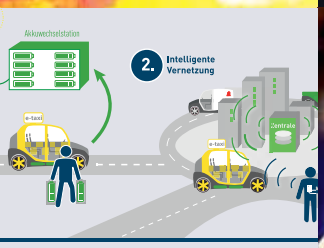
Steinbeis

TRANSFER

The Transfer Magazine



Technology – Transfer – Added value

Feature Topic: ICT
Steinbeis experts unearth the facts

The 2014 Transfer Award
Prize winners and their projects

Creating Digital Memory
Steinbeis experts help secure the sustainability of digitalization projects

Of Bathtubs and Underground Channels - Electricity Generated with Waste Water
Steinbeis works on innovative and environmentally friendly power generation project

04 | 2014

Find an overview of all Steinbeis Enterprises and their services on www.steinbeis.de → experts

Dear Readers,

Professor Dr.-Ing. habil. Eberhard Köhler heads up the Steinbeis Transfer Center for Drive and Handling Technology in Mechanical Engineering in Chemnitz. In 2012, Köhler was awarded a special prize by the Steinbeis Foundation for outstanding contributions to the field of knowledge and technology transfer. In 2010, his transfer center and its project partner Siemens AG Generatorenwerk (Siemens generator works) won the Steinbeis Foundation Transfer Award. In 2014, Eberhard Köhler was presented with the Seifriz Award.

Information and communication technology (ICT) is a driver of innovation throughout all sectors of industry and as a key technology field, ICT plays a decisive role in the future viability of the German economy.

ICT-based solutions and services are just as indispensible in mechanical engineering. The mechanical engineering market is currently undergoing change: Simply offering highly productive machinery and plants is no longer enough for many customers, who want added value in the form of complementary services to go with products. It is now nearly impossible to introduce machine or plant solutions on the market without intelligent drive and control solutions. The pressure to raise productivity is forcing companies to develop entire machine systems incorporating innovative automation technology, and this does not just apply to serial production plants, but also to the engineering of specialist machines. The job of the mechanical engineer no longer ends with the delivery of the machine and ramp-up at the client. Relationships between customers and suppliers are so close that continual customer support is required during use. And the key to this is ICT-based services.

Founded in 1991, the Steinbeis Transfer Center for Drive and Handling Technology has developed into an end-to-end provider of specialist mechanical engineering solutions over the years. Our activities range from development and design to the development and production of control units and machinery, offering on-site commissioning to customers, as well as ongoing maintenance and support during use. This would be impossible without innovative design and calculation tools. These tools have made a quantum leap in terms of development times and the quality of development output. Even the key areas of R&D have shifted over the years. Two decades ago, the main focus lay in the development and production of didactic modules for hydraulic and pneumatic control units, as well as simple feeding and handling units for processing machinery. Today, the demand is for research services relating to the development of emerging technology, as well as the production of matching machine technology and the integration of machine volumes into operating software, or even remote diagnostics and systems monitoring. The breadth of services we now offer has turned us into a reliable and longstanding development partner for small and medium-sized enterprises.

The importance of ICT will continue to rise sharply. I anticipate future developments in the technology used in mechanical engineering, especially with the new development of innovative and "smart" materials and sensor systems, which will result in increasingly miniature electronic systems and new sensor actuator systems. These will make it possible to integrate previously inaccessible processes into solutions. I also believe the results of nano-science will start to enter use, which will also be a challenge for ICT development. Furthermore, the issues of data protection and data transfer will play a crucial role. This will affect process technology, medical engineering and mechanical engineering.

The role and impact ICT will have on the development of different areas of the economy is something you can read more about in this latest edition of TRANSFER. I hope you find it an interesting and thought-provoking read!

Yours
Professor Dr.-Ing. habil. Eberhard Köhler

The 2014 Steinbeis Day

A meet and greet event for the Steinbeis Network

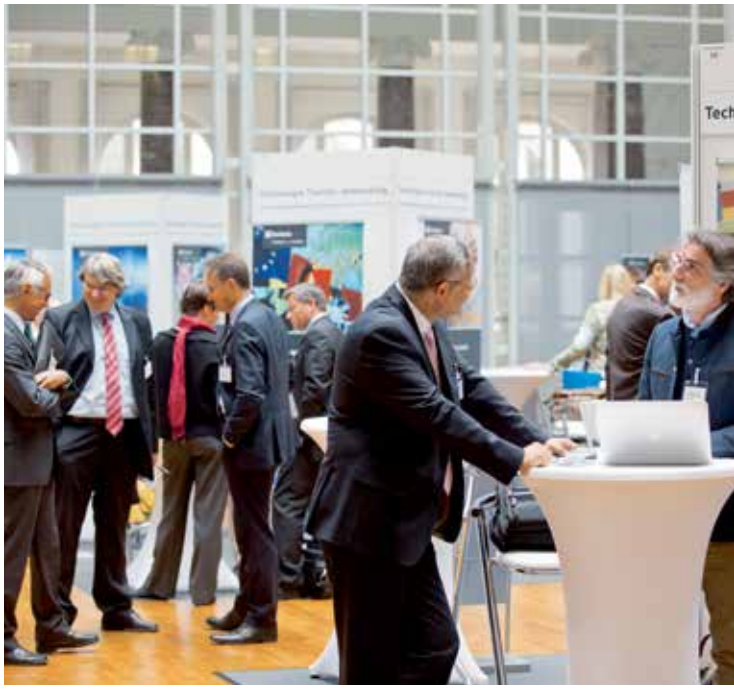
While soccer fans were enjoying the summer and watching the German team kick their way to the final, Steinbeis also had good reason to celebrate. Since September, there have been 1,000 Steinbeis Enterprises in the network, spanning a broad selection of skills and know-how, in all fields of technology and management. Now something of a tradition, the Steinbeis Day provided insights into the services offered by the network, this year attracting around 700 visitors to the Haus der Wirtschaft (House of Commerce) in Stuttgart.

As usual, the whole day revolved around "Transfer à la Steinbeis." There were 60 exhibitors in total at the event, engaging in technical discussion, providing information and using a variety of exhibits to present the details of their projects. Further information was provided in short talks in which the Steinbeis experts presented extracts of their project work. Excerpts of the talks can be viewed (in German) in the Steinbeis media library.

The development of the Steinbeis Network into an international service provider was also underscored by the workshops held in the afternoon. In collaboration with the Austrian Economic Chambers and the Steinbeis India Network, models underlying different aspects of international technology transfer were explored.

After the opening speech of Prof. Dr. Michael Auer, Chairman of the Steinbeis Foundation Board, the day started with the bestowal of the 2014 Seifriz Award. The Seifriz Award is a transfer prize of German skilled crafts that has been awarded for 25 years to honor successful collaboration between skilled trades and science. By tradition, the award is bestowed at the Steinbeis Day. 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 magazine handwerk magazin, 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.

