DIGITAL TRANSFORMATION IN AUTOMATION TECHNOLOGY

INTELLIGENT SOLUTIONS FROM SICK ENABLE INDUSTRY 4.0

SICK

Sensor Intelligence.

DEVELOPMENT STAGES OF INDUSTRY 4.0

Data generated using sensors in individual machines, linked plants or entire factories is the foundation for Industry 4.0 applications. Sensors record status parameters such as temperature, level, humidity, flow, vibration, etc. Usually an IIoT gateway transmits the generated and digitalized data to a higher-level system, for example an MES or ERP system or a cloud, in real time. This establishes the connection between the operative technology level (OT) and the IT world.
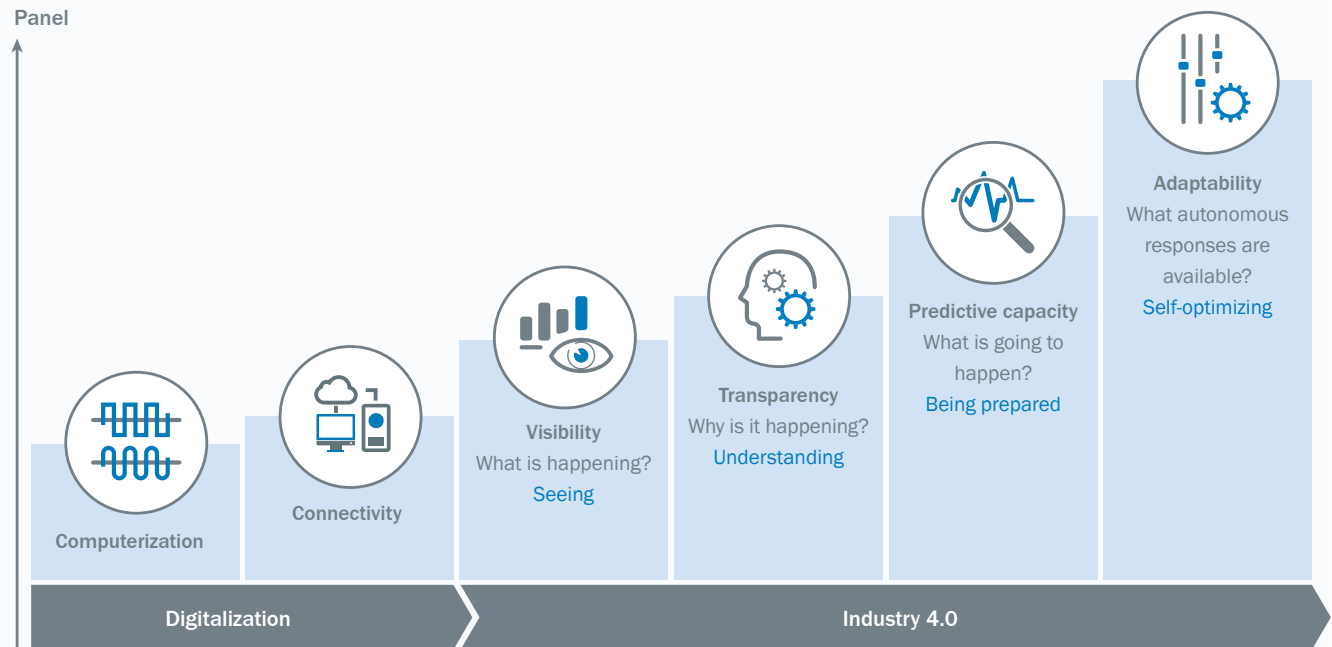
Based on the acatech Industrie 4.0 Maturity Index

The first stage of development of an I4.0 solution is visibility. Seeing - What is happening? The data is processed via dashboards and visualized in real time. This creates a digital twin of a machine, linked plant or an entire factory.

The next step is to create transparency by analyzing the data. Understanding - Why is it happening? Cause-effect relationships are identified, enabling condition monitoring of machines, plants or factories.

This transparency results in the capacity to predict future processes. Being prepared - What is going to happen? To do so, the large quantities of data collected over long periods of time (big data) are analyzed by means of neuronal networks (artificial intelligence) and behavior models are created. Expected machine or plant events can then be predicted. Reactive measures such as maintenance can then be initiated as needed (predictive maintenance).

