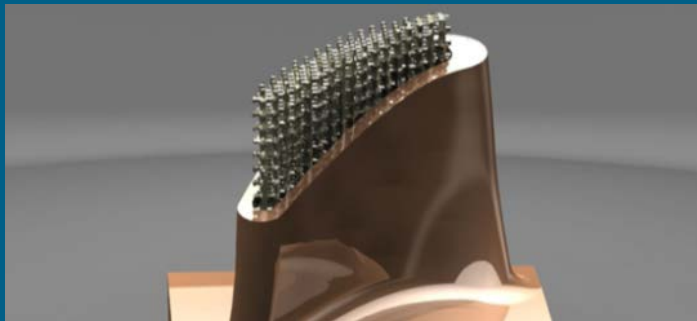
**Simulation software for fluid dynamics (CFD), solid mechanics (CSM), heat transfer, etc.**

**Simulation shortens time to market by up to 35%**

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

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## Development (CAD)



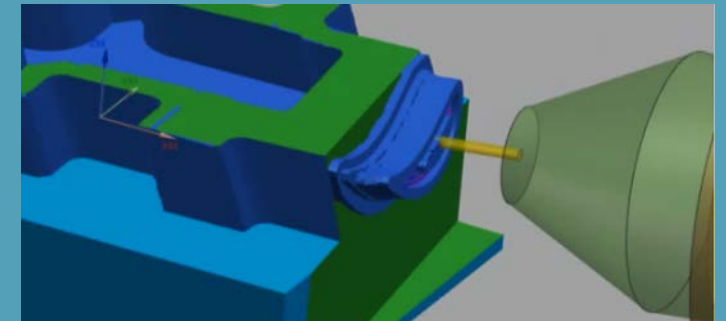
- Design rules and conditions
- Design of lightweight structures (grilles/ honeycombs)
- Support structures
- Multi-material support

## 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

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

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## TIA Portal V14 – New functions

