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The factory of tomorrow will be smart

The automated meshing of production and business processes is becoming a competitive factor for companies in economically uncertain times. Together with the Institute for Automation & Industrial IT at Cologne University of Applied Sciences, Intel and Computacenter are developing pioneering solutions for the creation of an appropriate, smart IT infrastructure.

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Collaborative partner:
Prof. Dr. Frithjof Klasen

Institut für Automation & Industrial IT

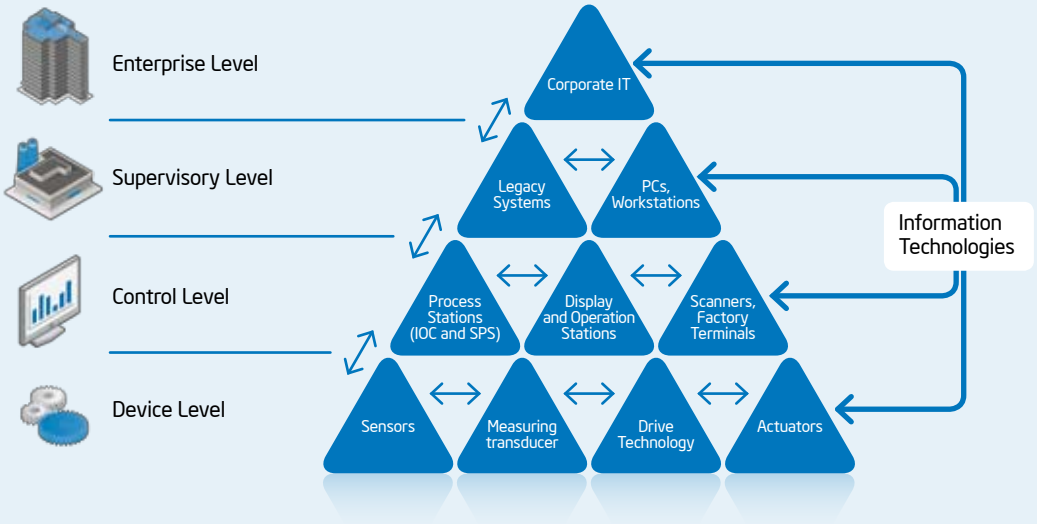
Fachhochschule Köln
Cologne University of Applied Sciences

The current economic crisis is making new demands on manufacturing industry, in particular, in terms of the flexibility and efficiency of production processes. This requires production and administrative processes to be meshed with each other by means of IT systems to optimise the use and capacity utilisation of machines and lines but also to be able to respond rapidly to wrong developments in production and thus to minimise adverse impacts on the business.

The future scenario of the "smart factory" represents the zenith of this development. The factory can be modified and expanded at will, combines all components from different manufacturers and enables them to take on context-related tasks autonomously. Integrated user interfaces will still be required at most for basic functionalities. The complex control operations will run wirelessly and ad hoc via mobile terminals such as PDAs or smartphones.

In many manufacturing companies, however, the reality looks very different. Every machine generally still operates in isolation without any interfaces to vertical or horizontal communication with the other systems in the classic automation pyramid. As a result, companies have had scarcely any capability to date to respond rapidly to changes in demand or supplies or to quality and service problems.

Intel: Innovator in industrial automation



In the smart factory of the future, the levels of the automation pyramid are interlinked. Manufacturing-related data become available in real time for making business decisions. The prerequisite for this is a highly effective IT system. The future-proof process technologies of Intel create an innovative and solid basis to achieve this.

Together with the Institute for Automation & Industrial IT, Intel and Computacenter are showing these companies a realistic route to the intelligent factory of the future. In optimising production processes through the use of IT, the two partners are drawing on the experience gained in numerous joint major projects and are using proven technologies such as iAMT (Intel® Active Management Technology).

