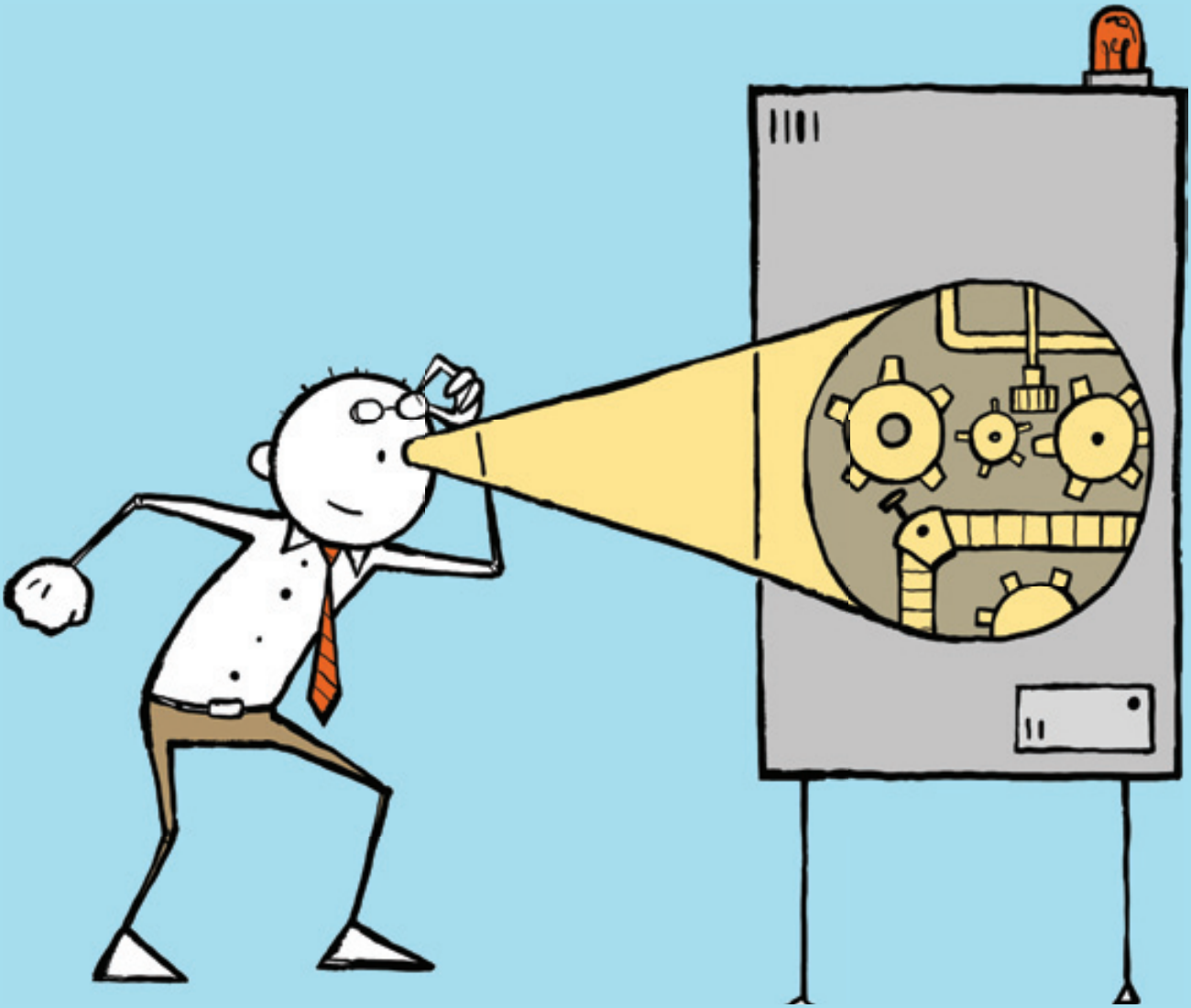
Issue 48

ROI DIALOG

X-RAY INSPECTION

Creating and managing transparency



ROI
MANAGEMENT CONSULTANTS

ROI DIALOG OVERVIEW – ISSUE 48

INSIGHT 4.0

The Era of IoT needs a New Understanding of Transparency

By Hans-Georg Scheibe, Member of the Management Board, ROI Management Consulting AG

All rules, best practices and processes suffer from a fundamental paradox – they are nothing other than answers to questions asked in the past that we formulate to shape the future. This problem remains purely theoretical as long as the future does not differ significantly from the past. Rules formulated with sufficient openness allow a certain degree of evolutionary adaptation to changing circumstances. However, it becomes difficult when the future cannot be managed using the rules from the past. And that is exactly what we are experiencing today with the hyper-dynamism of the general political, economic and regulatory situation, with a changing understanding of efficiency, profitability and sector boundaries in the wake of digitalization, and with ever shorter "lead times" for products, services and business models – a list that we are all very familiar with and that goes on and on. In other words – disruption has reached our strategic agenda, our innovation task forces and also, to a degree, our factories, but not our management systems.

> "It's a matter of embedding the ability to deal with fuzziness and to detect patterns from unstructured data into what are in principle binary systems."

Management Systems: The Real World of Disruption

What appears at first sight like a bold proposition becomes very clear when we look at what is predominantly understood by transparency today. Guaranteeing a comprehensive and objective view of central performance indicators in operations, finance, marketing or HR has been a core task of management and management systems for decades.