The last stage of development of I4.0 is automated adaptation for self-optimization. The data of the digital twin of a machine, plant or factory can be used to automatically make the right decisions – without human intervention – and take the right measures, e.g. maintenance, in a short amount of time.
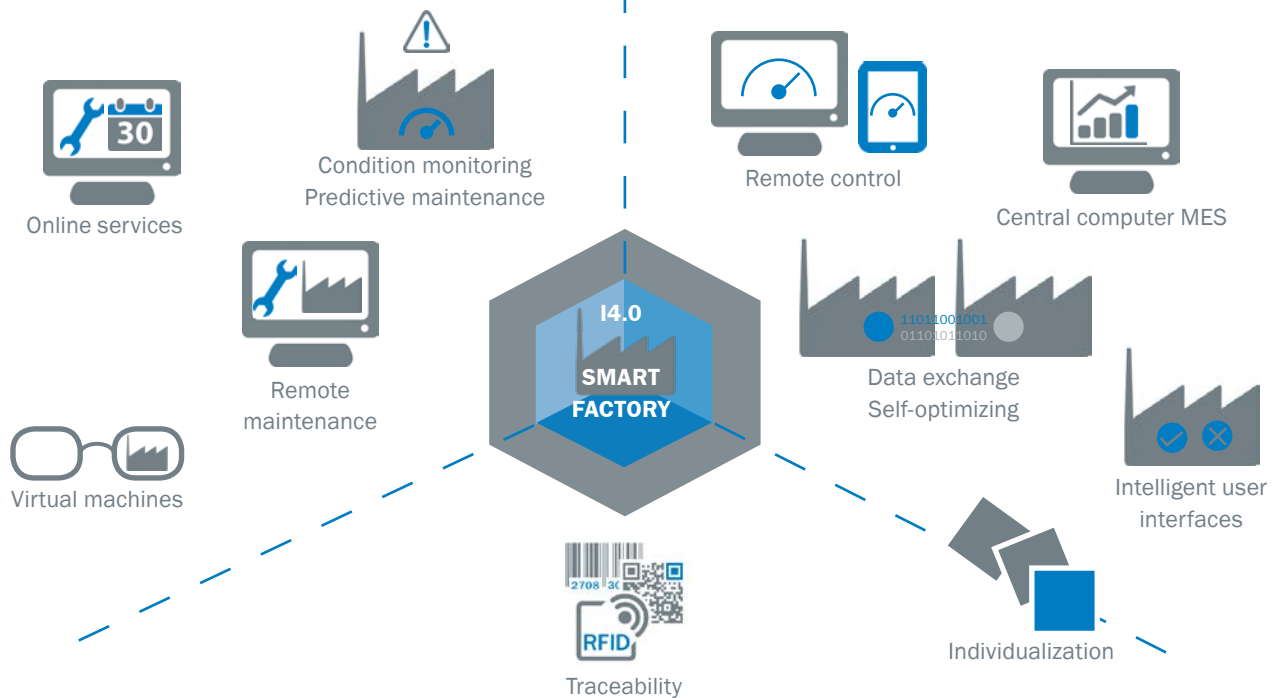
THE INTELLIGENT I4.0 SMART FACTORY

Flexible and highly-efficient production characterizes the I4.0 Smart Factory. This can be divided up into three areas: Smart Production, Smart Machines and Smart Services.

SMART SERVICES

The networking of machines or their components is the prerequisite for improved and expanded services. The machines and their components can be identified in the production network and supply data about their current status. Among other things, this enables more efficient maintenance and increases machine availability.

SMART MACHINE

With sensor-generated data and the exchange of information with external points, such as a cloud, the efficiency of individual machines, and therefore the entire process, is increased. With growing computerization, machines become decision-makers and require less interaction with the operator. This increases machine efficiency and availability and reduces the need for staff.

Online services

Condition monitoring
Predictive maintenance

Remote control

Central computer MES

Remote maintenance

I4.0
SMART FACTORY

Data exchange
Self-optimizing

Virtual machines

Intelligent user interfaces

RFID
Traceability

Individualization

SMART PRODUCTION

Flexible production systems enable efficient manufacturing of even small batch sizes all the way to individualized production. Due to the automated exchange of information between the different production equipment, these adapt largely on their own and optimize all processes. With individual marking, the product itself becomes an information carrier and therefore intervenes in the production process, which becomes traceable at the same time.

SMART PRODUCTION
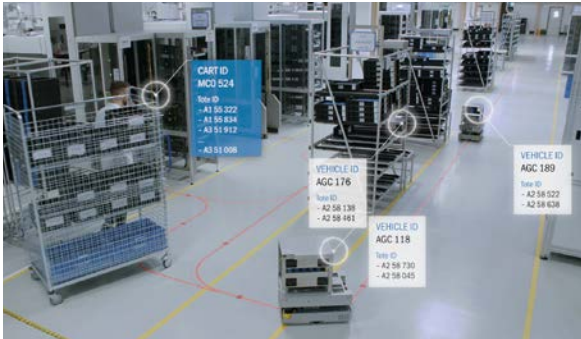
Production logistics play a key role in I4.0 Smart Production. Localization technologies as well as mobile platforms (AGVs, AGCs) are core components of Smart Production. Localization data generates a high level of transparency and understanding of all production-related assets, load carriers and loading equipment. This makes it possible to optimize and dynamically adapt mobile platform vehicles, to name one example. Machine setup times can also be prepared or scheduled flexibly. The material flow between manufacturing stations can be planned and controlled, goods movements can be monitored and storage spaces can be managed without manual booking. Localization data enables agile planning of production and logistical processes for better delivery quality and reliability. The localization and Asset Management solutions from SICK (Smart Service Asset Analytics) create consistent transparency in internal production logistics, open possibilities for higher process efficiency and can create the foundation for new services, even beyond intra- and production logistics.