Interfaces are the first step towards automated production

Industrial automation is characterised today by an increasing decentralisation of the automation functions. An additional factor is that production-related and administrative information systems such as enterprise resource planning (ERP), manufacturing execution systems (MES) and automation systems have to be efficiently linked to each other to permit the prompt procurement of materials. This places new demands on the communication systems in terms of their performance and integration. Industry is responding to this by making ever greater use of information technologies in automation. These include PC-based automation solutions and the use of interface technologies and protocols such as OPC, XML and TCP/IP. They guarantee that all production-related data on order and material streams, costs and product quality from the various IT systems and production sectors and from the shopfloor system is merged and made available in real time. They are also important drivers for using internet-based services, for instance in the field of remote maintenance, for web technologies as a human/machine interface and the integration of knowledge-based services such as e-services or computational services.

IT as an automation accelerator

Achieving a more productive meshing of information and materials streams calls in particular for the creation of a continuous "machine-to-machine" communication system, in addition to optimising business and IT processes. The prerequisite for this is a powerful IT system with local control software and a wealth of communication options. With Intel as its technology partner, Computacenter is responsible for the planning, implementation and optimisation of the industrial use of IT solutions within production scenarios and supports users in

creating an optimised application and business process landscape based on a secure infrastructure which can also be operated cost-effectively.

Production has to be secure

A number of Ethernet-based, real-time communication systems have become established in recent years which have the potential to supersede the field bus systems used hitherto. Ethernet is now being increasingly used as the standard for data cabling for industrial applications. Consequently, security is also taking on greater importance in production.

In order to provide the individual production cells with effective protection against threats, decentralised concepts are required which incorporate both organisational and technical measures to fend off dangers. The same protective goals apply to production IT systems as to a business environment: uptime, confidentiality and integrity. The threats are also similar. However, the administrative and production IT systems differ significantly when it comes to the methods for dealing with and containing the risks.

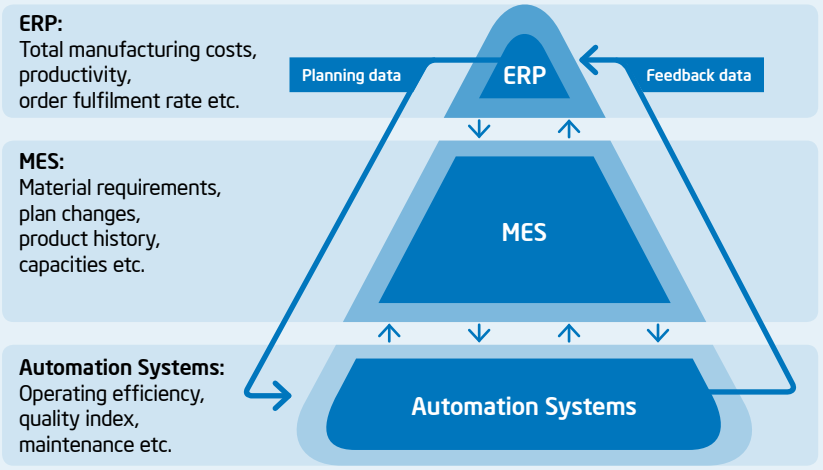
The Institute for Automation & Industrial IT, in conjunction with Computacenter, offers a comprehensive analysis of the overall threat and risk situation. This takes account of all the legal requirements and organisational specifications relating to the secure and reliable operation of the production IT systems in the relevant application environment. In a holistic security concept, for example, reliable connections between the IT architecture components must be specified.

Standardisation as a fundamental principle

Technology standards can be used to achieve harmonisation in the production environment. Standardisation of business processes forms the basis for communication between ERP, MES and automation systems. This enables complex system interface solutions to be gradually simplified and decouplings to be implemented.

In the smart factory scenario the PC has also taken on a greater role in automated production. In the process, the communication and performance requirements that the industrial computer has to meet as an embedded system are becoming more and more complex: a factory with a high degree of automation requires the integration of a very wide range of sub-systems from various providers such as programmable control technology and test systems with their underlying IT infrastructure. If these components are incompatible in terms of hardware and software, the solution to be implemented quickly becomes very complex and costly.