For several years, an exhibition of works by "Steinbeisers," which is on display in Steinbeis rooms at the House of Commerce, has demonstrated how effective science and art can work in harmony. This year's



exhibition at the Steinbeis Day was opened by Dr. Philipp Liedl, an expert at STASA Steinbeis Angewandte Systemanalyse GmbH.

Over and above his activities for Steinbeis, Liedl occupies himself with painting, which he taught himself by looking at the impact of colors in a dialogue with shapes. The exhibition can be viewed in the Steinbeis building during normal office hours.

Extracts of the short speeches at the Steinbeis Day can be viewed by going to the media library at www.steinbeis.de. The next Steinbeis Day will take place on Friday September 25, 2015 in Stuttgart.

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The 2014 Steinbeis Evening

Highlight of the evening: bestowal of the transfer prize

Steinbeis has hit the 1K mark: Professor Dr. Michael Auer and Manfred Mattulat, the board duo of the Steinbeis Network, staged a welcome with a difference at this year's Steinbeis Evening: a large-as-life tribute to the size of the now global network. Since the summer of 2014, there have been 1,000 active Steinbeis Enterprises – reason enough to celebrate at the traditional gala event in Stuttgart's Liederhalle Convention Center. There was no less pomp and circumstance for tributes to long-standing members of the network and the climax of the evening: the bestowal of the Steinbeis Foundation transfer prize.

Around 600 guests from around the world followed the story of how the network has evolved over the decades. Starting with the first center in 1983, the number on the stage gradually rose to show the figure that was already prominently featured during the daytime event and was still there in the evening: 1,000 Steinbeis Enterprises, many of which were represented at the event by directors and their clients.

The bestowal of the transfer prize continued the number game: The prize was first awarded ten years ago by Prof. Dr. Dr. h. c. mult. Jo-

The Steinbeis Foundation Transfer Prize

The Transfer Prize of the Steinbeis Foundation – the Löhn Award – recognizes what the Steinbeis Network is all about: excellence in knowledge and technology transfer, benefitting not only the world of science and academia but also the world of business through collaborative transfer projects.

The prize is awarded once a year and all Steinbeis Enterprises can apply with their project partners. The winners of the award are selected by the jury, which is made up of the board of the Steinbeis Foundation and the chairman and honorary trustees on the Steinbeis Foundation Board of Trustees. The jury can also award special prizes in honor of excellence and outstanding service.

The Löhn Award is also bestowed at the Steinbeis Evening, with prize money totaling up to €60,000. The award winners also receive a sculpture which embodies an artistic representation of the transfer concept.

The prize already enjoys a strong tradition. It was first awarded in 2004, and in the meantime, over 40 project partners have been honored for their exceptional projects alongside special award winners.

For an overview of award winners past and present, go to:

hann Löhn, the former chairman of the Steinbeis Foundation board. Again, the jury honored two teams in this year's awards for the excellent manner in which they achieved knowledge transfer. The prize was awarded to the Steinbeis Transfer Center for Applied Production and Joining Technology/ARGOS Systems Engineering (Oldenburg), which worked with Volkswagen AG on a project involving the adaptive control of welding processes. A prize also went to the Steinbeis Transfer Center for Laser Processing and Innovative Manufacturing Technology (Pforzheim), which joined forces with Daimler AG to develop a process for laser hardening camtronic camshafts. Prof. Dr. Joachim Goll, director of the Steinbeis Transfer Center for Software Engineering, was awarded a special prize for his long-standing and excellent contributions to knowledge and technology transfer in the Steinbeis Network.

A Steinbeis Evening never ends without looking forward to the next year: The 2015 Steinbeis Day will take place on 25 September 2015.

Two videos have also been made with more details on the 2014 winners. The videos are available in the media library on the Steinbeis website (www.steinbeis.de).

For more information about the Steinbeis Foundation transfer prize, go to www.loehn-preis.de. Entry forms for the 2015 award can be downloaded on the website.

Adaptive Control of Welding Processes

2014 Transfer Award winners

Automated production faces a variety of challenges arising from deviations in the measurements of vendor parts. To meet high quality standards, the position and fit of the work pieces that are about to be connected have to adhere to tight specifications – especially with joining technology in the automotive industry. The quality of the components is tested and optimized on a regular basis, but sometimes the automated process parameters have to be adjusted manually, which is not good for efficiency. To keep such manual intervention to a minimum, the welding process used in the car body construction of the VW Touran (Wolfsburg plant) is monitored within a manufacturing cell by a quality management system called ARGOS. ARGOS is a modular system developed by the Steinbeis Transfer Center for Applied Production and Joining Technology. It interacts with other systems as a cyber physical system (CPS) to enable adaptive monitoring of production processes and physical components. The Steinbeis Team and the project team at Volkswagen were honored for their partnership with the 2014 Steinbeis Foundation Transfer Award.

The team at the Steinbeis Transfer Center, which is based at Jade University of Applied Sciences in Wilhelmshaven, are experts in the field of Industry 4.0. Their work revolves around crosslinking systems used in production processes and monitoring the quality of data processing. CPS's interact "machine-to-machine" via embedded, network-based technology. By integrating physical objects (such as sensors and devices) into digital processes, systems can be flexibly linked, even if they previously had no common interfaces. Depending on the task, the ARGOS software is able to evaluate the process and sensor parameters and can process this information based on targets using sensor networks. There are also internal sensors to ensure evaluations meet requirements and that deviations can be compensated for in real time through actuators.

The application developed with Volkswagen makes it possible to monitor and analyze welding parameters as well as properties relating to component geometry with a bearing on quality. If deviations are detected, the production process is automatically adjusted through control and regulation algorithms in order to ensure that the final welding seam is of sufficiently high quality. As a result, manual adjustment of the process parameters is no longer necessary.

A number of technical aspects were a major challenge for the experts, as was implementation and testing of the system during ongoing production, and it was only thanks to the close collaboration and communication between the project team members that the undertaking was a success. There is tremendous potential for the application, which was awarded the Steinbeis Foundation's Transfer Award – Löhn Award. This is not just because it will now make it possible to monitor and adapt welding engineering processes in the future, but also a variety of other processes.