But what do the data look like that are used as a basis for far-reaching decisions? They are, above all, structured data. We use them to measure sales by customer group, output per hour, or cans of soda per kiosk. As such, they are usually "hard" data that can be expressed in unambiguous units of measure, preferably in convertible currency. These data are almost always related to periods or points in time and are therefore usually based on the past. And finally, these data help us to engage with ourselves – as a company, division or department. Shared, interdepartmental and perhaps even inter-company KPIs are called for virtually everywhere, but almost never used.

Hans-Georg Scheibe,
Member of the
Management Board,
ROI Management
Consulting AG

Transparency 4.0

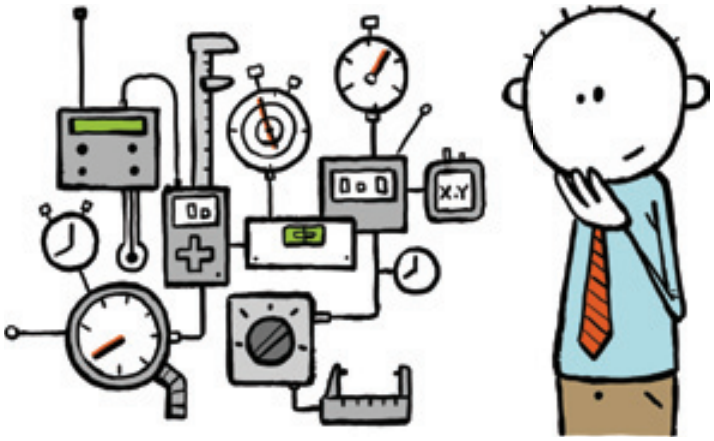
We could – polemically – call the transparency that we get from the use of such data models Transparency 1.0. The picture that we gain from it is not wrong – but it is, as in Plato's allegory of the cave, dramatically undersized. It has no potential to represent the reality in which companies have to act today, still less in the future.

This is why we need a new understanding of transparency that can integrate and process alternative data models – Transparency 4.0. Knowing what has happened so far is important – but not sufficient. Especially when the environment is undergoing rapid and fundamental change. We therefore need tools, methods and indicators that help us to understand how well our own organization is prepared to deal with impending challenges.

It also means embedding the ability to deal with fuzziness and to detect patterns from unstructured data into what are in principle binary systems. Of course, the indicators required for this do not allow any clear predictions to be made; instead, they point to trends and scenarios – besides 'yes' and 'no' there is also a 'perhaps'. In this process, transparency loses simplicity and precision but gains a closer relationship with reality and necessary complexity.

Technologies for Transparency

The basis for this is provided by systems that were not available to us in the past, or only in a very restricted form. This applies first and foremost to hardware elements whose performance has grown in inverse proportion to the fall in their price. These primarily involve sensors, the elementary material of the Internet of Things. They enable access to primary data that could not be reached in the past and thus open up new dimensions of transparency.



Another example is in-memory systems that store data direct in the main memory of the relevant system, thus allowing high-performance processing even with very large volumes of data. Fog computing approaches, where microprocessors are located on the periphery of the network and analysis and response competences are transferred to local terminal devices, also promise significant progress. This relieves data networks and cloud servers while substantially increasing performance and security.

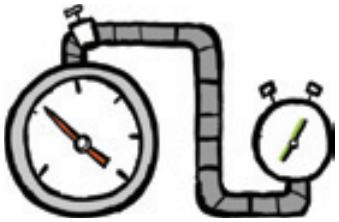
New software technologies are also available such as databases that no longer require data to be structured, thereby greatly simplifying the collection and aggregation of data and creating the basis for big data resources to be used to add value.

What technologies that are already available can mean for a new understanding of transparency is demonstrated by the example of General Electric's "Digital Twin" concept, an approach that also shows how the business models of B2B and B2C markets are converging. GE creates a precise digital copy – an avatar – of each of its aircraft engines that exactly emulates its physical twin thanks to environmental and performance data transmitted by sensors. Extremely detailed individual profiles can then be developed when combined with the data of all the other aircraft engines, allowing analyses and forecasts of a previously almost unimaginable precision to be made – transparency of a new magnitude.

How much Complexity can we bear?

Overall, we can gain new insights into our business processes that only a few years ago seemed inconceivable, and we can analyze production networks, logistics chains, points of sale or any other area of a company with astonishing depth and closeness to reality. However, the core question remains: How much real transparency do we need and wish to have? Are we prepared to confront our well-oiled management systems with the demands of complexity, fuzziness and closeness to reality? On the other hand, do we have the discipline to avoid fully exhausting the infinite measuring and analysis potential and to concentrate on what is essential? We need to find convincing answers to these questions very soon if Transparency 4.0 is to become reality.

"Are we prepared to confront our well-oiled management systems with the demands of complexity, fuzziness and closeness to reality?"



OPEN TO THE FUTURE

Interview with Richard Mayer, Commercial Director / CFO, PFLEIDERER GmbH

D

DIALOG: *Mr. Mayer, political, macro-economic and technological conditions nowadays change extremely rapidly, and above all these changes are difficult to predict. Is strategic corporate planning still possible?*

RM: Yes. In my view, strategic corporate planning continues to be possible and even essential at a time of rapid change. Firstly, this requires goal-oriented planning and, secondly, the necessary flexibility to adapt defined objectives to new circumstances. My argument in this context is based on the theory of Professor Werner Kirsch. He is responsible for the so-called 'Munich School' of strategic corporate management. When it comes to strategic planning, he expressly recommends being open towards the future and explicitly includes the changes associated with this. The approach turns strategic corporate planning into a very dynamic building block of corporate management, which is something I wholeheartedly follow.