Tag-based localization with LOCU

SICK's LOCU range of hardware components for indoor localization provide full transparency in intralogistic processes. LOCU employs ultra-wideband technology (UWB) based localization tags and antennas for receiving and evaluating telemetry data, to localize tagged objects in the covered logistic and manufacturing areas.

➔ www.sick.com

Identification solutions

Identification solutions are required to localize products, load carriers, loading equipment, etc. For these types of applications, SICK offers RFID read/write devices, laser scanners for reading 1D codes and image-based code readers for reading 1D and 2D codes. Interfaces in the devices enable integration into industrial networks as well as the SICK Asset Analytics platform.

➔ www.sick.com/identification_solutions

Solutions for mobile platforms

Mobile platforms move automatically or autonomously between different work stations and individual points in the logistics and production environment. SICK offers countless sensor solutions for the navigation, measurement, positioning and collision avoidance of mobile platforms and thus for personal safety as well.

➔ www.sick.com/mobile-platforms

SMART MACHINE
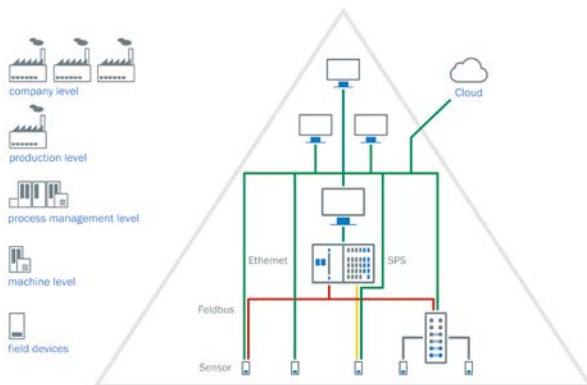
With sensor-generated data and the exchange of information between machines and higher-level systems, such as a cloud, the efficiency of the individual machine, and therefore the entire process, is increased. With growing computerization, machines become decision-makers and require less interaction with the operator. This increases machine efficiency and availability and reduces the need for staff. The basic prerequisite for this is efficient communication and integration of the data generated by the sensors.

Smart Sensors

Smart Sensors already support dynamic, realtime-optimized, and self-organized industry processes. They record real operational statuses, turn these into digital data, and share them automatically with the process controller. The added value of sensor communication depends significantly on the quality and stability of the delivered data. In order to create the best possible basis for a future-ready automation system, SICK has equipped its Smart Sensors with four special properties:

- Enhanced Sensing – Top sensor performance for stable processes
- Efficient Communication – Flexibility and transparency at the lowest field level
- Diagnostics – Highest availability levels thanks to predictive maintenance
- Smart Tasks – Tailor-made information directly from the sensor

➜www.sick.com/smart-sensors

Software tool FieldEcho® for IO-Link data accessibility and transparency

FieldEcho® allows for parameterization and monitoring of all IO-Link devices in a plant throughout the whole life cycle – regardless of the PLC, fieldbus, or IO-Link master used. FieldEcho® communicates with a PLC through OPC UA. Using the SICK generic function block, FieldEcho® provides access to the IO-Link device process and service data. FieldEcho® consists of a server that is responsible for the communication. It can read and write IO-Link device data as well as provide them for the FieldEcho® front end. Due to its REST API, these data are also accessible for any third-party application. Its front end interprets IODDs and provides a graphical user interface for the whole system as well as for any single IO-Link device.

➜ www.sick.com/fieldecho

SMART SERVICES

Asset Analytics

Asset Analytics provides decisive added value to the identification and localization solutions from SICK as it collects the data recorded by the hardware components, merges it and provides it to the user for further use. The technology-independent platform therefore enables a clear representation and intelligent evaluation of information as well as the derivation of additional possibilities for optimization in processes. The platform, which can be adapted to the needs of the user using various interfaces, can be operated on a local server, in a user-specific cloud or one provided by SICK. Technology-independent consultation, the design of total systems, the integration of IT components into existing customer systems as well as SICK LifeTime Services round out the efficient Asset Analytics services.