Image: Prof. Dr.-Ing. Dieter Liebenow (Steinbeis), Harald Musa (Steinbeis), David Piwczyk (Steinbeis), Stefan Braun (Volkswagen AG), Sven Gorny (Steinbeis) (left to right)

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Laser Hardening of Camtronic Camshafts

2014 Transfer Award winners

When it comes to making cars, the eco-friendliness of the vehicle is assessed and regulated by strict consumption and emissions parameters. Car manufacturers have to meet these requirements by using increasingly complex technological systems – all of which must work safely and reliably under any operating conditions. One area of major potential in this area is the engine control unit. For example, the innovative Camtronic system provides additional ways to optimize the combustion process by means of load-dependent valve stroke switching using a supporting camshaft with two adjustable cam components. Depending on the driving style, fuel consumption can be reduced by 3.5% – 10%. Due to their required functionality, the cam components of the Camtronic system are designed as pipe-shaped components with comparatively thin walls. As a result, conventional hardening processes offer limited usefulness because of the high heat loads they produce and the fact that this heat exposure can cause component deformation. The project partners at Daimler, who joined forces with the Steinbeis Transfer Center for Laser Processing and Innovative Manufacturing Technology, were presented with the Steinbeis foundation's 2014 Transfer Award for their project which looked at the laser hardening of Camtronic camshafts.

Laser hardening is ideal for components that are exposed to high stresses and require a high level of functional integration. Compared to induction hardening, it exposes the component to up to 90% less thermal stress for comparable hardening depths. With this in mind, Daimler and the Steinbeis Transfer Center for Laser Processing and Innovative Manufacturing Technology worked together to develop a laser hardening process for cam pieces. It was a natural fit – the project partners shared positive experiences from past collaborative work, and the Steinbeis experts at Pforzheim University of Applied Sciences had already acquired significant know-how in controlled laser beam hardening.

Based on preliminary feasibility studies, the transfer project covered precisely adapted process developments in the use of laser hardening for Camtronic cam components. As part of the project, the partners also took first steps in introducing the process in large-scale series production. This included a draft concept for the future production facility, support in implementing a suitable laser hardening optical system, and further evaluations of the optical system and other important facility components. Following this project, which was awarded the Steinbeis Foundation's Transfer Award - Löhn Award for outstanding transfer projects, the Daimler and Steinbeis partners plan to continue their work with new applications for laser beam hardening and to investigate the further potential this new technology could bring.

Image: Wolfgang Hansen (Daimler AG), Nelson Brito (Steinbeis), Tom Cruz (Steinbeis), Dr.-Ing. Andreas Baum (Steinbeis), Dirk Even (Daimler AG), Prof. Dr.-Ing. Roland Wahl (Steinbeis), Dr. Bernd Schietinger (Daimler AG), Christian Elsner (Daimler AG), Thomas Böhl (Daimler AG) (left to right)

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Dedicated Professor and Successful Businessman

2014 Special award winner

Prof. Dr. Joachim Goll has been awarded a special award by the Steinbeis Foundation for his many years of outstanding service to knowledge and technology transfer on behalf of the Steinbeis Network. Steinbeis thanks Joachim Goll for his support, which has always been constructive and based on mutual trust, and his successful dedication to target knowledge and technology transfer as director of the Steinbeis Transfer Center for Software Engineering.

Joachim Goll studied physics at Stuttgart University where he also earned his doctorate at the "1st Institute of Theoretical Physics." He embarked on a business career started at SEL – now Alcatel-Lucent – where he worked as a systems planner and programmer, headed up software engineering and was appointed director of systems software. In 1992, Goll was called up by the former Technical College in Esslingen, today's Esslingen University of Applied Sciences. While at the university, aside from lecturing, he managed and set up the software engineering degree program, establishing joint projects between school students, teachers and the university. He also launched a series of free summer school classes. Goll has written books on the introduction of Java and C, now standard teaching materials for students.

Joachim Goll first became involved in the Steinbeis Network in 1991 while working at the Steinbeis Transfer Center for Communications Technology at the university in Esslingen. Within three years, he founded the Steinbeis Transfer Center for Software Engineering (STC) there, which has enjoyed many successful developments and is an established, reliable and professional partner in the field of IT solutions used in automation technology and the automotive industry. The STC's clients receive support with state-of-the-art technology and the processes required to plan and develop software or operate Linux systems and networks. Goll joined forces with colleagues at the STC to set up and support a variety of spin-offs through Steinbeis.

Goll's work at the STC, at the interface to Esslingen University of Applied Sciences, is a prime example of the successful and targeted application of knowledge and technology in the field of business. His aim, through close collaboration with the university, is to provide an appealing work environment and act as an appealing employer of graduates with knowledge of the very latest technologies, simultaneously offering them a chance to gain qualifications in parallel to their work, including master's degrees and doctorates.

Image: Prof. Dr. Joachim Goll

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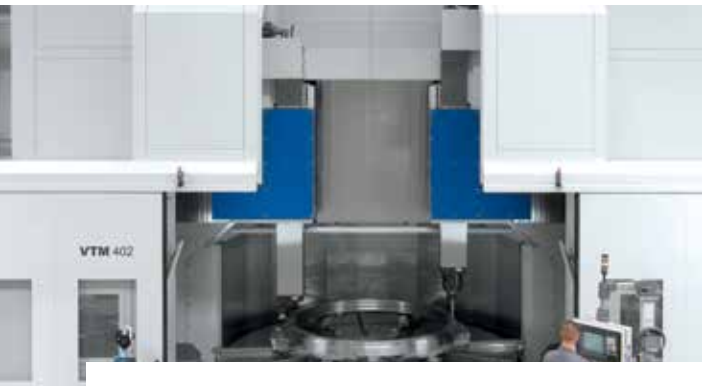

Feature Topic: Information and Communication Technology

Insights from Steinbeis experts

Modern Information and Communication Technology (ICT) is now a key field of technology and frequently acts as an important catalyst for economic growth. It is also a driver of essential renewal in industrial manufacturing and service markets. This edition of TRANSFER sheds light on the significance of this field of technology from a variety of angles: Prof. Reinhard Keller, director of the Steinbeis Transfer Center for Systems Engineering, examines the impact that developments in the area of communication systems are having on automation technology. Prof. Dr.-Ing. Jörg W. Fischer of the Steinbeis Transfer Center for Computer Applications in Engineering provides insights into product lifecycle management (PLM) and the product development process. Prof. Dr. Wolfgang Ertel, who heads up the Steinbeis Transfer Center of Artificial Intelligence and Data Safety (KIDS), explores the complex topic of artificial intelligence with an introduction of machine learning and corresponding control, diagnosis and optimization challenges in mechanical engineering. In an interview with Prof. Dr. habil. Günther Haag, director of the Steinbeis Transfer Center for Applied System Analysis (STASA) and managing director of Steinbeis Angewandte Systemanalyse GmbH, the role and significance of applied systems analysis is discussed with a close look at the issue of quality. An article by Professor Dr.-Ing., Dr. h. c. Florin Ionescu, who heads up the Steinbeis Transfer Center for Engineering & Project Consulting and the Steinbeis Transfer Institute for Dynamic Systems at Steinbeis University Berlin, introduces the production lines of the future. Ulrich Dietz, CEO of GFT Technologies AG, explains how know-how transfer works in the IT industry through startup companies. Dr.-Ing. Jürgen Jähnert, managing director of bwcon GmbH, takes a closer look at the issues surrounding cloud computing. Also, Alf Henryk Wulf, board chairman of the non-profit organization Baden-Württemberg: Connected e.V. (bwcon), explains how IT is being backed in the state of Baden-Württemberg.