One of the specific things this means for us as the management team is thinking very much in terms of future scenarios and measures. Here we count on things like stress tests, early-warning systems and action and emergency plans in our corporate planning to be able to respond rapidly to unforeseen changes.

"One of the specific things this means for us (...) is thinking very much in terms of future scenarios and measures."

DIALOG: *The maximum possible transparency over business development, processes and the organization provides the basis for robust financial, compliance and risk management. There is a whole arsenal of tried-and-tested tools available in order to achieve this transparency. And yet we have increasingly seen over the last few years how these instruments have failed. Why is that?*

RM: There are presumably a number of reasons. In my opinion there is frequently a lack of discipline on the part of those responsible when integrating the instruments systematically into daily business. I also see it as the task of those responsible to constantly question tools and methods and, where necessary, to adapt them flexibly to new conditions. As already discussed, circumstances change very rapidly nowadays and with them also the demands placed on management systems. If adjustment is neglected, we will find ourselves in a new world measuring long-obsolete processes.

Richard Mayer,
Commercial Director / CFO,
PFLEIDERER GmbH

Their effective application also requires a willingness among those responsible to disclose the findings. Unfortunately, at least it seems to me,

> "If adjustment is neglected, we will find ourselves in a new world measuring long-obsolete processes."

they are under such intense pressure to deliver results that transparent reporting suffers. And that leads to the failure of every management instrument.

DIALOG: *Thanks to technological developments like Big Data Analytics, the Internet of Things, AI and Deep Learning we can collect and analyze data in a dimension that was unthinkable just five years ago. Do you have a basic agenda for the deployment of these technologies, and how important are these for you in order to generate greater transparency?*
RM: Topics falling under the headings of the "Internet of Things" and "Industry 4.0" will increasingly find their way onto our agenda. However, what is currently important for our company is to understand the potential that they give rise to and to transfer this to our industry. We do not currently have a specific agenda but we are already looking into the subject.

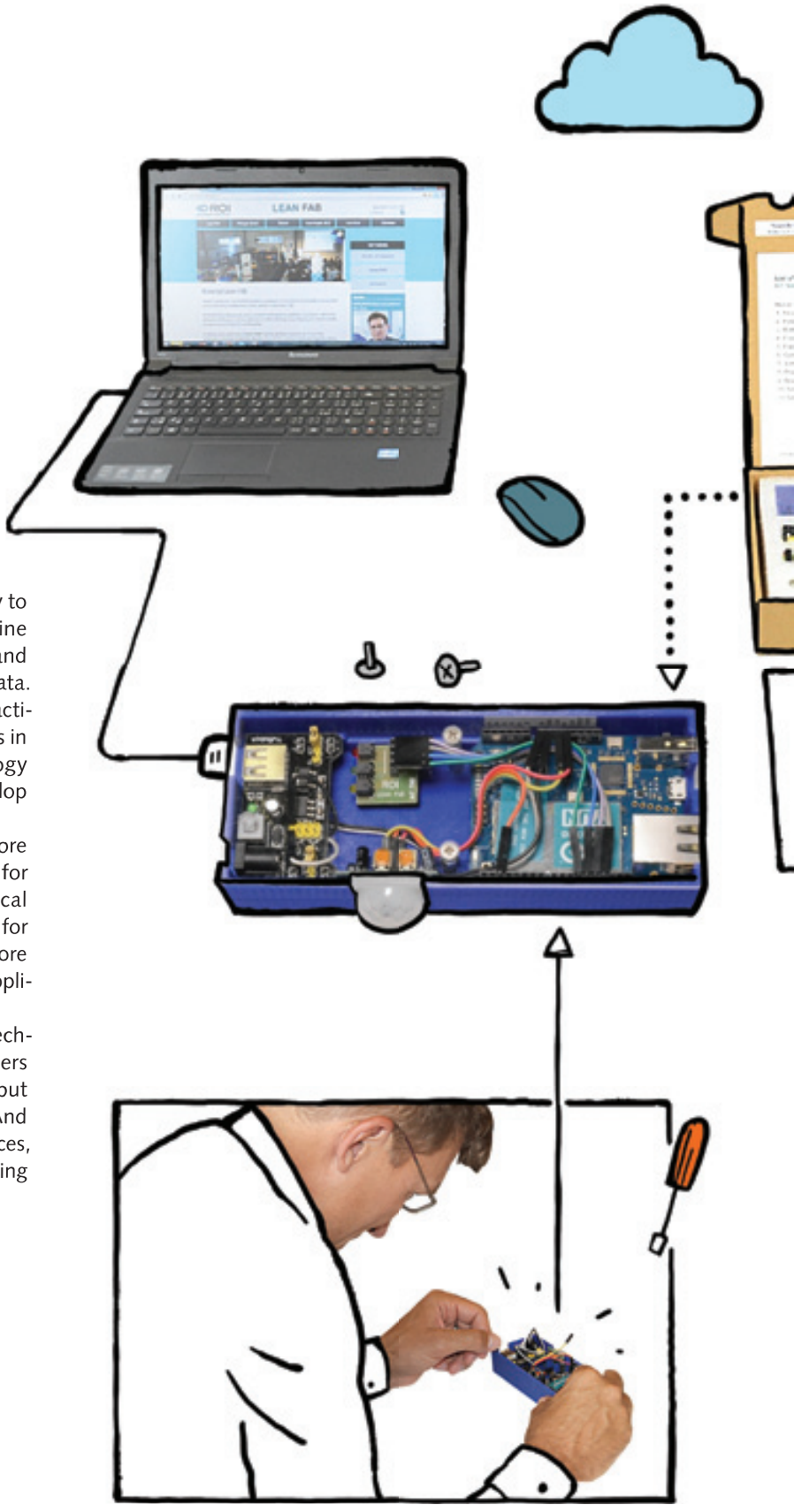
DIALOG: *Common "transparency indicators" often say very little about the actual state of a company. They are largely based on structured data anchored in the past and regard the company very much from an internal viewpoint without any reference to the environment. Are our management systems and the underlying indicators still up to date?*
RM: Yes, I think so. At the same time, data focused on the past only provide the basis. In his book, "The Black Swan", Nassim Nicholas Taleb criticizes exactly this human trait. We tend to create a plausible image of the future based exclusively on the past and on events we have experienced. He is concerned with the question as to how we can best prepare ourselves for highly improbable events in the future – so-called "black swans". The aim in all this is to achieve robustness vis-à-vis negative events – the "black swans" – and to better exploit the positive "black swans".
Following this line of thought, I believe that foresight and the inclusion of new external factors are of equal major significance. I talked earlier about our firmly integrated early-warning systems that we also use to observe new external environmental factors. The figures derived from the past are nevertheless a building block that can be used to create robustness with regard to negative events and to better exploit positive events.

