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

**Design and engineering**

- **Discrete industry**
  - Product design
  - Production planning
  - Production engineering
- **Process industry**
  - Product design
  - Process and plant design

**Operation**

- **Discrete industry**
  - Production
- **Process industry**
  - Engineering and commissioning

**Service**

- **Discrete industry**
  - Service
- **Process industry**
  - 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

- Mechanical Design
- Electrical & Automation Design
- e.g. Line Designer
- Automation Designer
- Simulation and Validation

Closed Loop Manufacturing

- Production Process Engineering
- Product Development
- Manufacturing Execution

Common shared data model between production process engineering and manufacturing execution

Teamcenter Data Backbone

PLM Software

NX

SIMATIC

NX

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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

1. Industrial software and automation portfolio
2. Industrial communication
3. Industrial security
4. Industrial services

Specifically for discrete or process industry
Joint platforms for discrete and process industry

Virtual world
Real world

Suppliers
Teamcenter
Full consistency

Production/Equipment
Production engineering
Production
Production Services
We are rigorously refining the Digital Enterprise –
Our innovations for discrete industry at the Hannover Messe trade show

**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)**
- Shared environment for optimizing the product development process
- Multidisciplinary CAE environment
- Uniform data management for all stages of the value chain

**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)

**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

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**Year of acquisition:** 2007

**Year of acquisition:** 2012

**Year of acquisition\(^1\): 2016

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1 Closing expected for H2/2016
Industrial software – CD-adapco acquisition – High-performance simulation solutions for design and engineering

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%
### 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

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 – Consistency and security also in wireless communication

From the field level to the world

- Industrial backbone
- Private mobile network
- Provider mobile network UMTS, LTE, ...
- NEW: Autonomous remote control unit SIMATIC RTU3030C

Production or cell network
- Industrial Wireless LAN
MindSphere – Siemens Cloud for Industry offers our customers a solid foundation for new, data-based business models.

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

*Powered by Sinalytics
Siemens is leading the way with industrial security concepts – for comprehensive security on the production and process levels.

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

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

Digital Enterprise in the process industry

From integrated engineering ... ... to integrated operation
We are rigorously refining the Digital Enterprise –
Our innovations for process industry at the Hannover Messe trade show

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

Industry-specific process know-how and solutions expertise
From integrated engineering to integrated operation – Example fiber industry

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.

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

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

**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

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**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

Digital Enterprise Ecosystem

1. Individual customer wish
2. Digital Enterprise Ecosystem
3. Involved suppliers
4. Integrated logistics
5. Networked production

Real world

Virtual world

Suppliers

Full consistency

Design and engineering
Operation
Service
Siemens is offering solutions for the digital transformation of industry – Investing in Industrie 4.0 with Digital Enterprise today

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

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