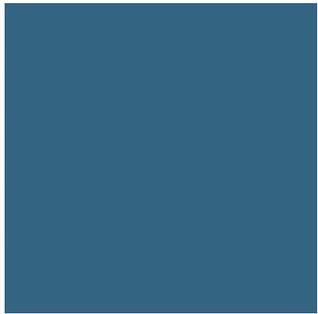




**Steinbeis**



# TRANSFER

*The Steinbeis Magazine*



## Networked Competence

**Feature Topic: The Environment  
and Resource Efficiency**

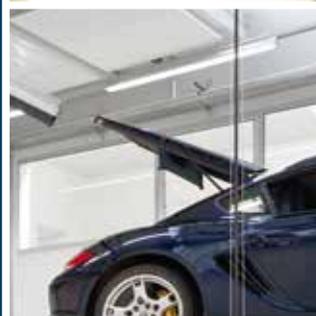
Insights from Steinbeis experts

**The 2015 Steinbeis Day**

A review of highlights

**The 2015 Transfer Award**

Award winners and their projects



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## Dear Readers,



Prof. Dr.-Ing. Johannes Teigelkötter is a lecturer and researcher at Aschaffenburg University of Applied Sciences and is the director of the Steinbeis Transfer Center for Energy-efficient Power Electronics for Electrical Drives and Power Storage Systems. Collaboration with the Darmstadt-based company Hottinger Baldwin Messtechnik GmbH resulted in Johannes Teigelkötter and his team winning the 2015 Steinbeis Foundation Transfer Price – the Lohn Award – for their project work, which dealt with raw data analysis and precise efficiency measurements taken on electric drives.

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Everywhere something has to be moved, an electric motor could come into use. Modern electric drive technologies use power electronics circuitry to feed electric machinery in such a way that the process being driven runs at the desired rpm and the required torque. With an efficient and powerful drive system, energy and resource efficiency can be improved in a broad spectrum of industrial fields. As a result, electric drives are an important technology that transcend a number of areas of the European economy.

The value chain for electric drive technology in Germany includes major companies just as much as small and medium-sized enterprises. Their core activities range from the manufacturing of special materials and components to the delivery of complex systems. Electric drive technology itself is a broad discipline that falls under engineering science. Working in this area often requires in-depth application know-how. Since the producers of drive components, their business partners, and plant operators do not always possess such competence themselves, specialists from the Steinbeis Network are available upon request to provide the expertise needed for their projects.

Guidelines laid down by the European Union stipulate different energy efficiency classes for products that require power to operate. This is to provide users with guidance and to encourage the production and promotion of more energy-efficient products. Since machines with electric drives are either in operation or stand idle for significant lengths of time – and they incur high energy costs – it is in the interest of every industrial operator of such machinery to use energy-efficient drive models. In terms of the total, cumulated outlay on a machine, energy costs often exceed the initial purchasing outlays, even after a short period of time. To design new or even optimize existing drives, one has to go beyond simply referring to energy efficiency classes; making sound decisions that make sense in financial or technological terms, takes more detailed experimentation.

Transferring know-how and technology into different areas of energy and resource efficiency not only reduces the burden on our environment, it also bolsters Germany's competitiveness as an industrial economy. I do hope you gain plenty of interesting insights from this latest edition of TRANSFER magazine and enjoy reading about the projects, services, and products offered by the Steinbeis Network.

Prof. Dr.-Ing. Johannes Teigelkötter

## Come on companies – show some commitment!

**Entrepreneurship can be learned. But more established enterprises have to be aware of their responsibilities, too.**

Have you ever wondered what happened to those companies that were once huge – in some cases even the Number 1 in their sector of industry – and are now apparently gone? Some examples: The Nokia 1100 sold 250 million units, making it the best-selling cell phone in the world – despite this, the company's cell phone business has all but disappeared now; Commodore Computers was one of the pioneers of computing and dominated many markets in the 1980s – at one point, the C64 was selling two million units a year, the equivalent of 50% market share. Nonetheless, the company went bust in 1994. Things went horribly wrong at both companies. Why?

It's simple: because they missed a key moment, the time to change course. They rested on their laurels. Or perhaps they were just too busy dealing with all their day-to-day business to think beyond the horizon.

The successful competitors of those former market leaders did one small thing completely differently. They started thinking early about the things people might wish for in the future. They picked up on key trends and changed their products and product ranges. Apple once just made computers. It was once a competitor of Nokia. But it did a visionary thing and developed smartphones with touchscreens for the masses, instantly opening up a completely new field of business: the smartphone market.

West German chancellor Helmut Schmidt once said: "Whoever has visions should go to the doctor," and even if his utterance was regarded as just a grumpy answer to a silly question there are still established firms today that view young people and their futuristic concepts with skepticism. It's like in 1876, when the chief engineer of the General Post Office made his disdain for telephones in the UK totally clear, announcing: "Here we have a super-abundance of messengers." Or Darryl Zanuck, the 20th Century Fox producer. In 1946 he predicted that, "Television won't be able to hold on to any market it captures after the first six months. People will soon get tired of staring at a plywood box every night." Today we can only smile wearily at the people who had no faith in those visions. They were proven wrong by the passage of time.

But what would it take today to not be derided in the future? An amazing idea nobody has ever thought of? Not necessarily. IBM was selling its Simon Personal Communicator with a touchscreen as early as 1994. It wasn't until the iPhone was launched in 2007 that the idea really took off.

Does it take lots of money to research fascinating new technologies? Not necessarily. Successful innovators often just find a creative way to imitate ideas lifted from other industries. Two examples are the flea market, which was shifted into the World Wide Web by eBay, and the Tupperware method, which shows that it only takes a new business model like a selling party to be successful.

Sometimes it takes something much more meaningful than an idea that nobody has thought of yet, or lots of money to research some amazing

technology: The person who is the do-er needs something to offer like empathy, creativity, or optimism. They need the will to develop the idea, to prove they have real determination, to find solutions, to make things happen.

So you think that's all successful companies need? And boy wouldn't it be great if there were more people like that? Well, there are lots of people like that. But just waiting for the wheel of fortune to point them in your direction is wasting time and isn't enough. So what can be done to uncover more such people with entrepreneurial flair? As is often the case, the answer is to foster them. Foster them early. Because entrepreneurial spirit can be trained. One example of how such skills can be fostered comes from the Young Founders (Jugend Gründet) competition organized by Steinbeis. Every year, around 4,000 students and apprentices take part in the contest, proving just how much potential they have to come up with innovative ideas. They think up exciting business ideas and prove they have what it takes in business simulations. The best teams present themselves and their business ideas to a jury. These young people do magnificent work, and taking part in the contest is really worth it. Competition alumni can't wait to show what they can do in real, everyday business. The only question is how to bring companies and young innovators together.



Steinbeis Swipe! is a regular feature in Transfer Magazine in which an author takes a look at a specific topic and may even take a swipe, left or right, up or down, along the lines of a critical commentary.



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## Tracking Down Energy Loss

### Resource efficiency within companies

How much of the value that companies add is then effectively lost through material residues, waste materials, and defective products? The ISO standard 14051 provides the answer by calculating material flows. A special method for evaluating company costs, this standard revolves around the analysis of energy and material flows within a company. This not only lays a foundation for assessing costs, but it also makes it possible to draft "environmental balance sheets," for example a company's carbon footprint. The Steinbeis Transfer Center for Marketing, Logistics, and Company Planning takes this as their starting point for training courses on resource efficiency.

Resource efficiency is an important issue in Baden-Württemberg. In collaboration with leading business associations in industry, the Baden-Württemberg Ministry of the Environment is currently publicizing a showcase project called 100 Companies for Resource Efficiency. Businesses openly and descriptively outline the measures they have already introduced or are currently planning to implement in order to save resources. This serves as an example for others, also showing what manufacturing companies are already doing to protect resources and be innovative. A grant of €10,000 is given to each company involved in the project.

As part of the project, the state of Baden-Württemberg has issued free software that now makes it easy for the first time to carry out clear material flow cost accounting (MFCA). This solution is called bw!MFCA and it provides a professional tool for mapping energy and material flows in production. It also captures material and energy costs, as well as all outlays on personnel, machines, and material disposal. The result is a calculation of added value, showing the value that is squandered through residual materials and wastage. The losses resulting from die cutting, offcuts, spoilage, production residue, or even defective products are greater than the cost of simple disposal. What lies beneath is the expense of the materials that had to be purchased and these were also transported and processed internally, so other operational costs are wasted when materials are thrown away. It is precisely this potential to make savings that MFCA methods work out. This unveils even greater cost savings, resulting in quicker pay-back periods on any measures that are introduced. But avoiding material losses does not just make sense for cost reasons. Behind every loss lies damage to the environment, especially carbon emissions, which are essential just not necessary. The bw!MFCA software therefore highlights the cost of avoidable carbon emissions thus bridging the gap between financial and environmental factors.

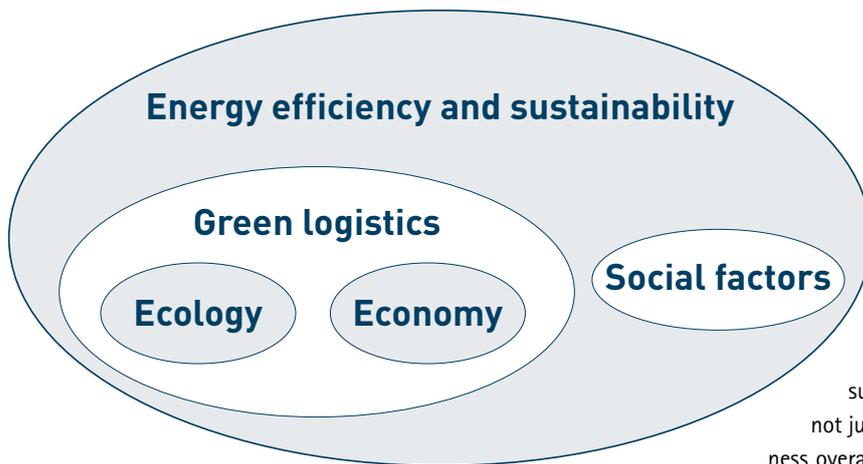
Working in collaboration with the Baden-Württemberg State Agency for Environmental Technology, the Steinbeis Transfer Center for Marketing, Logistics, and Company Planning, which is based at Pforzheim University of Applied Sciences, has developed training courses on resource efficiency, as well as the methods of MFCA and the bw!MFCA software. These are regularly offered to people working at manufacturing enterprises, and the training and software are provided to companies in Baden-Württemberg free of charge (more: <http://pure-bw.de/de/mfca-schulung>). The feedback from companies until now has been extremely positive, raising hopes that the program will culminate in widespread use of MFCA methods in Germany, on a similar scale to the results achieved in Japan.



Professor Dr. Mario Schmidt is a project manager at the Steinbeis Transfer Center for Marketing, Logistics, and Company Planning, which is based at Pforzheim University of Applied Sciences. He also heads up the Institute for Industrial Ecology at Pforzheim University of Applied Sciences and is a member of the advisory board for sustainable development for the State Government of Baden-Württemberg. Schmidt and his team also advise politicians and companies on resource efficiency, life cycle assessments, and environmental management.



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## Energy Efficiency in Transport and Logistics

### Training on sustainable development is crucial

The transportation and logistics industry is one of the most important areas of the German economy, second only in economic terms to the automotive industry and health care. Given this, considering how this industry operates in terms of energy efficiency and sustainability – especially as a sector dominated by small and medium-sized enterprises – it is clear that there are still many areas that need closer examination, not only to tackle practice within individual companies but also to get workers more actively involved. The Steinbeis Innovation Center for Logistics and Sustainability is demonstrating how this could work in practice.

Against the backdrop of recent climate change and globalization, it is crucial that energy efficiency and sustainability are given greater priority, especially considering how much attention is given to these topics in the transportation and logistics industry. Sustainable thinking should become an established part of business practice in the future; it should be valued and perceived as "a matter of course." It will be particularly important for energy efficiency and sustainability to be conveyed to people in the market in such a way that they not only understand why it is important, but are also motivated to act. A term commonly used in the transportation and logistics industry that's more or less synonymous with "energy efficiency" and "sustainability" is "green logistics." Green logistics can be understood to mean "a long-term and systematic process of measuring and reducing resource use and emissions resulting from transportation and logistics process within and between companies" (Wittenbrink, 2011). The aim of green logistics is thus to cut pollution and emissions caused by logistical activities – especially greenhouse gas emissions – and thus contribute to climate and environmental protection. Whereas the focus with green logistics lies in the pillars of the economy and ecology, with energy efficiency and sustainability the focus lies in a holistic view of business activities with respect to commercial, ecological, and social aspects. Implementation measures aimed at achieving energy efficiency also play an essential role and these are especially important given the current developments as part of the "energy transition" in Germany.

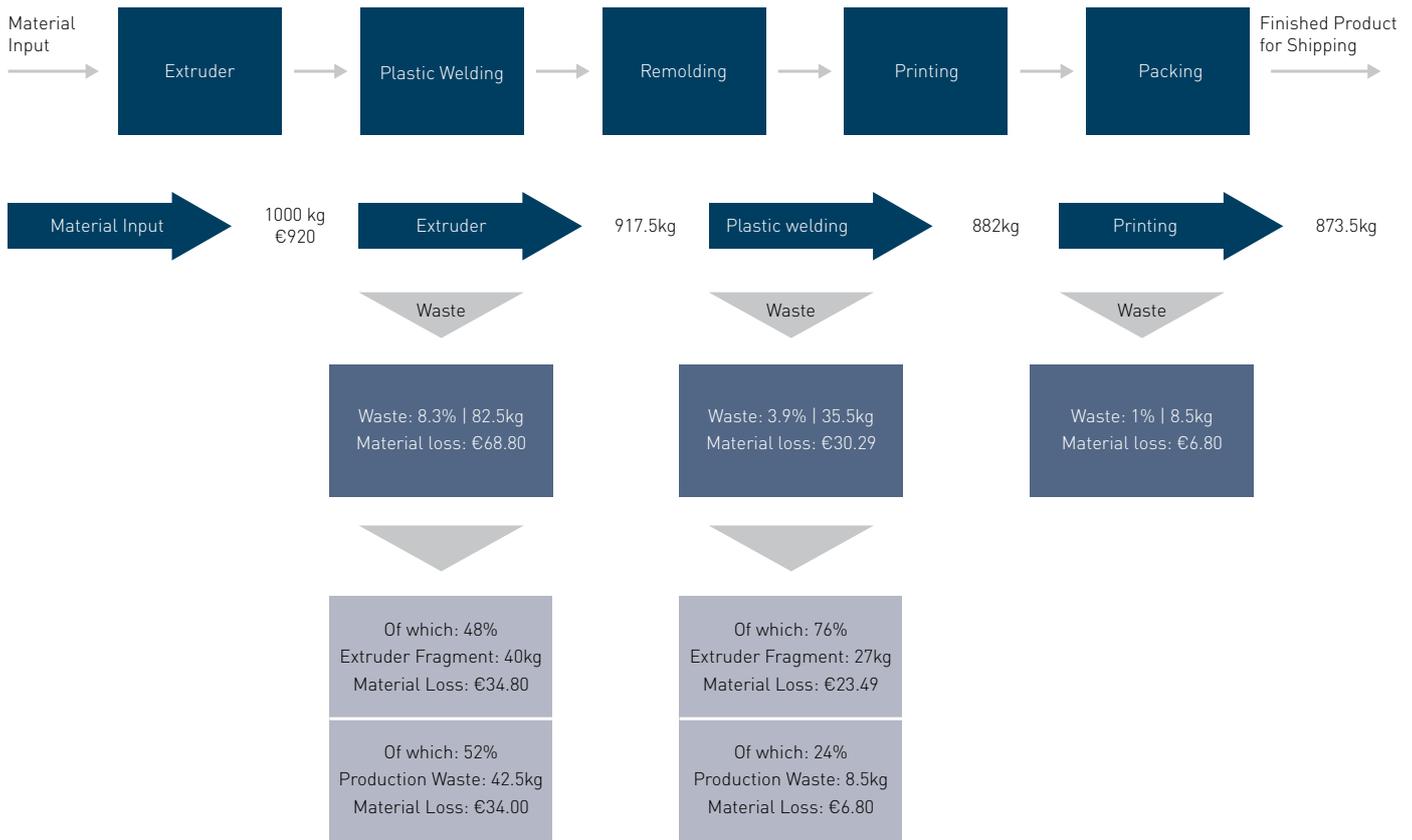
The core competences of the Sinsheim-based Steinbeis Innovation Center for Logistics and Sustainability (SLN) have been focused on the fields of energy efficiency and sustainability. The center is already working on delivering a variety of projects with partners in these areas of industry. The main emphasis of these projects lies in training people to work as instructors, lecturers, and apprentices in order to improve energy efficiency in the transportation and logistics sector. The underlying concept is partly to ensure that their sustainable know-how is bolstered in the long-term, affecting not just the people involved at vocational colleges but also in business overall. It is also about making a contribution towards sensitizing up-and-coming managers for topics relating to sustainability. Drawing on a variety of training measures and techniques, the aim is to develop sustainable know-how both within companies and within training establishments. "As in the past, we're finding that there is still so much development potential among workers and apprentices when it comes to energy and sustainability in the transportation and logistics sector. The first step must be to unlock this potential and then it will need continual reinforcement," explains Jens-Jochen Roth, director of the Steinbeis Innovation Center for Logistics and Sustainability (SLN) from Sinsheim. SLN focuses on professional and systematic analysis in developing made-to-measure solutions for business and logistical challenges. Most projects have an environmental or sustainability angle. Going by the principle of "working with those in the field, working for those in the field," the project partners work together to develop sustainable concepts and implement specific measures. The SLN primarily works on business tasks and sees itself as the lynchpin between transportation science and the transportation industry.



Jens-Jochen Roth is the director of the Steinbeis Innovations Center for Logistics and Sustainability. His philosophy of "shaping the future, taking responsibility" guides the work done at the Steinbeis Enterprise, driven by a commitment to sustainable innovation in the field of vocational training – for people working in transportation, logistics, and manufacturing. The focus here lies in providing qualifications and raising awareness of sustainability issues among people who work in business.



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## Small Investment – Major Impact

### Resource efficiency improvements in production

Energy efficiency is an important issue, especially following the introduction of new energy services legislation in Germany. One thing that is often overlooked is the biggest cost driver in the processing industry: material expenditures. To make full use of any potential cost savings and raise competitiveness, companies have to look very carefully at all material flows. This raises the important question of how to organize resource efficiency projects strategically and in terms of operational implementation. The Steinbeis Transfer Center for Energy and Environmental Process Technology, Eco-Management is demonstrating the different options open to manufacturing companies when it comes to resource efficiency – showing that it really is worth subjecting the issue to closer scrutiny.

According to the German Federal Statistics Office, manufacturing companies invested €58 billion in materials in 2013. On average, this is around 47% of all company expenditures, making it the biggest cost factor. This includes outlays on energy, which is mainly sourced through non-renewable energy sources, particularly from fossil fuels, even if these only account for 5% of all material costs. A simple calculation reveals the possibilities: A company with sales of €0 million, 5% profit margins and material costs creating 40% of expenditures can raise its material efficiency by 5% and thus also raise profits from 2.5 to 3.5 million euros – or 70%.