DIALOG: *Where do you see the limits to transparency, especially in your role as CFO? When is the point reached where additional data and additional analysis tend to do more harm than good?*
RM: From the management point of view it is always desirable to have a low degree of data granularity. I see no benefit from the point where I am no longer in a position to handle the data and analyses. In this respect I adhere to the maxim of "as detailed as necessary, but not as detailed as possible". Less is sometimes more.

About the Pfleiderer Group:

Pfleiderer is a Europe-wide leading manufacturer of wood-based panels. Group-wide, the company has around 3,400 employees (as per the end of 2013, incl. trainees) and is divided into the two business units: Core West (Western Europe region) and Core East (Eastern Europe region). Core West consolidates the product ranges of Duropal, wodego and Thermopal under the Pfleiderer umbrella brand and is the partner of industry, commerce, installers, designers and architects. The company has five production locations in Germany. In Eastern Europe, Pfleiderer holds the majority shareholding of the listed Polish subsidiary Pfleiderer Grajewo S.A., which has a strong position in the Polish wood-based panel market.
www.pfleiderer.com

ROI LEAN FAB GOES IOT

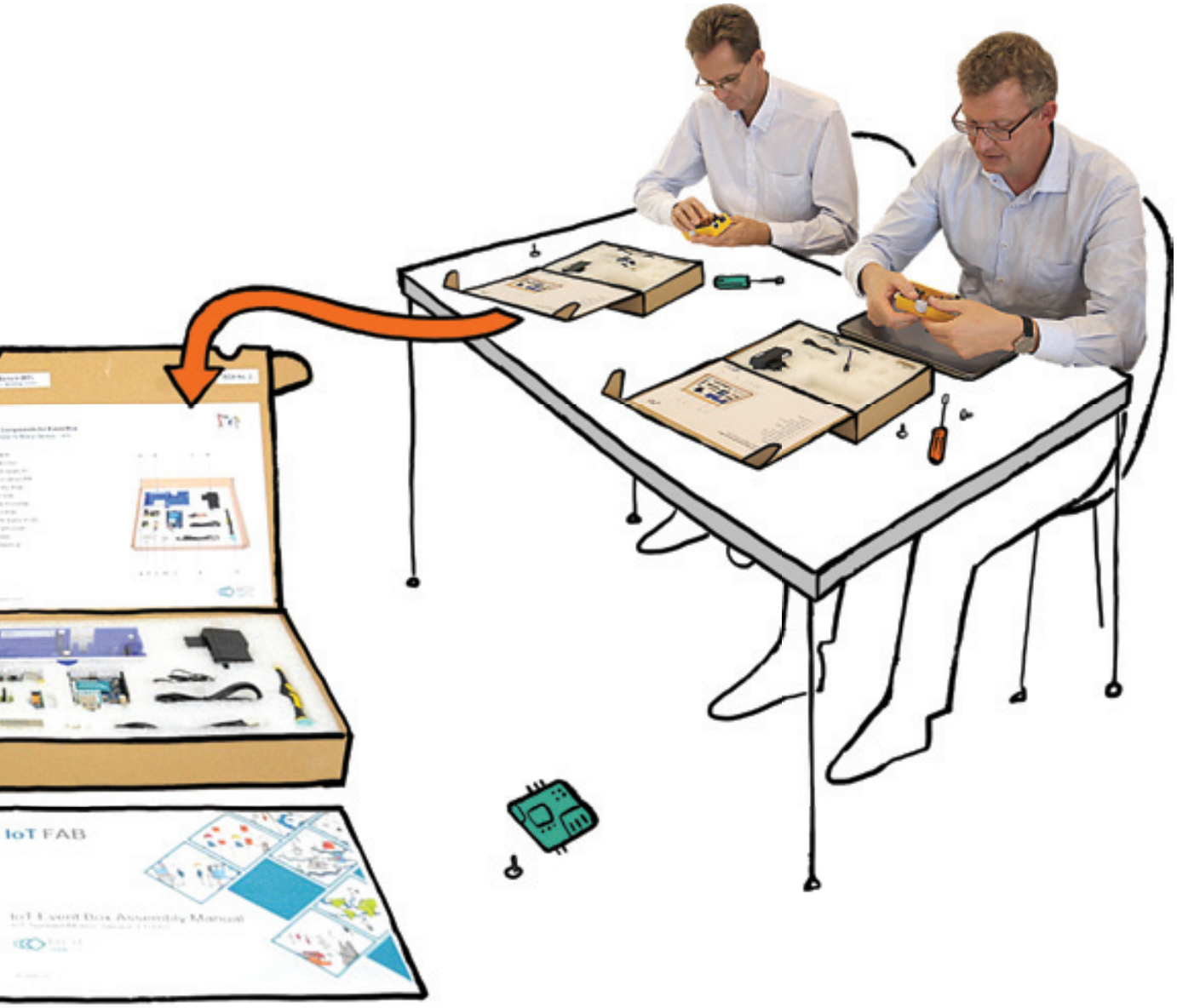


The Internet of Things provides the opportunity to achieve significant process improvements and to refine business models by interconnecting people, machines and workpieces and, additionally, making use of collected data.

It is possible to experience how this works in practice in ROI's IoT Lean Fab. Access to IoT excellence occurs in several steps that lead from the assured use of technology and lean manufacturing expertise to the ability to develop new business models.

