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FAQs about Industrie 4.0 and Digital Enterprise

How does the Siemens Digital Enterprise Software Suite enable the intelligent interaction of the digital and the physical worlds? What are immediate economical advantages, and why is the development of the digital enterprise absolutely vital to future competitiveness and economic success?

Listed below are the questions most frequently asked about the Digital Enterprise Software Suite. Simply click on a question to be taken straight to the answer.

When considering the digitalization of industry, the terms Industrie 4.0 and Industrial Internet Consortium (IIC) are often used. How do these relate to one another?

Industrie 4.0 focuses on the digitalization of the manufacturing industry as part of the IoT (Internet of Things), while IIC goes further and is more generally formulated – for example, it also addresses healthcare, energy and IoT itself.

Industrie 4.0:

The future-oriented Industrie 4.0 project forms part of the German Federal Government's high-tech strategy. The goal of Industrie 4.0 is to develop a forward-looking strategy which prepares the German manufacturing industry for the Internet age. Key focus areas include:

- Horizontal integration of the entire value creation process through corresponding technical IT support
- Seamless integration of all engineering tools along the entire value creation chain
- Vertically integrated, networked production systems

At 2015 Hanover Fair, the Industrie 4.0 platform was restructured and is now in the lead of the German government and includes, amongst others, companies such as Festo, SAP, Siemens, Telekom and the Confederation of German Industry (BDI) in its management group.

The private sector, academia, policy makers and unions work together with the goal of undertaking pre-competitive activities in the field of Industrie 4.0 under one roof.

The intention is that meaningful coordination will be brought about without an uncontrolled proliferation of regional regulations such as those that arose during the initial stages of mobile telephony implementation.

IIC:

IIC was founded in March 2014 and its members include technology companies of all sizes, research establishments, universities and governmental organizations. Siemens has been a member since January 2015.

IIC is a network intended for the exchange of best practices and for promoting the growth of an “Industrial Internet”. It focuses on the accelerated development, adaptation and extensive use of networked machines and devices as well as intelligent data analysis.

Siemens and Industrie 4.0/IIC:

Siemens follows all activities and participates in those relevant to business success – both from a technical and from a geographical perspective.

As an international company, Siemens is involved in both IIC and initiatives such as Industrie 4.0 or those from other consortia. The Company has taken a leading role in the newly-founded Industrie 4.0 platform.

The wide variety of approaches taken by the various initiatives is in many respects stimulating. For example, cross-border communication and understandings between the initiatives can enormously shorten the path to global perspectives and standards.

Is Industrie 4.0 a German-only or a global topic?

The digitalization of the manufacturing industry is a worldwide topic. Fundamental discussions on the future of this industry and the importance of digitalization are being held everywhere. The reason for this is the challenges being faced, which are very similar around the world:

New products must be brought to market in ever-shorter timeframes

The individualization of products and quickly changing markets requires increased flexibility

The ongoing wish for efficiency improvement demands shorter development times or savings in resources/energy

There are various international initiatives that are meant to smooth the path to the manufacturing of the future, for example in Germany “Industrie 4.0” and in the USA the “Industrial Internet Consortium” (IIC).

In the meantime, Governments around the world are investing in initiatives to strengthen or revive their manufacturing sectors. Industrie 4.0 technologies are also needed here:

In Germany, the subject is driven above all by the Government and various associations. The German Federal Government actively supports Industrie 4.0 by means of, for example, projects for autonomics, production technologies, smart data/smart services and IT security. In these subjects, decisive for digitalization, there is still a great need for research. The efforts being made to strengthen research and innovation must therefore not be allowed to abate, to ensure that Germany, and indeed Europe, do not fall behind with respect to other regions.

In the USA, the subject is addressed by company consortia, for example IIC or the Smart Manufacturing Leadership Coalition.

In addition there are initiatives to strengthen manufacturing industry, e.g.:

The US Government is supporting manufacturing innovation through the National Network for Manufacturing Innovation (NNMI), an initiative by President Obama to bring together industry, academia, and government partners to leverage existing resources, collaborate, and co-invest to advance manufacturing innovation and accelerate commercialization.

In India, the “Make in India” program aims at encouraging innovations, simplifying investment, strengthening the manufacturing infrastructure and extending qualifications with the goal of increasing the growth of the Indian manufacturing industry to over ten percent per annum.

In China, comprehensive economic reforms by the Government have given industry much greater room for maneuver. In the program “Manufactured in China 2025”, innovations are placed at the heart of industrial development – from “Made in China” to “Created/Innovated in China”.

What can Siemens offer its customers today to encourage them to invest in the digitalization of industry?

Industrie 4.0 came about due to customers' requirements and the reason for its existence is to be found in their systems. Siemens' portfolio includes major elements that both satisfy such requirements and are capable of being implemented.

Siemens terms its way to Industrie 4.0 the "Digital Enterprise". The path to the Digital Enterprise comprises four core elements that logically build on one another:

- Digital Enterprise Software Suite – a comprehensive portfolio of software-based systems, built up for more than 15 years, based on Teamcenter as a collaborative platform that seamlessly integrates PLM (Product Lifecycle Management), MES/MOM (Manufacturing Execution System/Manufacturing Operations Management) and TIA (Totally Integrated Automation). Siemens intends to extend and complete the Digital Enterprise Software Suite in coming years.