As a rule, much greater savings are possible. The only question is how a company deals with such issues on a strategic level and in operational or implementation terms. The following approach has proven to be quite effective: The first key step is to conduct an analysis of potential, taking a

snapshot of the current status and possible optimizations. This involves initial interviews in which objectives and expectations are captured, as well as the key criteria by which resource efficiency measures should be benchmarked. At this point, a company needs to establish clear lines of responsibility for a given project. It can then organize a workshop to start screening existing data and work out if there are any information gaps in order to define key processes. Information can be used to establish input and output flows, drawing diagrams if necessary and also modeling energy and material flows. The tool the firm adopts should be tailored to its needs in order to enable the company to categorize information by individual processes. In most cases, missing data can be derived from calculations and estimates. In fact, in many cases, it doesn't even make sense to take actual measurements. Once a basic data template is in place, a model can be used to calculate related cost drivers. Available data can be looked at together to check for plausibility.

It is during this phase of a project that discrepancies in the plausibility of the data are actually quite beneficial. This is because they motivate people involved in the project to invest time in explaining data variations. This often results in identifying inadequacies. Visualization tools can also be used to work out which parts of a process are most intensive in terms of energy and material use. They can also help identify potential improvements. With the right key performance indicators, which should be tailored specifically to the company, efficiency measures can be defined and priorities can be set. It is also best to go through different scenarios for each identified area of potential savings. All of the results are then pulled together, documented, and explained. The project finishes with a presentation of the energy and material flow model, the results of the analysis that was carried out, possible optimization measures, and implementation suggestions – at all times taking any commercial aspects into account as well as different ways to use the model to gain operational transparency.

This lays an excellent foundation for measures such as the introduction of an energy management system according to the ISO 50001, or even official audits. When a company is attempting to drive optimization, it makes sense to take baby steps over a longer period. This allows people to implement the project properly and not become overwhelmed in the process. Some optimization processes result in genuine change, so it is also important to take different change management issues into account. As a rule, however, many measures can be introduced relatively inexpensively, so the time and effort of such a project is worth it, especially given the value it generates.

This was exemplified in the analysis of an SME carried out by the experts at the Steinbeis Transfer Center for Energy and Environmental Process Technology, Eco-Management. The firm that was analyzed makes plastic parts in a production process that covers a number of stages. The machines used by the SME were originally designed for large batches and much more extensive machine tooling processes. An analysis of potential helped identify the fact that the extruders and a number of downstream parts in the process could be significantly improved in terms of energy and material use. A typical production line was chosen to capture all inputs and outputs in detail and these were then mapped. It became possible to save materials worth EUR 371,000 per year on the plant, simply by introducing a variety of measures – without actually having to invest much, if anything at all. To leverage further potential to save money, it was recommended that the company use special cleaning fluids on the extruders. This simple measure would make a significant difference in terms of machine availability in production and improve revenues by a seven-figure number. The potential energy savings were estimated at up to EUR 80,000. To achieve this, it would only be necessary to make a small investment, with a breakeven point of well under one year.

By comparing the savings made with this example – in terms of energy and materials – it is clear that manufacturing companies should not focus unilaterally on energy efficiency. Improving material use offers much greater leverage and the extra time and money needed to capture not just energy flows but also material flows is actually only minimal. However, compared to energy savings projects, it is even more difficult to find the right experts with the necessary skills to provide third-party

support. Even experienced specialists sometimes struggle with some of the highly specific issues, and may even have to first acquire the required know-how or turn to a network that they can trust, like the Network offered by Steinbeis.

### Steinbeis Transfer Center for Energy and Environmental Process Technology, Eco-Management

#### Services

- Applied research and development
- Technical consulting
- Process analysis
- Optimization of production processes

#### Key Areas

- Technology consulting and process analysis:
  - Energy and material efficiency
  - Utilization of byproducts and waste products
  - Compliance with environmental regulations
- Research and development:
  - Production-integrated environmental protection
  - Registering and evaluation of environmental impacts
  - Ecological balances
  - Cost reduction potential in environmental protection
  - Reduction of resources in production
  - Efficiency improvements through process coupling

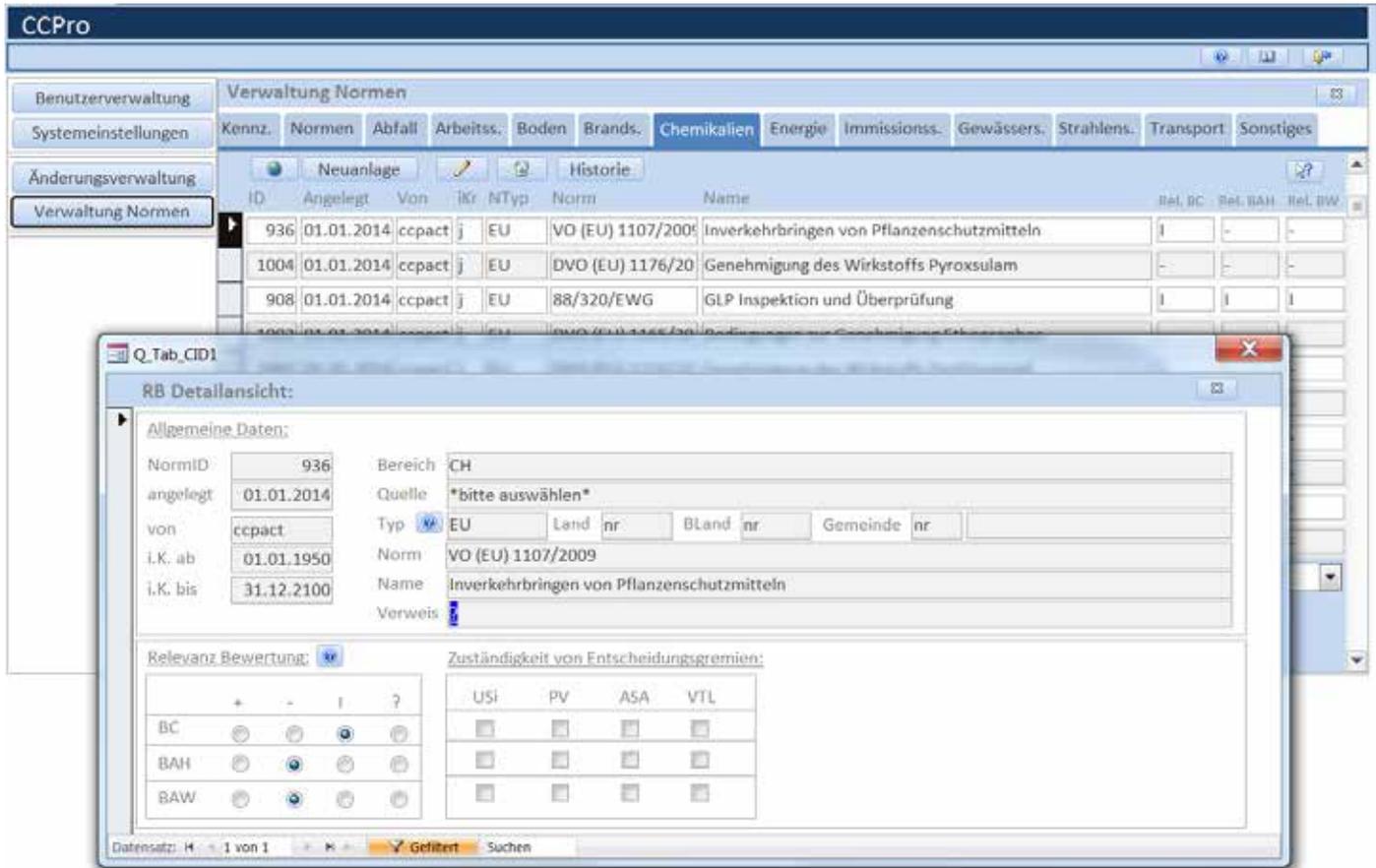
**Image:** Example of an extract from a production process with a corresponding Sankey diagram showing material flows and the cost of 1000 kilos of material input.



Prof. Peter Kleine-Möllhoff is director of the Steinbeis Transfer Center for Energy and Environmental Process Technology, Eco-Management, which is based at Reutlingen University. His Steinbeis Enterprise advises clients on the optimization of their production processes with respect to energy and material efficiency, the use of byproducts and waste, and complying with environmental regulations.



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## Innovative IT Systems: Support with Environmental Compliance Projects

### Software called CCPro helps establish systematic and reliable processes

The VW emissions scandal thrust compliance with environmental legislation straight into newspaper headlines, not just within Germany. Somebody clearly developed software to cheat on emission tests carried out on diesel engines. For whoever developed the software, the "common good" or long-term environmental protection were clearly not at the top of their agenda – something that cannot be said for IVO, the Steinbeis Innovation Center Information Systems for Responsible Organizations. It has developed a software package called CCPro which is all about researching and developing innovative information systems for use in corporate environmental management, thus turning the spotlight on environmental protection.

Companies are obliged to adhere to a variety of laws, guidelines, and directives in a variety of areas of environmental legislation. If they fail to adhere to guidelines, they can be penalized, may have to pay fines, could lose licenses, may have authorizations withdrawn, and may even be forced to shut down. As a result, companies need specialists whose duty it is to ensure that all pertinent legal requirements are being met. A typical title for such a discipline in companies is environmental compliance management. The function involves a variety of tasks and requires detailed specialist knowledge. One of the key areas of responsibility is to monitor announcements of new regulations or legislation revisions. The originators of regulations and revisions are typically local environmental agencies, state authorities, federal environmental departments, and other similar bodies on a European or even international level. Another key task in this field is to assess the relevance of new regulations and revisions to the company, to organize and implement decisions in order

to adhere to legislation, and to organize and implement systems that monitor the effectiveness of different measures. It is essential that each task is documented meticulously as complete and executed, because to pass an environmental audit, companies must provide evidence of seamless documentation – which cannot be manipulated – in all areas relating to environmental law.

The sheer volume of legislation has been expanding for years and the frequency of revisions to regulations is intensifying as different lawmakers in all kinds of areas relating to environmental guidelines place more and more demands on companies. The impacts of globalization – shorter product cycles, the cost crunch, more intense competition, and more and more intense work for employees – have every potential to exacerbate this situation. For many companies, ensuring they fully comply with environmental legislation, and preparing for and successfully

passing environmental audits, feels like a gargantuan task. It therefore makes sense to look carefully at their compliance management processes. As a next step, they then need to establish a foundation of process management methods in order to optimize compliance management, typically by using the right information systems.

But it is particularly in this area – when it comes to systematically organizing their compliance management processes and making the best use of IT – that so many SMEs seem to have problems keeping up. A number of empirical studies have established that SMEs are frequently reverting to standard office software – such as simple spreadsheets and word processing packages – to carry out environmental compliance activities. As a result, companies even accept that there may sometimes be significant shortcomings in their adherence with compliance obligations. Inevitably, these can be failings such as information deficits or a failure to comply with common standards in areas such as data security and data protection. This constitutes a major risk when it comes to ensuring a company is conforming with environmental legislation. It must also be assumed that compliance officers will be underachieving in terms of productivity.

It was against this background that experts at the IVO Steinbeis Innovation Center have been working in collaboration with consultants at UB-Splus (Heilbronn) to develop CCPro, standard software (but still customizable) that draws on databases and is fully adaptable. It helps structure and reliably administer environmental compliance management tasks. CCPro is aimed at officers responsible for ensuring a company complies with environmental legislation, who can use it for administration, monitoring, data management, and documentation tasks, drawing on a central database which has secure access and can be closely monitored. CCPro supports organizational modeling mechanisms, making it possible to precisely map the specific structures of a company. Clear and realistic distinctions can be made between different parts of the company affected by various compliance requirements, also taking into account decision-making processes or involvement with environmental legislation specialists. CCPro sets up different areas for each business unit so that compliance tasks can be monitored and managed based on available data.

Another feature offered by CCPro allows important decision-making processes to be systematically structured and monitored, including aspects such as measures introduced to adhere to legal requirements. This makes it possible to fulfill important prerequisites pertinent to environmental legislation compliance. People working in compliance management are thus freed up to focus on specialist duties. The amount of time invested in administrative and organizational tasks is kept to a minimum, as is the time needed for simply managing information.

CCPro offers standard overviews and evaluation functions to call up the current status of compliance tasks at any time, with different lists and diagrams. It ensures the company is in a position to provide information and keeps things transparent for all employees involved in environmental compliance duties, helping them to monitor and check the progress of any processes related to adhering to legal guidelines.

The IVO Steinbeis Innovation Center is currently working on an internal project to develop a kind of risk radar as an extension to CCPro. Aside

from drawing on known methods and techniques aimed at predicting risks, the team is also developing new kinds of data analysis methods to pinpoint and assess errors made when carrying out compliance management tasks. The aim is for CCPro to continuously update risk profiles in order to provide companies using the software with extra assurance that they are adhering properly to relevant environmental guidelines, also shielding them and other affected parties from damage. Risk profiles are made available on an adaptable dashboard showing users their key indicators, risk indicators, and recommended courses of action to deal with risk. Weak points, omissions, and missed deadlines are instantly recognizable on the dashboard. This makes it possible to execute the necessary risk management measures in good time.

Following a successful dummy run with an initial prototype under a real operational scenario, CCPro will be continually updated and improved upon using modern software engineering techniques. CCPro is being developed with a focus on SMEs in all sectors of industry in German-speaking countries. Work is also underway to develop a Web-based version. The background research into database technology, business environmental information systems, and IT-based compliance management is being carried out by the project partner, Pforzheim University of Applied Sciences.

**Image:** The graphical user interface of CCPro. The window in the foreground shows detailed information on a list of selected chemical regulations, such as relevance ratings for different areas of the business.



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## Today's Building, Tomorrow's Smart Energy District

### Steinbeis experts support sustainable city development

For several years now, Steinbeis-Europa-Zentrum (SEZ) has been involved in sustainable urban planning projects in Europe. As part of this project work, it supports European cities in their endeavors to replicate sustainable urban concepts that pave the way for "smart cities." The SEZ promotes successful concepts and sustainable technologies, ensuring more widespread dissemination and implementation. The SEZ also supports companies and research establishments in the energy sector in the exploitation of existing technologies.

In 2009, the EU parliament established guidelines for the overall energy efficiency of buildings under the Energy Performance of Buildings Directive. This is an important step in achieving energy and environmental protection aims in the EU. As of 2019, all member states should ensure that all new buildings used in the public sector meet low-energy housing standards. The SEZ is involved in several EU projects which focus on achieving these goals, bringing its services for technology exploitation and project management to the table. SEZ analyzes the plethora of potential innovations and develops exploitation and launch strategies. To this end it deals with intellectual property rights and implementation options, and plans how rights should be exploited. New business models and innovative services are every bit as important to this as new technological developments. The SEZ rounds off its portfolio of services with the effective communication of project results, good examples of projects in terms of profitability and sustainability, as well as offering administrative and financial project management.

These services are currently being invested in the European project BRICKER, which aims at optimizing energy consumption in public buildings. These buildings attract broad public awareness so the hope is that they will not only serve as pilot measures for kick-starting further reconstruction but also provide a model for other European cities. Three model buildings in Liege (Belgium), Caceres (Spain), and Aydın (Turkey) are being retrofitted with active and passive technologies like renewable energy sources and decentralized heating systems as well as improved building facades, windows, and roofing. A facade analysis is also being

conducted. These measures are intended to reduce the energy consumption of the buildings by 50%. Information and communication technologies are being used for simulations, interaction, and management accounting activities. As a project partner to BRICKER, SEZ coordinates work packages for replicating and exploiting project results. Exploitable results are analyzed in workshops aimed at developing individual and shared exploitation strategies. This serves as the basis for new business models.

Another example is a project called R2CITIES, in which project partners are carrying out reconstruction work on buildings in Valladolid (Spain), Genoa (Italy), and Kartal (Turkey) to achieve near-zero-energy districts. Strategies for planning, construction, administration, and exploitation are under development. The expectation is that the energy consumption in 850 apartments (measuring over 57,000 m<sup>2</sup>) will be reduced by 60%. This involves a two-pronged approach: the renovation of the city areas and coming up with a comprehensive methodology for energy-efficient reconstruction at the city level. In the R2CITIES project, SEZ is a partner for exploiting the results of projects and offering training courses. In these training sessions, Steinbeis experts cover the protection and use of intellectual property as well as risk assessment. They also look at business models, innovation audits, strategy development, and technology exploitation.

In a third project – the European project CITYFiED – SEZ is working with partners to develop a strategy for a process covering everything from

planning to market roll-out. The process should allow European cities to develop into "smart cities." Three city quarters serve as trial areas: Lagunade Duero in Valladolid (Spain), Soma (Turkey), and Lund (Sweden). Feasibility studies are being conducted for eleven so-called city clusters to check whether these measures can be replicated. Another 40 cities are regularly updated on the project results. The CITYFiED partners have backgrounds in the research industry, public administration, and business development. The exploitation strategy includes plans to stimulate development in other cities over the next 10 years, spanning 100 projects and up to 500,000 building renovation initiatives. In Germany, the SEZ has been able to attract the city of Ludwigshafen to the city cluster project. The metropolitan area along the Rhine and Neckar rivers and the city of Ludwigsburg count as "communities of interest."

### European Innovation Partnership on Smart Cities and Communities

The European innovation partnership for smart cities and communities is geared at cities, industrial enterprises, and citizens with the aim of sustainably improving the quality of life in cities through integrated solutions. These include applied innovation, improved planning, a participative approach, greater energy efficiency, improved traffic solutions, and the intelligent use of information and communication technologies..

### Energy Policies in the European Union

An efficient, clean, and safe energy system is a central element of European Union's energy policy. To achieve this, goals have been put in place to reduce greenhouse gas emissions by 20% by the year 2020 compared to 1990, and to achieve further reductions of 80-95% by the year 2050. Efforts will also be made to increase the share of renewable energy in use by 20% by 2020; this is coupled with an energy efficiency target of 20%. To achieve this, the European Union has initiated various subsidy programs with strategies from the SET plan (Strategic Energy Technology Plan). In line with the priority for societal challenges defined within the Horizon 2020 programme, the program for Secure, Clean, and Efficient Energy promotes, among other things, the further development of energy provision through renewables, the development of a uniform, smart European energy grid, improved storage technologies, traffic and communication solutions for smart cities, and the market rollout of innovations in the energy sector. Additional measures should lead to consumers and producers working together to sustainably reduce energy consumption and lower their carbon footprint through intelligent and sustainable use. The focus placed on innovation under the Horizon 2020 programme enables funding for projects aimed at implementing and disseminating technologies in the market. In addition to Horizon 2020, funding for innovation projects is available through COSME and the Joint Technology Initiative Fuel Cells and Hydrogen.



Anette Mack



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## “Energy moves the world”

In conversation with Heinz Pöhler, Director of Steinbeis Consulting Center 4IES

Heinz Pöhler explains in our interview why he is so fascinated about the subject of energy and how sustainable energy strategies in the industry and non-residential buildings have gained in importance. He also reflects on future strategies.