### Cloud connection



Cloud Connector

### Simulation of process control system



PLCSIM Advanced

### Flexible, open communication



OPC UA

### Multi-user environment



Multiusers

### Energy analysis & management



Energy Suite

### Integration of motion control

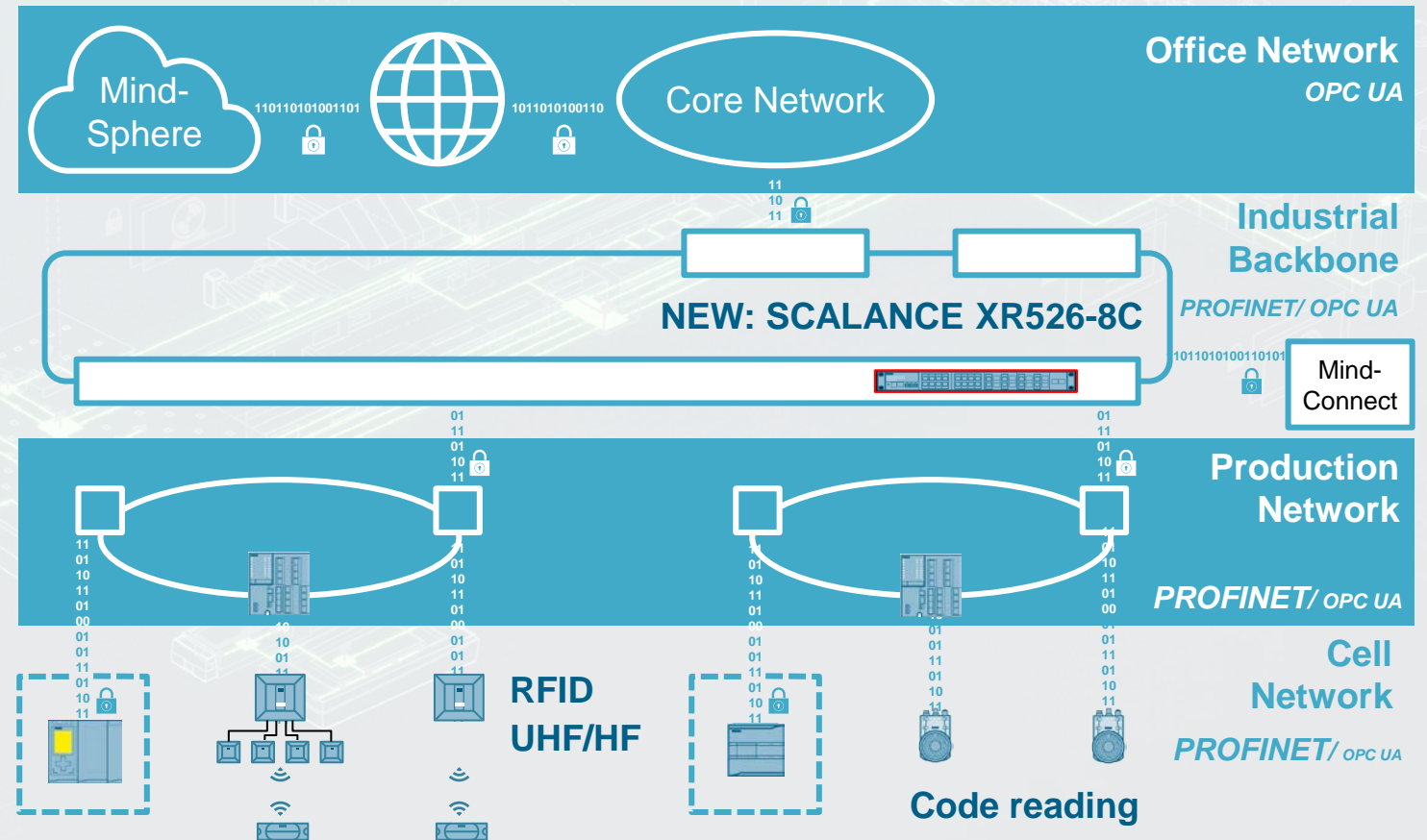


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SINAMICS V90PN

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

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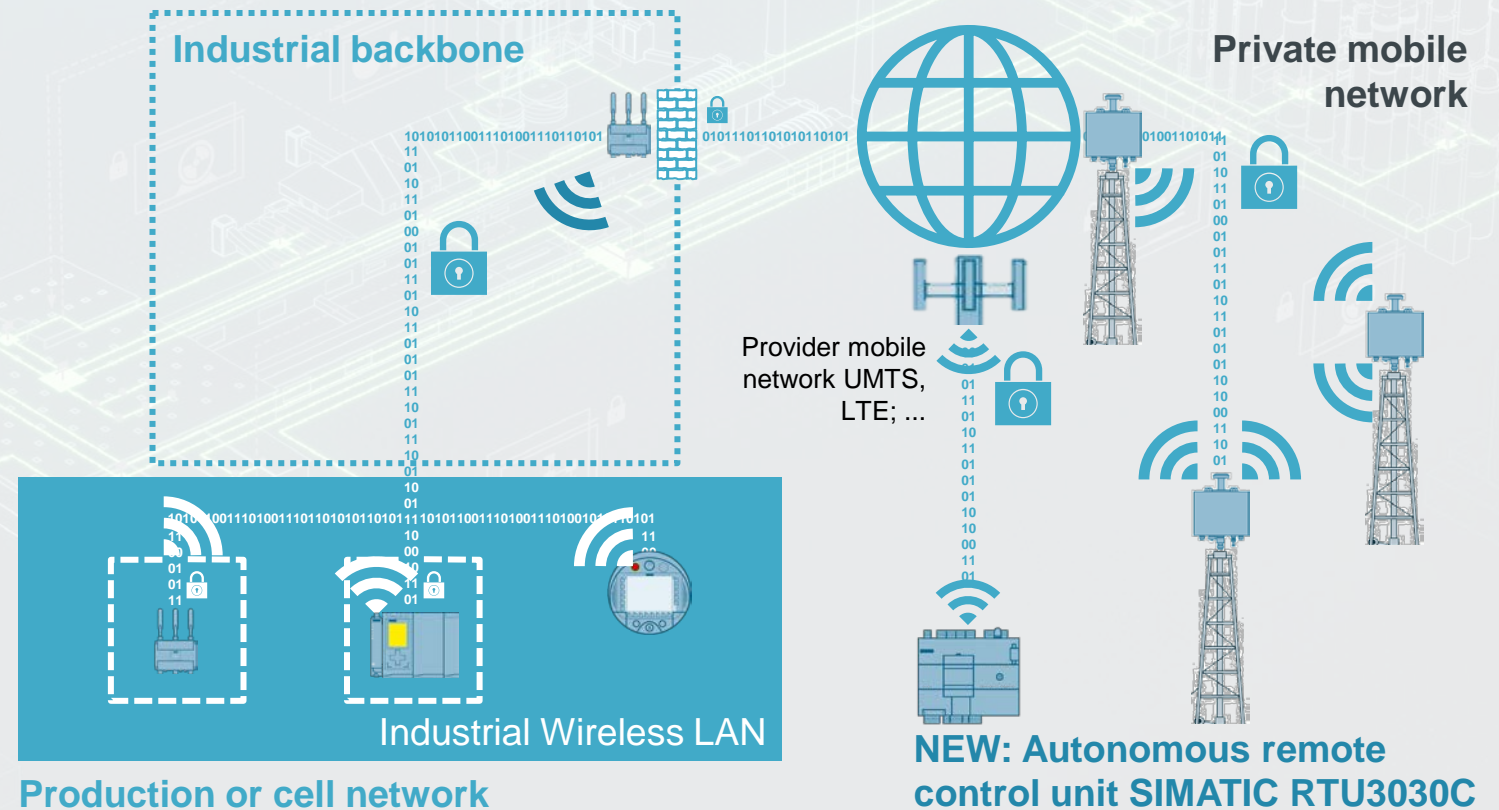
## Industrial communication and identification