Training participants do not just get to know core IoT technologies, they also learn how to develop them for themselves and to use them in practice. The technical facilities of the IoT Lean Fab offer the optimum platform for simulating and analyzing IoT-based processes as well as core lean technologies and for testing them in a concrete application environment.

The possibility of engaging with the specific technologies directly and largely free of theory lowers barriers and imparts not just the required skills and expertise but also the assurance to handle IoT structures confidently. And it also means shifting one's focus from products to services, taking a new look at one's own business model and opening up new and unconventional sources of income.



ACHIEVING IOT EXCELLENCE STEP BY STEP

1. The starting point is learning how to deal with important IoT technologies such as sensors, portals, apps, the cloud and modern databases, with the rapid, automated and flexible development of applications enabling the simple and playful communication of the skills required to deal with the technical infrastructures.

2. Technological know-how provides the basis on which training participants can develop their own IoT test environments (testbeds). This is where various types of non-interconnected production – reflecting specific customer scenarios – can be physically simulated. Possible defined areas of focus can be, for example, a complete value stream, SMED, maintenance or 5S.

3. Production is then optimized using lean methods and the potential that can be achieved with data-based transparency is demonstrated.

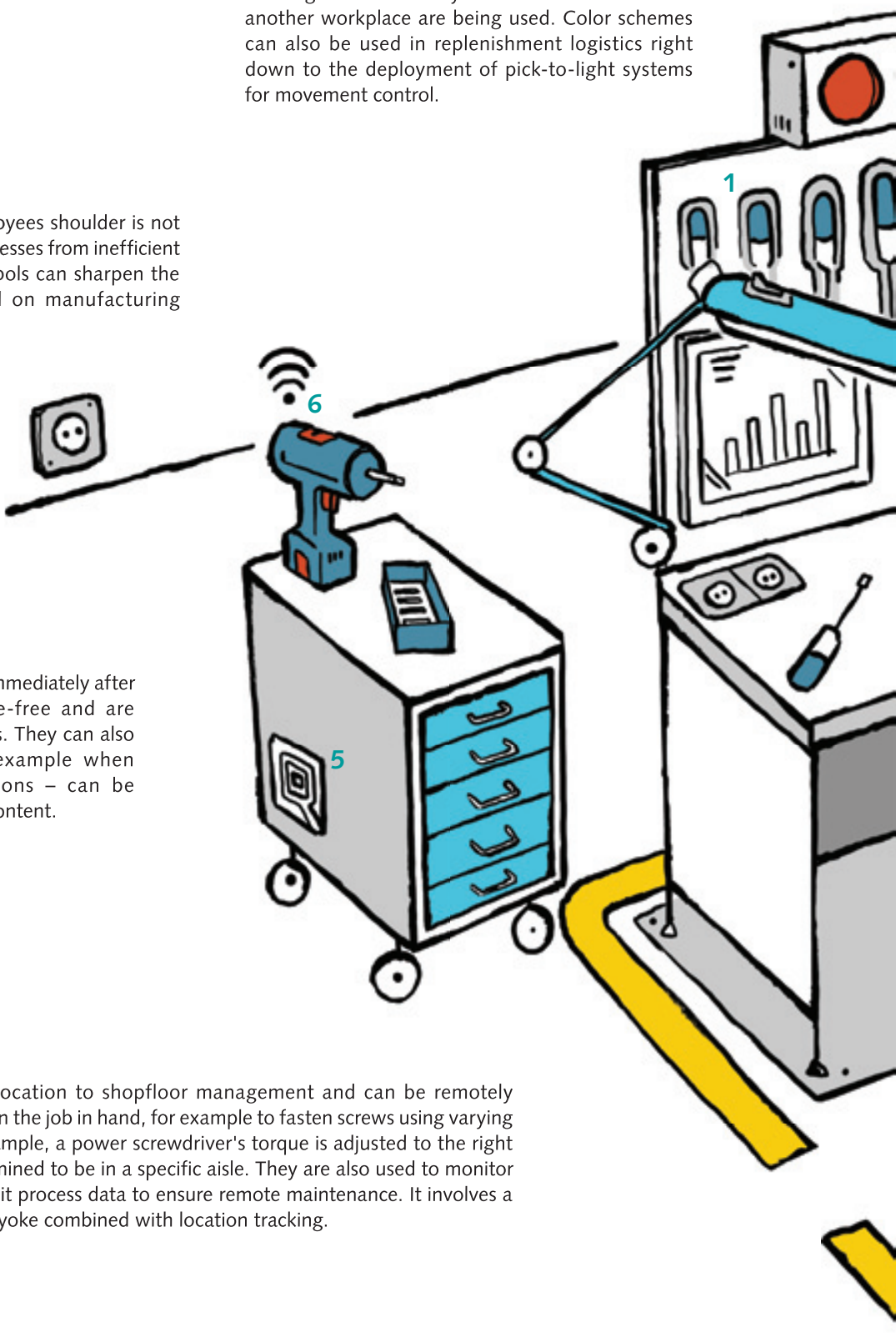
4. The next step involves selecting the data relevant for control based on the ROI KPI Board, and recording and processing them in the previously developed production scenario, with the participants using the same technologies that they themselves tested before. The results are then visualized in the form of apps and dashboards, and suggestions for optimization are developed.