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From Electromechanics to Industry 4.0

Automation technology: Communication systems set the pace

For decades, advancements in machine system automation have been driven by fast-paced change in electrical engineering and electronics. As the world becomes more digital, automation innovations are increasingly coupled with information technology. As a result, the next pioneering steps taken with automation technologies will be based on extensive networking of the tasks carried out by machine systems. This networking of equipment through internet technologies has been touted as the fourth industrial revolution and is now commonly referred to as "Industry 4.0." Whether it's an evolution or a revolution, a lot will change in the field of automation technology and German companies would be wise to stay at the forefront of developments.

Looking back at the long-term development of machine system technologies, it's easy to see that – starting with the invention of the steam engine – much of the progress we've made has been driven by advancements in the fields of mechanical systems and mechanical engineering. Machine system functions were increasingly enhanced by electromechanical open- and closed-loop control, which slowly but surely began dictating the overall functioning of the entire system through centralized control of the machinery.

Massive change was ushered in with the invention of the transistor in the 1950s. Thanks to the use of microcontrollers and signal processors, the scope of open- and closed-loop control functions seemed to grow exponentially and far more complex processes could be mastered – and all this with reductions in costs and space requirements. This process was accompanied by a demand for more precise data, but with this came significant wiring costs. As a consequence, this heralded the development of centrally controlled field buses for the exchange of process data.

The communication systems that were introduced at the time – like Interbus S, Profibus, DeviceNet, Sercos, AS-Interface and many others – made it possible to implement decentralized open- and closed-loop control through intelligent field devices. Practical application was carried out in phases, that is, in an evolutionary manner. Despite this, it had a revolutionary impact in terms of the new possibilities it opened up to modularize and customize machines and equipment.

As it turns out, the functional limitations of communication systems now set the boundaries for innovative machine system functionality. In other words, the communication system sets the pace and becomes the defining element. In addition to a limitation in the scope of process data, real-time parameters like latency (the time it takes to transfer the data) and synchronization jitters are the measures for concurrency in a decentralized process.

With the advent of industrial Ethernet (an Ethernet which meets industrial demand and which is suited for industrial environments) a much more powerful technology was introduced in the year 2000. This opened up enormous potential for innovation. One significant effect was the dissolution of the lines between the individual layers of the automation pyramid according to IEC 62264 – a process also referred to as "vertical integration." All variants of the industrial Ethernet standardized in IEC 61158 have one thing in common: They make all of the functions known in IT available to the components of automation technology – in particular, the very important Internet Protocol (IP). This creates a broad spectrum of applications for using IT technologies in machines and equipment. Telematic functions are also used extensively in the monitoring of plant equipment, as well as for diagnostics and maintenance.

It is important to assess the opportunities and risks associated with using IT functions in machine systems. Great leaps in increased efficiency are counteracted by the risk of damage through attacks on a machine's control functions from the outside. The "Stuxnet" attack on the uranium enrichment facility in Natanz, Iran was a prime example of why the issue of security must be given a lot more attention in future.

Despite the skepticism that arises when looking at risk, opportunities abound when it comes to the additional functionality currently proclaimed under the concept of "Industry 4.0." Central to the idea known as the "Internet of Things" – which describes this all-encompassing networking of machines, equipment, indeed whole factories – stand newly defined industrial processes that are to be established based on the functions we're familiar with from the "Internet of the People."

Whereas nowadays the subsystems and components of a plant are involved in communications, and the interplay between the individual components is supposed to be controlled in an overarching system, in the future, processes and the recording of all data relevant for a given process will be a strict digitized, establishing a basis for planning, implementation and optimization. For example, it can be expected that we will achieve superior quality by mastering more complex processes thanks to simulations based on actual data and the models that can be generated from this.

These developments clearly show that the communication systems used within machine systems will gain in importance and will set the pace for innovation to an even greater extent in the future.

Due to the fast-paced developments that can be expected, it will become vital for companies involved in automation technology to keep at the forefront of developments in the coming years. The Steinbeis Systems Technology Group (Steinbeis STG) is an association of three Steinbeis Enterprises: the Steinbeis Transfer Center for Systems Engineering (Steinbeis TZS), the Steinbeis Embedded Systems Technologies GmbH (Steinbeis EST GmbH) and the Steinbeis Interagierende Systeme GmbH (Steinbeis IAS GmbH). Steinbeis STG supports its customers with the implementation of cutting-edge IT in pioneering products: Steinbeis experts help with the design and implementation of innovations that are based on the application of IT in the field of embedded systems. The group is an active player in the field of automation technology with a focus on industrial communication and the development of innovative solutions. It also helps with the certification of control units for automotive technologies.

Steinbeis Systems Technology Group

Services

- Engineering services for hardware, software, systems technology
- Engineering services for industrial communications
- Requirements engineering and specifications
- Integration and testing of components and systems
- Implementation of system prototypes and low-volume production
- Testing of embedded systems
- Certification services
- Training

Image: © istockphoto.com/uchar

Professor Reinhard Keller is head of the Steinbeis Transfer Center for Systems Engineering and a professor at Esslingen University of Applied Sciences. The enterprise works on system solutions and develops hardware and software for distributed embedded systems with a focus on industrial communications. It also offers extensive services related to system integration.

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"The Innovation Process Needs Flexibility and Freedom!"

An interview with Professor Dr.-Ing. Jörg W. Fischer

Professor Fischer, for more than a decade, your work has revolved around the topics of product lifecycle management (PLM) and information management, the product development process (PDP) and the digital factory. That's a long time for an industry as fast-paced as ICT. What developments would you describe as the milestones in this area?

There have been an unbelievable number of developments with a major impact on the industry in the last 10 years. The ones I consider most worth mentioning are the development of PDM (product data management) into PLM (product lifecycle management). With PDM, it´s just about administering CAD data, whereas with PLM the idea is to manage all product data throughout the entire life cycle. We now have access to IT systems that make this possible, which we almost take for granted. Another important milestone was the development of the digital mock up (DMU), so we had the possibility to produce digital product prototypes in 3D, long before the real prototype was ready. The same thing happened around the same time to factories. Another step came when the DMU was made available for different types of simulations which made it possible to make reliable predictions about the future behavior of products and factories. The quality was far superior compared to existing simulation techniques.

