On the Way to Industrie 4.0 – The Digital Enterprise
Siemens focuses on electrification, automation and digitalization – and is actively picking up on new technological developments

Digitalization

Automated

Electrification

**Enablers**

- Sensors
- Computing power
- Storage capacities
- Data analytics
- Networking ability
Siemens at the Hannover Messe 2015

Energy  Automation  Digitalization
The Internet is revolutionizing the world of business
New business models in the Internet age

- From bookstore to e-book
- From record store to streaming
- From Yellow Pages to marketplace
- From taxi to ride-sharing
The main challenges and drivers in the industrial environment

Shorten time to market
- Shorter innovation cycles
- More complex products
- Greater data volumes

Increase flexibility
- Individualized mass production
- Volatile markets
- High productivity

Boost efficiency
- Energy efficiency and resource efficiency are critical competition factors
Industrie 4.0 – A German future project for the vision of industrial production beyond the year 2025

Industrie 4.0 ...

- Represents a new level of organization and control of the entire value chain, across the life cycle of products
- Is increasingly geared to individualized customer wishes
- Encompasses all phases from the idea and the order to development and production, delivery of a product to the end customer, even recycling and related services

Key research areas

- Horizontal integration via value-added networks
- End-to-end engineering across the entire value chain
- Vertical integration and networked production systems

Source: acatech, April 2013 “Recommendations for implementing the strategic initiative Industrie 4.0”
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Industrie 4.0 affects all elements of the value chain
Digital Enterprise is the Siemens solutions portfolio

The Digital Enterprise today –
Domains covered by Siemens DF and PD
Digitalization takes different forms in the industries

Siemens offerings for the future of industry

Discrete Industry
- Product design
- Production planning
- Production engineering
- Production
- Service

Process Industry
- Product design
- Process & plant design
- Engineering
- Operation
- Service

Digital Enterprise

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Discrete industry – The entire value chain from product design to service is digitalized and integrated
Cornerstones of the Digital Enterprise

Use of intelligent models

Integrated value chain with seamless engineering

Modular, networked, secure automation

Transparent factories, internally and externally networked

Klaus Helmrich, Member of the Managing Board of Siemens AG
“Digital Enterprise”: The Siemens portfolio of solutions for the stepwise implementation of Industrie 4.0

PLM
Teamcenter / NX

MES
SIMATIC IT

TIA
SIMATIC / SINUMERIK

Siemens Collaboration Platform: "Teamcenter"
The logical way – Step by step into the digital world

Four steps on the way to the Digital Enterprise for small and medium-sized enterprises

1. Digital Enterprise Software Suite
2. Industrial communication networks
3. Security in automation
4. Business-specific industrial services
Our software solutions for the Digital Enterprise fulfill all needs of industry

### Design and virtual production

<table>
<thead>
<tr>
<th>Software</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX</td>
<td>Computer Aided Design/Engineering/Manufacturing (CAx) Digital development of products</td>
</tr>
<tr>
<td>Teamcenter</td>
<td>Collaborative Product Data Management (cPDM) Global collaboration across the entire value chain</td>
</tr>
<tr>
<td>Tecnomatix</td>
<td>Digital Manufacturing (DM) Simulation of production processes</td>
</tr>
</tbody>
</table>

### Real production

<table>
<thead>
<tr>
<th>Software</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simatic IT</td>
<td>Manufacturing Execution Systems (MES) Complete overview of the manufacturing process</td>
</tr>
<tr>
<td>Simatic S7</td>
<td>Command &amp; Control (C&amp;C) Steering and control of individual manufacturing steps</td>
</tr>
</tbody>
</table>
Our offering for low-cost, secure, end-to-end communication in industry

End-to-end communication across companies, production facilities and field sensors with PROFINET

Automated configuration of IP communication

Assignment of IP addresses directly in the machine and automatically configured IP routing

- Flexible and quick configuration and reconfiguration
- Relocation of address administration from engineering to run-time
- Simplification for remote service, with improved security
Our offering for comprehensive security in industry

The Siemens security concept – “Defense in Depth”

- Copy and manipulation protection
- Authentication and user management
- Firewall & VPN (Virtual Private Network)
- System “hardening”

Products and systems with integrated security

Industrial Security Services

1) CPU Firmware V4.0 and higher; STEP 7 Professional V13 (TIA Portal) and higher.