EVERYTHING IN SIGHT?

Taking a glance over the employees shoulder is not enough to distinguish value-adding processes from inefficient practices. High-tech, but also simple tools can sharpen the view on waste and hidden potential on manufacturing workspaces.

1 Color Schemes

Prevents a workplaces 'disintegrating'. For example, a blue workplace only has tools with blue markings to make it easy to detect when tools from another workplace are being used. Color schemes can also be used in replenishment logistics right down to the deployment of pick-to-light systems for movement control.



7 LED Lights

Provide maximum brightness immediately after being switched on, are maintenance-free and are durable even with long service intervals. They can also be controlled remotely and – for example when networked with operating instructions – can be automatically adapted to match work content.

6 WiFi Tools

Report their location to shopfloor management and can be remotely configured depending on the job in hand, for example to fasten screws using varying levels of power. For example, a power screwdriver's torque is adjusted to the right setting when it is determined to be in a specific aisle. They are also used to monitor other tools or to transmit process data to ensure remote maintenance. It involves a process similar to poka-yoke combined with location tracking.

2 Shadowboards

Reduce time lost when looking for tools. For example, all tools are kept sorted and labeled in foam plastic trays and can be easily grabbed thanks to recessed grips – it is immediately obvious even with mobile units whether required tools are missing.

3 Traffic Lights

Above the workplace, but also in some cases for unmanned machines incident management. Employees can see immediately whether a workplace is equipped in accordance with the rules or whether machinery is operating correctly (green), whether a machine is being powered down or refitted (yellow), or whether a fault has occurred (red).

4 Smart Glass

Bring augmented reality (AR) to the workplace. Each employee is identified and is given a customized display of production parameters and operating instructions. The employee can also retrieve details about work plans and CAD drawings, create quality reports, scan objects, trigger automated workflows in the ERP system, communicate with service operatives and make use of remote service. Smart glasses, AR-software and other mobile applications will in future play a key role in the workplace.

5 Motion Sensors

On refitting, material or tool trolleys can transmit information to the logistics system via RFID chips. This allows unnecessary steps to be avoided and required elements to be localized faster.

"THE MOST IMPORTANT BENEFIT IS TRANSPARENCY"

Interview with Thomas Kreuzer, Project Manager, Head of Corporate Industrial Engineering, Balluff GmbH

Thomas Kreuzer, Project Manager, Head of Corporate Industrial Engineering, Balluff GmbH

DIALOG: *Mr. Kreuzer, you have reduced lead times on your production line for inductive sensors to three days. With over 1,000 different types of product and a production volume of 300,000 sensors a year, that has a considerable effect on efficiency and productivity. What were the decisive levers for this?*

TK: Owing to the large number of different product variants, we first evaluated a number of theoretically possible production approaches – and we did this in an open process. It was important for us to identify ideal modules and to combine them in our own concept. Two approaches proved to be especially helpful in this process. Firstly, the arrangement of the production line on the principle of directed flow where, according to lean philosophy, no return to the work steps is allowed. We combined this, secondly, with the workshop principle, which allowed us to subdivide the individual process steps into three sections.

This new concept gave us an ideal point of departure – more flexibility, greater scalability and a decoupling from work processes. This above all allowed us to accomplish implementation step by step and to tackle it while production was running. Decisive factors for the success of the project were the four fields of action of our new production concept: a new workplace and machine changeover concept, a flow-oriented layout with designated buffer areas, visual management of production orders and the stabilization of the new concept via shopfloor management.

DIALOG: *What concrete steps did you undertake?*

TK: There was a clear focus on the strict separation of value creation and waste. On the one hand, this applies to questions that arise as a general principle when designing the production workplace, particularly from the perspective of 5S methodology – how do we design the ideal workplace from an ergonomic point of view? How can we avoid unnecessary paths, and what equipment do we need to provide at the workplace?

"There is a focus on the strict separation of value creation and waste."

We introduced standardized workplaces with a high level of visualization as a basis. This means, for example, that the spaces for all the tools required were marked with photographs as placeholders. Line operatives as well as so-called line monitors, also called hanchos in LEAN terminology, can immediately see which tool or consumable material is missing for the set work order.

