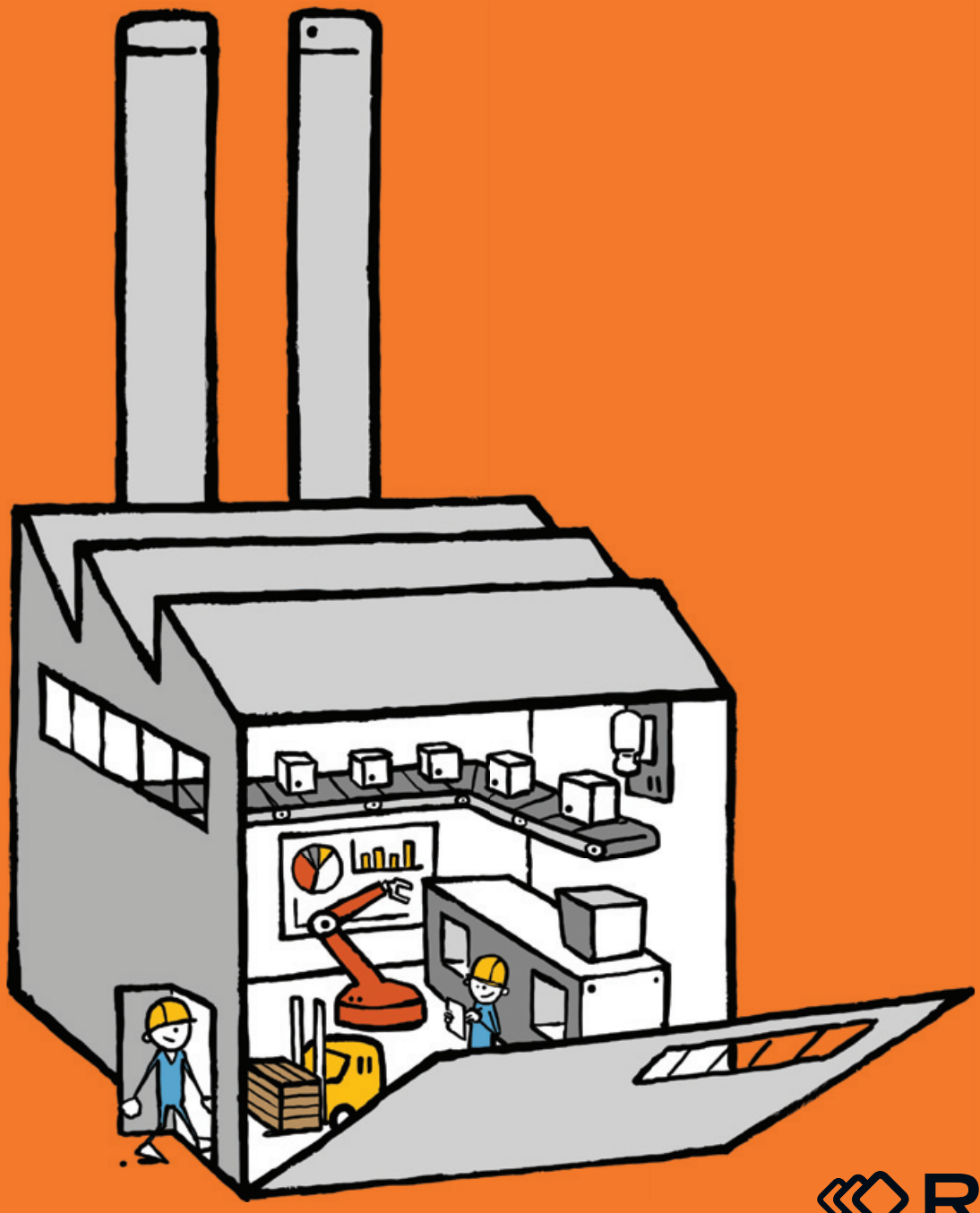
Issue 49

ROI DIALOG

INSIDE THE SMART FACTORY

How the Internet of Things is transforming manufacturing



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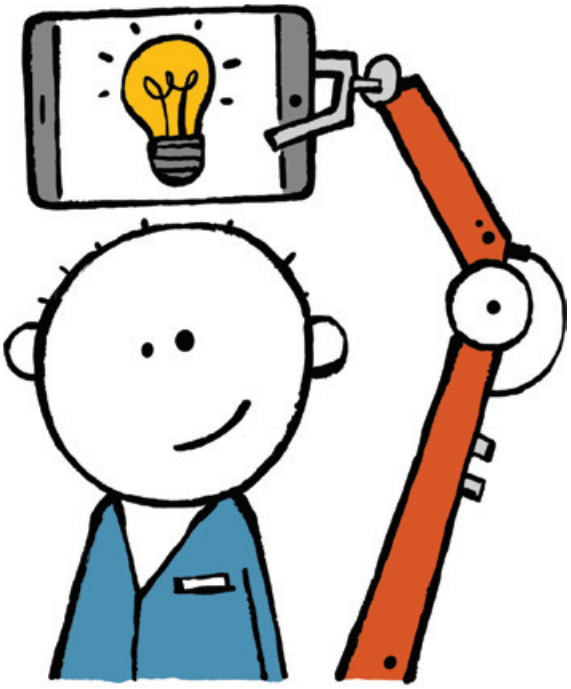
GOING SMART