* Based on IEC 62443
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Our portfolio of digital, data based services for all requirements in the industrial environment

Siemens Plant Data Services Portfolio

Siemens Plant Cloud Services

- Open industrial cloud platform, including standardized device connectivity
- Eco-systems for customers and analytics partners
- Siemens as “data custodian”

Siemens Plant Analytics Services

- Plant and asset optimization through
  - Asset Analytics
  - Energy Analytics
  - Process Data Analytics

Siemens Plant Security Services

- Holistic security offering for industrial plants
- Ensuring data confidentiality and integrity as well as plant and asset availability
  - Plant assessment
  - Plant optimization
  - Managed Security Service

1) Currently only pilot customers

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Siemens offers open cloud platform for industry customers based on SAP HANA technology

Optimization of plants and machines as well as energy and resources

- **Open standard (OPC)** for connectivity of Siemens und third-party products
- **Plug and play connection** of Siemens products (engineering in the TIA Portal)
- **Cloud for industry** with open application interface for individual customer applications
- Optional **cloud infrastructure** – public cloud, private cloud or on-premise solution
- Transparent **pay-per-use pricing model**
- Opportunities for completely new **business models** (e.g. selling machine hours)
At last year’s Hannover Messe, the focus was on applications for larger enterprises ...

Production line for the automated installation of doors to a VW Golf 7: systematic linkage of data, innovative industry software and powerful production hardware
... this year, we are showcasing the scalability of our solutions in small and medium-sized enterprises

- **CB & VALKO s.r.l.** (Italy, 50 employees combined)
- Catering equipment suppliers for polyvalent cooking appliances, electrical convection ovens, vacuum packaging machines, etc.

**Increase of competitiveness**
- **Time to market**: working prototypes ready one month after design completion
- **Flexibility**: 6 new product models designed every year from scratch
- **High variance**: more than 500 different product models regularly managed and updated in Teamcenter

**Stronger digitalization of the production processes**
- **NX** for design of complete machines
- **Teamcenter** as uniform data platform

"Teamcenter can be implemented without having to make major adjustments. The software is thus ideally suited for small and medium-sized enterprises like ours."
Example of small and medium-sized enterprises: CB and VALKO s.r.l. Italy
Recommended steps for digitalization in midsized companies

![Diagram showing the implementation process]

**Analysis of initial situation and existing data**

**Installation of PLM software Teamcenter as data backbone**

**Use of function modules and proven process templates**

**Training of end users and system administrators**

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**Thanks to a structured implementation process, Teamcenter is completely ready for use within 10 days:**

<table>
<thead>
<tr>
<th>Step</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project alignment</td>
<td>0.5</td>
</tr>
<tr>
<td>Installation of software</td>
<td>1</td>
</tr>
<tr>
<td>System configuration</td>
<td>1</td>
</tr>
<tr>
<td>User definition</td>
<td>0.5</td>
</tr>
<tr>
<td>Data migration</td>
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</tr>
<tr>
<td>System tests</td>
<td>1</td>
</tr>
<tr>
<td>Training of users</td>
<td>2</td>
</tr>
<tr>
<td>Training of administrators</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>

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Components of the Digital Enterprise in the process industry

1. Digital Plant design and processes
   Use of a shared data model to generate value-added in design, engineering, operation and service

2. Modularization
   Greater flexibility through the combination of pre-configured operational units via standardized interfaces

3. Production Excellence
   Increased productivity through resource efficiency, throughput optimization and highest process quality
Integrated engineering as efficiency driver in the process industry – Example BMA

BMA benefits from an optimal integration of both systems and a continuous workflow

Integrated engineering with COMOS/SIMATIC PCS 7

- Effort for the creation of typicals reduced by 25%
- 60% of the plant generated from typicals in COMOS
- Project failures minimized
- Time savings for the customer
Siemens at the Hannover Messe 2015 – The showcases at the Siemens booth show which solutions we can already offer today

- **Process Industry**
  Efficient, comprehensive plant management leading to higher availability, resource efficiency and productivity

- **Machine Engineering**
  Easy simulation and implementation across the entire lifecycle, leading to more flexible production processes

- **Additive Manufacturing**
  Across the entire product lifecycle – from lab production to serial production

- **Automotive Manufacturing**
  NX software used to generate a digital twin of the Maserati Ghibli
• The Digital Enterprise is our innovative portfolio of solutions for the implementation of Industrie 4.0 in enterprises of all sizes
• Digital Enterprise portfolio elements are already available today
• Digital Enterprise comprises four core elements:
  1. Digital Enterprise Software Suite
  2. Industrial communication networks
  3. Safety in automation
  4. Business-specific industrial services

Already today, customers can invest in future-proof solutions for Industrie 4.0 with Siemens’ Digital Enterprise
Visit us in Hall 9
Siemens press conference at the Hannover Messe 2015

On the Way to Industrie 4.0 –
The Digital Enterprise