➜ www.sick.com
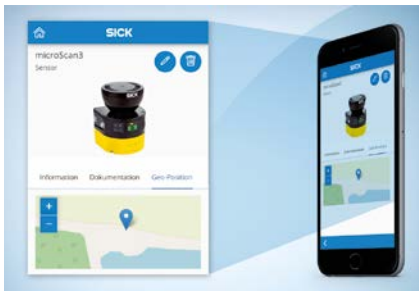
Installed Base Manager

With the Installed Base Manager app from SICK, the installed base can be detected quickly, easily and with a high level of quality. The app offers an overview of the devices and sensors used, and it can be updated at any time. There is also the option to directly access other product-related information of SICK products. The installed base is therefore transparent for all authorized employees in a company and can be accessed at all times using a smartphone. Detection and visualization of the installed base is the first step to making a digital twin and condition monitoring.

➜ www.sick.com/Installed_Base_Manager

Remote Service Connect

The Remote Service Connect sensor app makes it possible to reach SICK devices via SICK Remote Service. The app is designed to offer a pure remote service software solution for all programmable SICK devices. Neither a meeting point router nor special hardware is needed to connect SICK devices to the remote service platform. This creates the basis for I4.0 condition monitoring and predictive maintenance.

➜ www.sick.com/Remote_Service_Connect

Artificial intelligence for SICK sensors

Deep Learning from SICK breaks new ground in industrial automation. With its user-friendly operation, Deep Learning makes it possible to train artificial neuronal networks for SICK sensors in the cloud with little effort using example images. The sensors can then evaluate and sort objects in line with customized criteria on-site – in machines or systems – even if the natural appearance of the objects varies. Different SICK products can be enabled to solve such applications with the help of Deep Learning software licenses.

➜ www.sick.com/Deep_Learning

I4.0 RETROFIT

Data and the networking of machines and plants build the foundation for digitalization and I4.0 via the Industrial Internet of Things (IIoT). It is not always necessary to invest in new machines. It is cheaper to digitally convert existing machines with retrofit solutions. Existing machines and plants are equipped with modern sensor systems and communication technology for this purpose. This enables the recording and analysis of production data as well as networking and communication between plants and higher-level systems, such as an MES or ERP system or a cloud. This creates the foundation for production in the spirit of I4.0. Retrofit solutions are therefore the ideal stepping stone for the step-by-step digitalization of production and conversion to I4.0.

Monitoring Box

The Monitoring Box from SICK makes it possible to detect status changes of sensors, machines, and plants early on. It is a software-based solution which can be adapted to specific customer requirements and implemented either at the customer's site or in the SICK cloud.

To permanently record and interpret sensor and machine data, your Monitoring Box needs three components: A powerful gateway, a user-friendly dashboard and a pre-configured monitoring app. The device data collected by the Monitoring Box gateway is sent to the cloud in encrypted form and processed there. A significant change to the device status is visualized if needed and enables a timely reaction by operating and maintenance staff. This ensures the availability and productivity of critical device components and machines.

➜ www.sick.com/Monitoring_Box

TDC-E for collecting machine data

The TDC-E IIoT gateway system offers a variety of interfaces such as analog or digital inputs, serial interfaces, FTP and Euromap 63 protocols for networking production machines and plants and retrofitting them in a cost-effective manner. Other sensors can also be connected to the TDC-E to monitor additional process-critical values such as flow and temperature of cooling circuits or material levels. All data and diagnostic information along the process chain can be merged in an information system or a cloud using the TDC-E – the ideal foundation for optimal evaluation.

➜ www.sick.com/TDC

Sensor Integration Display for on-site data visualization

The Sensor Integration Display (SID) is used if the components contained in the retrofit system or the data generated by it are to be visualized on site at the relevant machine or plant. The SID is a programmable, intelligent human machine interface and part of the SICK AppSpace eco-system. The intuitive touch display can be integrated seamlessly into the SICK portfolio of programmable devices. Individual user interfaces for sensor integration and visualization can be created using the SICK AppStudio development environment. It makes it possible to process data for simple display via dashboards and creates transparency in terms of I4.0 condition monitoring.

➜ www.sick.com/SID
➜ www.sick.com/AppSpace

SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 10,000 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, SICK is always close to its customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents, and preventing damage to the environment.

SICK has extensive experience in various industries and understands their processes and requirements. With intelligent sensors, SICK delivers exactly what the customers need. In application centers in Europe, Asia, and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes SICK a reliable supplier and development partner.

Comprehensive services round out the offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

That is "Sensor Intelligence."

Worldwide presence:

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Hong Kong, India, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Romania, Russia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Arab Emirates, USA, Vietnam.

Detailed addresses and further locations ➜ **www.sick.com**

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