There have been tremendous changes in the last two or three years, mainly fuelled by ideas relating to Industry 4.0. I'm delighted at the number of smaller companies that run at the front of the pack in this area, and there are two developments I think are worth highlighting. At the moment, the problem we face is that digital models and reality are gradually developing in different directions. Painstakingly constructed digital models are quickly becoming irrelevant for actual operation of the machines. To automatically compare real machines with virtual models, one of our partners – IPO.Plan – has developed a wonderful solution. They use a robot with a system called IPO.Eye which can move by itself across the shop floor and scan in the actual situation in the factory, which it then uses to update the digital model. In the future, it will be this kind of technology that will make it possible to carry out ad hoc simulations in the factory. The second development worth pointing to is virtual machine tooling. We now have the technology that will allow machine tool manufacturers to deliver a virtual machine to go alongside the real machine. Both systems will operate on the same control systems so they both react almost exactly the same way. The fact that even smaller machine tool manufacturers are doing this as a matter of course, companies like our partner ELHA, is a wonderful sign of their innovative flair.

An important part of most business strategies these days is productivity improvement stemming from cost squeezes and competitive pressure. What roles do PDP and PLM have to play in this area? And what should SMEs in particular be more on the lookout for in this regard?

Companies have invested huge amounts of money in recent years, trying to avoid wasting resources and making their material flows more lean. For every material flow there is a corresponding information flow. What's interesting is that wastage in information flows doesn't seem to be relevant in this respect. As the PDP becomes more and more integrated with IT systems, the volume of product data that will need handling will increase. The demands this will place on companies will be much worse than what we've seen to date. Up until now, people have tried solving the issue on a purely technical level, e.g., by using a PDM system. Planning the product development process in terms of organizational rationalization is pushed aside, but the mature processes are left in place, which obviously isn't really that effective. Making the PDP more lean is an absolute necessity, especially when introducing or redeveloping products in PLM. It's important to see this as a genuine opportunity to rationalize the organization and to do this carefully, as part of a continuous improvement process. SMEs need to be aware of the fact that an investment in lean management will be especially lucrative if the idea behind lean management is also applied to product development. But this is an area where companies often need help. Our Steinbeis Transfer Center for Computer Applications in Engineering has made a breakthrough in this area. We've developed a technique called Do(PLM)Con, which allows us to examine the current situation in the product life cycle and make the information that's developed transparent for everyone involved – without complicated IT terms – so people can see for themselves where the problems lie. Based on this, we work with the customer to identify targets and help them during implementation.

It goes without saying that answering customer requirements has a central influence on product success. It's important to improve the standard of documentation in requirements management, and avoid errors resulting from misinterpretation. You've been working on the development of a requirements management system which is integrated into PLM, which should help solve the problem. Can you provide us with some insights into the tool?

A key success factor for companies these days is the ability to quickly translate a good concept into a successful product. Innovation shouldn't be down to chance. If you think about that fact that, according to experts, 50% of product launches don't succeed, naturally you have to wonder why that is. Clearly, lots of companies don't manage to transform market requirements into a product or its components. Requirements go through a number of levels of abstraction in the product development process. This refinement process works beyond the boundaries of departments or companies. The requirements have to be expressed time and again in verbal terms, and explained and discussed. With each stage of this transformation, there's a risk that the requirements will be misinterpreted or be taken out of context. For us the issue was whether it would be possible to develop a methodology to eradicate these problems, something based on the system functionality of the Teamcenter PLM system developed by Siemens, which is also quite similar to the intuitive approach used by engineers. We succeeded in doing this with a technique called SITIO (Securing Information Transformation for Input and Output). Our transfer center now offers customers consulting services on the introduction of this process and we've noticed strong interest in the topic on the market.

Professor Fischer, it's now been a year since you started working at Computer Applications in Engineering, a Steinbeis Transfer Center that was set up by Prof. Dr.-Ing. Wolfgang Hocheisel 30 years ago, and has been successfully headed up by him ever since. The services on offer range from consulting to implementation or adaptation of PLM components. What trends have you noticed in terms of the types of tasks customers ask you about and their requirements?

Based on discussions held with people in the market, we've currently worked out three key trends. Lots of companies have successfully introduced PLM components and used them to automate a number of routine processes. But when they do, they then start to notice lots of weaknesses in their processes. More and more of our customers are wondering what's the best way to systematically make the PDP lean. Another trend is the shift toward engineering to order (ETO), or just producing based on customer requests, and then there's configure to order (CTO). Lots of companies are actively working on making their products more modular. At the same time, they're working on the introduction of suitable configuration systems. Our goal is to offer customers configurable products that fulfill the individual requirements of customers, but which also consist – to a large extent – of standard modules that can be mixed and matched. In lots of cases, this would allow companies to move away from workshop production or standalone production toward proper production lines, simultaneously reducing complexity with major potential to cut the cost of product development and manufacturing.

What mustn't be forgotten is that without the right underlying methodologies or organizations that "think in modular terms," the modular approach is not possible. Another trend is the increasingly intense debate about the relative positioning of PLM systems and ERP systems. There's a borderline between the two systems, with the strictly formalized processes of enterprise resourcing planning coming up against the technological, innovative processes of product development. The issue people are debating is the extent to which the tendency of SMEs to see PLM as an add-on of ERP might by hindering the innovation process because things become more formal as a function of the system. The innovation process needs flexibility and freedom! In the future, PLM platforms will increasingly have to provide a proactive working environment that preempts what we want to do and helps us. This would then put people center-stage and allow them to orchestrate the creative process without wasting time on laborious formalities.

Image 1: IPO.Eye © IPO.Plan GmbH
Image 2: IPO.Eye-Daten © IPO.Plan GmbH
Image 3: © ELHA-Maschinenbau

Professor Dr.-Ing. Jörg W. Fischer is a project manager at the Steinbeis Transfer Center for Computer Applications in Engineering and is a professor at Karlsruhe University of Applied Sciences. The portfolio of services offered by the Steinbeis Enterprise ranges from consulting to the implementation or adaptation of PLM for companies of all sizes.