Milestones on the Road to an Intelligent Factory

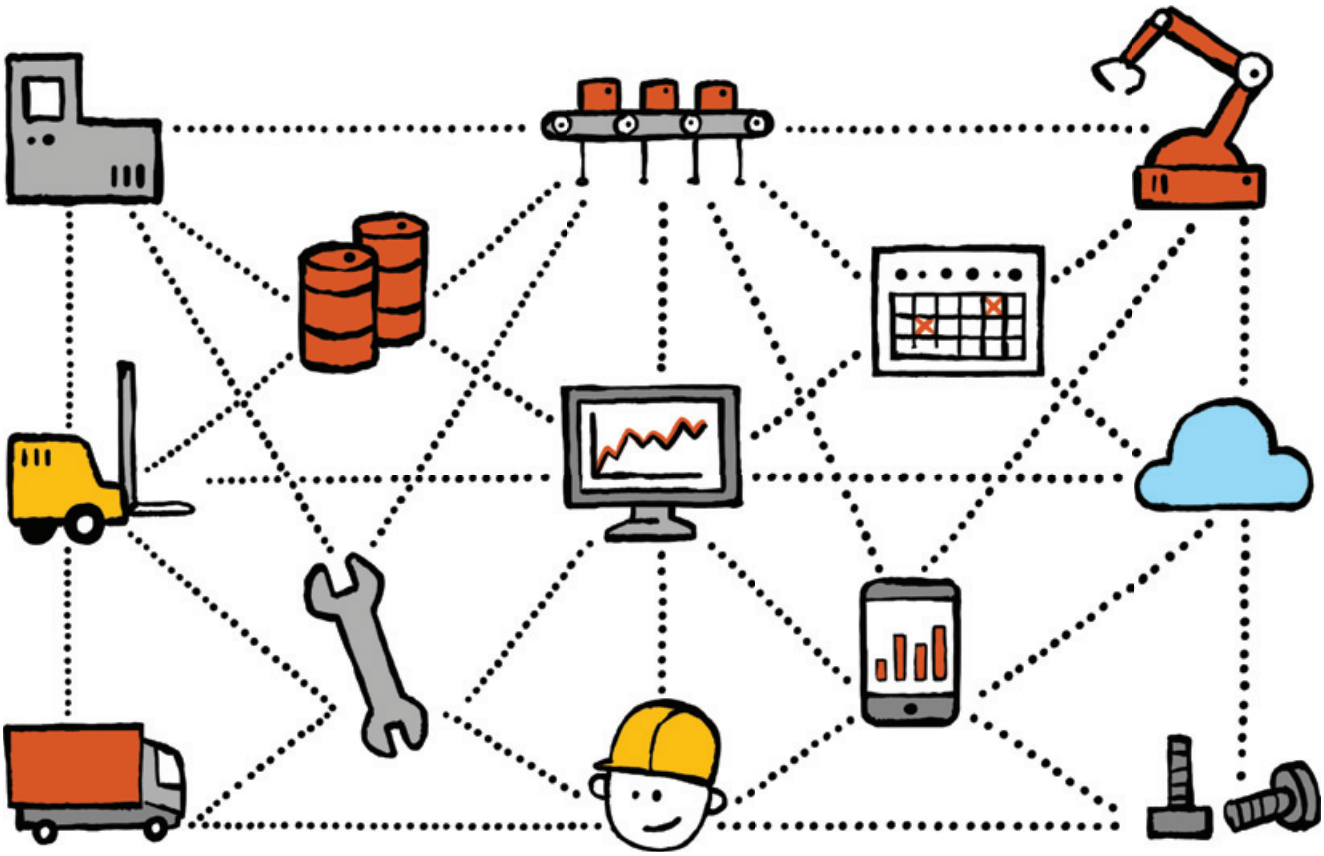
by Professor Werner Bick, Chief Representative, ROI Management Consulting AG



Ever since the first factories came into being in the 17th century, such institutions have been the traditional focus of commercial and technological approaches to optimization and innovation. In the context of digitalization, too, the spotlight is once again on the factory floor, as the increases in efficiency and effectiveness promised by the use of IoT and Industry 4.0 technologies directly affect the processes and organization of the production plant—or "smart factory". The way to increasing quality and output while using fewer resources is via a comprehensive model of operational excellence. In this area, six especially promising elements have come to the fore over recent years.

Core Technologies of the Smart Factory

1. One essential element in making the intelligent factory a reality is the widespread use of assistance systems. As a complement to lean approaches, these are intended to reduce the pressure on workers, both physically and in terms of time, enabling them to concentrate on value-adding core activities. On the physical level, assistance systems in the factory have in many cases already been implemented in the form of autonomous transportation systems, or robotics solutions. Nevertheless, it is digital technologies that above all else offer the greatest potential. For example, the status of a machine can be quickly and easily read using apps that run on a tablet, while capacity utilization, critical wear values, and advanced statistics are immediately available thanks to the inclusion of all the elements involved in a "factory cloud". In this context, new opportunities are offered by the use of augmented reality technologies, which as a result of low-cost, user-friendly, and effective devices such as smart glasses are becoming ever more attractive. Thus, for example, working instructions or important statistics can be made directly accessible.

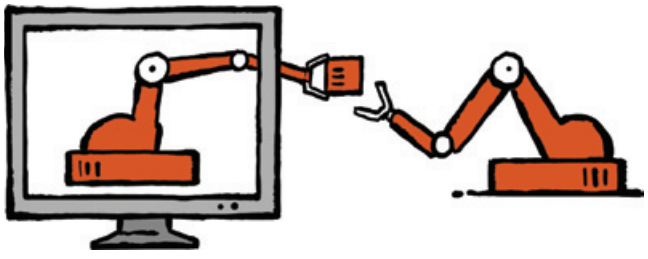


2. Another key characteristic of the smart factory is its decentralized organization. The dismantling of pyramid-type structures in favor of a network aligned with the process of creating value reduces control costs and allows for the largely autonomous coordination of the various network elements and production-relevant software solutions, such as ERP, MES, and PPS systems. These are based on the use of M2M, RFID, or smart OTS technologies and the equipping of machinery, tools, and production facilities with sensor technology.