**At first glance, starting with your apprenticeship and university studies, followed by your career, responsible for power supply at Siemens AG, as a guest lecture at the Ulm University of Applied Sciences and finally as Director of the Steinbeis Consulting Center 4IES, your professional career shows that energy topics have always fascinated you. What exactly?**

Energy moves the world! Without energy, there wouldn't be any development. From the discovery of fire through the invention of the steam engine to the use of photovoltaic in space, the innovative use of energy has a significant influence and impact on mankind.

Energy production and distribution already attracted my attention during my university studies, whether it be the complexity of a power plant, the secure supply of energy for industries and households or innovative renewable energy systems with storage technology. As long as I can think of, dealing with energy has strongly been tied to technical challenges, where at the same time economic and political aspects play a meaningful role. My utmost goal as an engineer is to use energy as efficiently and economically as possible. With the discussions about the

exit from nuclear and fossil fuel power supply, economic and political aspects are gaining public interest - which makes the issue even more exciting.

**One of the core fields of business of your Steinbeis Competence Center is developing sustainable energy strategies, especially for industrial and non-residential buildings. Which services do your customers require?**

The personal needs of our customers is very varied. Some are still in an early stage, in which we make them aware of various possibilities of an efficient (and cost-saving) usage of energy. After taking stock and a thorough examination of heating, ventilation, air conditioning technology as well as building technology, energy supply and electric lighting, we analyze energy saving potentials. The next step is to create a sustainable, ecology-minded, economic, long-lasting, individual and demand-oriented concept for our customers, taking into consideration cost development of the individual energy sources and the available technology on the market. Furthermore, counseling in assistance measures are given.



Other customers are already a few steps ahead and require support with the implementation, e.g. with independent expert reports for financing the energy efficiency measures or with the application for governmental benefits.

Our customers primarily focus on production processes. Energy consumption plays a minor role. During consultation, we sensitize our customers for energy saving measures, which then gain on significance. Therefore, they need a helping "right hand" providing advice for placing independent manufacture orders and to ensure the desired quality during the implementation phase.

Due to changes in the European Energy Efficiency Directive (Energie-dienstleistungsgesetz) and the specifications for energy tax refunds (SpaEfV), the demand for support with audits according to DIN-EN 16247 and ISO 50.001 has strongly increased in Germany.

### **In your opinion, how could possible future strategies for developing further sustainable energy concepts for non-residential buildings look like?**

First of all, it would be wise to make use of all energy saving potentials to reduce energy consumption in general. Energy, which is not required,

doesn't have to be produced or bought in the first place. Depending on the area of application or production processes, there are many options on how to save energy. Process-related heat and refrigeration requirements should be coordinated. These can be optimized by using waste heat energy, heat pumps, renewable energy sources and/or customer power generation in combination with energy storage.

Monitoring and load management systems play an important role in optimizing energy flow and managing energy more efficiently. "You can only manage what you measure!" Looking beyond the own company's boundaries might also be of advantage; maybe you neighbor has an excess heat supply which could be used or vice-versa.

### **Sustainable Economy – is that possible? Which role would resource efficiency play?**

Sustainability is the balance between economy/profitability on the one side and ecology/environmental safety on the other side.

Sustainable energy systems are always demand-oriented. Energy is just one of many available resources. Personnel, raw material, natural resources, knowledge, for example, are also very important resources, that should be used carefully. As history has proven, a system that is only oriented towards profit maximization or social compatibility will eventually fail, if we do not treat humans, natural resources and energy in a sustainable and respectful manner.

Image: © Centrotherm Blaubeuern



Heinz Pöhler is the director of the Steinbeis Consulting Center, 4IES. The Steinbeis Enterprise offers its customers energy consulting on industrial and non-residential buildings, the development of sustainable energy concepts, innovative energy systems based on photovoltaic technology, and resource efficiency consulting.



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## “It all comes down to the life cycle assessment.”

**An interview with Prof. Dr.-Ing. Matthias Stripf, director of the Steinbeis Transfer Center for Thermo-fluid Dynamics and Efficient Energy Conversion.**

Prof. Dr.-Ing. Matthias Stripf talked to TRANSFER about efficient energy conversion and the current infrastructure changes in the German energy grid. He also ponders the question of which challenges this process will create for everyone involved.

**Professor Stripf, the laws of physics teach us that energy is neither created nor destroyed, but converted. Since the kick-off of Germany's transition to renewable energies, we've been seeing an emphasis placed on efficient and environmentally friendly energy conversion. But how is that supposed to work?**

The topic of efficient energy conversion has been shaping the engineering sciences for over 200 years. For example, as a result of this relationship, we were able to increase the efficiency of fossil fuel power stations by 6% over the last 20 years here in Germany. The resulting savings we were able to achieve could cover the entire power consumption of a country like Austria. We can achieve savings on a similar scale just by replacing all light bulbs with energy-saving alternatives or LEDs.

Although a lot has been done in terms of efficient electrical power generation and usage, we can't really say the same for progress in other areas such as space and process heat or efficient travel. But these comprise 80% of our ultimate energy use, which is why we really ought to be focusing our development in these areas.

It doesn't make sense to introduce many of the well-known technologies used for indoor heating (e.g., heat pumps and solar thermal systems) on a broad scale since this would require specific infrastructure: there isn't enough roof area, not all buildings are equipped with modern under floor heating, or it wouldn't be possible to install a downhole heat exchanger for an outside heat transfer system. New technologies such as gas heat pumps, fuel cells, and small cogeneration units are still in their infancy, and despite government funding, they aren't yet as cost-efficient as standard gas-powered boilers.

Only those technologies that show large-scale cost reduction potential and greater production numbers will stand a chance on the market. Technologies that require rare or expensive materials or manufacturing processes, and that aren't easily scalable to large batch numbers, won't really play a part in worldwide energy conservation efforts. Overall, energy efficiency is only part of the picture when it comes to a technology's or product's life cycle assessment. But life cycle assessments are vital and this topic should feature much more prominently in political debate and legislation. It makes little sense to only look at the energy efficiency or

CO<sub>2</sub> emissions of products without considering all of the resources required to produce and recycle them.

If we place greater emphasis on efficient technologies for heat supply and the transportation sector in future, and we start to take a closer look at life cycle assessments and cost-reduction potential, we will find a sensible way to achieve the transition to renewable energies here in Germany, and we will be able to export these new technologies worldwide.

**Your Steinbeis Transfer Center offers its customers – among other things – services in the field of efficient energy conversion. Why did you decide to specialize in this area?**

I've been fascinated by thermal and fluid dynamics since my college days. I also really enjoyed electrical engineering and computer science. All of these areas come together in efficient energy conversion. This has allowed me to make a career out of one of my hobbies. Add to this the fact that the Steinbeis Transfer Center works closely with the Institute of Refrigeration, Air-Conditioning, and Environmental Engineering (IK-KU), which is based at Karlsruhe University of Applied Sciences. This gives us access to excellent know-how and outstanding infrastructure including modern wind channels and measurement technologies. We can tap into the best setting imaginable.

**Energy providers, network operators, and industry can expect new challenges on account of the current infrastructure changes in the German energy grid. What role will thermal energy conversion play here?**

These days only 20% of the energy demanded is needed as electrical power, the rest comes from fossil fuels, for heat generation and mechanical energy for drives. But with the exception of biomass, renewables feed electrical energy directly into the electricity grid.

If we were to power all heating systems with electricity or heat pumps and make a switch across the board exclusively to electric vehicles, this would require drastic remodeling of not just the large power grids, but also the local distribution networks. But we're already seeing the extensive costs involved in this kind of expansion, even though a rise in the number of electricity users hasn't yet been accounted for. And then add the unresolved issue of how to store large amounts of electrical power. This is another reason why many consumers will still rely on fossil fuels in future. The natural gas grid, which offers large transfer and storage capabilities, could be used for renewable energies as well. This would involve using electrolysis, converting electrical energy into hydrogen and then converting it further into methane through carbonation. Since so much gets lost in conversion, it's all the more important that the conversion chain (e.g., from methane into heat using gas heat pumps, or from methane into mechanical energy using cogeneration units) becomes more and more efficient. It's important to keep trying to improve thermal energy conversion processes.

An additional challenge lies in the many district heating grids, which are often supplied by coal-fed power stations. New solutions must be found for this as part of a sustainable transition to renewable energy sources. Such solutions could include connecting large manufacturers (which

generate a lot of excess heat) to district heating grids or operating gas and steam power stations with renewable methane. At the same time, consumers have to become more efficient and come to terms with lower room temperatures. One option for this would be heat transformers, which use district heat to power motors to supply heat at higher temperatures or provide refrigeration.

**What kinds of challenges do you foresee this process will bring on in future for the sciences, transfer, and education?**

The required technologies for Germany's transition to renewable energies dip deep into the engineer's toolbox. Successful new products in this sector can only be achieved through interdisciplinary collaboration between the engineering sciences. Properly organized knowledge transfer between specialized Steinbeis Enterprises, other research facilities, and industry can stimulate new approaches and help bring ideas and new products more quickly to fruition. But it's even more important that more is done in schools and universities to lay the right foundations by introducing students to the basic principles. This is a prerequisite for finding new ways to collaborate seamlessly between the engineering disciplines. Shortening the time needed to earn a general qualification for university attendance and shortening the time needed to complete degree programs sends the completely wrong signal. As people are expected to enjoy longer lifespans, this time should be invested into more extensive education.

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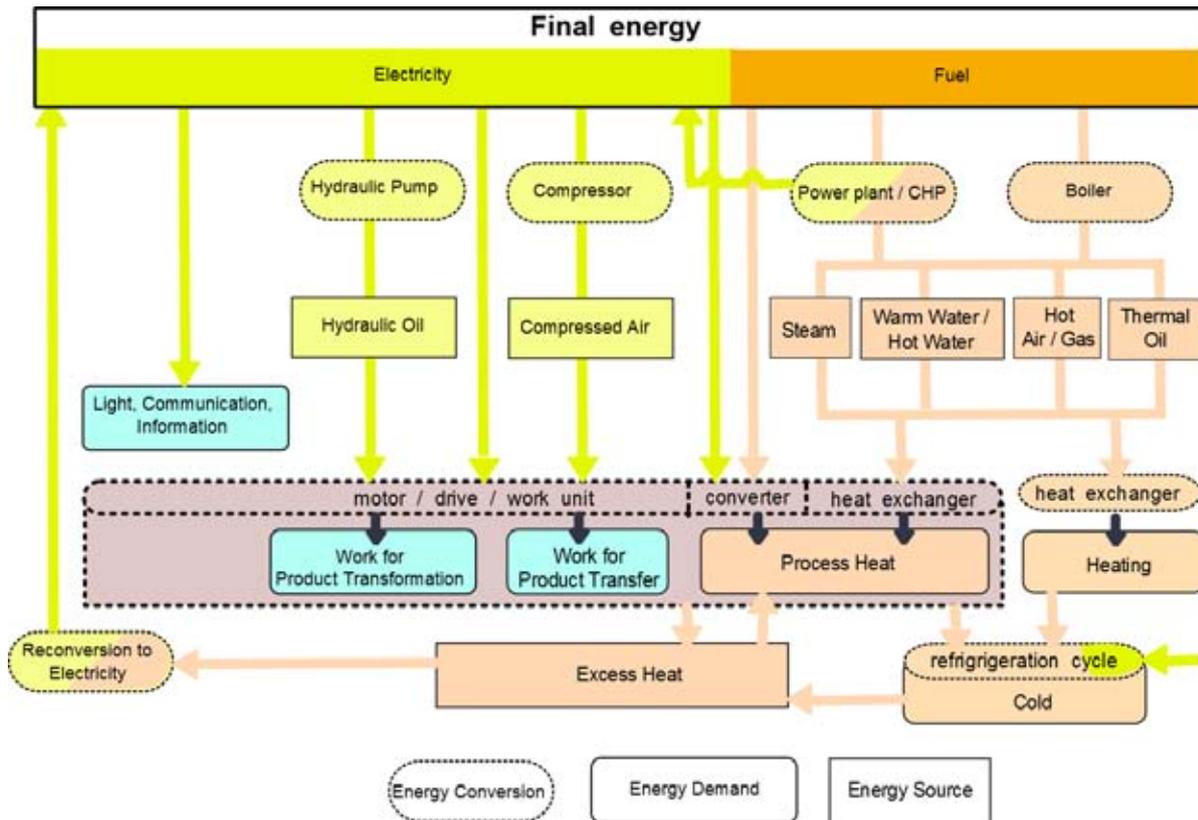


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## Energy Efficiency in Manufacturing

### A significant building block in ensuring resource efficiency

It seems not a day goes by without us hearing the buzz word “energy efficiency.” We see energy efficiency labels on products on store shelves in specialty departments selling things like consumer electronics. Even in industry, the issue of energy efficiency is ubiquitous, guiding our decision making at every turn. Prof. Dr. Georg Kleiser, head of the Steinbeis Consulting Center for Energy-Efficient Manufacturing, explains the various aspects that companies should consider when it comes to energy efficiency.

In addition to how this topic is being pushed in product marketing, legislation is forcing companies to think about the issue through energy audits and the introduction of energy management systems. Some of these measures are backed by government incentives promising reimbursements on energy costs. The prevalence of this topic in the public eye coupled with corresponding standards and laws shows us that long-term production strategies aimed at resource conservation cannot be achieved without considering energy efficiency. But how important will energy efficiency remain in the future as part of a resource efficiency strategy? And what are the challenges we might face as a result?

The growing environmental awareness from the 1980s/90s and the resulting implementation of environment management systems in the planning and control of manufacturing systems cast a spotlight on the issue of energy management and the role it plays in optimizing companies from the inside out. Corresponding tools and standards such as management systems, typically aligned with DIN standard ISO 14001 and the European Energy Management and Audit Scheme (EMAS), point to energy consumption as a central environmental factor, one which should be duly documented and minimized. In keeping with the general aims of environmental management systems, the primary focus has been

on “achieving environmental protection by preventing or reducing damaging effects on the environment.” This means energy consumption is quickly equated with its impact – harmful emissions – as an environmental indicator. The most harmful of these effects are carbon dioxide emissions, often cited as the cause of the greenhouse effect. Energy, in this respect, has been primarily looked at in terms of final energy consumption, which only in some cases, to get a more detailed analysis, was subdivided into electricity and fuel.

In the meantime, the global rise in significance of the greenhouse gas problem has led to increasing pressure to reduce energy-related carbon dioxide emissions. This is evident, for example, in the introduction and continual application of eco-design guidelines and newly established national energy savings plans (which also lay down target requirements for trade and industry). As the issue becomes more relevant, people are now placing greater value on energy management, which has led to the rise of ongoing standards for using energy as an economic commodity. For example, since 2012, we have had the DIN standard ISO 50001 as a guideline for establishing and applying energy management. The main focus in this area lies in organizations and internal company processes. The process of quantifying energy flows and discovering potential sa-

vings as part of audits are standardized under DIN standard 16247. The German energy service provision act (EDL-G) makes it mandatory for companies to set up an energy management system or carry out audits in line with the standards named above. This applies to all companies not classed as SME.

In the past, implementing these measures and meeting these requirements was a big challenge for companies. This led to strong demand for consulting services in the field. Manufacturing systems are defined by the advanced need for various energy services. In production processes, "work" is actually needed to transform products (i.e., to change the nature of a product) or for transportation (i.e., to convey the end product). This work is either provided through electrical power or through additional energy carriers such as compressed air or hydraulic systems. There is also a need for process heat as a useful energy source and this is needed to affect chemical reactions and phase changes such as melting and evaporation. The need for process heat is also often satisfied through additional energy sources such as steam or hot water.

In addition to the actual requirements for work and heat in the manufacturing process itself, there are other energy demands related to the manufacturing process and these also have to be met. This includes heating and lighting of production halls and providing energy for communication technologies. Energy consulting and state-funded programs for investment projects have previously only focused on the energy consumption in actual manufacturing or energy conversion processes immediately upstream or downstream of production. These are often referred to as cross-sectional technologies, since they are universal in many branches of industry and because they employ similar technologies. This focus initially seems reasonable for the following reasons: Most consultants have expertise in building or facility technologies, or in individual energy supply technologies such as compressed air or cooling, so as a result, these are the primary focus of consulting services. Furthermore, agencies offering funding programs are tasked with driving broader investment, making funding options available in all industries. As a result, they avoid tenders that are too highly specialized or ones that relate to individual production processes and sectors of industry.

Far-reaching, future-oriented energy efficiency optimization – even as part of holistic resource efficiency strategies – should take the following points into account: The first lever in optimizing energy efficiency is the actual manufacturing process. For example, there is no sense in optimizing the compressed air provision in bulk cargo transportation if the overall logistics concept within the manufacturing system is inconsistent. Energy optimization has to lie at the heart of the production process, at the actual point of energy requirement. As a result, a central lever for achieving energy efficiency lies in optimizing throughput. Since many auxiliary machines have high energy demands, even when they are running at partial load or are idle, specific energy demands sharply increase at low-capacity production. Energy conservation measures may be well-intended, but they can also threaten production or batches, or even have a negative impact on material efficiency, so in such cases they should be avoided from the start. The only way to save energy overall, is to conduct a holistic assessment of energy flows, including the supply chain. It is also important to consider material consumption when it comes to energy use. This is only possible if holistic life cycle

assessments (LCAs) are carried out and various production methods are compared under the same scenarios. Cumulative energy demand (CED), which in essence is about conserving energy resources, can be used as an indicator to compare various forms of energy consumption. As an alternative, global warming potential (GWP) can be used. This allows for a comparison of processes and technologies with respect to their negative impact on global warming.

Society's desire to minimize global warming has given the topic of energy efficiency a big push in the right direction. The general scarcity of our resources and the development of completely new technologies and processes (which are accessible globally thanks to the Internet), are shifting the topic back in the direction of overall manufacturing optimization, taking all used resources into account. Specialists should focus their expertise on combining technical and manufacturing know-how with the methodological skills needed to evaluate respective systems, and this should be given a greater priority by universities of applied sciences and the providers of consulting service. This is the only way to ensure that we meet political aims and the need to reduce greenhouse gases and improve resource efficiency.

Image: Energy flows in production



Prof. Dr. Georg Kleiser heads up the Steinbeis Consulting Center for Energy-Efficient Manufacturing at the University of Applied Sciences in Ulm and offers his customers consulting on increasing energy efficiency in trade and industry. He also offers evaluations and analysis of energy efficiency measures as well as energy optimization in manufacturing processes.



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## “Resource efficiency is a growth market.”

**An interview with Dr. Bertram Lohmüller, director of the Steinbeis Innovation Center for Sustainable Resources and Energy Management**

Dr. Bertram Lohmüller talks to TRANSFER about the sustainable and efficient use of resources and considers the role that social factors play. He also takes a look at future developments in this field.