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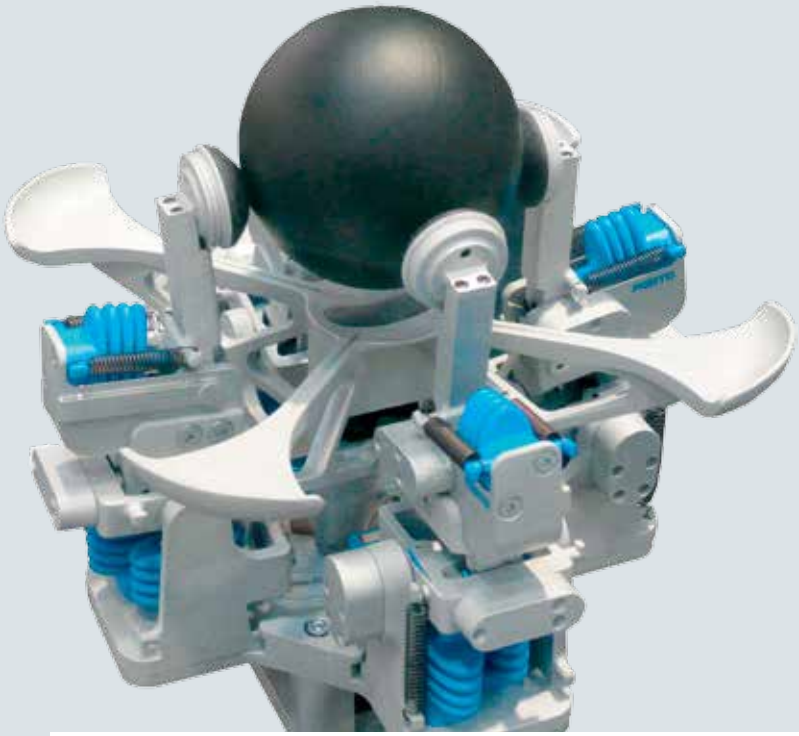

Machines Learn How to Learn from Steinbeis Experts

Artificial intelligence in mechanical engineering: machines become capable of learning

Controlling modern machines and robots has become so complex that classic control technology and other programming methods are reaching the boundaries of technical feasibility. Artificial Intelligence and Data Security (German: KIDS), a Ravensburg-based Steinbeis Transfer Center, is entering new territory in this field: For a number of years, Professor Dr. Wolfgang Ertel and his team have been looking at machine learning related to control, diagnostics and optimization issues in mechanical engineering. As can be seen from two projects conducted on behalf of Festo in Esslingen, their work has evidently been highly successful.

The LearningGripper is a grasping tool with four fingers designed as an abstract representation of the human hand. The four fingers on the gripper are moved pneumatically by twelve low-pressure bellow actuators. What is special about the bionic gripper is that it can learn. This is because it uses learning algorithms instead of highly complex programs.

Thanks to machine learning (a field of artificial intelligence), the gripper is able to teach itself complex tasks, such as grabbing and positioning a ball. For example it has to rotate a ball such that at the end a given side of the ball points upwards. The gripper uses reinforcement learning to learn this behaviour. While Festo was developing the gripper hardware, the KIDS Steinbeis Transfer Center invested exactly one year in the learning algorithms, which were successfully implemented and then presented at the Hanover Trade Show.

Based on these principles, self-learning (adaptive) systems like the LearningGripper could be integrated into production lines in the future and then optimize their behavior by themselves. The crucial advantage machine learning has over classic process controls is that the learning algorithm does not need a mathematical model for the hardware – in this example: the gripper. This is similar to how we learn complex sequences of movements as human beings, without having to study mathematics or mechanical engineering. Just like our brains, the learning algorithm generates its own model of the task it needs to learn.

Now that the gripper project has demonstrated the successful application of machine learning with a prototype, a second project was started to solve a more specific problem for Festo involving pneumatic machinery. The project aim was to continually gauge the flow rate of compressed air on an automated pneumatic device in order to detect changes in power consumption, irregularities and faults. This can be as a result of things like compressed air leaks or other defects in the pneumatic system.

The device to be monitored was treated as a black box, since the diagnostic module that was to be developed also had to be usable on any other kind of pneumatic device. It had to be possible to connect the diagnostic module to devices without major effort or expense to allow operators to carry out monitoring or function diagnostics. Furthermore, the module would have to "get to know" equipment in a learning phase of a few hours in order to be able to classify deviations from normal operating conditions as errors. To do this, machine learning algorithms were used that can detect deviations from the typical shape of the flow rate curve.

A particular challenge with the project was a condition laid down by Festo: during the learning phase, the device had to operate only under normal conditions. As a result, the learning algorithm had no access to faulty operating conditions of the device during the learning phase but still had to be able to distinguish with certainty between normal opera-

tions and faulty conditions afterwards. To solve this problem, the experts used a modified version of a method called "one-class nearest neighbor." The method was introduced to a prototype and tested very successfully with flow rate data on several machines – i.e. with an extremely low error rate.

It is often not possible to fit machinery with a sufficient number of sensors due to cost or technical reasons. This can result in major problems with model-based diagnostic methods. The new diagnostic module only requires one flow rate sensor, and, thanks to the machine learning process, it can extract relevant information from the flow rate chart.

The project is also interesting given developments regarding Industry 4.0, on the cusp of an era of autonomous machines. With modern mechanical engineering it is now possible to design extremely complex machines, and powerful sensors, drives and control units are entering the field from mechatronics and electrical engineering. Simultaneously, over the past 20 years, developments in artificial intelligence have resulted in learning algorithms that can be put to highly practical use, and, just like the task that was solved in this case, many areas are simply waiting for this to happen. With this project, two matching partners worked together, culminating in a pleasing result. But it was soon clear from the many meetings and discussions that the approaches adopted in mechanical engineering and artificial intelligence are a long way apart. The project was only possible in this constellation because of the strong interest from Festo in new methods from different specialist areas, and because the scientists at the KIDS Transfer Center were motivated by their enthusiasm for the practical challenges encountered every day in automated manufacturing.

The solution that was developed as part of this project is universally applicable and the sensors were extremely basic, meaning it could be applied to many other diagnostic tasks of a technical or non-technical nature. For example, this potential innovation could be applied to the automatic self-diagnosis of household instruments, electric motors and gasoline engines. Also, it could be used in different ways for medical diagnostic purposes or for home security monitoring.

Steinbeis Transfer Center for Artificial Intelligence and Data Security (KIDS)

Services
- Consulting
- Applied research and development
- Seminars, talks, courses

Key areas
- Machine learning for diagnostics, prognoses, classifications
  - · Automatic fault diagnostics for technical devices
  - · Quality control
  - · Classification
  - · Adaptive classification systems
  - · Automatic diagnostics in medicine
  - · Validated second opinions
  - · Adaptive robots
  - · Service robotics
  - · Object detection
- Data security
  - · Public key infrastructure
  - · Digital signatures
- Seminars
  - · Machine learning (1-5 days, depending on requirements)
  - · Adaptive expert systems
  - · Artificial intelligence with applications
  - · Data security
  - · Secure communications on the Internet
  - · Digital signatures
  - · Public key Infrastructure

Image 1: STZ KIDS
Image 2: © Festo AG

Prof. Dr. Wolfgang Ertel is director of the Steinbeis Transfer Center for Artificial Intelligence and Data Security (KIDS), which is based at Ravensburg-Weingarten University of Applied Sciences. The center offers its clients R&D services as well as consulting services relating to the field of machine learning used in diagnostics, prognosis, classification and data security.