- Industrial communications networks

- Security for automation

- Business-specific industrial services

Siemens has all of these four core elements in its portfolio. These allow customers to invest in future-proof solutions for a step-by-step realization of Industrie 4.0 today.

What benefits does Siemens offer its customers?

The primary focus is on customer requirements:

- Shortened time-to-market through an integrated chain of tools running from product design through to production and on to maintenance

- Increased flexibility through the integration of PLM (Product Lifecycle Management), MES/MOM (Manufacturing Execution System/Manufacturing Operations Management) and automation

- Improved efficiency due to shorter development times and savings in resources and energy

From these requirements, Siemens developed a holistic approach to the integration of its customers' value creation chains in the process and manufacturing industries and has also developed its own value creation chain that includes seamless technical data interchange with supplier networks.

This integration of the value creation chain is only possible by means of digitalization coupled with industrial software, the unique feature being that it is a single source for know-how regarding industrial sectors and processes, industrial hardware and automation, and the combination of software and data analytics.

Are there any examples of Siemens products in use on the path to Industrie 4.0?

Mars Rover: PLM software aided NASA in its development of "Curiosity". The functions required in a highly challenging environment were determined by advanced simulation – first undertake virtual development and testing, and then build.

Eisenmann, a mid-range German company: PLM software was used for the construction and simulation of a dip coating line for the automobile industry. Provision of the necessary process parameters for optimal programming of this complex plant – three axes for drive, hoisting and rotational movements of various body types and dipping curves.

Amberg is often named as an example of Industrie 4.0. What especially characterizes this facility is:

Since opening in 1989, production volume has increased eightfold with almost the same number of employees (approx. 1200)

Minimum fault quota (quality level 99.9988 percent)

Over 1000 product variants using SIMATIC control technology

Around fifteen million products a year – a product leaves the factory every second

From initial production steps to delivery, around one thousand SIMATIC controllers are used

75 percent of the value creation content is managed by intelligent machines and computers, 25 percent depends on an employee decision with the assistance of information technology (digitalization).

Siemens sees the industrial company of the future as a Digital Enterprise. What is behind this term?

Since many activities in a company are today supported by software, the focus is now on seamless digitalization of the company's core processes across the entire product creation operation, supporting this through the use of software tools. In future, no part of the value creation process will be able to exist without its own digital map. This already begins with ideas concerning the potential product and continues on with the engineering of the product, its production, its commissioning and its use, through to new services offered in conjunction with the product or based on it. One of the main aspects of a Digital Enterprise is that it seamlessly reproduces its value creation processes in digital form and links these to one another.

The path to the Digital Enterprise comprises four core elements that logically build on one another:

The **Digital Enterprise Software Suite** consists of software products for the discrete manufacturing industry that cover all the requirements of the industrial value creation chain. Its backbone is Teamcenter, a software platform for collaborative product data management [= uniform data platform (data backbone) from Siemens]. Teamcenter allows employees anywhere in the world to access the same database for the purpose of seamless and more efficient integration and cooperation. Tecnomatix and NX are used for design and planning. In actual production, products such as the Manufacturing Execution System (MES) Simatic IT and the Simatic S7 portfolio of controllers have proven themselves across the globe.

In **industrial communications networks**, Siemens has a comprehensive set of communications networks offerings matched to one another – from AS interfaces to Industrial Ethernet with the associated Scalance X family of switches.

In industrial security, i.e. **IT security for automation**, with its “Defense in Depth” concept, Siemens presents a broad portfolio of products and services for industrial use. This portfolio includes plant and network security as well as system integrity.

For **business-specific industrial services**, Siemens offers a range of classic services, for example data-based services such as Plant Data Services, Plant Security Services and Plant Cloud Services. Plant Cloud Services for industry are based on an open cloud platform utilizing SAP Hana technology. Siemens customers will use this to develop, extend and operate apps in the cloud. Today, intelligent data analysis and evaluation already helps support industrial decision processes and makes a decisive contribution to productivity increases. In this context, digitalization has for a long time not only meant the provision of a fast-growing volume of data generated on a worldwide scale – it also means collecting such data, analyzing its content, deducing conclusions or developing completely new business models and in the end, creating a great deal of value.

What are the success factors on the path to the Digital Enterprise?

The digitalization of industry, with links to both the virtual and the real world, not only demands “big data” but also “smart data”, i.e. the intelligent use of data as well as automation and process know-how.

A technical understanding of both of these worlds coupled with a profound comprehension of industry business models are both necessary and of advantage. More than anywhere else, this is possessed by companies – whether automobile manufacturers, electrical technology providers or machine builders – who have been at home in this field for a long time.

It is completely clear that no company can renew its entire software and IT infrastructure overnight. In the end it will depend on starting in the right place and making the necessary transformation economically viable through a long-term program of migration and renewal. It is better to start with a quick first digital step – by introducing, for example, a common data backbone such as Teamcenter – than to wait for possible new developments or standards.

Increasing networking and digitalization also means that the requirements for data and process security go up accordingly. What has to be taken into account when considering industrial security?

Cybersecurity is a major challenge and an important competitive factor in a digitalized economy. Often what is missing is the necessary awareness that not having adequate overall strategies for IT security – also in the manufacturing process – can result in great danger. With the “Defense in Depth” concept, Siemens supports companies by thoroughly checking their security strategies and developing effective measures and/or countermeasures.

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