**Dr. Lohmüller, you're a civil engineer with an MBA in marketing. How did you end up becoming so closely involved in the sustainable use of resources?**

Sustainable construction and energy efficiency are a core part of a civil engineering degree, and structural engineering also takes sustainability into consideration. Because I'm an engineer, I'm interested in all kinds of technology issues. If I think back to my first job at Bilfinger in Mannheim, I spent a lot of time looking at environmental issues and innovative ways to sustainably seal landfills and clean up sewer systems. During my time as a community councilor in Tübingen, I was closely involved in issues relating to the different ways to sustainably carry out urban development and source energy. I was a member of the environmental committee and the supervisory board of the municipal utilities company in Tübingen. The sustainable use of resources are still an important field of business and research today, on both a national and an international level. But to use new technologies and implement energy models properly in the field of energy and resource application, you need market acceptance and demand. So for me, the fields of technology and business development are closely intertwined. At our Steinbeis Innovation Center, competence relating to energy exploitation and resource application go hand in hand and they form part of the master's degree in Global Technology Management at the Steinbeis Transfer Institute called Steinbeis Global Institute Tübingen. There are further overlaps in our collaboration with Export-Akademie Baden-Württemberg.

**What do you believe is the best way to achieve sustainable and efficient resource utilization and what role do social factors have to play?**

Sustainable resource use is reflected in the moral values and behavior of (manufacturing) companies and consumers. Also, people are continuously coming up with new and improved technologies and exploitation options. One particularly important driver of this is digitalization (like the Internet of Things) because it makes it possible to offer physical objects for common use – things like cars, bikes and even places in a “sharing economy.” On a global level, it's important to look at technologies and implementation strategies, and the way resources are used sustainably and efficiently in Europe, and transfer this to other countries. Particularly developing nations face the challenge of implementing new methods for dealing with the rising pollution levels, despite the fact that resources are simultaneously becoming more scarce. I strongly believe that the only way to lay a sensible foundation for life for future generations is to attain a “new global awareness” in terms of the way we deal with our natural resources. So to implement resource-efficient models worldwide, it will be necessary to train the so-called experts and multipliers. This is why we're working in close collaboration with partners in Argentina, Brazil, the rest of Europe, India, and Iran, to put a master's degree in Global Technology Management in place. This degree pulls together the topics of sustainable resource use, renewable energy, and the Internet of Things, which are all important fields of technology and research.

**One of the topics your Steinbeis Enterprise focuses on is bioeconomics. What sort of issues do your customers ask you about in this respect?**

A good example is a research project backed by the Federal Ministry of Education and Research, which looks at “Polycultures involving the European crayfish (*astacus astacus*) and blue whitefish (*coregonus wart-*

manni)." The starting point for this project is the growing importance of fish farming in order to safeguard the worldwide supply of protein. Transferred to the European context, the challenge is to produce premium quality organic produce using local production methods in a high-price market segment. One way to meet this challenge is to farm edible freshwater crustaceans threatened by extinction and to use new types of mixed farming (polyculture) with local edible fish that is in strong local demand. The farming methods require new feeds and technologies (such as closed mariculture systems and pond systems), which have to be developed and tested. An exact-fit business model is also being developed with key players in the market. Another challenge is to set up regional networks with all key players involved in the organic product market. We're currently working on first ideas for setting up a website platform to optimize the value chain for the sustainable production of organic products. The aim of the platform is to make the value chain fair and transparent – with traceability – and to promote a mutual understanding in the (nutrition) industry, from the original producers to the end user. Another project involves the development of new kinds of plate membranes for use in the ultrafiltration of water. The idea is to use a new kind of technological procedure and optimize the membranes to improve the energy efficiency of ultrafiltration plants – and thus make it possible to operate drinking water treatment plants and process industrial wastewater more economically.

**Renewable materials are a key topic when it comes to the sustainable use of resources. What impact do they have on the environment – in a positive and negative sense?**

We're currently conducting research into renewable raw materials as part of two international innovation clusters in collaboration with universities, research institutions, public bodies, and businesses. The key issue we're looking at is the sustainable use of biomass along the Danube river, with an emphasis not just on how to use resources already available in our environment, but also the farming of fast-growing timber in plantations to be used as biomass. To lay a foundation for the project, we're doing a local stocktaking exercise to develop regional utilization models for renewable raw materials. It's really important to take the local situation into consideration in order to avoid the risk of over-farming and any threats this would pose to the local ecosystem. Making good use of unused biomass or cultivating fast-growing plants in plantation farming helps compensate for energy bottlenecks. A number of new methods are being looked at as part of this research project. But it's important that planting is adapted to regional conditions to make sure that nutrition is used optimally and that the Danube itself isn't polluted with irregular nutritional elements. Another goal with the project is to develop new, highly mechanized techniques for harvesting biomass products, as well as technologies for processing energy resources and validating their economic viability. But it would be short-sighted to use renewable timber and grass as biomass for combustion or gasification. It's more about building up and managing material cycles to use biomass intelligently. This means creating value chains for processing high-value timber into products, setting up collection systems for waste wood, and processing materials together with other raw materials to generate energy.

**Using resources sustainably will be an important issue for a long time to come. Where do you think the priorities will lie in the immediate future, which issues or problems?**

Resource efficiency is a growth market. Population growth, rising affluence and the trend toward urbanization are all fuelling growing demand for resources and shortages in the reserves of raw materials. I see this pressure to develop environmentally efficient and resource-efficient technologies, especially in the fields of energy, water, food production, and new materials. The challenges are varied, so the complexity this leads to means that new models are needed to closely dovetail technical, economic, and social innovations. In the western economies, these challenges are being met with technological developments, or new models like the sharing economy, citizen involvement, and connected (or smart) cities. From a global standpoint, the biggest challenge is actually to support emerging countries in managing their problems. Western technologies have to be adapted to the regional needs in developing countries through "frugal innovation," sometimes called low-cost innovation. New products and services for using resources sustainably make it possible to create new jobs and improve living standards. For us as a Steinbeis Innovation Center, this is a fillip to keep expanding our global network and to keep working together with our partners to develop new technology transfer models – in terms of the technology, the economics, and the social aspects – and to implement those models.

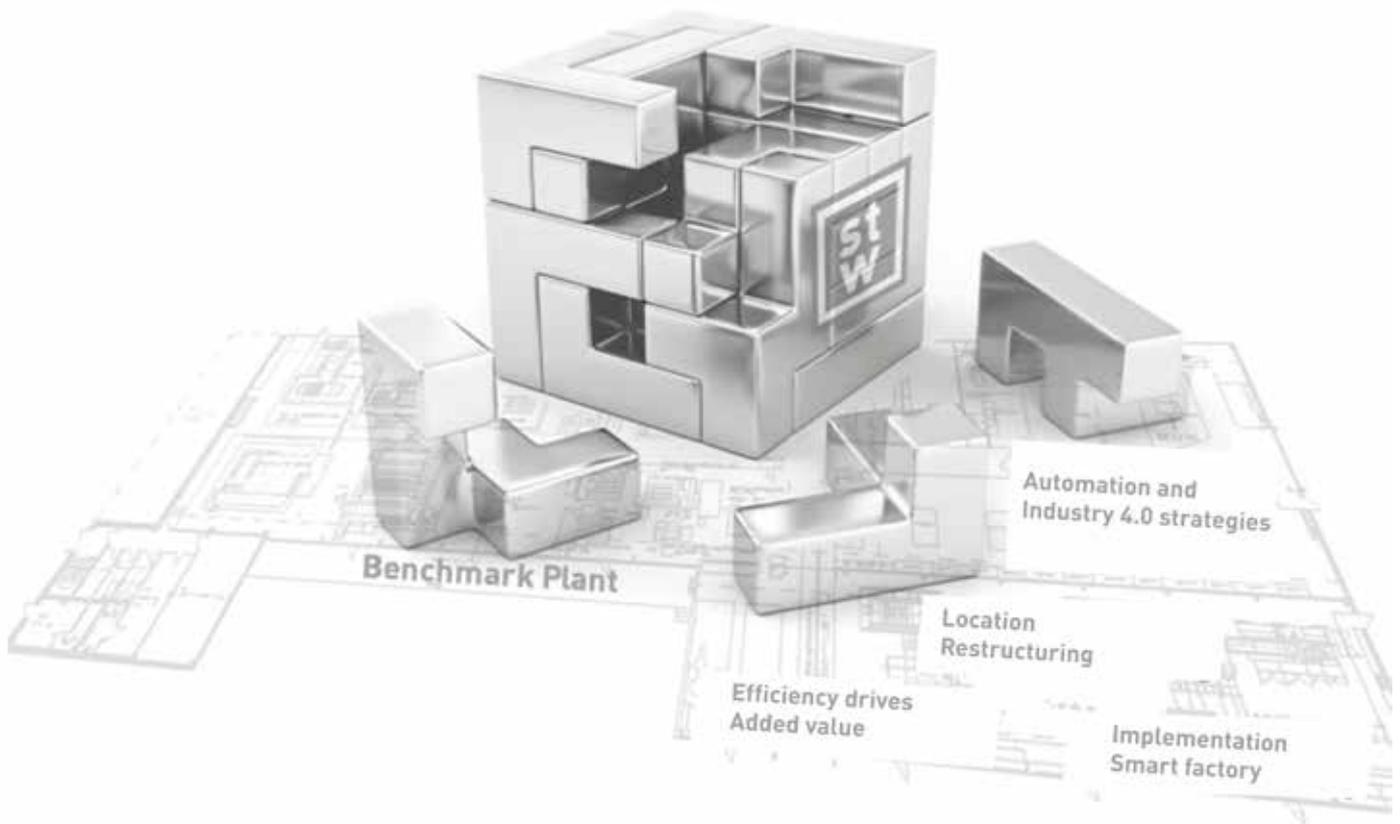
Image: Rotor blades on a wind power turbine. © Export-Akademie Baden-Württemberg



Dr. Bertram Lohmüller is co-director alongside Norbert Wagemann of the Steinbeis Innovation Center for Sustainable Resources and Energy Management. The services offered by the Steinbeis Enterprise range from setting up national and international innovation hubs to the implementation of research projects and providing advice on collaborative research.



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## “Logistics plays a leading role in the digitalization of the value chain.”

### An interview with Dietmar Ausländer, director of the Steinbeis Transfer Center for Logistics and Factory Planning

The factory of the future must make efficient use of resources. Which factors influence this? What role should logistics play when it comes to planning factories to use resources efficiently? A look at these questions and many others in an interview with Dietmar Ausländer.

**Mr. Ausländer, the factory of the future will have to be adaptable to change and quick to react. In addition, the increasing scarcity and rising costs of resources will also influence factory planning: resource efficiency will be key, but which factors will be the most decisive in this respect?**

Companies are now subject to continual change due to increasing globalization in the economy, calls for more and more customized products, and rising customer demands for better availability (e.g., 24-hour deliveries). Also, growing environmental awareness, stricter legislation such as the German energy saving regulations ENEC, and the continuing expansion of mobile communications play an important role, just as much as shorter innovation and product life cycles, plus the increasing willingness to collaborate along the entire supply chain.

On one hand, these megatrends are resulting in new ways of looking at the value chain within companies; on the other, they're having a significant impact on the design of future factories. The approach we take to future factories at our Steinbeis Enterprise is therefore called "smart factory." This is essentially based on the following:

- The efficient design of material flows
- Improved resource efficiency with respect to energy, raw materials, material use, and manpower
- Supply chain networking between different parties involved in value creation (suppliers, clients)
- Product network and "intralogistics" through the use of IT and process automation

Taking these different factors into account results in significantly more complexity in the factory planning process. For us as planners, this means the planning process has to be made more efficient to be able to react to changing conditions. Also, the planning process has to be more adaptable to gear itself to changing situations or the different business environment. Manufacturing facilities also have to be designed to make them more adaptable to changing requirements. So overall, there are a whole variety of major demands placed on the factory of the future and these go far beyond technology or commercial aspects.

**Your Steinbeis Transfer Center offers its clients factory planning services and location consulting and you place a great deal of emphasis on holistic consulting. How does this benefit your customers?**

We offer an end-to-end portfolio of services to help clients plan entire logistics systems and manufacturing facilities. Customers can count on our collaboration model at all stages of project planning and implementation, picking out the service modules they require. This allows us to offer all planning services under one roof. To deliver these services, we have to integrate specialized knowledge, drawing on a variety of specialist disciplines. To do this justice, we place a great deal of emphasis on the people working in the project team. It's important that the people in the team offer the right degree of professionalism, interdisciplinary knowledge, and international experience. It's here that we notice the major benefits offered by our Steinbeis Network and we actually recruit a significant portion of our project teams from this network.

More and more planning tasks now run in parallel to address the need for short planning cycles. We've also developed a planning method that involves clients at all stages. This merges the detailed process knowledge of the client with the planning know-how of my Steinbeis Enterprise. The decisive added value offered by this method lies in the quality of outcomes and our adherence to budgets and schedules.

To avoid poor investments, the feasibility and economic viability of the overall undertaking are checked right at the beginning of the project. This integrative and interdisciplinary approach benefits customers because they're given a made-to-measure concept that's future-proof and is a good match with their expectations.

### What role do logistics play in resource-efficient factory planning?

The role of logistics in the factory planning process has changed fundamentally over the past 20 years. Factories and sites are now planned according to logistical criteria. The approach has changed too. First the process is planned, then comes the framework.

Logistics play a leading role in the digitalization of the value chain. Networking smart production and smart logistics will pave the way for new business models and business processes. For example, it will be possible to make completely different products on the same production line. Or it will be possible to customize a variety of products and still produce them economically in batch sizes of a single unit. In many areas, logistics will be able to run autonomously, guided by intelligent algorithms, based on up-to-date machine data. Only recently, we planned a logistics center that moves around products largely automatically, right to the trucks waiting in the loading docks. Production facilities can automatically send their requirements to automated warehouses without human involvement and a transport robot brings the products autonomously. Automated control loops were mocked for a long time. Now they're undergoing a renaissance. Smart logistics are unthinkable without IT. These are areas of action that will decide the competitiveness of production and commerce, here and now. Because of all these factors, combined with IT and process management, logistics play a central role in resource-efficient factory planning.

**The challenges posed by scarce resources will become more and more important in the future. In what ways do you believe this will affect factory planning and what demands will this place on the work carried out by your Steinbeis Enterprise?**

Our clients' most important goal is to prevent any kind of resource wastage by optimizing existing production facilities or building new ones. The shortage of resources in terms of qualified personnel, energy, raw materials, and land has resulted in planning using all available technologies as intelligently as possible.

The interdependencies between building architecture, technical infrastructures, and logistics are significant. Planners therefore have to talk closely with other people very early in the planning stages to determine uniform processes and thus fulfill the prerequisites for efficient factory operations. The sequencing and positioning of individual functions within the business are no longer based solely on material flows; they increasingly take energy factors into account. To do this in practice, we use special checklists and software packages. These ensure that factory planning works in harmony not just with energy efficiency but also efficient material use.

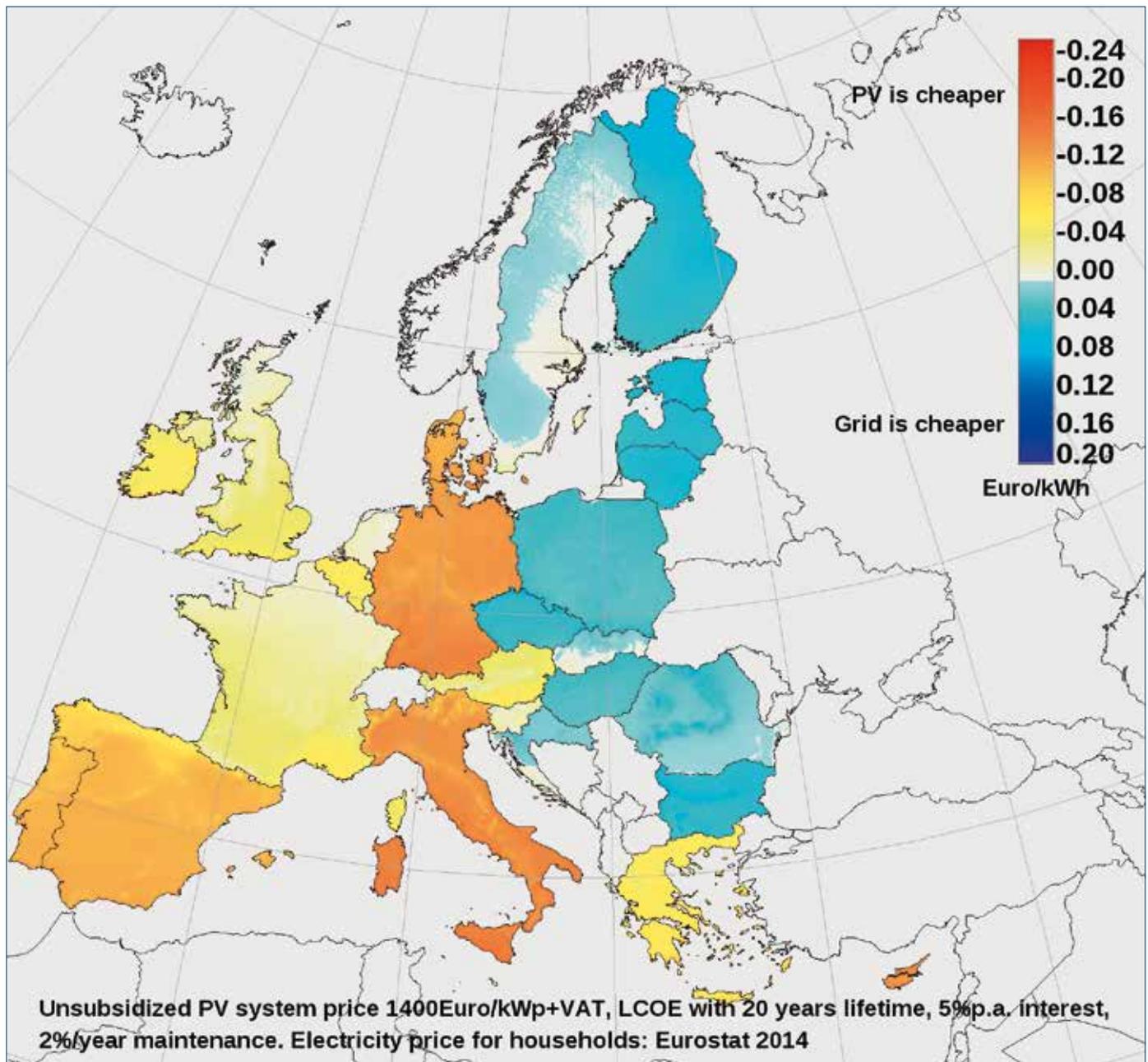
Image: © Steinbeis Transfer Center for Logistics and Factory Planning



Dietmar Ausländer is director of the Steinbeis Transfer Center for Logistics and Factory Planning, where projects revolve around the fields of logistics consulting, process optimization, factory planning, business location consulting, and production planning.



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## “We’re experiencing a transformation in the energy system.”

### An interview with Professor Gerd Heilscher, Director of the Steinbeis Transfer Center for Local Renewable Energy Systems

Professor Gerd Heilscher provides TRANSFER magazine with an overview of key developments in the field of renewable energy systems and talks about the importance of smart grids during the current energy transition. He also discusses sustainable energy provision and offers a prediction for future energy scenarios.