> "The way to increasing quality and output while using fewer resources is via a comprehensive model of operational excellence."

3. With regard to the avoidance of waste and production errors, increasing importance is being assigned to real-time production control and real-time quality control. The deployment of sensor-based solutions enables key process parameters to be captured in real time and compared to sample values. This allows counter-measures to be taken in good time, resulting, for example, in a significant reduction in reject parts. For example, by analyzing sensor signals in the welding process, systems can immediately detect a high probability of a defective welding point and therefore correct the welding procedure within milliseconds. The same principle underlies what is termed "smart" quality control. In this case, specified critical values are used on a continuous basis to take measurements. Errors are therefore identified and corrected very early on, leading to a significant reduction in quality-related costs.

4. One of the best known scenarios being discussed in the context of the smart factory is "predictive maintenance". This approach, which combines statistical forecasting models with sensor technologies, is often cited as an example of the way that new business models can develop, or at least can be developed further. This combination of product and service, however, is of most significance within the factory. Not only can costs be dramatically reduced by the fact that maintenance takes place at the very moment it is needed and production standstills due to total system failures can be avoided – but the analysis of operational data and load scenarios also allows for the very precise allocation of production resources and the avoidance of idle states or system overload. At the same time, predictive maintenance approaches can be combined with condition-monitoring systems for the continual tracking of especially critical elements. This enables machinery to remain at high availability levels while costs are substantially reduced.



5. A strategy for handling with big data forms the common basis for all of the technologies described. The benefits of digital technologies can only be sustainably exploited when there is an integrated approach – in terms of how the immense quantity of data arising in a smart factory might be efficiently and securely clustered, analyzed and incorporated into decision-making processes.

6. The organization and processes within a smart factory are significantly different from those that characterize the traditional image of a production plant. They involve not just the dismantling of accepted procedures but also questioning established social frameworks and skills that had been thought of as secure. A structured approach to shop-floor management and an intensive engagement with newly introduced processes and technologies are therefore vital factors in breaking down old routines and the establishment of new working methods and use scenarios.

Smart Start

Nowadays, particularly in the high-wage economies of the West, all sectors could profit from the introduction of at least some Industry 4.0 elements to their factories – and in fact should do so if they are to succeed long-term in the face of global competition. Despite this, the degree of implementation currently seen in industry is surprisingly low. An important reason for this – stated in polemical terms – lies in managers' inability to "slice the elephant", as it were. Very often, the task of implementing smart factory principles is hindered by a concentration on taxonomies, extensive safety concepts, and highly complex visions. This process is used to dismiss the opportunities for embarking on small-scale digitalization. However, the highly dynamic nature of the topic, the extremely fast pace of technological change, and the lack of standards in the field actually call for more local initiatives, a willingness to engage in a trial-and-error approach, and a passion for creative experimentation. As the organizers of the "Industry 4.0 Award", we have observed over the last few years that the majority of successful projects have come about without five-year plans. This clearly shows that a "smart start" is the best way of bringing the smart factory into reality.

"The task of implementing smart factory principles is frequently hindered by a concentration on taxonomies, extensive safety concepts, and highly complex visions and a blindness to opportunities for embarking on small-scale digitalization."

Professor Werner Bick,
Chief Representative,
ROI Management Consulting AG

INCREASED EFFICIENCY THANKS TO SHIFT-PLANNING APP

Interview with Michael Berner, Production Manager, BorgWarner Ludwigsburg GmbH

Michael Berner, Production Manager, BorgWarner Ludwigsburg GmbH

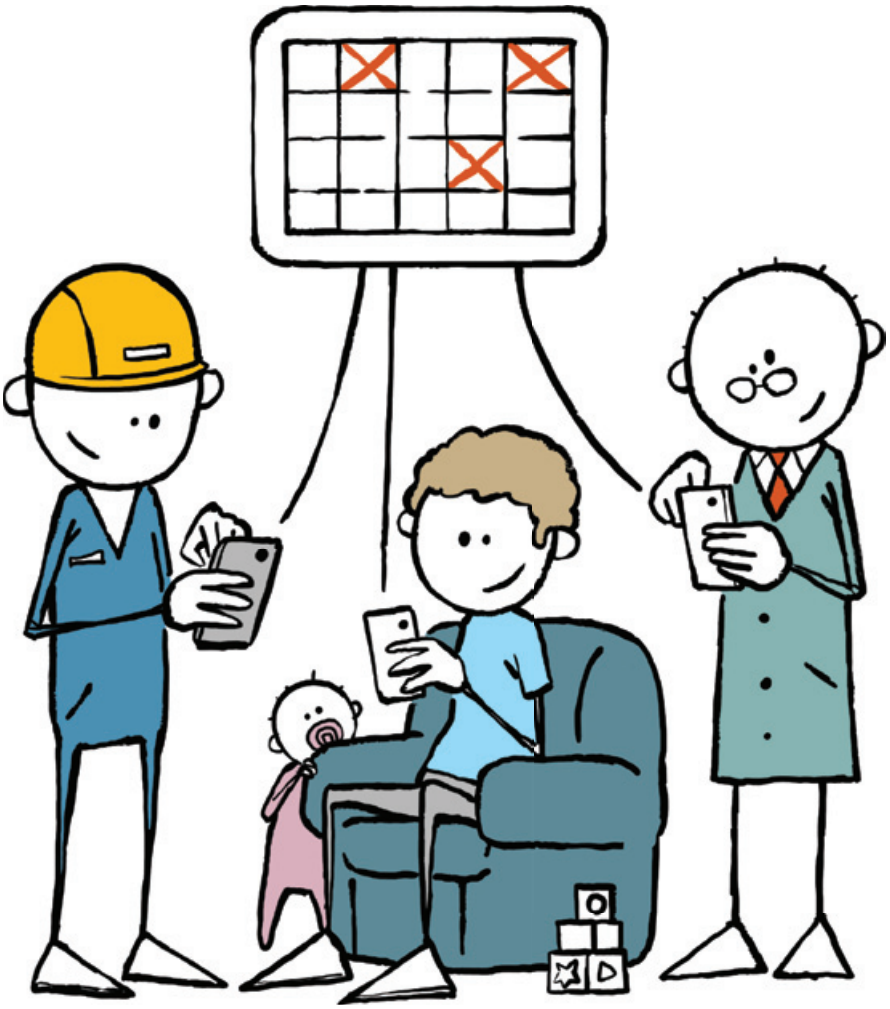
DIALOG: *Mr. Berner, how do you cope with the complexity involved in the digital networking of production activities?*