# Industrial communication – Consistency and security also in wireless communication

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## 🔒 From the field level to the world



MindSphere – Siemens Cloud for Industry offers our customers a solid foundation for new, data-based business models

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## MindSphere – Siemens Cloud for Industry

MindApps\*



by Siemens



by OEMs



by end-customers



Optimize the performance of assets, energy and resource consumption, maintenance, services ...



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\*Powered by Sinalytics

Siemens is leading the way with industrial security concepts –  
for comprehensive security on the production and process levels

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## Holistic Security Concept



### 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

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Alcon

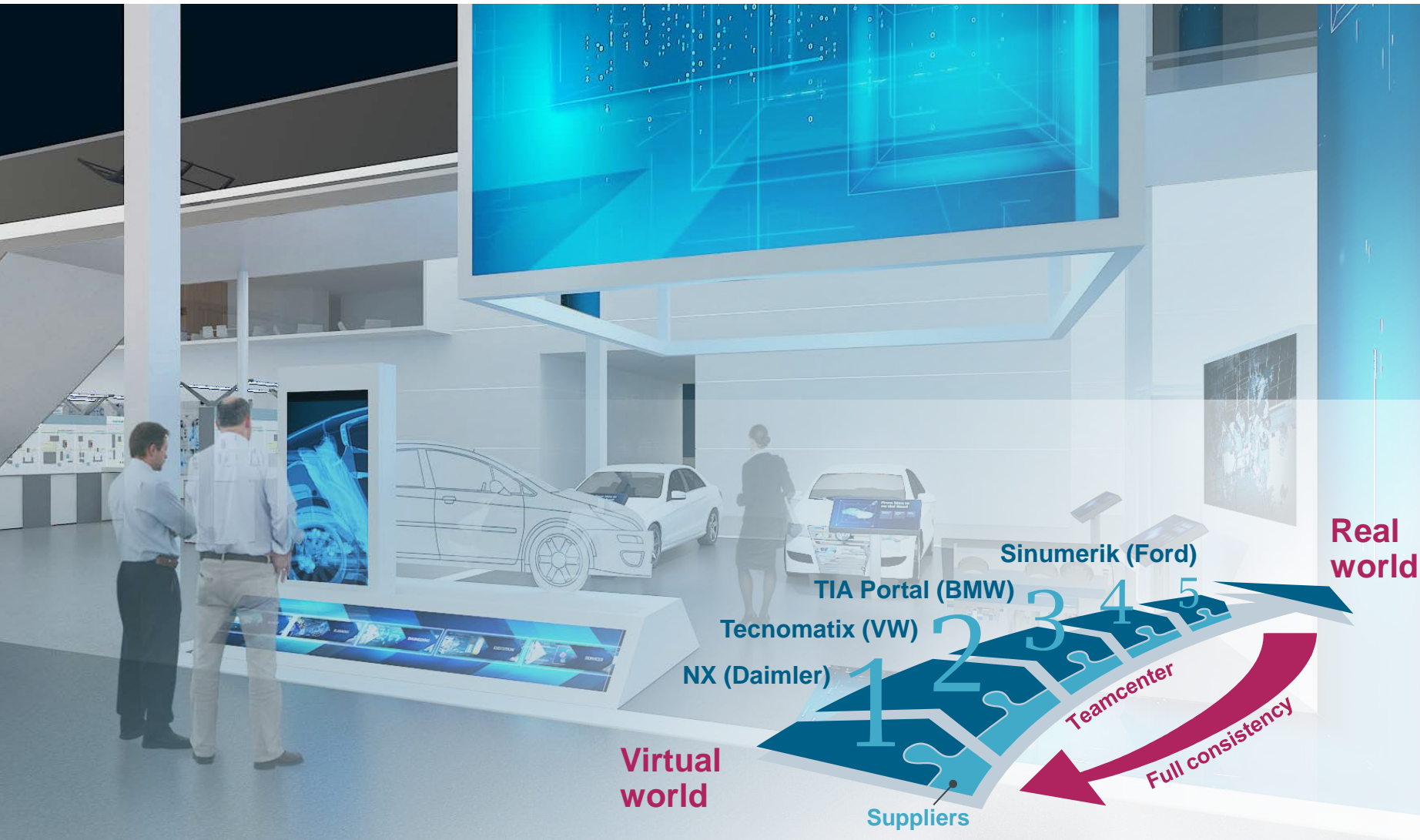
### 12% less energy consumption with Energy Analytics Service