**Professor Heilscher, you have decades of experience in the planning and analysis of renewable energy systems. Looking back, what would you describe as the key turning points in this area?**

The biggest success has to be cost reduction, not just in the way wind energy is used but also in photovoltaics. Local solar power – on the roof of your house in Germany and many parts of the European Union – is

now cheaper than the electricity supplied by the energy companies. A key driver behind this development was the expansion in feed-in legislation with feed-in tariff degeneration. At the same time, manufacturers and service providers have safeguarded the high standards of renewable energy systems, because poor quality and downtime was having an impact on the feed-in tariff system with a direct effect on profitability.

**You were honored with a science award by the City of Ulm in 2014 for your research into smart electricity grids for the energy transition. How important are smart grids for the environment, as well as consumers?**

Switching our energy provision to local renewable energy systems will bring about sweeping changes in the supply structure, as well as the companies and business models that are linked to it. The point is that this isn't an "energy transition" at the moment, we're experiencing a "transformation in the energy system." Liberalization of energy provision transformed energy users into consumers. At the same time, a transition to different energy provision is transforming those consumers into providers. These two terms can effectively be combined to describe a new group of "prosumers." All parties previously or even only recently involved in energy provision will have to get accustomed to the new structure of energy flows and the impact this will have on the energy market.

Smart grids are an important constituent of this transformation. Smart grids initially mean more information on the energy flows in the local supply structure. At the same time, this information lays a foundation for new services.

**Sustainable energy provision is important, but somehow it seems it's not – or not yet – working properly. Why do you think that is?**

The way I see it, sustainable energy provision clearly is actually working properly. But at the same time, there are losers in this energy system transformation. The established energy providers were extremely late to pick up on the change going on and it's not clear yet how those companies will cope with reconfiguring to local provision.

Even the Federal Ministry of the Environment was caught out by the switch to renewable energy provision. Putting a ceiling on electricity prices and taxing solar energy was a bit like pulling the handbrake to give the energy providers a breather so they could cope with the change.

Just a small amount of solar energy in the market was enough to wreak havoc with the business model of new power stations. Although it may have been a surprise for most market players, any fifth semester student could easily figure it out. The green and white paper of the Federal Ministry of Economics on restructuring the energy market has now started the discussion process.

However, for renewable energy provision to keep working as the system is rolled out, more changes are needed. Even holding electricity prices down won't be enough to stop this development. But the crucial question is who will be the future key players in the energy market. In the same way that Industry 4.0 is shaping competition between Google and co. and manufacturing companies in Germany, there's already a contest underway between IT newcomers and the conventional energy industry.

**Your experts at the Steinbeis Transfer Center look at the energy industry and energy management, as well as smart grids and local energy systems. What sort of areas of industry do your clients approach you from and what problems do they ask you about?**

We're working with Ulm University of Applied Sciences on smart grid topics. Our smart grids team mainly focuses on public utilities companies and is supporting the grid operators, meter service providers, and energy providers with the transition process. To do this, we're looking particularly closely at concrete scenarios with fully expanded local provision. We're also examining the impacts on the electricity grid and energy flows. The interesting issues at the moment are how to link up electricity, heating, and gas grids, as well as how to use smart meters and communicate directly with power inverters.

**What do you think we should expect to happen in the medium term with respect to future energy scenarios?**

I grew up with gray telephones with a rotary dial on the front. Today I use a telephone that hasn't even got a wire and making a call is just one of many possible functions. For me, the initial building blocks are there as a starting point for exciting new energy scenarios, with things like flat rates for energy use, adaptable electricity and heating demand depending on the energy supply, the advent of storage systems, plus lots of other new products and services.

**Image:** The differences between the cost of solar power and domestic electricity prices in Europe. Source: H. Ossenbrink, A. Jäger-Waldau, N. Taylor, S. Szabo, T. Huld, E. Dunlop: TOWARDS A EUROPEAN UNION OF PHOTOVOLTAIC SOLAR ELECTRICITY"; 31st European Photovoltaic Solar Energy Conference and Exhibition; [https://www.researchgate.net/publication/283513499\\_TOWARDS\\_A\\_EUROPEAN\\_UNION\\_OF\\_PHOTOVOLTAIC\\_SOLAR\\_ELECTRICITY](https://www.researchgate.net/publication/283513499_TOWARDS_A_EUROPEAN_UNION_OF_PHOTOVOLTAIC_SOLAR_ELECTRICITY)



Professor Gerd Heilscher is director of the Steinbeis Transfer Center for Local Renewable Energy Systems at Ulm University of Applied Sciences. Work at the Steinbeis Enterprises focuses on the areas of photovoltaics, the energy industry, energy data management, smart grids, smart metering, smart homes, the grid integration of local energy systems and energy meteorology.



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## The 2015 Steinbeis Day

### The Steinbeis Arena on Industry 4.0 – discussion forum – Steinbeis workshops – exhibition

The 2015 Steinbeis Day was marked by two new changes, both of which received an extremely warm reception from the guests. This year around 500 people turned up on the traditional "Steinbeis Friday," i.e., the last in September and for the first time Steinbeis Day took place at the Steinbeis House for Management and Technology (SHMT) in the suburb of Plieningen in Stuttgart. The program was also completely overhauled to lay emphasis on interaction, networking, and forging new contacts – which the new location is virtually made for.

The focal topic for the day, which revolved around an interactive Steinbeis discussion forum with modern multimedia, was a thought-provoking question: Is Industry 4.0 Making the Grade in Industry? In the inner circle, Prof. Dr.-Ing. Gisela Lanza (Karlsruhe Institute of Technology), the lecturer Dr. Heiner Lasi (the Ferdinand Steinbeis Institute, Steinbeis Foundation), Dirk Slama (Bosch Software Innovations), and Roman Zitzelsberger (IG Metall Baden-Württemberg) expressed their sometimes contentious opinions on Industry 4.0 in a debate moderated by Marcel Wagner. Their views were then commented on, sometimes also critically, by further forum members in an outer ring, which was moderated by Tina Kraus. This ring was comprised of Claudia Gläser (Gläser GmbH), Johannes Matheis (Jomatik GmbH), Johann Peter Pfeifer (Baden-Württemberg Trade Association of Electrical and Information Technology), and Klaus Dietrich Wachlin (vicar, moderator, publicist). For people who could not attend in person, there are excerpts in German and English in

the Steinbeis media library. After the arena, the SHMT opened its doors to all guests. There were workshops to provide an opportunity to go into topics in more detail with the speakers, plus lunchtime snacks and relaxed conversation with others.

The day started with the bestowal of the Seifriz Award. The Seifriz Award is a transfer prize of German skilled trades that has been awarded for 25 years to honor successful collaboration between skilled trades and science. It is awarded once a year by the Baden-Württemberg Skilled Crafts Conference and the German Confederation of Skilled Crafts in collaboration with the business publication *handwerk magazin* (tradesman magazine), the Signal Iduna Insurance and Finance Group, the Association for Technology Transfer in Trades, the Ministry for Finance and Economics in Baden-Württemberg, and Steinbeis. By tradition, the award is bestowed annually at the Steinbeis Day.



During the open part of the day, more members of the Steinbeis Network joined workshops in the afternoon, which offered insights into totally different topics with experts and many others looking at the Steinbeis Company Competence Check®, international Steinbeis activities, issues related to bookkeeping and accountancy, and current strategies related smart manufacturing (Industry 4.0).

To demonstrate that there is also an artistic side to science, the annual event has included an exhibition of Steinbeis art for several years now. To coincide with the Steinbeis Day at the SHMT, Steinbeis also welcomed art lovers to an exhibition at the House of Commerce. This year's exhibition is by Katja Wolter, a native of Greifswald who is not only the director of the Institute for Resource Development, a Steinbeis Research Center, but who is also a painter and is fascinated by co-habitation in society and the influence of life experiences and how they shape people. Wolter mixes the colors of the sands of the Baltic Sea to add accents of home to her pieces. Her exhibition can be viewed at Steinbeis headquarters until the summer of 2016.

Extracts of the forum discussion and photos taken on the day are available at [www.steinbeis-tag.de](http://www.steinbeis-tag.de) and in the Steinbeis media library. The next Steinbeis Day will take place on Friday September 30, 2016 at the Steinbeis House for Management and Technology (SHMT) in the suburb of Plieningen in Stuttgart.


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Dipl.-Ing. (FH) Thomas Wendel  
Johanna Wiczorreck  
Professor Dr. Rainer Würslin





## The 2015 Steinbeis Evening

### The Steinbeis Foundation Transfer Prize – employee honors – premiere of *Early Birds*

This year's evening event, which followed the traditional Steinbeis Day, showed what happens when traditions meet visions. Around 600 guests from Germany and abroad were invited to the Beethoven Hall at Stuttgart's Liederhalle convention center. The evening revolved around honors awarded to long-standing members of the Steinbeis Network, the bestowal of the Löhn Award (the Steinbeis Foundation Transfer Award) and the premiere of a Steinbeis film called *Early Birds*.

Long-term company success always revolves around its employees. We traditionally recognize this at our Steinbeis Evening. As in the past, Prof. Dr. Michael Auer and Manfred Mattulat, both members of the Steinbeis board, thanked a multitude of Steinbeis members for their 20 to 30 years of commitment to the Steinbeis Network.

Three project teams and one special award winner received this year's Steinbeis Foundation Transfer Award – the Löhn Award – in recognition of their contributions to outstanding transfer. The award has been bestowed since 2004 for exceptionally successful projects carried out by Steinbeis Enterprises and their project partners in which they transfer know-how and technology into business. The prize money totals up to €60,000 to go towards future-oriented, innovative projects with a bearing on transfer. The degree of project success is a key criteria for winning the award, based on the quality of the transfer process and the recognizable transfer potential. Special prizes are sometimes also awarded for projects, services, and contributions worthy of particular acclaim. The Löhn Award was initiated in honor of the work of Prof. Dr. Dr. h. c. mult. Johann Löhn, former chairman of the board and current honorary trustee.

This year, the Steinbeis Foundation Transfer Award for outstanding technology transfer projects was awarded to the Steinbeis Transfer Center eyetrial, part of the Institute for Ophthalmic Research in Tübingen, for its collaboration with VISUS GmbH (Herrenberg). This resulted in the development of standardized conditions for testing visual contrast. An award was also given to the Steinbeis Transfer Center for Energy-Efficient Power Electronics for Electrical Drives and Power Storage Systems (Aschaffenburg) and Hottinger Baldwin Messtechnik GmbH (Darmstadt). The two project partners successfully optimized raw data analysis and the precise measurement of electric drives. Steinbeis Interagierende Systeme

GmbH (Esslingen) and Daimler AG (Stuttgart) also received the 2015 transfer award. Their two teams of experts developed an innovative testing environment and software systems for modern driver assistance systems. This year's special prize was awarded to Prof. Dr. habil. Hans Jobst Pleitner. The Steinbeis Foundation honored Prof. Pleitner for his outstanding contributions to the development of Steinbeis University Berlin, acting as a role model who reflects the very values of science, transfer, and society as a whole.

As all good things come in threes, there was a third highlight at the Steinbeis Evening. The Beethoven Hall was transformed into a movie theater and the curtains opened on a short Steinbeis film called *Early Birds*. It felt just like a grand movie premiere. The young actors Lilly and Louis Häussermann, who performed in the main roles of the movie produced by Rolf Heiler, also talked about their adventures during filming (more on the movie on page 47).

A Steinbeis Evening never ends without looking forward to the next year: The 2016 Steinbeis Day will take place on 30 September 2016, as usual in the Liederhalle convention center in Stuttgart.

For more information about this year's Steinbeis Foundation Transfer Award winners, simply flip through the next few pages. Entry forms for the 2016 award can be downloaded on the website at the end of January 2016 ([www.loehn-preis.de](http://www.loehn-preis.de)).



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## Testing Eagle Eyes

### The Steinbeis Foundation Transfer Award 2015

Testing visual contrast with contrast boards – special viewing boards with graduated levels of contrast – is an everyday medical routine in ophthalmology. It is used to check new treatments for eye conditions. *eyetrial*, the Steinbeis Transfer Center at the Institute for Ophthalmic Research in Tübingen, has been working with VISUS GmbH from Herrenberg on standardized conditions for testing visual contrast. In recognition of their successful partnership, the two project partners have been awarded the Steinbeis Foundation Transfer Award.

At the start of the project, the main difficulty was that it was not possible to create uniform conditions for illuminating contrast charts. In a series of experiments, the Steinbeis experts at the Institute for Ophthalmic Research at Tübingen University Hospital ascertained that standard room lighting – no matter how they are made – cannot produce homogenous lighting conditions. The luminance required to test photopic contrast sensitivity is governed by DIN standard EN ISO 8596, but this was neither attainable during testing relating to driving conditions nor during clinical testing. After consulting specialists in traffic safety ophthalmology, the team tested a technical solution and decided to develop an illumination system called LUVIS.

After further consultation and developing a marketing strategy, the Steinbeis team quickly contacted businesses that supply measurement devices to occupational health physicians, ophthalmologists, and pharmaceutical companies. This resulted in a successful partnership with VISUS GmbH from Herrenberg, a provider of eye testing products and visual training. The first LUVIS prototype was ready that same year and the device went into series production the following year. LUVIS ensures that testing boards under incident light are illuminated according to standards during photopic contrast and visual acuity testing, not only in terms of absolute measurements but also uniform luminance across the entire chart surface. It thus ensures that testing conditions are suitable and remain uniform for all tested drivers. Used in patient studies aimed at developing new kinds of treatments, LUVIS also makes it possible to keep measurement conditions uniform at different international loca-

tions. There was no competitive product on the market at the beginning of the project and there is still no competition now.

Another area for future collaboration between the Tübingen-based Steinbeis Enterprise and VISUS lies in the miniaturization of illumination cabinets and contrast charts, especially given the major advantages small and portable devices offer in occupational health environments.

**Image:** Peter Fanti, Moritz Fanti, Liselotte Betz-Martin, Prof. Dr. med. Barbara Wilhelm and Prof. Dr. med. Helmut Wilhelm (left to right)



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## Getting a Feel for Energy Efficiency

### The Steinbeis Foundation Transfer Award 2015

The desire to reduce energy consumption in industry, domestic use, and road traffic, is placing more demands on the energy efficiency of electric drives and motors. To really understand how well attempts to optimize the efficiency of electric machines and convertors actually work, accurate measurement devices are needed, as well as the right measurement techniques and analytical procedures. Motivated by strict customer requirements from businesses and the need to simultaneously capture and process electrical and mechanical measurements in real time, the Steinbeis Transfer Center for Energy-efficient Power Electronics for Electrical Drives and Power Storage Systems, which is based at Aschaffenburg University of Applied Sciences, has been working in collaboration with the Darmstadt-based measurement technology company HBM (Hottinger Baldwin Messtechnik GmbH) to define the specifications required for measurement devices and data analysis, and to then implement these in practice. The two partners received the Steinbeis Foundation Transfer Award for their raw data analysis and the accuracy of the efficiency measurements taken on electric drives.

To ensure that energy efficiency measurements match actual applications and generate meaningful results, the experts used a measurement model based on time-varying load points. The team first optimized the electric current measurements that are used to gauge the electrical output of rectified drives. Based on the electrical data and mechanical dimensions, these resistances were then adjusted precisely for the Genesis HighSpeed data recorder series produced by HBM. The accuracy of these resistances lies at 0.02% within the relevant frequency range.

The experts also came up with analysis methods to determine other important parameters for electrical machines and drives. For example, using software called Perception, it is now possible to calculate the air-gap torque in rotating field machines. This is done with raw data measurements of currents and voltages, and these are plotted on graphs over time. Calculating when there are air gaps makes it easy to assess the dynamic properties and the accuracy of drive controls.

To explain and illustrate the measurement techniques and different analytical methods to experts, the team built a demonstration unit. This consists of a complete drive test bench with a testing and load unit, frequency inverters, and a complete array of sensors. One challenge was

to minimize the weight and size of the demonstration device so that it could be checked as airline baggage.

The success of the collaboration was recognized by the Steinbeis Foundation's transfer award – the Lohn Award – and this provided a stepping stone to a new sector of industry and new markets. Some of the results of the transfer project have been shared in scientific publications and presented in speeches. They also form the basis of two doctoral studies being conducted by research assistants at the university. Both of the project partners anticipate further interesting project ideas in the field of efficiency improvement.

**Image:** Dirk Eberlein, Klaus Lang, Thomas Kowalski, Prof. Dr.-Ing. Teigelkötter, Michael Reis, Peter Ackermans and Norbert Strack (left to right)



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## Virtual Testing of Reality

### The Steinbeis Foundation Transfer Award 2015

The development of driver assistance systems to avoid or at least reduce the number of car crashes has resulted in a rise in demand for resources to conduct maneuver testing in the lab on driver assistance equipment. Carrying out comprehensive testing on software algorithms is extremely difficult in vehicles, since certain scenarios can only be created in special environments and these often place significant strain on test drivers. It was only after the serial development of ESC devices that the automotive industry really adopted automated testing of driver assistance system in hardware-in-the-loop (HIL) test environments. These involve simulating surroundings virtually. It was against this backdrop that Daimler AG, represented by Mercedes Benz Cars Research and Development in Sindelfingen, asked Steinbeis Interagierende Systeme GmbH to work on the development and implementation of a system that would make it possible to operate a vehicle control device to work with driver assistance functions on a standard PC, and to use this device to test virtual trips. The collaborative project earned both companies the 2015 Transfer Prize from the Steinbeis Foundation.

The development alliance already spawned the first prototype ten years ago. Today, the test system and the method – coined Mini-HIL – is being used in the serial development of driver assistance systems that take in their own surroundings. The complexity of testing environments, especially when it comes to the simulations they require, were encapsulated in such a way that the time needed to become familiar with using the test platform could be kept to an absolute minimum. As each generation of driver assistance systems was developed, the growing number and complexity of vehicle functions meant that testing intensity kept on multiplying. It is always a challenge to keep testing protocols simple and useable, yet still address the many different demands placed on testing platforms.

The testing instruments were designed by Daimler and the Steinbeis experts in collaboration with the Universities of Applied Sciences in Esslingen and Karlsruhe, drawing on a variety projects that have been

looking at future technologies, property rights, degree theses, and dissertations. The success of the development and transfer achieved by the project partners resulted in the bestowal of the Steinbeis Foundation's Transfer Award.

**Image:** Dr. Oliver Bühler, Steffen Wittel, Karsten Hüntich, Dr. Daniel Ulmer, Markus Höfling, Dr. Helmut Keller and Joachim Missel (left to right)



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## A Role Model for Demonstrating Values in Science, Transfer, and Society

### The Steinbeis Foundation Transfer Award 2015

Prof. Dr. habil. Hans Jobst Pleitner is awarded the special Steinbeis Foundation prize for his many years of exemplary service in knowledge and technology transfer on behalf of the Steinbeis Network. The foundation honors him as a role model for demonstrating the values that are important in science, transfer, and society.