It is possible to implement this principle systematically right down to the smallest area. Kanban cards are used to indicate when an operative has no more small parts for assembly at the workplace. The line monitor recognizes the need for fresh supplies and replenishes the stock of consumable material. This avoids the value-adding operation being interrupted by a walk to the stores, a search for parts, etc. – it is a simple process based on kanban logic that results in significant overall time savings along the entire line.

The line monitor's tasks, however, entail much more than this. They not only take set orders to the workplace but also establish the logistical connection between the work processes of the different workplaces and recognize deviations from the defined standard. They also take part in the daily shopfloor meetings and in the weekly 5S audits.

DIALOG: *The line monitors thus play a central and critical role in your concept. But how can the line monitors retain an overview of the many details at each workplace?*

TK: We actually bundle all the waste processes into the line monitor function. This is made possible by the concept of external set-up, where the line monitor "sets up" a customer order with the required materials and equipment on a service cart, which is then used to complement the standardized workplaces. The relevant set-up status is displayed for each workplace using illuminated signs. A further element of this concept is decoupling the production order from the operative and workplace, which not only makes production more transparent but also makes the overall production process much more reliable. Production orders continue to "flow" through the system, for example when a colleague is absent – as if it were independent of individual operatives.

"Decoupling workplace and production order makes production more flexible."

DIALOG: *But this functional aspect is presumably not enough?*

TK: No, of course not. The overall process can only work in conjunction with human intelligence and problem-solving skills. And here the focus is on the hancho again. In Japanese the term stands for a "team leader" who, as process observer and coordinator, is responsible for the daily improvement process in his team. He leads using targets, solves problems systematically using PDCA and also develops and monitors standards. The role requires strong social as well as technical skills. He thus provides a central link between production line operatives and management.

DIALOG: *You introduced a flow-oriented layout in conjunction with the redesign of the workplaces. What benefits does that provide?*

TK: According to this principle, operatives produce their orders in the exact sequence dictated by the market or released by the scheduling team. The focus is on article lead time. Improvements at individual points in this process result in considerable overall time savings. For example, idle times in the process are visualized, and this encourages operatives to keep to the production sequence.

The most significant benefit of the flow-oriented layout is the transparency that is created at every step of the process. Return steps in the work sequence do not occur. The work steps are sequential in one direction only, the direction of flow. This makes the status of an order clearly visible for everyone. Free workplaces are transparent, disruptions in the production process can be identified immediately and, thanks to a defined process, result in an immediate response.

In the next step we will be extending this transparency to other areas of production. We use jointly developed indicators to provide senior managers with clear orientation about shopfloor management. In my experience, the "problems are jewels" approach is extremely helpful. It promotes open, trusting communication that identifies and eliminates weaknesses in the production process. It provides an important basis on the way to a self-learning organization.

About the Balluff Company

Balluff, established in 1921 in Neuhausen a.d.F., Germany, with its 3,000 employees worldwide, stands for innovative technology, quality and maximum customer orientation. As a leading supplier of industrial automation, the family-owned company offers a full product range of high-quality sensors, systems and customer-specific solutions. In the year 2014, Balluff GmbH achieved sales of some EUR 324 mill. In addition to company headquarters in Neuhausen auf den Fildern, Balluff has production and development sites around the globe and is represented by branch offices and sales reps in 68 countries. This guarantees the customer rapid, worldwide availability of products and a high quality of advice and service on-site.
www.balluff.com

TRANSPARENCY IN THE SUPPLY CHAIN: HOW THE COSTS OF LOGISTICS CAN BE LOWERED

By Michael Jung, Member of the Management Board, ROI Management Consulting AG

Michael Jung, Member of the Management Board, ROI Management Consulting AG

The supply chain is one of the most complex topics in a company. The reasons for this are obvious – global reach, the involvement of a wide range of partners, numerous physical and digital interfaces and the need to take account of a number of customers and tax systems in cross-border transportation. Guaranteeing cost and process transparency in this situation, and hence managing rigorously according to operating indicators is a core challenge. One example of this is the proportion of logistics costs – an indicator that is assuming major significance in logistics management. The most important success factor for the practical use of an indicator to manage logistics is the accurate and consistent differentiation and collection of cost elements.

Logistics costs first and foremost include all the classical costs for transportation, handling and storage. However, costs for planning and managing the supply chain as well as those caused by shortfalls must also be included if the process costs are to be fully determined. It is also necessary to calculate the implicit costs of capital tied up through storage and logistics infrastructure company-wide.

While there are few problems when it comes to capturing the costs for incoming and outgoing freight, for storage and for internal and external logistics employees, determining the costs for planning and management functions or for shortfalls is generally more difficult. In a similar way, direct logistics costs concealed in material supplies (delivered duty paid) are not immediately clear. They can, however, be revealed by switching to delivered ex works.

The proportion of logistics costs generally depends on the product, the real net output ratio, factor intensities and production and logistics strategies. For example, the proportion of logistics costs will be lower for high-value products with stable procurement and production processes than for low-value goods that need to be distributed to a large number of points of sale. The circumstances in the sales and procurement markets also need to be taken into account. For this reason, the proportion of logistics costs in practice range from below 5 percent to around 30 percent.

Starting points for optimizing this indicator include lean management approaches, structural improvements in the supply chain and a targeted use of modern information and communication technologies, for example:

- Procurement of primary materials using a JiT/JiS concept and close supplier integration in order to cut inventory and storage costs
- Optimization of the network structure by consolidating suppliers or logistics centers
- Optimization of processes and the organization of supply chain management and planning
- Replacement of stocks through information
- Outsourcing logistics services in order to exploit synergies and specialization advantages

Comprehensive transparency provides the basis for such optimization measures. It is only after individual logistics costs have been analyzed that the decisive levers can be identified and positively influenced.