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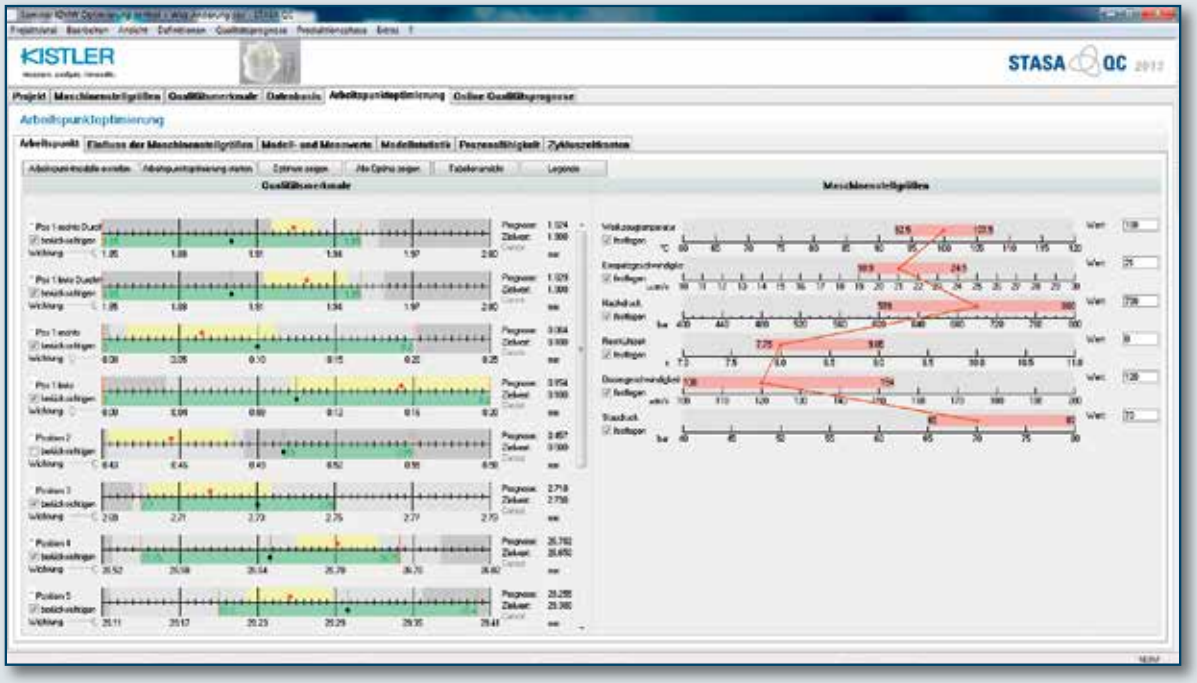

"Our Goal is to Make Use of Meaningful Developments and Research Findings at the Frontline of Research"

An interview with Professor Dr. habil. Günter Haag

Professor Haag, your Steinbeis Transfer Center for Applied Systems Analysis (STASA) celebrates is 20th anniversary in 2015. What made you decide to become self-employed and find the courage to enter the fast-paced ICT sector with your own Steinbeis Enterprise?

I knew at the time that I wanted to be my own boss, so I went to see Professor Löhn, who I'd already known for some time through my work as a consultant. I was interested to hear his thoughts about my business model. "Then start up your own Transfer Center," was his advice, and we sealed it with a handshake. I've not regretted it for a single second since.

The name STASA and the topics we look at are based on the IIASA (International Institute for Applied Systems Analysis) in Laxenburg outside Vienna. I worked there for a number of years as a theoretical physicist in the field of "metropolitan studies" and "long waves in economy." Lots of my international contacts go back to that time. I did a degree at Stuttgart University in theoretical physics and synergetics, and the interdisciplinary research projects I worked on laid the foundations for STASA. The scope of possible applications that the methods of systems analysis can be used in is extremely broad; it includes R&D areas such as economics, demographics, engineering, physics, geography and biology.

Your Steinbeis Enterprise offers its clients applied systems analysis – data analysis, modeling, simulation and the optimization of technical and socio-economic systems. What are the main areas your clients work in, that you connect with through your services?

Our goal is to make use of meaningful developments and research findings at the frontline of research – and thus safeguard competitive edge in terms of the know-how of our clients. To do this, we have to be actively involved in research ourselves, publish international papers and be part of a research network. To build the right know-how with the Steinbeis Enterprise and keep moving forward, you need a strong base of highly qualified, motivated and satisfied employees. Our clients value and trust us because we realize the stated objectives by carrying out their projects. This is primarily reflected in longstanding business contacts based on the systematic approach and standards of our work and the trust that's invested in us.

One of STASA's main areas of work is town and regional planning, strategic location auditing, and demographics and employment. In which direction do you think developments are headed in this area?

With the social sciences, macro-dynamic developments are actually a function of the decision-making processes (on the micro level) of individuals (agents). A multitude of individual decision-making processes – of different agents within the economic system – creates the micro-dynamics, even if the decisions of each individual are independent of one another and rational or irrational motivations play a role, as do external influences and people's future expectations. Our emphasis on social science centers on the analysis, mathematical modeling and simulation of these kinds of decision-making processes, drawing on models we developed ourselves from the field of statistical physics. It doesn't matter if it's the analysis of population movements to predict population numbers, or the strategic analysis of a region, or traffic flows, or customer flows, it always revolves around the decision-making processes of people, households, working professionals, etc. Our work is

about defining the right mathematical models for decision-making processes, in keeping with Einstein's idea of making things as simple as possible, but not simpler – in other words, we try to reduce the information derived from data to the smallest possible number of significant but easy-to-interpret factors and graph this for our customers.

An important challenge in the future with the modeling of socio-economic processes will be that, in the long term, it will need a lot of support from information and communication technology (ICT). This will have an impact on the hyperbolic expansion of data (mass data) that comes with ICT in terms of timescales and locations. So we can assume that processes to compress data and graph essential facts will become more and more important in the future.

Another area of focus at your Steinbeis Enterprise is quality. You've developed a software package called STASA QC that helps improve the quality of finished parts, and, at the same time, reduce the number of faults. How does this software help small and medium-sized enterprises, especially with their projects?