After completing an apprenticeship as an industrial management assistant at Siemens and its German subsidiary, the Deutsche Grammophon record label, Hans Jobst Pleitner went on to study business administration at the University of Münster and the St. Gallen Graduate School of Commerce, now part of the University of St. Gallen (HSG). Deciding on an academic career path, he stayed at St. Gallen and was awarded his doctorate in 1972, becoming an adjunct professor at the university that same year. Three years later, he became director of the Institute for Industry (IGW), now the Swiss Research Institute of Small Business and Entrepreneurship at the University of St. Gallen (KMU-HSG). At the age of 45 he wrote his habilitation thesis. From 1985 to 2000, he served as a tenured professor of general business administration with a focus on small and medium-sized enterprises (SMEs) at the University of St. Gallen.

Hans Jobst Pleitner made significant contributions to the establishment of Steinbeis University Berlin (SHB). As director of the IGW, he opened doors for the founding of the St. Gallen Management Seminar in Germany, which was one of the key academic programs at SHB. He also actively supported and influenced the development of SHB's first programs of study. All of this was achieved thanks to his cooperation with

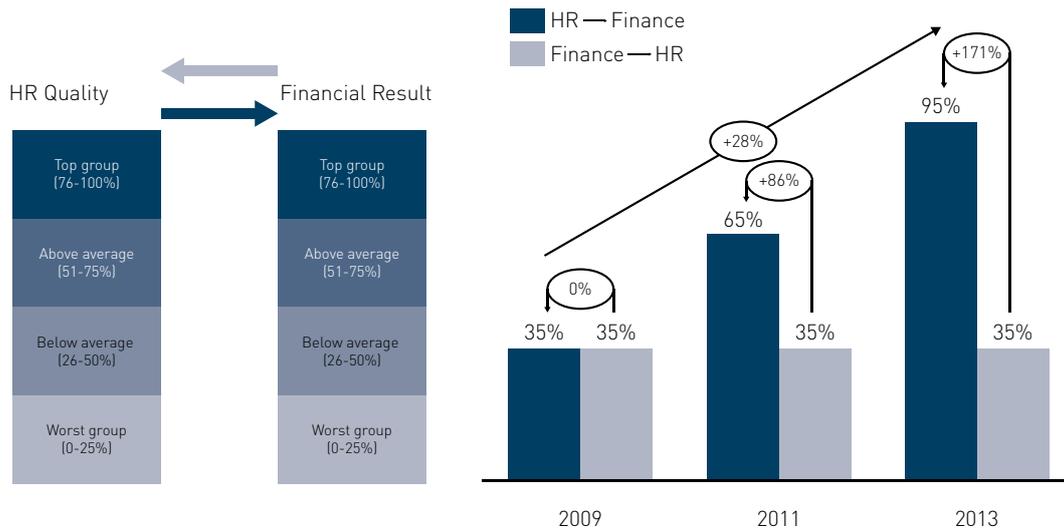
Steinbeis, a very unusual course of action at the time. After receiving the status of professor emeritus at the University of St. Gallen in 2000, he became a professor for entrepreneurial management at SHB.

Over the last 15 years, Hans Jobst Pleitner has offered SHB exemplary dedication. In addition to his extraordinary commitment to teaching and advising students, he has shown devotion and support in the development of the project competence doctorate, which has been the main focus of his endeavors in recent years. He will retire his services to Steinbeis at the end of 2015. With this special award, Steinbeis would like to thank Hans Jobst Pleitner for his exceptional contribution to the success of SHB, while acknowledging his lifetime achievements in two-way knowledge transfer between academia and SMEs.

Image: Prof. Dr. habil. Hans Jobst Pleitner



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## Management Quality as a Driver of Business Success

### Steinbeis study points to data-driven HR as a value driver within companies

Since 2009, Steinbeis University Berlin (SHB) and the management consulting company zeb have been conducting a biennial personnel survey. The study involves surveying HR managers, executives, and people with direct line responsibility at banks in Germany, Austria, and Switzerland. The recently published longitudinal study was managed by the Steinbeis Transfer Institute zeb/business.school backed up by seminar papers written at the School of International Business & Entrepreneurship (SIBE) at SHB.

Personnel managers often ask themselves – and are asked by senior managers – what measurable contribution HR work makes to company success. But is it actually possible to measure the value of HR management? According to the recently issued study, it certainly is. The figure next to this article shows how this is calculated. Companies are categorized into four groups according to the quality of their management. They are also categorized and divided up based on their financial success. The graph on the right shows the results: If one calculates precisely how management quality can determine financial success, the result shows a correlation of between 35% (2009) and 95% (2013). If one calculates the correlation between financial success and management quality, the figure remains constant at a significantly lower level of 35%.

What is this data based on and how is it gathered? Around 1,900 banks and 2,700 respondents have taken part in the studies until now. At 94 banks that took part in three studies in a row, the project team has now conducted a longitudinal study into the quality trends and personnel developments spanning the three measurement periods in 2009, 2011, and 2013. The quality of HR management is measured by looking at processes in the HR department, the implementation of HR measures within different departments, the strategic orientation of HR activities based on support given to senior management, and employee performance. The analysis was based on guidelines for assessing quality laid down by the European Foundation for Quality Management (EFQM). The survey was based on an online questionnaire looking at specific actions such as "Is your HR strategy based on key indicators taken directly from the business strategy?" The answers were scored on a five-point scale from 0% (rarely or never) to 100% (regularly and systematically).

Cost and revenue figures were also worked out for each company participating in the study by examining annual reports. As banks all use the same reporting methods, the experts at Steinbeis University did this for net profit margins, cost/income ratios, and HR cost rates using a moving three-year average. Other figures used included the average balance sheet total, the number of workers (headcounts and full-time capacity), and staff fluctuations. For the first time, this made it possible to work out the direct relationship between the quality of HR management and the financial success of a company.

It has not been known until now whether such improvements actually deliver measurable benefit in financial terms. What these calculations demonstrate is that 95% of the variance in the financial success of a bank is determined by its HR processes. According to the 2009 HR study, this value only stood at 35% because the financial crisis and the growing importance of client business also significantly raised the importance of HR management. The financial strength of banks only accounts for 35% of the quality of HR management. The evaluation of the longitudinal study is also clear. If a company raises the quality of its HR management, it also improves costs and revenues. But if quality goes down, the financial indicators also get worse.

Recent studies show that, viewed internationally, around 20% of firms have suitable evaluation methods for assessing large volumes of internal and external data. Only half of such evaluations then make their way into HR reports or HR dashboards. Around 15% of the respondents at the banks in the Steinbeis study use advanced data analysis methods but under 5% have access to a structured, continually updated HR dashboard.

The team in charge of the study has been working with DekaBank, the central asset manager of the German association of savings banks (Sparkassen-Finanzgruppe), showing that things can be different. Drawing on the results of the studies, the experts developed an HR risk dashboard that supplies all departmental heads with updated data on their personnel (accumulated monthly). The system structures the most important operational HR risks, motivation, shortage, staff losses, adjustments, and staff potential, categorizing data in grouped topics that are clear and easy to understand. Grouped topics are explained with key financial and HR indicators. The dashboard uses a traffic light system to show if figures go above or below key thresholds with back data for the last five years.

In simple and practical terms, the results of this study mean that the value of HR management contributions can be measured – and it is much greater than expected. To put these results to practical use, quality-based HR indicators and success-based financial indicators have to be pulled together on a dashboard. These key performance indicators should already be available to the company or be easy to identify. After an initial introduction and training phase, the HR dashboard can lay a foundation for the planning and implementation of HR measures.

## Literature

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**Image:** Left: calculation of the correlation between management quality (grouped top to bottom) and growing financial success. Right: rising dependence of banks' financial success on the quality of their HR management (percentages corresponding to explained variance (corr. R<sup>2</sup>), canonical discriminant function analysis)



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## Welcome to the Steinbeis Network

**Steinbeis know-how:** There are currently more than 6,000 experts actively involved in knowledge and technology transfer at around 1,000 Steinbeis Enterprises. The portfolio of services offered by the Steinbeis Network ranges from research and development to consulting, expert reports, training, and continuing professional development for all fields of technology and management. And this network continues to expand. For an overview of the most recently founded centers go to [www.steinbeis.de/en/news](http://www.steinbeis.de/en/news). Welcome to the Steinbeis Network!



Information on recently founded enterprises in the Network can be found at [www.steinbeis.de](http://www.steinbeis.de)



More on recently founded enterprises in the Network can be found at [www.facebook.de/Steinbeisverbund](http://www.facebook.de/Steinbeisverbund)



## Certification Course to Become Healthcare Compliance Officer (HCO)

Staff training on compliance in the health care industry

Corruption in the health care industry became a point of political debate this year, culminating in the German federal government drafting legislation to combat this particular type of corruption. To address the gaps left behind by current practices and the risks associated with them in the health care industry, the School of Governance, Risk & Compliance (School GRC) at Steinbeis University Berlin (SHB) has developed a certification course that is specifically tailored to the requirements of the health care industry. The next course starts in early 2016.

The course involves 5 days of classroom sessions from Feb 29–March 2, and on March 14–15, providing a fast-track introduction by looking at the topics of anticorruption measures, laws forbidding illegal payments, hospital compliance, self-monitoring in the pharmaceuticals industry, combating inappropriate behavior, internal enquiries, and compliance itself. The course was developed under the supervision of legal expert Dr. Daniel Geiger, who worked for many years in the pharmaceutical industry before specializing as an attorney in medical law. The certification course is targeted at specialists and managers at pharmaceutical companies, businesses involved in the provision of medical products, hospitals, medical services centers, convalescence centers, health insurance companies, health providers, medical associations, and specialist doctors' associations.

## ZCertification Course on Energy Management in Costa Rica

SHB “administrador de la energía” certification

Despite the large proportion of renewable energy used on the domestic energy grid in Costa Rica, the country is still struggling with continually rising energy prices. Electricity prices in the country have more than doubled in the last decade alone. At the same time, local industry representatives say that energy prices are the most important factor in limiting the competitiveness of industry. Thanks to a collaboration between local universities, the environment and energy ministry, electricity providers, technology suppliers, the Costa Rican chamber of commerce CICR, and German experts on development cooperation, one answer has been found regarding the strong demand for effective energy know-how: qualification as an Administrador de la Energía. This is the result of a joint initiative between the CICR, a regional energy program called 4E run by GIZ GmbH (the German Association of International Collaboration), and the competence institute unison, a Steinbeis Transfer Institute at Steinbeis University Berlin.

The training course offered 120 hours of tuition and was attended by local experts, with more than 50 people from 40 private and public institutions. Aside from the purely technical aspects, particular emphasis was placed on the feasibility of energy efficiency and renewable energy projects, as well as local legislation and quality standards. To pass the course, participants have to put their knowledge to practical use at work and present their results to the group. The theory modules are underpinned by workshops, panel discussions, and study trips. The program is so



Sandra Kuwatsch

Graduates of the last certification course included legal expert Sandra Kuwatsch, who has been head of personnel and law at the Leipzig University Hospital since 2012 and performs a key role as the person responsible for compliance at the health provider. “The HCO certification course is an ideal foundation for me, providing the best possible way to establish and expand on my role as a compliance officer. The lecturers in the different topics were an outstanding choice and were excellent at introducing me to different legal aspects, with practical tips on investigation principles.”

After the course, the participants have the option of taking an exam and thus gaining a university certificate from Steinbeis University Berlin. This certificate will be recognized for those who want to become a Certified Compliance Expert in Healthcare (CCE-HC) or who would like to complete an MBA and specialize in compliance and white-collar crime.



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successful that it has been on offer in Honduras since last year thanks to collaboration with the local chamber of industry. Since this year, it has also been on offer in Guatemala through the Cámara de Industrias de Guatemala.

“Steinbeis certification helps us to achieve homogeneity in Central America across different programs, raising the standards of tertiary training and providing a point of comparability,” confirms Rodrigo Jimenez, director of the continuing professional development unit at the CICR. Working directly with industry is an essential tool in achieving the required savings in energy consumption. The CICR has been offering first specialization programs on the topic of transparency (“Iluminación”) since 2015. The course lasts 60 hours and has been a total success with more than 35 participants. It is a direct response to the high level of demand for greater expertise in the Costa Rican industry. Thanks to a joint initiative between the local chamber of commerce and Steinbeis University Berlin, aimed at offering the program with a university certificate, staff training has become more appealing to industry.

The next 120-hour course to become an Administrador de la Energía starts in April 2016 and the next 60-hour course to become an Especialista en Iluminación y Eficiencia Energética in Costa Rica is planned for July 2016.



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## Steinbeis Collaboration with Deutsche Telekom School of Management and Technology acts as training partner

Deutsche Telekom promotes "life-long learning" among employees through collaboration with a variety of universities. The School of Management and Technology (SMT) at Steinbeis University Berlin (SHB) has been an alliance partner of Deutsche Telekom AG since 2015, offering a selection of collaborative master's degree programs. Two degrees under the collaborative agreement are the Master of Science in Controlling & Consulting and the Master of Business Engineering. At the core of all master degree programs lie project skills in keeping with the project competence degree (PCD), plus a project carried out at Deutsche Telekom or one of its subsidiaries.

A top priority of the project competence degree is to transfer and directly apply what has been learned during the seminars into the project work. Because acquired knowledge dovetails directly with the project and an innovative workplace task, it is ensured that students implement projects based on scientifically sound, using practical, and results-oriented methods.

"The PCD allows us to offer firms a valuable tool as they compete for the best people in the war for talents. Combining a degree with a project

that relates directly to practice helps not only with recruitment but also with staff retention. Students get the chance to gain a master's degree while they gather their first professional experience, and because the program's based on modules, they're not kept away from their work," explains Dr. Walter Beck, CEO of the Steinbeis Center of Management and Technology.

The Master of Business Engineering (MBE®) was the founding degree program of the SHB. It combines scientific knowledge with technology topics, thus ideally preparing students for the stension between technology and economics. The Master of Science in Controlling & Consulting (MCC) arms students with consulting tools and advisory skills, offering in-depth training in fields such as leadership-based accounting, planning, financial control, and international accounting, thus addressing the increasing demands placed on management accountants and business consultants. The first students on the master's alliance program started working toward their degree last fall.



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## Professional Construction Management Staff training to become a certified Site Manager (Steinbeis)

As in other areas, in construction management success revolves around the qualifications of management. Given the situation in the employment market, small and medium-sized construction companies are particularly dependent on promoting up-and-coming specialists through in-house training programs, just in order to safeguard quality in the long term. The Rastatt-based construction firm weisenburger bau GmbH has developed a training program with the Steinbeis Transfer Center for Site Management and Business Development designed to keep its site managers up to speed with current demands.

Demands in the field of construction have become more complex and firms are only competitive if they keep pace with developments – just two reasons why weisenburger bau trains and certifies its young managers as part of an executive degree lasting four semesters to become a Certified Site Manager (Steinbeis). In-house training takes place at the weisenburger Akademie, which offers practical tuition worth 120 credits and is taught by professional external and internal lecturers to ensure that training matches the very latest state of knowledge.

The topics dealt with during the degree include the philosophy of weisenburger, the personality of site and project managers, and the fundamentals of turnkey construction. The building blocks of the training are offered in modules revolving around clearly defined objectives derived from weisenburger's guiding principles, the skills and content that need to be learned, and the specific tasks of site managers. Aside from the purely technical aspects, time is also invested in the personal development of



Foto: Stefan Straube/UKL

managers and team-working skills. Working alongside Steinbeis, the degree allows weisenburger to certify between 40 and 50 managers every year.



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## Japanese Collaboration Partner Visits Stuttgart SCMT welcomes delegation from Tokyo University of Agriculture and Technology

For the last five years, the Steinbeis Center of Management and Technology (SCMT) has enjoyed a closed partnership with Tokyo University of Agriculture and Technology (TUAT). To mark this milestone, a two-day visit to Stuttgart was organized in September with a 10-strong Japanese delegation. The TUAT and SCMT organized the exchange with the aim of building on the long-standing alliance.

The delegation was headed up by Professor Chiba and Professor Akisawa, who both attended an innovation seminar held by Prof. Dr. Gunter Herr, Professor at Steinbeis University Berlin and director of the WOIS Innovation School. The seminar provided insights into the "Steinbeis Education Method" and the Project Competence Degree (PCD) at Steinbeis University Berlin.

The focus lay in the principles behind the PCD and the way it makes use of models and methods by applying these to projects across Europe. The transfer of content to everyday tasks in the workplace is central to this approach and this was something of a revelation for future Japanese managers. A presentation highlighting the idiosyncrasies of European culture, key aspects of a market entry in Germany, and the collaboration plans of Germany companies was also given. These topics were looked at using case studies. A cultural highlight at the end of the Japanese

## Emotional Intelligence: A Key Qualification SHB certification course providing profound knowledge

Emotions move people, resulting in doubts but also hopes and bringing people together. And almost everything that people do is in order to experience certain emotions or avoid them. The ability to deal with emotions – experienced personally or by others – has a major influence on whether people are happy, healthy, or successful in life. This lies at the core of emotional intelligence – the ability to perceive your own feelings and the feelings of others properly, to understand them, and influence them positively. Working in collaboration with the Eilert Academy of Emotional Intelligence, the competence institute unisono, a Steinbeis Transfer Institute at Steinbeis University Berlin, now offers a module-based university certification course to become a "Trainer in Emotional Intelligence (SHB)."

Emotional intelligence is fundamental to one's ability to understand oneself and others better. It could even be described as a kind of macro-ability which dictates how people use other abilities. It makes it possible to exploit one's personal potential. But it is not something one is born with – it has to be developed.

Through a series of individual coaching sessions and group exercises, the Steinbeis course teaches students how to foster emotional intelligence and resolve possible barriers. It is module-based in so far as each participant can choose their own rate of learning through different blocks of seminars. They can also gain partial qualifications, for example as an

delegation's stay was a meal together with Swabian cuisine and the handing out of the certificates.

The Master of Business Engineering (MBE®) has been offering a stay in Japan since the very first degree program was introduced at the SHB in 1998. The key to success of the PCD programs offered by the SCMT is their international outlook and the clear connection to regional economic differences. Close collaboration makes it possible to provide realistic insights into economic and cultural factors, thus going beyond pure classroom teaching. The close relationship with Japan and the professional nature of the partnership can also be attributed to Sachihiki Kobori. As president of Steinbeis Japan Inc., he has played an important part in this transfer of knowledge since 1999.



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"Emotion Coach (SHB)" or as a "Facial Expression Analyst, Eilert Methods (SHB)."

The university certificate as a "Trainer in Emotional Intelligence (SHB)" not only makes it possible for students to gain in-depth and practical training on emotional intelligence, but also provide evidence to the outside world of the scientific basis and sustainable quality of their competence. This is a key success factor for all trainers and coaches, since the vast offering of products has made the seminar and coaching market somewhat bewildering to clients.



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## Secure Immobilizers – Not to be Taken for Granted

### Steinbeis experts work with partners to develop a method for protecting cargo bikes

Electronic immobilizers are used in vehicles to protect electronic car keys (smart keys or keyless entry devices). It is already known that these protective systems sometimes fail to work properly. Experience in the United States has shown that roughly 150 million vehicles could simply be driven off without permission using “the most basic technical equipment.” This was the motivation for the Steinbeis Transfer Center for Identification Media & Identification Management to join forces with three partners and come up with an independent solution that works with any system.