MB: The one clear goal of our Industry 4.0 solution in production was that by the time our employees are using the shift-planning app "KapaflexCy"– which works in a similar way to a Doodle app – they shouldn't even notice the complexity of the digital networking process. This is because real complexity only takes place in the background of the app, where a rules engine runs calculations on all of the data for the shift planner and then provides him with this data. By using the app, the shift planner can send inquiries about specific shift or flexibility requirements directly to a factory worker's own smartphone. That person can then respond individually to the requests to work at particular times or coordinate with his colleagues. Finally, the factory worker can submit his response back to the tool and thereby make the information accessible to the shift planner. Thanks to user-friendly systems like this shift-planning app, the complexity of the digital networking process is no longer an issue for our employees.

> "Thanks to user-friendly systems like the shift-planning app, the complexity of the digital networking process is no longer an issue for our employees."

DIALOG: *Can you tell us how the KapaflexCy app is changing the work processes in the smart factory?*

MB: Our work processes changed enormously almost overnight. Before we introduced the app, we still had a white piece of paper hanging on the wall where each employee entered his own shift details. But it wasn't possible to reach every employee at a specific time, because not every production worker had their own e-mail address on the shop floor level at that time. This meant that communication about shift planning always went through a central "single point of contact" (SPoC). So, the assignment of working hours to our employees could only be initiated after all information had been centrally processed. If a person therefore got the information early, he was always right at the top of the list, of course. That process has been completely changed.



Nowadays, communication takes place with all eligible employees at once – either via their smartphones, private e-mail addresses, or time card. One of the major outcomes of this is the removal of the distinction between work and private life, as the use of this app enables them to be brought together. For example, employees now have the option, not just at work but also in their free time, to flexibly accept or reject requests for overtime shifts – and if necessary even discuss these with their family beforehand.

DIALOG: *What best-practice experiences have been gained from using the KapaflexCy app?*

MB: For HR management, an Industry 4.0 application represents a major challenge since, with regard to the main objective of bringing more flexibility into the factory, even more factors need to be taken into account such as labor laws and new collective agreements. Only by doing this can we achieve the flexibility in working processes that's demanded both by the market and by employees themselves in the light of their personal requirements. Our objective is to balance these demands so that an Industry 4.0-oriented flexibility tool like the KapaflexCy app becomes truly successful. That's why we've decided to adopt a system that offers not just the functionality of an app but also that of a terminal. As a result, employees have access to the same functions through either their time card or e-mail address as they do via the app. While there were reservations on the part of individual employees to begin with, these were soon overcome in the context of the overall team. The KapaflexCy app software is basically so self-explanatory that when we started introducing the system there was no need to train up Generation Y employees. They had no problems working through the system themselves. That was also especially due to the fact that most co-workers were already looking forward to the implementation of the tool and were really pleased about the innovation that the company could now offer them.

> "With regard to the main objective of bringing more flexibility into the factory, even more factors need to be taken into account."

About BorgWarner

BorgWarner Inc. (NYSE: BWA) is a product leader in highly engineered components and systems for powertrains around the world. Operating manufacturing and technical facilities in 74 locations in 19 countries, the company delivers innovative powertrain solutions to improve fuel economy, reduce emissions and enhance performance.
www.borgwarner.com

DIGITAL SHOP FLOOR MANAGEMENT: THE BACKBONE OF THE SMART FACTORY

by Dr. Johannes Pohl, Head of Industry 4.0 Practice, ROI Management Consulting AG

A core management instrument in the context of lean production is shop floor management, because however sophisticated a lean strategy may be and whatever added value it may offer, it initially means a significant break with some of the structures, learned processes and cultural framework of production that have been around for decades. Shop floor management is therefore the key to the long-term viability of lean production. Without 'local leadership', lean initiatives such as the introduction of Kanban are restricted to cosmetic process-related and technical changes whose operational effectiveness and long-term existence are anything but certain. IoT technologies that are currently available offer extremely interesting possibilities of organizing shop floor management more effectively and efficiently. Data in real-time, visualization and intelligent apps make it possible to set up a more agile and transparent system of management.

Actual management presence and communication at the place of production are of course as difficult to replace as the experience and intuition of a long-serving manager. The process can, however, be significantly optimized and simplified. The most important levers in this process are, first, the intelligent capture, aggregation and clustering of all collected process and object data and, second, accessible visualization and provision of the most important indicators

to match the relevant target groups and tasks, making the data – and only those data – available that an actual job requires. This allows the benefit of Industry 4.0 architecture to be used without information overload paralyzing management's ability to act.