- 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

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

- Close interlinking of previously separate processes
- Increased flexibility
- Shorter time to market

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

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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

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

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## **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

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Pharmaceuticals  
industry



Chemical  
industry



Oil & Gas



Food &  
Beverage



Industry-specific process know-how and solutions expertise

# From integrated engineering to integrated operation – Example fiber industry

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**FRIPA**



## 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

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

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**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

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## 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

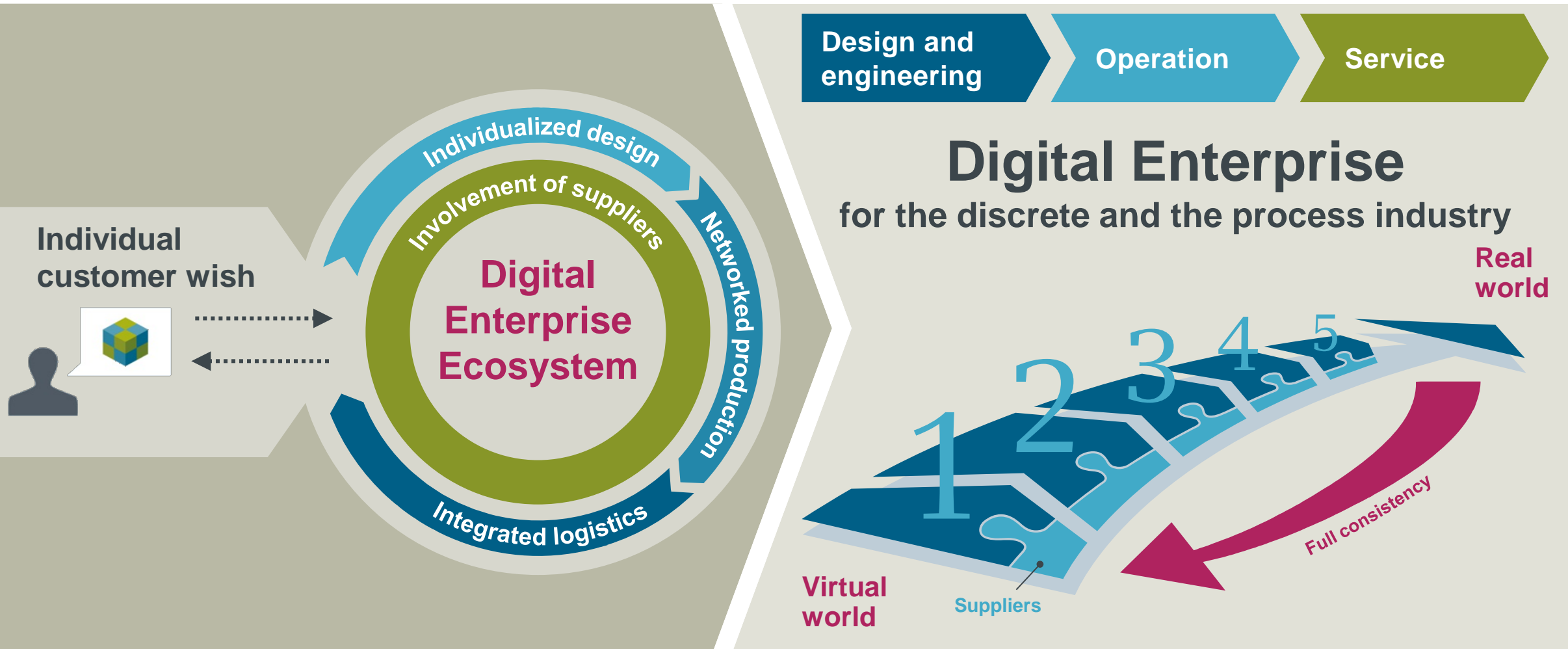
Less than 11 defects per million (dpm) equal a quality rate of 99,9988%