The chips used in immobilizers have a digital signature, a technology that is designed to only allow certain users to access sensitive information stored on the chips. Immobilizers typically lie at the heart of all electronic vehicle controls, making them the apple of any vehicle producer’s eye. But according to the experts, these apples are relatively easy to bite into. They have security issues, which do not just affect cars and trucks but also vehicles like cargo bikes, plus the freight they carry. It was these vehicles that were made the focal point of a research project carried out by the medium-sized companies baimos technologies, Roc-Ket Cargo Bikes and Weber Technik under the leadership of the Steinbeis Transfer Center for Identification Media & Identification Management.

One development objective that was derived from customer requirements was to significantly enhance security and encryption versus conventional, widely known locking systems. A key premise of development came from demands of a logistical nature, namely that the security system should work across multiple areas. So it should not just be useful for the cargo bikes themselves but also for the containers they convey. These are sometimes fixed to bikes and trailers; sometimes they are detachable. Another important criterion was linking riders with their bikes, allowing riders who removed goods from containers on their cargo bikes to identify themselves and which items were removed. The technical solution developed for the project is essentially based on a mobile security technology called BlueID, which is supplied by BAIMOS technologies. Taking this as their starting point, the project team developed a solution called biketID, a new and innovative way to offer high security for cargo vehicles – and of course cargo bike fleets typically used in inner-city traffic. biketID makes it possible to release Roc-Ket immobilizers installed on bikes or trailers. It also unlocks all kinds of containers and is not just reliable but also secure, even when used with a smartphone. Authorized users are granted encrypted, digitally unique access authorization for a specific bike or a specific container. This authorization is sent to the user’s mobile phone. Users can then safely open and release the miniature electronic locks and locking devices using a smartphone. They do not even need Internet access for this.

biketID is significantly more secure and better encrypted than conventional locking systems. After removing items from a cargo box, users have

to close it again and receive a closing notification before customer data can be confirmed. This makes it impossible to manipulate or sabotage data. The approach marks a significant leap forward for the four project partners in innovation terms. Integrating BlueID software into the Roc-Ket portfolio creates a quick and secure link to allow smart devices such as the cargo bike to communicate with users’ smartphones or smartwatches. The smart devices independently check if the smartphone is authorized to communicate with the bike. Only then will it permit commands to be submitted like “Unlock.” Handing out physical authorization devices is no longer needed: Instead of requiring smartcards, tokens or electronic keys, people can use their own smartphone to access the system’s security modules.

Authorization is issued completely digitally so there is no need to hand over physical objects or make special trips. This allows for the use of biketID in combination with many other kinds of access control systems. As a result, it can be integrated into objects at the destination, front doors, or specific parking lots – and simply opened using a smartphone. biketID can be integrated seamlessly into existing authorization management systems using standard APIs. The management system defines which users and smartphone should be granted which access authorization. Sharing authorizations is also possible throughout the world, depending on the location.

Managers of vehicle fleets have a complete overview of vehicles accessed and delivery personnel, making it possible to use a variety of completely new, user-friendly functions in the logistics chain.

Image: Communications within the biketID immobilizer system



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## No More Threats of Being Held Back!

### Steinbeis experts develop digischule, an online school grade administration tool for students and teachers

Cloud software is now fairly mainstream in Germany. An increasing number of firms and authorities use Web-based solutions, which involve no local administration effort. Not only does this save time and money, it also helps keep data secure. A privately funded high school in Schwetzingen spotted this trend and has now been using cloud-based software for some time. It also recently adopted digischule, a grade administration tool developed by the Digital School Steinbeis Consulting Center.

Many areas of school administration are laid down under regional state law or at least made available by the state. In Baden-Württemberg, for example, schools are provided school administration software which not only allows them to process key information on the school and parents, but also shares necessary statistical information with the state government. It can also be used to print report cards. However, the individual grades behind the semester results (from tests and exams, etc.) are left up to the school to deal with, or often even individual teachers. Administration methods are thus heterogeneous, ranging from classic client-based software to Excel spreadsheets and even pen and paper – even within the same school. This brings a number of drawbacks:

- It is almost impossible for schools to ensure data is kept secure, because teachers have their own individual systems.
- It is difficult to work together. Often, class advisors cannot even see how a specific student is faring in a given subject.
- Archiving data in accordance with the law is difficult, with all manner of systems being used from classic filing cabinets to a box full of memory sticks.

- Because grades are administered in so many different ways, it is difficult to pull grades together at the end of the school year based on a common denominator, i.e., to create a report card for the whole school year.

Jörg Bader, principal of the private high school in Schwetzingen, is no longer worried about such problems: "We've been using the digischule system from Steinbeis on a test basis since late 2014 and it will enter full operation in the next semester." For Bader, the benefits are obvious: "Finally, all of the grades are captured in a uniform system and are understandable. For example, if we can't get ahold of a specific teacher during a parent-teacher conference, we can still access all of the student's latest grades in the central system."

This is not the only advantage offered by digischule. Because the grades are stored centrally, the software also generates uniform statistics. Bader continues: "Of course this significantly improves the way we come across to parents and guardians because the performance of the students is presented in a uniform manner – it's all based on the same data and the same evaluations or graphs, at every meeting."

Thanks to modern cloud technology, having "centralized records" means that the teachers no longer have to store data on a computer in the classroom – an approach that leads to problems. As Ralf Hanke from the Digital School Steinbeis Consulting Center explains, "Our digischule software is available as an Internet-based application and can also be used as an app on mobile devices. So basically teachers can carry out their admin from anywhere – while actually at the school or in the afternoon at home in the garden, it doesn't matter anymore."

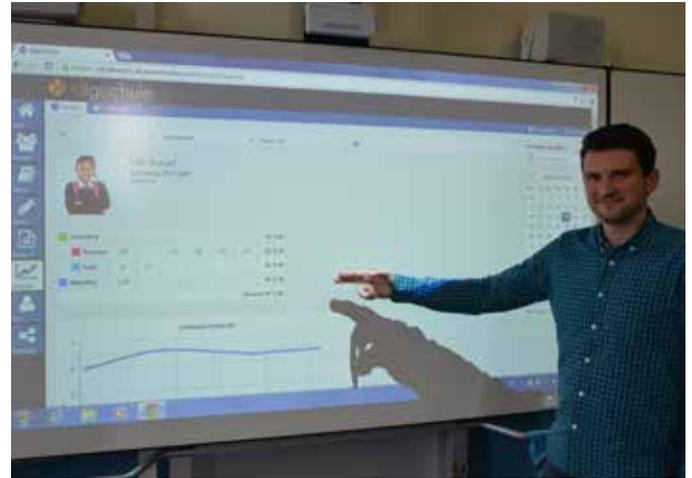
An issue that often comes up with cloud software is whether the data is secure. Volker Matejka, director of the Digital School Steinbeis Consulting Center emphasizes that, "We know that data security is a concern for customers – the software does after all record sensitive data. But we can assure users that our software is run by strictly certified providers, with access controls, security specialists, plans for worst-case scenarios, etc. It was also developed according to the very latest security standards, drawing on many years of experience. If anything, we believe that using this kind of solution is the only way to really ensure data is kept safe, and in fact that corresponds with the views of the BSI (German Federal Office for Information Technology Security)!" The point is that it is not possible to safeguard security if, as has been normal until now, different teachers use their own software on their own PC or mobile device, with their own security settings and virus protection.

Despite the complexity of such issues, when digischule was developed, close attention was paid to making the software easy to use. School principal Jörg Bader: "Not all teachers are IT experts and they don't have to be. So it's all the more important that the learning curve for using the software isn't all too steep and that it's intuitive, even for less experienced users – digischule is exemplary in this respect."

Of course the digischule software is not restricted to purely administrative tasks with grades. A number of other useful features are included in the software such as an address list for all teachers, contact information for students and their legal guardians, a simple scheduling tool, seating plans, and lots more. Further functions are also planned. "We can be extremely flexible as far as requirements are concerned, and we prefer to work directly with customers, so if a school has certain expectations regarding software, we're happy for them to ask us about them," says Steinbeis expert Ralf Hanke. Jörg Bader also values the collaborative approach: "Collaboration was always excellent – whether we were discussing the usage sequence or eradicating problems in the early testing phases. Having such reliable partners is extremely important to us!" Ralf Hanke and Volker Matejka are convinced that digischule is a major step in making their vision a reality: "Using IT at schools should just be a means to achieving the actual end: pedagogical and didactical work with students. Software is good if people hardly really notice it and it's not complicated to use. And that's exactly what we've achieved with digischule!"

Although schools can buy the software for their teaching staff, individual teachers are also free to register and, if required, connect with co-workers at their school. The digischule software can be used independently by individuals or in teams, or tested for use at a school. As Bader summarizes: "We recommend that other schools use such modern software solutions. Of course it means abandoning a couple of old habits,

but what you gain in return is a high degree of transparency, security, and simplicity – and you significantly improve collaboration between teachers, which ultimately benefits everyone involved."



### Steinbeis Consulting Center Digital School

#### Services

- Innovative, self-developed software solutions for schools and teachers
- Consulting on the implementation and use of the self-developed software solutions
- Development of software-supported work processes for schools

#### Key areas

- Software solutions for schools and teachers
- Consulting services for schools

Image 1: The private high school, not far from Schwetzingen Palace

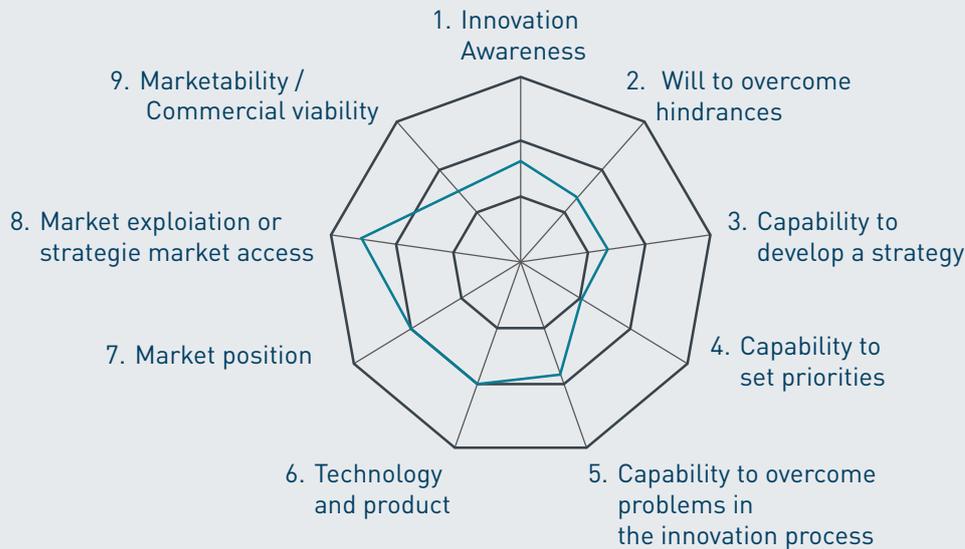
Image 2: School principal Jörg Bader presenting digischule statistics on an interactive display



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## Innovation Management at SMEs: Implementing New Concepts and Preparing Ideas for Markets

### Steinbeis-Europa-Zentrum provides support with the development of future strategies

The competitiveness of an enterprise hinges around its ability to think up innovations, develop them, and launch them successfully in the market – especially if the company is a small or medium-sized enterprise (SME). Central to this is innovation management, an area in which Steinbeis-Europa-Zentrum (SEZ) provides support. A number of companies in Baden-Württemberg have already benefitted from its support, and worked with SEZ on the development of a strategy for the future that fits like a glove.

What can companies do to gain a competitive edge? What is the best way to cut costs and optimize resources? And what about a company's potential to innovate? How does a company gear itself to international business and who are the right people to know? Making the transition from research to market-ready products is often one of the most tortuous parts of the innovation process. The European Commission provides funding through its Horizon 2020 research and innovation program, thus allowing experts from the Enterprise Europe Network to support SMEs with innovation projects. This helps them develop innovative products and services before launching them in the market. SEZ advises SMEs from Baden-Württemberg on such undertakings.

Innovation management refers to the methodical planning and steering of innovation processes within a company, ranging from an innovative idea to its actual implementation as a product or service. But innovation is not just about carrying out research, it also includes all of the necessary steps to get products into markets.

SEZ provides support by acting as a moderator during this process, working alongside companies and covering a number of different stages:

- An evaluation of the potential for innovation and competitive strengths
- Identification and assessment of strengths and weaknesses in the innovation processes
- Determination of the goals and strategies for an innovation
- Concrete recommendations on the planning and implementation of innovations – from ideas to markets
- Support during the implementation process

One company that took advantage of these services was db&w GbR, whose core business is to develop and produce the software modules found in 3D computer graphics programs that create images and animations. db&w (full name db&w Bornemann und Wolf GbR) is a global player, and, in the past, its technological advantage has allowed it to pick up on trends in the 3D market at an early stage and translate these into marketable products.

The project team at SEZ joined forces with db&w to work on the innovation strategy and the future vision of the company. Aside from putting the company's internal strengths and weaknesses under the microscope, plus the firm's visions, the SEZ specifically examined its technology. To do this, it selected a highly promising technology and explored each aspect of this technology individually. This detailed assessment made it possible for the company to decide which individual parts of the technology should be developed in-house and which could be developed outside the company. By looking at the life cycle of individual products and evaluating their market potential, the company and SEZ were able to define a future market strategy. They then organized an in-depth workshop which was supervised by a moderator to create a roadmap for marketing and communication actions over the next 18 months. SEZ then used this roadmap to write an action plan, providing a list of key actions for each challenge the company will face in the months to come.

Moderation during the innovation management process may cover the following:

- What strengths can the company draw on for the innovation project? What weaknesses need to be addressed?
- What unique selling position would the company like to communicate or develop?
- Which technologies will the company require to remain or even become competitive? Do these already exist or will they have to be developed specially?
- Which partners does the company work with? Which partners are needed to play a leading role in the niche market, even on an international level? In which regions does the company want to operate?
- What is the company planning in terms of innovation? Are there any projects that could take the company forward in strategy terms?
- What competitive positioning does it want to adopt (e.g., cost or technology leadership; pioneering)?
- What sort of European, national, or regional funding could help the company move forward with its innovation?

### Support during the innovation process

Steinbeis-Europa-Zentrum works with SMEs to develop a strategy and implement ideas in practical terms. This includes steps such as:

- **Observation and idea generation (especially research strategies and development strategies)**
- **Project definition (especially technology and trend analysis)**
- **Planning and financing (especially strategic alliances, finding partners, and submitting European proposals)**
- **Implementation and monitoring (especially European project management in research and innovation)**
- **Intellectual property protection and exploitation (especially exploitation strategies and internationalization)**

**Image:** The potential to gain competitive and innovative capabilities



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## Gerd Birkhold

### Obituary

**Steinbeis mourns the sad loss of Gerd Birkhold, who passed away on October 14, after battling a brief but severe illness. Gerd Birkhold was director of the Steinbeis Consulting Center for Business Development & Corporate Control in Kaufbeuren.**

Gerd Birkhold studied mechanical engineering at Esslingen University of Applied Sciences before going to work for Krauss-Maffei AG. After this, he was appointed assistant to the management board at Karl-Süss GmbH & Co. KG, where he was then made responsible for manufacturing groups. This was followed by a period as head of manufacturing preparation at Friedrich Merk GmbH under Bosch Telecom in Munich. In 1996, Gerd Birkhold entered self-employment as a business consultant and in 2006 he founded the Steinbeis Consulting Center for Business Development & Corporate Control, which supported small and medium-sized enterprises with complex business challenges.

Gerd Birkhold was a highly valued and reliable partner of the Steinbeis Network. His calm manner, level-headedness, and his ability to identify strongly with the Steinbeis philosophy made him a professional and popular expert on collaborative projects. We would like to express our deepest sympathy to the bereaved family of Gerd Birkhold.

Prof. Dr. Michael Auer | Manfred Mattulat  
Steinbeis Foundation Board



**Dos.Base**  
Low Budget Dosiersystem

# It's All About the Dosage

## The Steinbeis Research Center for Simulation develops innovative, low-cost dosing system

Smiles everywhere and satisfied people – the sight that met Ruben Maier, director of Simulation, the Steinbeis Research Center, on a visit to Bondexpo. Maier was at the international trade show for bonding technology in Stuttgart, standing at the booth of Kübler GmbH. He was the initiator of a development project at Kübler and the head of development on Dos.Base and his innovative, low-cost dosing machine has solved a key industry challenge.

"It was two years ago and I was looking for a suitable bonding system for one of my clients. I'd been through every product seeking something that would put two components together. It had to be easy to use, adaptable, and inexpensive. I couldn't find any products on the market so I gradually started thinking about developing a system and making one myself," recalls Ruben Maier. One year later, in the fall of 2014, he was at a trade show organized by Steinbeis called Products seek Producers at the Chamber of Commerce in Pforzheim. During a conversation with Kübler GmbH, the idea sprang up again for a two-component (2K) low-cost, bonding device. As a producer of complex and comprehensive dosing devices, Hans Kübler was more than familiar with the desire of his clients and potential sales leads for more compact devices – something with fewer fittings that is just as precise and adaptable. Another meeting followed, in which Maier presented the areas of competence of his Steinbeis Research Center for Simulation, especially in terms of its development potential. Kübler recognized the opportunity to realize his vision and offer his customers a simple and inexpensive system.

After just one exploratory meeting, the Steinbeis Research Center for Simulation embarked on a feasibility study in early 2015 based on scientific methods. As part of their analysis, the Steinbeis experts examined which processes were best suited to doing without control circuits and being transferred to 2K dispensing tools. The testing phase was completed by the summer of 2015 with a successful four-axle simultaneous test.

After achieving positive results, the team moved straight into design and development, setting up and testing a prototype aimed at achieving 2K dispensing tool control without an actual control loop. To do this, the project team first designed, developed, and produced a two-component dispenser tool. This made it possible to adapt hand dispensers to be used with cartridges of different sizes. The tool was mounted on a flat-bed base. After comprehensive testing, the team succeeded in dosing two-component media and producing a variety of 3D trajectories. The new solution was so innovative that the team's research and development work received funding from the Baden-Württemberg Ministry of Finance and Industry under the innovation voucher program (A and B vouchers).

The new dosing system is called Dos.Base. It combines the highly precise dosing of two components with user-friendly features at a low price. As well as using manual dispensers, it also allows the operator to carry out micro-dosing using jet valves. The system works to a precision level of up to 0.05 millimeters, making it just as precise as more expensive dosing systems. Dos.Base is also extremely adaptable for use. For example, it can handle a broad spectrum of materials ranging from adhesives to thermal compounds, silicon, and PU. The work surfaces on the

machine make it suitable for extensive usage scenarios.

The positive reception that was given to the machine by visitors to the Bondexpo trade show indicated that the market has been waiting for just such a solution for dosing applications. "We received so many queries from customers at the show that we're planning to hire a project manager as quickly as possible to manage the project planning and coordinate the contracts," announced Boris Kübler, managing director of the Kübler subsidiary, on the last day of the trade show. "Some of our companies only actually went to the trade show to take a look at the innovative dosing machine for themselves," gleams Michaela Benz, who is responsible for marketing.