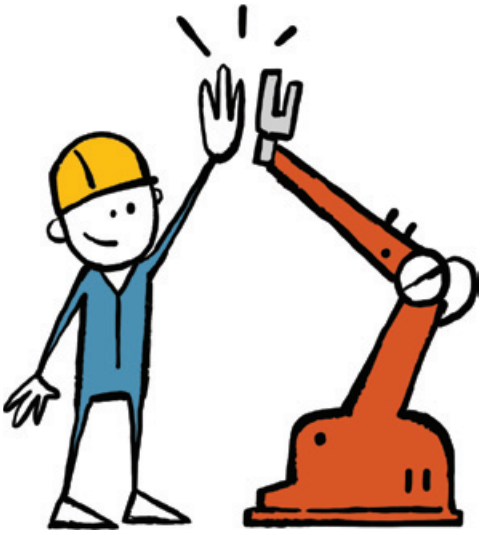
An example of how this approach can work in practice is the "ActiveCockpit" production information system developed by Bosch Rexroth AG. The solution continuously captures, filters and visualizes data and ensures that managers and employees can monitor all the indicators they need at all times. At the same time, ActiveCockpit is also a platform for interaction allowing, for example, decisions from a team meeting to be communicated directly. Essential information like production data, load parameters and failure alerts can be accessed over a number of channels in real time: via employee smartphones, large screens in the production building or on digital CIP boards. This allows fast, coordinated and precise intervention whenever required.

Visualizing and supplying the most important indicators that match the relevant target group make highly efficient shop floor management as well as fast and precise control interventions possible and make management processes logical and transparent for employees (and for the managers themselves). However, this is just one side of the coin. Systematically digitalizing the entire factory – or even a global production network – opens up previously unknown possibilities to compare processes, to document especially effective problem-solving methods and, as a result, to initiate lasting continuous improvement processes. Such changes have a definite revolutionary character, as they not only make conventional shop floor management more efficient and transparent, but also more scalable beyond the boundaries and the actual shop floor.

Dr. Johannes Pohl,
Head of Industry 4.0 Practice,
ROI Management Consulting AG

ROBOTS AS COLLEAGUES

Interview with Thomas Ebenhöch, Site and Plant Manager, Continental Regensburg



DIALOG: *Mr. Ebenhöch, people at Continental's plant in Regensburg form teams with "collaborative robots". How do they differ from conventional robots?*

TE: Our collaborative robots can be deployed flexibly and can work hand in hand with humans – although they do not need to. Many of these lightweight robots can be programmed and "taught" on site by trained employees. This means that the employee shows the robot a movement once, i.e. guides the robot arm, and the robot remembers the movement, meaning that it can perform it reliably again and again. Moreover, our collaborative robots are able to work conveniently, quickly and precisely. Inherent errors are avoided and processes executed extremely dependably. This, in turn, results in quality improvements and cost savings.

DIALOG: *To what extent do your robotic colleagues improve everyday work?*

TE: In direct interaction, a collaborative robot can perform monotonous or physically demanding parts of the work process and therefore make the work process more ergonomic for humans. This is an important aspect considering demographic change and the higher age of retirement. The elimination of less demanding activities that can be easily automated and the reduction of physically demanding work means that we focus more on our colleagues' technical skills. They are offered the chance to qualify appropriately, which is something that definitely enhances their job descriptions. This also enables us to ensure that expertise continues to develop.

DIALOG: *Many companies are still engaged in networking their production robots within the smart factory or their own network of plants. What challenges do you see in networking robots with external elements of the supply chain in future?*

TE: Networking within the factory of course only offers limited potential. In order to be able to really exploit the full potential it is absolutely essential to network along the entire supply chain. However, this transparent communication between customers and suppliers requires different business models. At the same time, technological change goes hand in hand with cultural change – besides customers and suppliers, employees also need to be involved at an early stage and to be prepared appropriately.

Thomas Ebenhöch,
Site and Plant Manager,
Continental Regensburg

About Continental

Continental develops intelligent technologies for transporting people and their goods. As a reliable partner, the international automotive supplier, tire manufacturer, and industrial partner provides sustainable, safe, comfortable, individual, and affordable solutions. In 2015, the corporation generated preliminary sales of approximately €39.2 billion with its five divisions, Chassis & Safety, Interior, Powertrain, Tires, and ContiTech. Continental employs more than 208,000 people in 53 countries.
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SMART PRODUCTS: NEW RULES FOR THE INDUSTRY

by Hans-Georg Scheibe, Managing Partner, ROI Management Consulting AG

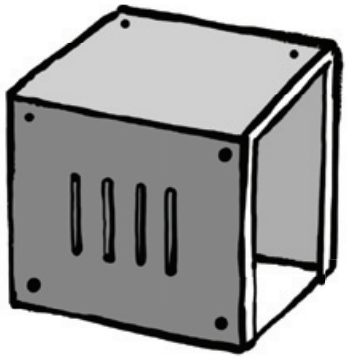
In the not too distant future there is likely to be a global or national competition for the title of "The Most Intelligent Product". And here is a prediction about the winner – it will not be a smartphone, a car and definitely not a refrigerator. In all likelihood it will be an industrial product like an agricultural machine, a transport robot or a truck that can interact thanks to swarm intelligence. There are two simple reasons for this. First, "intelligence" is not simply created by embedding microprocessors and sensors with software, connectivity and a link to cloud-based management systems. These are just the prerequisites. A product or device only becomes really smart when it interacts autonomously with its environment. Thanks to sensor technology, many industrial applications can already do this better than smartphones or wearables, which only respond to their user's input.