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



# Digital Enterprise – An ecosystem for individualized customer wishes

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**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**

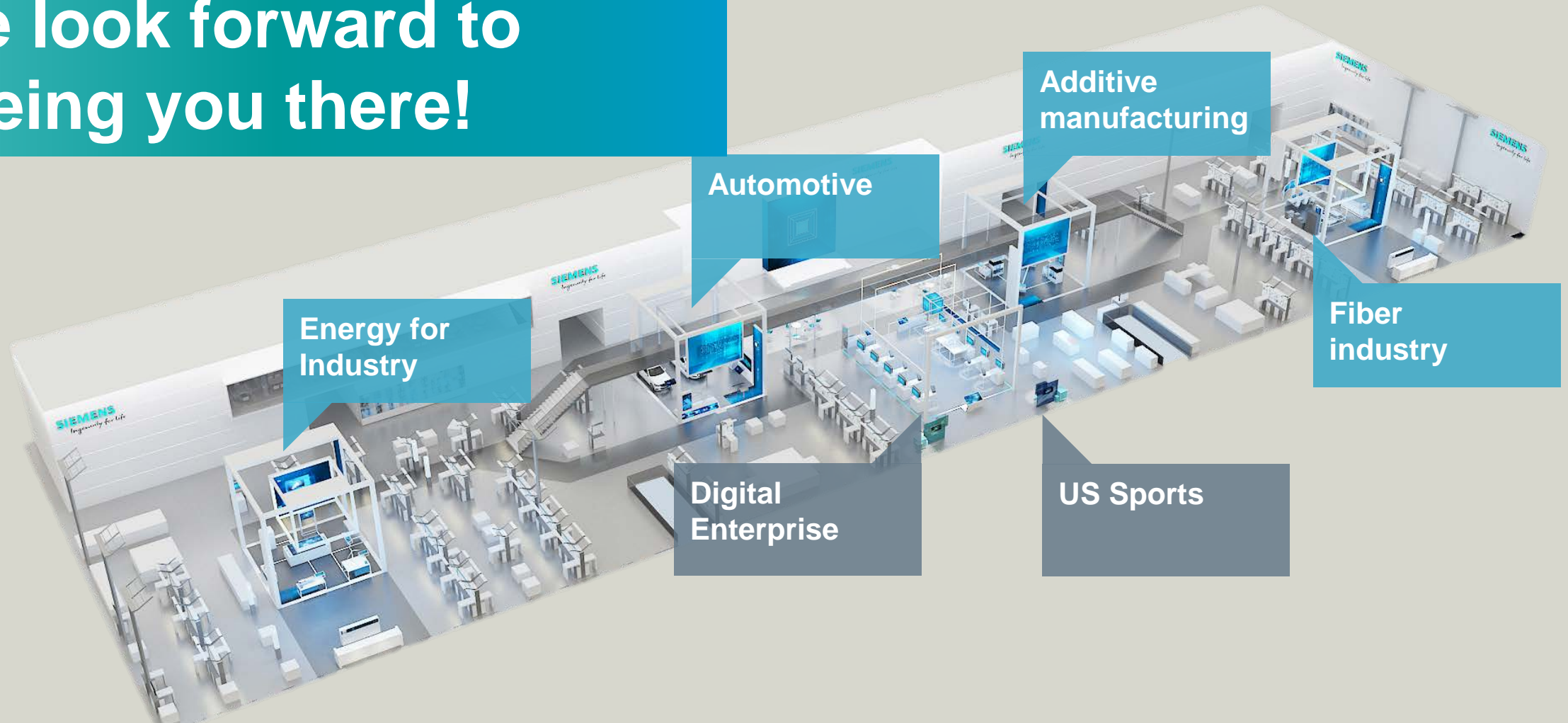
- Specific industrial software and automation portfolio
- Joint platforms for communication, security, and new data-based service business models

**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!**





**SIEMENS**  
*Ingenuity for life*

**Your questions**

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