Optimum data flow thanks to standardisation



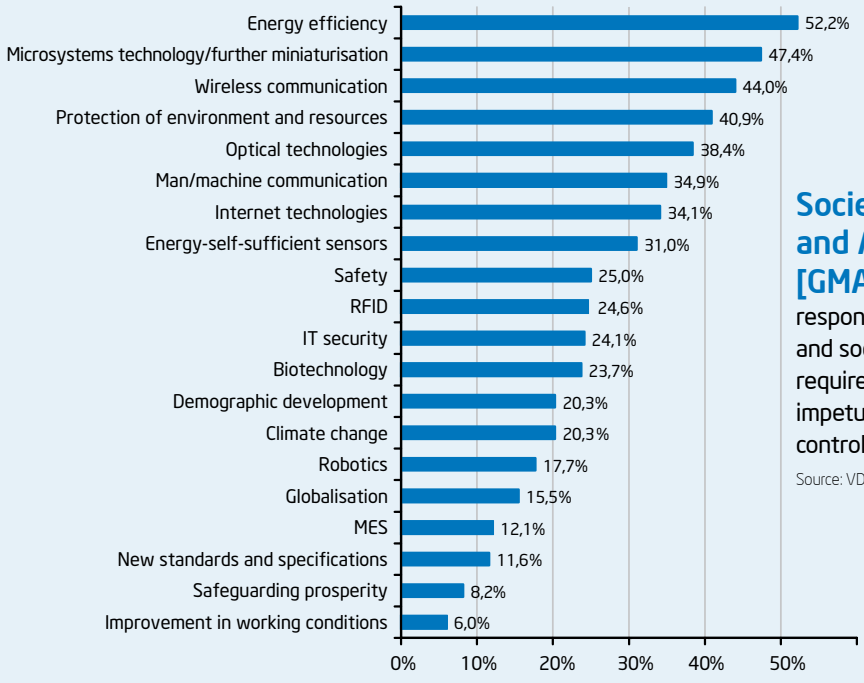
Standardisation forms the basis for communication between ERP, MES and automation systems. Data exchange takes place either via a messaging system as an integration layer (middleware) or a direct interface to the ERP system.

Intel's industrial computer platforms help to standardise this decentralised, fragmented IT and bring all the applications seamlessly together in one network. Similar to the desktop, notebook or server field, the embedded systems use hardware-supported virtualisation, with the result that multiple operating systems can access the processor resources simultaneously.

Outlook

The automation of production processes will permit existing productivity potentials to be better and more efficiently exploited. IT innovations will deliver a technology push and therefore contribute significantly to achieving a digital, real-time factory.

The further development of automation will not remain limited to traditional application fields such as plant, mechanical and automotive engineering in the years ahead. The fields of energy, production, process and environmental engineering together with microtechnology and nanotechnology also show huge growth potential. It is apparent that the rising demands relating to energy efficiency will have the greatest impact on automation in the future. Further important impetuses will come from advances in miniaturisation, the increasing use of internet technologies, the desire for safety or the introduction of new standards and specifications (cf. responses in the Society for Measurement and Automatic Control [GMA] member survey 2008).



Society for Measurement and Automatic Control [GMA]- member survey 2008:
responses to the question "Which technical and socio-economic developments and requirements will provide the greatest impetus to measurement and automatic control technology in the next three years?"

Source: VDI/VDE Society for Measurement and Automatic Control

About Intel

Intel (NASDAQ: INTC) is the world's leading company in the field of semiconductor innovation, developing the technologies, products and initiatives that deliver constant improvements in people's lives and work. Further information is available by visiting **www.intel.com/pressroom** and **www.intel.com/community/.**

About Computacenter

Computacenter is Europe's leading independent service provider for information technology. It develops, implements and operates bespoke IT solutions for its customers. For further please visit **www.computacenter.de.**

About the Institute for Automation & Industrial IT at Cologne University of Applied Sciences

The Institute for Automation & Industrial IT at Cologne University of Applied Sciences focuses its research and consultancy operations in the fields of industrial Ethernet and IT security in automation. In the IT security field the institute develops network analysis tools and conducts beta tests and integration tests on automation components in its own test laboratory. The institute's director is Prof. Frithjof Klasen who is also involved in the evaluation and introduction of information technologies in automation systems on committees and working parties of the German Electrical and Electronic Manufacturers' Association (ZVEI), the Society for Measurement and Automatic Control (GMA) and the PROFIBUS User Organisation. Further information is available at **www.fh-koeln.de/ait.**