Second, the market for intelligent products is already growing most strongly in the industry. More than 1 in 2 IoT pioneers polled in a Cognizant/EIU study (1) indicated that they are developing smart products in an industrial context. Indeed, a smart factory provides the ideal environment for intelligent products as almost all its components can be interconnected. It is not only machinery, transport vehicles and robots that can be smart products here, but also complete production lines and buildings, which, for example, use sensors to record which workplaces are occupied and regulate lighting, heating and security systems accordingly. However, the most successful use of smart products does not just depend on an optimum technological infrastructure. Manufacturing companies wishing to sustainably change their value creation process through the use of smart products and transform them successfully into digital, platform-based business models should consider three fundamental principles:

1. Be open to change. What are the chances of survival for core products if they are offered without intelligence or smart components and utilization scenarios? Might customers already have requirements that could be met with a corresponding enhancement? Best-practice companies use smart products to design monitoring, management, optimization and automation on a continuous basis. In the optimum case, a product will fulfill several functions, or improve other working processes through information. One good example from the smart factory is condition monitoring, i.e. the constant monitoring of the status of plant or machinery using sensors and IT applications. Shift leaders or mechanics can receive status messages in real time about performance, or warnings when an outage is about to occur, on a tablet PC.

Physical Components

These are the mechanical or electronic elements of the product.



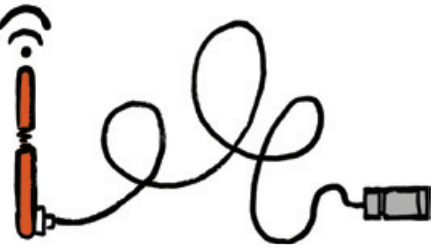
Intelligent Components

Hardware and software provide the core for the product's virtual identity. This includes, for example, sensors/actuators, microprocessors and data storage devices. The software is generally integrated into the operating system. Access is made possible via a user interface like a dashboard or app.

Hans-Georg Scheibe,
Managing Partner,
ROI Management Consulting AG

Product Cloud

The functions of a smart product can be integrated in the product or the associated cloud. This makes e.g. software for intelligent applications or information from big data product database systems available.



Networking Components

Interfaces, antennas and software protocols allow a fixed or wireless connection to the product during installation, during the work process or when it is with the customer.

This not only makes preventive and efficient maintenance possible, but also allows continuous improvement in resource scheduling, machinery and even in the design of the factory based on an analysis of the data collected.

2. Start with small steps. A smart product like a shift-planning app (see interview on page 6) may only change a small part of the production process, but it is ideally suited as a test bed for larger projects. If a concrete product like a machine is involved as the starting point, it should always be assigned to its own virtual identity, for example in a cloud application, that contains the interaction details of the product. This information can in turn be gradually integrated into open systems architectures and shared with third-party providers, customers or partners for further product enhancements and variants.

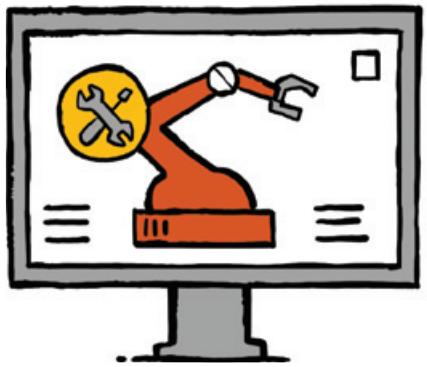
3. Extend your product ecosystem. Billions of objects and services will be integrated into the IoT/IIoT in the coming years. It is therefore highly likely that customers, partners and suppliers are already working on smart products, or even already have them. It is essential for businesses to be a part of this network. The central challenge in networking beyond the boundaries of a factory/company consists in creating additional synergetic customer benefit using new models of cooperation and application scenarios and, at the same time, optimizing internal processes and cost structures. It is thus possible to reduce e.g. development costs and time to market when shared "data labs" are established with customers and partners as experimental fields for enhancing products and business models.

In particular, manufacturing companies should not put off the development of smart products to the near or far future, but instead start the process today in order to transform rigid production lines into modular and efficient manufacturing systems. It is worth entering the global competition for the most intelligent product for this purpose alone.

(1) Cognizant/EIU: The Rise of the Smart Product Economy, 2015

ERROR-FREE PROCESS CONTROL: QUALITY MANAGEMENT 4.0

by Ulrich Krieg, Partner, ROI Management Consulting AG



The mystery surrounding the intelligence of a smart factory has been revealed. Anyone linking materials and products optimally using automation and management processes can also design complex manufacturing and logistics processes more effectively and efficiently – and hence more "intelligently". However, this also speeds up the development of global production networks within which the boundaries between a company and its partners, suppliers and customers will blur in the coming years. And it is precisely this that will have significant implications for quality management. It will be vital to adapt processes and tools used for quality assurance to the smart factory in such a way that they can be deployed in a highly automated and digital way. Instead of this, even pioneers of "intelligent manufacturing" continue to focus on standardized production and quality processes that are already defined. This is, however, exactly what is not appropriate for increasingly large and transparent manufacturing and value-added chains that require constant risk mitigation in quality issues to assure error-free production.

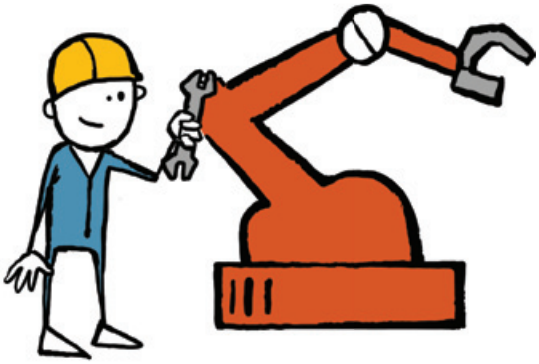
Virtual Quality Control

It is not only short product life cycles, scarce resources and pressure from the market for flexibility that create enormous obstacles to quality assurance, but also the increasing complexity of development and production processes for customized serial products. Digital interconnection also means, above all, that manufacturers can respond to their customers' personal wishes since ever more consumers demand products that meet their individual needs – and at the most attractive price. However, manufacturing with a batch size of 1 and the associated increasing number of variants in particular require new quality assurance measures.