R&D LANDSCAPE 2025

New ROI Trend Study

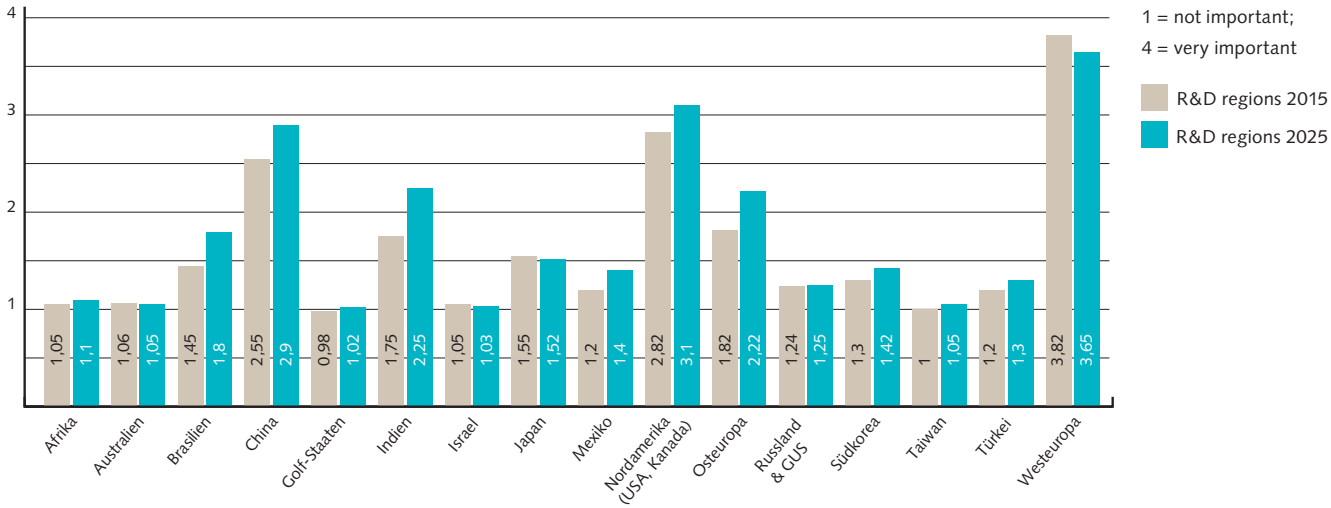
For years R&D departments have focused on the question of what they should develop. The question essentially revolved around the high art of engineering, inventiveness and also often pushing the boundaries of what was technically feasible. The fact that what they came up with often failed to meet the needs of the markets, was not cost effective, and did not satisfy efficiency criteria, was simply accepted with a shrug of the shoulders and a shake of the head in the belief that that's the nature of innovation. This approach has, however, been undermined in the last few years. Of course it does not mean that the "What" of development has become obsolete, but technological excellence on its own is no longer sufficient to achieve long-term economic success. The dramatically increasing pressure that R&D departments are subjected to today cannot be addressed by continuing with existing practices. Companies are focusing more and more on the question "How", i.e. the organization and management of research & development.

In order to gain a clear picture of trends in the global R&D landscape, we asked 60 decision-makers from both large and medium-sized companies in the areas of R&D, production and procurement about their current situation as well as about their assessment of future developments. Six central questions emerged from the process, and these also form the framework for our study:

1. What does the global footprint of a forward-looking R&D organization look like?
2. How can centralized control be balanced with the need to adapt R&D activities to local circumstances?
3. How does an R&D organization need to be structured in order for it to be interconnected both internally and externally and open for the knowledge and ideas of its network partners?
4. How can the success and performance of development activities be made measurable and how can they be constantly optimized?
5. What IT and communication processes need to be established in order to coordinate work in an R&D network spanning several countries?
6. How can the best people around the world be inspired for an organization's R&D team?

The findings of the study not only provide a clear view of the most important R&D areas of activity over the next ten years, they also show how the global R&D map will change. You can request the full study report at **research@roi-international.com**.

The main R&D regions today and 2025



www.roi-international.com

Excellence in Manufacturing and Development
Having completed more than 2,000 successful projects, ROI is one of the leading management consulting firms providing operational excellence in research & development, production, and supply chain management (SCM). ROI helps industrial companies worldwide to optimize their products, technologies, and global production networks and also to exploit the potential of the Internet of Things (IoT) for the benefit of business model and process innovation. As initiator and co-organizer of the Industry 4.0 Awards, which were first presented in 2013, ROI actively promotes the development of technological innovation in Germany.

ROI has won numerous major awards for its highly implementation-oriented projects. The company employs approx. 100 experts at its locations in Munich, Beijing, Prague, Vienna and Zurich, and is represented by partner offices in Italy, France, United Kingdom, Thailand and the USA.

Subscribe now to ROI DIALOG
Use this QR code to access the order form directly.
Or simply click on ROI DIALOG in the navigation bar at www.roi-international.com

Legal notice:
Person responsible for content under German press law:
Hans-Georg Scheibe

ROI Management Consulting AG
Nymphenburger Strasse 86, D-80636 Munich
Phone: +49 (0) 89 12 15 90 0, E-mail: dialog@roi.de

Management Board: Michael Jung, Hans-Georg Scheibe