So what is the next chapter in the success story of Steinbeis and Kübler GmbH? "Of course our main priority at the moment is to sell Dos.Base and set up machines for customers," explain Boris and Hans Kübler. "That said, we're looking forward to hearing more about Ruben Maier's innovative ideas, especially when it comes to dispensing technology!" The reason for saying this is another innovative product idea that popped up during the development of Dos.Base, which is also related to the market for dosing equipment. The Steinbeis Research Center for Simulation is due to begin implementing that idea shortly, meaning that many specialists have more to look forward to in the market for dosing technology in the year to come.

**Image:** Ruben Maier at the Bondexpo trade show talking to Hans Kübler, managing director of Kübler GmbH.



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### Rollout of the Steinbeis Company Competence Check®

**Online tool provides access to abridged version and master check**

There was a world premiere at the Steinbeis Day with a workshop and an introduction from the project team that developed the Steinbeis Company Competence Check® (UKC). The team presented the analytical instrument to an audience of Steinbeis Network members. The full version of the online tool developed by Steinbeis, which assesses company competence, is now available to all potential users.

An abridged version of the UKC can be accessed by going to [www.steinbeis-ukc.de](http://www.steinbeis-ukc.de), where any user can conduct a quick check for free through a fully accessible interface. The Master Check as a full version with all analytical functions can only be accessed with a login. This version includes comparative analysis of self and external assessments, plus comparisons of functional levels and databases which can be used to derive best practice examples.

### Baden-Württemberg Seeks the Best Startups Elevator Pitch BW gets underway

As part of an initiative for startup companies and people in company succession (ifex), which was launched by the Baden-Württemberg Ministry for Finance and Economic Affairs, a series of contests took part across the state in 2013 under the banner Elevator Pitch BW. Baden-Württemberg is the first federal state in Germany to organize such a competition at the state level in order to promote more entrepreneurship in the region. This modern and novel kind of event is aimed at providing young startups with a platform for presenting their concepts to a relevant audience.

The initiative includes regional cups to give contestants a chance to win over a selected jury and a local audience for their business idea, plus receive useful feedback. This allows young entrepreneurs across the state to go public with their business ideas early on in the process, in order to validate their business model at an early stage and forge useful networks to keep developing their new business.

The third round of Elevator Pitch BW got underway in October 2015. The winners of local pitches (regional cups) in cities such as Karlsruhe, Mannheim, Constance, and Stuttgart have the unique opportunity to present their business ideas at the state finals in the summer of 2016

The access codes for the full version of the tool are handed out after a one-day training session. Members of the Steinbeis Network can attend sessions for free. Third-party participants pay a training and license fee. The training outlines the foundations of the methods used, how the software works, and the various analytical functions. If people are interested in trying out the competence check, they are welcome to take part in the training sessions and can also work with members of the Steinbeis Consulting Groups which are constituted around the analytical dimensions of the UKC. The project team will also be pleased to answer any questions about the tool and the project.

To find out when the next training sessions take place, go to [www.steinbeis-ukc.de/schulung](http://www.steinbeis-ukc.de/schulung). Registrations can be emailed to [ukc@dstw.de](mailto:ukc@dstw.de).



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and win a prize worth up to 3,000 EUR. Entrepreneurs who received advice through the Exi startup voucher scheme are also welcome to present their ideas at the regional cups and try to win over the jury and audience with their business visions.



More information and details of events and timings can be found at [www.elevatorpitch-bw.de](http://www.elevatorpitch-bw.de).



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### Steinbeis: Transfer Visions into Business!

**A short movie called *Early Birds* takes entrepreneurship into new realms**

Knowledge and technology transfer are not exactly the kinds of topics that get the emotions going – all those complex technical drawings, barely comprehensible formulae, and labyrinthine industrial machinery. But without the enthusiasm and passion of the people behind transfer – without the employees and entrepreneurs – transfer would not be possible in the first place. Steinbeis has dared to take a new angle on this aspect in a short film called *Early Birds*.

The 2-minute movie revolves around the ideas, visions, and entrepreneurial spirit of the younger generations in a lighthearted depiction of

everything that Steinbeis stands for: turning imagination and ideas into a reality, transferring knowledge into actual products and services, helping people and companies. The fact that this model works is underscored everyday by more than 1,000 Steinbeis Enterprises.

The movie premiered at this year's Steinbeis Evening in the Liederhalle convention center in Stuttgart. *Early Birds* has also already made it into social media and can be viewed on the Steinbeis website.



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### Successful Premiere of the Leipzig Mediation Forum

**Marketplace for exchanging ideas and interacting with others**

The Academy for Mediation, Social Aspects, and Law, a Steinbeis Transfer Institute at Steinbeis University Berlin, joined forces with Mediation for Business, the Steinbeis Consulting Center, to organize the Leipzig Mediation Forum – Steinbeis Days. The event took place in Leipzig at the end of June and the main focus lay in mediation as a foundation for all successful interpersonal interaction.

The day included a variety of talks, seminars, and workshops to allow around 400 participants to discuss topics such as expressing personal opinions as a mediator, the special demands of individual groups undergoing mediation, sexual harassment at the workplace, and mediation in public areas. Two courses, one on dealing with conflict within organizations and the other on conflict management and systems design, proved to be particularly popular with participants.

Dr. Gernot Barth, director of the Academy of Mediation, Social Aspects, and Law (STI), is quite pleased with how the event went: "I'm delighted

that so many mediators and such a large number of conflict management experts made their way to us. This made an important difference in the variety of the discussion. Our aim for next year is to expand on the number of participants and establish ourselves as a regular event in Germany for exchanging opinions on conflict management."

A particular highlight at the event was a discussion about soccer at the traditional Leipzig restaurant Bayerischer Bahnhof. Speaking before an enthusiastic audience, Frank Aehlig (sports coordinator of second division club RB Leipzig) joined Guido Schäfer (chief reporter of the newspaper Leipziger Volkszeitung and former player for 1 FSV Mainz 05), the attorney Friedbert Striewe (the insolvency administrator of VfB Leipzig) and the host for the day Dr. Gernot Barth to talk about conflict in the world of soccer. The day finished in a congenial atmosphere with a summer party.



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### The 2015 MuT Business Award: Small and Medium-Sized Enterprises in Thuringia Quality assurance and image processing center ranked among the top 10

The MuT Business Award was bestowed in southern Thuringia for the eleventh time in 2015. The award honors individuals and companies that help secure the future of the southern Thuringian economy. The Ilmenau-based enterprise Steinbeis Qualitätssicherung und Bildverarbeitung GmbH (Steinbeis quality assurance and image processing) was one of the 10 finalists.

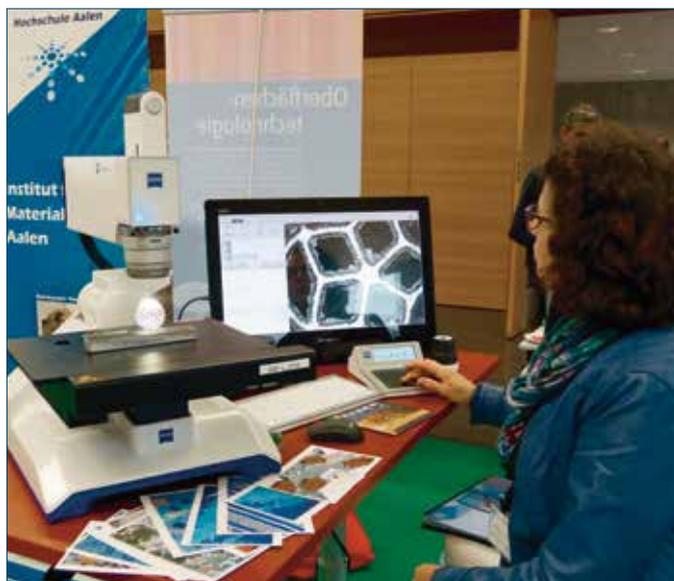
The MuT Business Award is an initiative coordinated by the South Thuringia Chamber of Crafts, the Chamber of Industry and Commerce in southern Thuringia, three local newspapers – Freies Wort, Südthüringer Zeitung, and FW Meininger Tageblatt – and the Thüringer Wald regional marketing association. The aim of the award is to reward exceptional instances of entrepreneurship. The assessment criteria for the award include financial success in combination with a discernible focus on local interests, the implementation of innovation while preserving local traditions, creating employment opportunities whilst also offering fair working conditions, a particular focus on training and employee development, and improvements in raw material and resource efficiency.

The Ilmenau-based Steinbeis enterprise for quality assurance and image processing was nominated by last year's winner Goldbeck and finished in the top 10. Work at the enterprise focuses on contractual research and development, production, and consulting in the field of quality management. This includes the development and production of innovative measurement and checking systems used in contactless precision measurement and visual inspection, the development of user-based programs, and software components for individual or universal applications. The enterprise is also involved in continuing professional development and collaborates with three other companies in the region as co-sponsor of the professorial chair for Industrial Image Processing at Ilmenau University of Technology.

Image: Steffen Lübbecke, Managing Director of Steinbeis Qualitätssicherung und Bildverarbeitung GmbH  
© Michael Reichel/arifoto.de



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## Innovative Products Meet Producers

### Steinbeis trade show in Aalen

The fourth Products Seek Producers concept utilization trade show took place at Aalen University on October 16, 2015. This time the emphasis lay on products, processes, and services with a bearing on surface technology and new materials.

Products seek Producers (PsP) is an innovative event that provides a platform for new products and processes in various fields of technology, which are all presented under one roof. The format of the event allows developers to bring patented ideas into direct contact with possible collaboration partners, producers, and sales partners. It is also a vehicle for rapid technology transfer revolving around business practice. Suppliers

and producers can be introduced directly to one another and visitors to the show gain insights into current technological developments in a specific field.

As in the past, the event in Aalen was a complete success. "PsP is the ideal platform for sharing ideas, marketing, and forging networks with inventors. What I find special about the show is the particular way exhibitors network amongst one another. Only minutes after the exhibition has started people are already engaged in excited conversation at the booths. I'm pleased that the brand and the format of PsP has established itself so well," says Claus Paal, member of the regional state parliament and one of the trade show initiators. Exhibitors also described the event as a success: "Once again, PsP was extremely interesting and I was particularly pleased to find a former customer, to whom I provided my consulting services, appearing here as an exhibitor," says Konrad Roth, director of the Steinbeis Consulting Center for Corporate Development and Social Space Planning. Dr.-Ing. Andreas Ehrhardt MBA, managing director of the innovation center and operating company at the University of Applied Sciences in Aalen (Innovationszentrum an der Hochschule Aalen Betreibergesellschaft GmbH) says that he felt, as a trade show for inventors and people using technology, it was an important addition and enrichment to existing trade shows. He also finds it a unique chance to get in touch with lots of other inventors and business founders, and that this is extremely helpful and useful. Preparations are already underway for further PsP shows in 2016.



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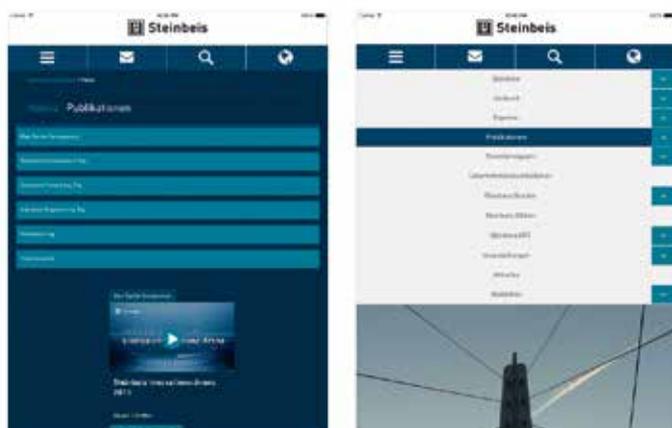


## It's here: The Steinbeis App

App version now available for [www.steinbeis.de](http://www.steinbeis.de)

The Steinbeis app was introduced in September for iOS (through the App Store) and Android users (Google Play Store). The app is free.

The idea for the new Steinbeis app is to offer users a way to access the current Steinbeis website from anywhere and at any time, in a format that matches their mobile end device. Now it is possible to search for a Steinbeis Enterprise or information on head office events, read articles from many past editions of TRANSFER, or stream the many excerpts in our Steinbeis media library while on the go.



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## Experts.Knowledge.Sharing.

### New Releases from Steinbeis-Edition

Steinbeis-Edition, the publishing arm of the Steinbeis Foundation, regularly publishes works reflecting the scope of the Steinbeis Network's expertise. All titles can easily be ordered via our online shop at: [www.steinbeis-edition.de](http://www.steinbeis-edition.de).



#### The Impact on Success of Business Process Outsourcing Jan Bartenschlager

2015 | Paperback, B&W | 380 pages, German  
ISBN 978-3-95663-066-8 | 2nd edition

#### About the author

Dr. Jan Bartenschlager gained his doctorate at Steinbeis University Berlin in 2008. He previously studied business administration at Hamburg University. Between 1999 and 2002 he was a consultant at Lufthansa Systems pob Business Consulting. He then worked as a consultant at the Business Technology Office, and he was a senior consultant at Navisco from 2003 until 2008. Dr. Bartenschlager is currently an associate partner at the sourcing consultants ZELOS Management Consultants.



#### Employee Reviews. Evaluating Performance – Understanding Competence – Identifying Potential Viktor Lau

2015 | Paperback, color | 128 pages, German  
ISBN 978-3-95663-071-2

#### About the author

Dr. Viktor Lau is a project manager at the Steinbeis Transfer Center Technology - Organization - Human Resources and has authored many publications under Steinbeis-Edition. Lau studied business, German studies, history, and philosophy. He is now considered a leading expert in the German HR industry. His focal topics are strategic HR management, aptitude testing, and HR development.



#### Raw Material Investments as Part of Portfolio Management. The Investment Process of Institutional Investors for Capital Investments in Raw Materials Alessandro Munisso

2015 | Paperback, B&W | 300 pages, German  
ISBN 978-3-95663-057-6

#### About the author

Between 2004 and 2009, Dr. Alessandro Munisso studied business at Munich University of Applied Sciences with a focus on banking, the financial industry, and investment business. Upon obtaining his degree he worked as a research assistant at the Research Center for Financial Services at Steinbeis University Berlin. His work currently revolves around the fields of asset management, banking, and transactions, and has been published multiple times. Munisso earned his doctorate from Steinbeis University Berlin in 2015.



#### Strategic Research & Innovation Roadmap and Business Opportunities for ICT in Manufacturing Nicky Athanassopoulou, Haydn Thompson, Meike Reimann et al.

2015 | Paperback, color | 36 pages, English  
ISBN 978-3-95663-064-4

#### About the SEZ

The publication is the result of a collaboration with the Steinbeis-Europa-Zentrum (SEZ). The SEZ is part of the Steinbeis Network and helps companies, research institutions, universities, and regional development organizations build bridges to other European countries.



#### The Satisfaction of Parents with Day Care Centers in Mecklenburg-Western Pomerania Katja Wolter | Steinbeis Research Center Institute for Resource Development (Ed.)

2015 | e-Journal (PDF), color | 24 pages, German  
inRE-Ressourcenmanagement | 01/2015

#### About the e-journal

inRE-Ressourcenmanagement is published by the SFZ Institute for Resource Development. It regularly reports on current methods of human and regional resource development, also providing information on recent trends and presenting future models and how they are being implemented in business.

The author of the latest edition is Katja Wolter, director of the Institute for Resource Development, a Steinbeis Research Center.



**Structure & Character.**  
**Exhibition catalog**  
**Katja Wolter |**  
**Steinbeis Foundation (Ed.)**

2015 | Paperback, color | 100 pages, German  
 ISBN 978-3-95663-040-8

#### About the artist

Business graduate Katja Wolter is director of the Institute for Resource Development, a Steinbeis Research Center in Greifswald. Her works of art examine issues relating to the structure of origin and societal cohabitation, with the influence of life experiences that shape people or reshape them, thus giving them character. Her canvasses capture the surfaces and structures of our environment and impressions of our counterparts.



**The 2014 Steinbeis Consulting Day**  
**Focus: Company Competence**  
**Steinbeis Foundation (Ed.)**

2015 | Paperback, color | 200 pages, German  
 ISBN 978-3-95663-007-1

#### About the 2014 Steinbeis Consulting Day

Company competence is now a key competitive success factor. Companies are no longer seen as the sum of all their resources. What's more important is exactly how different skills and competences are configured and assembled. Until now, the debate on company competence has focused on the personnel or human resources perspective within firms. But a competence-based view on companies also means examining all other departmental functions and specific contributions to company competence as a whole. This approach towards company competence was the focus of discussion at the second Steinbeis Consulting Day.



**Next Generation Banking**  
**Analysis Report**  
**Heinz Wings, Jens Kleine**

2015 | Paperback, color | 94 pages, German  
 ISBN 978-3-95663-067-5

#### About the co-author

Prof. Dr. Jens Kleine is director of the Research Center for Financial Services, a Steinbeis Transfer Institute. He is also a professor for bank management and financial services at Munich University of Applied Sciences. His core competences are the development of business field strategies, innovation management in financial services, asset management, and payment transactions. Kleine regularly conducts research on trends in the capital markets, the investment patterns of institutional investors, asset allocation, and portfolio optimization.



**Feeling Safe – The Secret of Success**  
**Gernot Barth, Bernhard Böhm (Ed.)**

2015 | stapled, color | 68 pages, German  
 Business Mediation 2015/03

#### About the publishers

Associate professor Dr. habil. Gernot Barth is director of the IKOME® (the Institute of Communication and Mediation) and the Steinbeis Consulting Center Mediation of Business, the Academy for Social Aspects and Law (a Steinbeis Transfer Institute at Steinbeis University Berlin). The focal topic of his work is mediation, especially within and between companies.

A qualified attorney and master of mediation, Bernhard Böhm is co-director of the Steinbeis Consulting Center Mediation of Business. He is also head of the arbitration committee office of Steinbeis Consulting Centers (Steinbeis Beratungszentren GmbH). Additionally, he shares responsibility for a variety of domestic and European mediation projects involving cross-border mediation.



**Consensual Planning and Construction**  
**Series of Publications from Corporate**  
**Mediation magazine**

**Gernot Barth, Bernhard Böhm (Ed.) |**  
**Werner Andres, Hermann Hasselmann,**  
**Marco Ilgeroth et al.**

2015 | Hardcover, color | 201 pages, German  
 ISBN 978-3-95663-048-4

#### About the publishers

This publication is the first part of a series of publications of the specialist magazine Corporate Mediation. The publishers of the series – Associate Professor Dr. habil. Gernot Barth and the attorney and master of mediation Bernhard Böhm – are directors of the Steinbeis Consulting Center Mediation of Business.

In the *Consensual Planning and Construction* series, the authors look at the still widely ignored problems stemming from the interwoven nature of planning and construction processes, including the interest not only of users, but also those affected. The authors give detailed insights into business practice, outlining the reality of personal experiences.

#### Back in print again:

**Diversity Management. Fueling unseen potential.**

**Marco Bambach, Christine Kuhn-Fleuchhaus**

ISBN 978-3-941417-64-9 | 2015 (7<sup>th</sup> edition) | Paperback, B&W | 310 pages, German



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**Photos and images:**  
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