Simulations and virtual models, which are continuing to gain significance as information grows denser, can help in such cases. Companies can model production systems that mirror reality using data captured and prepared in networks and available in real time. This provides the basis for analyzing optimization, commissioning and restructuring measures inexpensively, simulating them virtually and implementing the most efficient solution without having to make major adjustments or take risks in real life, since virtual models can be used to bring about increased productivity and reduce changeover times. This potential can be used especially for detecting risks and increasing efficiency as well as in quality assurance. For example, one well-known manufacturer of filling and packaging equipment uses 3D simulation software to check whether new control concepts work. The control software tested in this manner can then be transferred 1:1 to the machine. This assures quality at an early stage and saves considerable costs for each machine supplied.

Assistance Systems for Error Prevention

Assuring the quality of the process chain is essential for production operations in particular. Nevertheless, the anticipated flexibility and dynamics in the production processes of a smart factory can in an extreme case result in every product being routed through the manufacturing process along a different path. This makes it significantly more dif-



ficult to analyze error patterns and to identify causes. In this case it is important to use the "memory" of smart products that can remember their individual path through production, for example with the help of an RFID chip. In this way, every product generates an individual "quality stamp", much like a fingerprint, as it passes through the various steps of the production process. Depending on requirements, it includes not just the product's entire path but also quality-related information such as production tolerances.

Comprehensive data capture and the corresponding comparison of these quality stamps ensure that abnormalities can be detected fast. Special assistance systems will ideally trigger an alarm even before errors occur thanks to precise measurements in real time. As a general rule, companies should deploy three essential elements for quality assurance in a smart factory:

Ulrich Krieg, Partner,
ROI Management Consulting AG

1. Inline Quality Control:

It is advisable to integrate quality checks as inline quality controls, i.e. into the working production line in order to assure product quality. This guarantees that measurement data are reported back reliably, allowing automated corrections to be performed. Ensuring the traceability of data relevant for the quality of a product not only minimizes liability risks but also allows possible sources of errors to be localized quickly. At the same time, automated correction, for example through assembly controlled in real time, is also possible. Integrated measuring systems capture material parameters quickly and effectively and send any variations to the next machine in order to perform an update of the process parameters.

2. Direct and Indirect Process Parameters:

The capture and analysis of various parameters is necessary for comparison using reference patterns. This involves both direct process parameters like varying forces or torque as well as indirect process parameters like temperature or humidity, allowing proactive measures such as the adjustment of machine settings to be initiated wherever necessary at any time. However, controlling process parameters on their own is not enough to guarantee error-free production. They are nevertheless an important element for preparing decisions about the type of intervention that may be required in the production processes under examination.

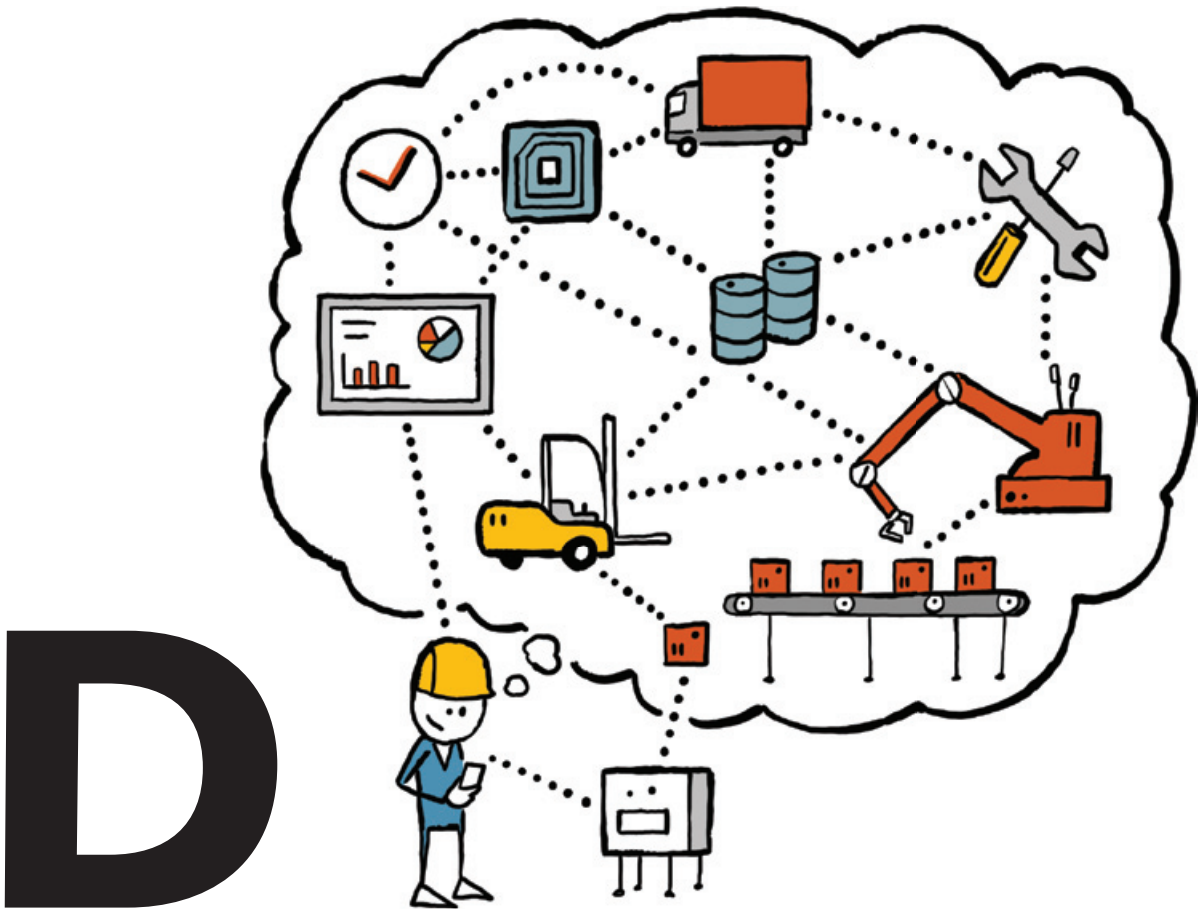
3. Transformation of Big Data:

In the smart factory it is important to transform the volume of information gained from "big data" into "smart data" – i.e. into precisely the type of information that is relevant for assuring product quality. It is especially important to avoid media disruption, which almost inevitably results from merging analog information in the operational field with digitally structured databases. The use of big data allows important analytical steps to be performed in order to achieve significant improvements in productivity and quality. These include, first, quality-related analysis that serves to return field data such as pressure, temperature and tension as well as to recognize patterns and investigate causes in quality statistics. Second, the analysis of usage data in the field plays an important role in optimizing the development of components such as pumps, batteries and power brake units. Moreover, the use of SCM-related analysis is of great importance in the early detection of critical supply chain events. In this case, a special plant information system enables patterns in disruptions and output volumes to be identified, speeding up the correction of errors and bringing about improved delivery reliability.

Quality assurance and management thus remain essential success factors in the smart factory. Companies must therefore start identifying promising areas of activity based on existing Industry 4.0 technologies, implementing initial pilot applications and defining their own personal roadmap.

"THINK BIG, START SMALL"

Interview with Big Data-Expert Mark van Rijmenam



DIALOG: *Mark, the Industry 4.0, or the Industrial Internet of Things, is quickly entering the manufacturing industry, transforming the way traditional companies define business. How well is the "old economy" prepared for the data driven age?*

MvR: Currently we see the most innovative organizations quickly changing their business model to a data-driven business model, completely incorporating the Industrial Internet of Things. As such, we see more and more examples of this new, inter-connected, economy. Quite often, these companies are new disruptive startups that are a lot more flexible and innovative than companies in the old economy.

The old economy is therefore not very well prepared and many companies experience difficulties in changing their organization into a data-driven, information-centric company. Big Data, which lies at the heart of the Industrial Internet of Things, requires changing your organization, requires a different culture and requires, especially in the manufacturing industry, significant investments to be ready for the Industrial Internet of Things. Many organizations in the old economy are less flexible and thus have more difficulties with such massive change management.

DIALOG: *You say that Big Data Management is at the heart of the IoT-based business models. But many companies are experiencing difficulties in finding their way to cope with strategic and technological complexity and to get started. What is necessary for a quick-start into Corporate Big Data Management?*

MvR: The best way for a quick-start into Corporate Big Data Management is Think Big, Start Small. A data-driven mentality is key for a successful big data strategy and if you wish to start with big data, you should have at least a thorough, shared, understanding what big data means for your particular organization, as big data means something different for every industry, organization and employee.

Once you have this shared understanding the best steps for a quick-start are to create this ultimate vision of what you want to achieve with big data within your business and then start very small, with a small Proof of Concept or pilot project, to learn how big data can benefit your business, what it does to your organization and employees and what the return will be. Once you have established these first minor projects, it becomes easier to scale your data-driven projects as you have a better understanding what is required in terms of human capital, skills and resources.

DIALOG: *Digital platform-based firms emerge as some of the most profitable businesses in the last 20 years. According to an MIT research which you have recently cited in one of your articles, almost the half of the top 30 global brands by market capitalization in 2013 were platform-oriented companies. What does it mean for traditional, let's say supply chain-oriented, manufacturing companies? Can they capitalize on this trend?*

MvR: Traditional supply chain-oriented manufacturing companies need to reinvent themselves. Independent, silo organizations, that don't cooperate with other companies in the supply-chain, will not survive in tomorrow's hyper-connected world. The traditional manufacturing company can therefore definitely capitalize on the trend of digital platform-based firms, but will have to collaborate with the other players in the supply-chain in order to remain competitive.

"Big Data lies at the heart of the Industrial Internet of Things"

If they manage to move their organization from a traditional manufacturer to a digital platform based manufacturing firm, they will be able to better understand their business, better collaborate with other stakeholders in the supply chain, lower their costs and increase their revenue. It means that they will have to reinvent themselves and understand what parts of the company can be digitalized and incorporated in the digital platform, as that will provide them with significant benefits to remain competitive in the fact-changing environment.

Mark van Rijmenam, Datafloq

About Mark van Rijmenam
Mark van Rijmenam is Founder of Datafloq. Datafloq is the One-Stop source for Big Data, creating the Big Data ecosystem by connecting all stakeholders within the global Big Data market. He is author of the best-selling book "Think Bigger - Developing a Successful Big Data Strategy for Your Business" and is ranked as one of the global top Big Data influencers.
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Does the formula „Data = Power" apply? In fact, the power of data companies does so far rather appear in their share prices than in real cross-industrial disruptions. Is it really possible to create economic and political power from data? Do we have to prepare ourselves for a global competition that breaks industry boundaries and holds Big Data as the ultimate weapon? And what are the opportunities for traditional industrial firms in this struggle for power?

DATA WARS - Who will win the race in the data-driven economy?

We cordially invite you to shed light on these questions together with our guests at the

ROI DIALOG DINNER in Munich on 28th of April 2016

DATA WARS - Who will win the race in the data-driven economy?
Keynote speaker is Professor Gunther Reinhart, TU Munich. After a few short introductory speeches we will offer enough space for an open discussion and intensive exchange of experience. You will definitely be spared another PowerPoint presentation.

Please get in touch with us by **28th of March via event@roi.de** for registration or further information.The number of participants is limited – therefore registration is made with reservations. We are looking forward to your participation in this event.

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