Let me start with an example: to rig injection molding processes, work out the right machine set up, or optimize the quality of a component, SMEs typically still apply the standard method of trial and error. Systematic experimentation based on testing schedules is mostly considered too expensive and too complicated by the people doing the fitting, since the requirement is to ramp up production as soon as possible.

If the fitter finds a setting for the machine that generally fulfills quality guidelines, deviations in quality criteria are hurriedly adapted by adjusting tools. As a result, there are often quality problems later on in production because the production process is unstable. This unsystematic way of doing things has been overhauled for years, resulting in significant outlays since nobody can find a way to optimize the number of rejects (material efficiency), cycle times (energy efficiency) and quality, and bring everything into harmony. This was the background for STASA QC. The goal is to support experts in their work – they are under a lot of time and cost pressure. The mathematical processes that are introduced are fine-tuned to learn adaptively, making things a lot easier for the user. With fewer rounds of testing, which are suggested by the software, and a systematic and automatic evaluation of measurements, a connection is identified between the machine settings and different aspects of quality, i.e., product quality. As a result, the optimum machine setting can be worked out in terms of quality and cycle times, with indicators for process quality, and, in some cases, any necessary tool changes. We know from experience that STASA QC can reduce cycles times by between 5 and 20% versus previous processes, and the energy saving potential is as high as 15%, with significant reductions in time investments to optimize processes.

STASA QC is being used successfully in medical technology, the automotive supply industry, and production process with high throughput volumes, but small and medium-sized enterprises are not benefitting nearly as much as they could be from the software, especially when it comes to reacting to growing cost pressures. There are modules in the STASA QC software which of course can also be used in other areas, for example, in welding and adhesion processes, the production of hardboards, ceramic pressure casting, extrusion processes, painting processes – just to name a few.

Soon you'll be looking back on 20 successful years. Looking forward, where do you think the challenges will lie?

Research, development and technology transfer will still be central to work and challenges at STASA. There'll be more involvement in ICT applications and Web-based services, and this will move some of our work in a different direction. I have a good team so we're geared well to future challenges.

Professor Dr. habil. Günter Haag is the director of the Steinbeis Transfer Center of Applied Systems Analysis (STASA) and managing director of Steinbeis Angewandte Systemanalyse GmbH (STASA GmbH). Both Steinbeis Enterprises work in the field of applied systems analysis and offer their clients services that include time series analysis, trend analysis, general statistical processes, network analysis and network optimization.

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The Virtual Manufacturing Lines of the Future

A tool for use in R&D, teaching and process control

The development and expansion of mainframes, computers and finally PCs inevitably resulted in digitalization in all areas of society – and thus started a race against time. In the early 1970s, the specialists started becoming involved in "formula translation programming," or FORTRAN, doing a huge service to scientists and engineers. After the introduction of Pascal and C in the 1980s, a framework was established to take on multilevel object-oriented tasks with subroutines. For the first time, it became possible to write general purpose programs with packages such as CAD, MKS, MATLAB®/Simulink and FEM platforms. Now there were powerful 2D (and later 3D) tools and these played a significant role in improving quality in a variety of areas of engineering. The first steps had been taken on the path to virtualization. Professor Dr.-Ing. Dr. h. c. Florin Ionescu, a Steinbeis director in Constance, has now spent a number of years observing and promoting the application of developments made in the field of virtualization to production lines and components used in production.

Virtualization has been of particular benefit to a number of fields – plant engineering, vehicle construction, the aerospace industry, shipbuilding and the railways – where products can now be depicted and presented virtually. But the real pioneer in virtual applications is considered to be the automotive industry. It was here that leaps in development and quality became possible and development cycles and costs were reduced radically. Simultaneously, there were long-term improvements in functional reliability.

In the world of tomorrow, the vision is of fully automated manufacturing, with entirely virtual production lines (officially "virtual manufacturing lines," or VML). But everything depends on progress with the development of automatic processing. Under an EU research program called Horizon 2020 and a framework concept laid down by the BMBF called "Research for the production of tomorrow," companies are being invited to tender for funding to support future-oriented work in order to solve a number of key tasks in this sector. The experts expect the VMLs of the future to become a key success factor in technological advancement, with a sweeping impact on product and service markets. Specialists believe that an important step on the road ahead will be the predicted launch in manufacturing of dual or multiprocessor technology, as well as germanium processors.

Without a doubt, virtualization brings a number of benefits. Design and development always involves making calculations, which can take on new forms and include modeling and the simulation of drive and control systems. More and more development and modeling work involves the highly realistic reconstruction of tools and tooling machines, milling and machining processes, industrial robots, and logistical equipment (tool/device warehouses, component transportation). With virtualization, it is also possible to include sensors, either networked or on an individual basis. It is already possible to improve speeds by integrating optical fibers. Tracking processes and gathering data on the status of individual tasks makes it possible to carry out diagnostics and make predictions, and based on this, alternative or corrective measures can be planned and tested online. In fact, virtualization makes it possible to model processes and simulate the entire VML in parallel. Parameters can be defined for carrying out further optimizations, especially if revolving or touching parts malfunction, and the impact of non-linear phenomena can be identified early and eradicated. Virtualization is an enrichment for research and university lecturing, and training and staff development can be made more tangible and informative. This is all achieved by improving the content and quality of images, which can be highly accurate and realistic. Also, savings can be made on machines and equipment, but also

with energy, space and materials. Ultimately, in many cases virtualization actually makes things possible in the first place.

The concept of VMLs has become more detailed over the years and it is now being implemented step by step. It involves complex issues, requiring a comprehensive understanding of physics, mechanics, mathematics, engineering science, 3D modeling, simulation, control technology, drive technology and IT. A decisive element has been inclusion of the latest progress made in hardware and software development. The crux of a VML concept lies in:

- The multilevel object-oriented concept and models relating to this: This comprises the combination of modules, with the lowest level being dedicated to layer properties. With MBS and HYPAS platforms, consolidation is possible into bodies or sub-modules, then, based on this, come chains and machines or equipment. The model can be open-ended in vertical terms, which is helpful in case of possible extensions.
- The composition of components: Design and modeling are specific to parts. This makes it possible to develop components independently for machine tools, industrial robots, sensors and logistical equipment.
- Workstations are the basic element within a VML: They can include one or several tool machines with their specific surroundings when used in machining, or one or several industrial robots, warehouse facilities or sensors.
- Models for device warehouse facilities, industrial robots and logistics equipment are produced with MBS M/S platform, which includes CAD and FEM programs.
- Industrial robots are observed on a case-by-case basis and controlled and regulated as necessary.
- Modeling and simulation of drive functions, control functions and process controls is achieved with a HYPAS platform which can be integrated into the VML platform. These platforms also use integration algorithms (RKII, RKIV, PC, etc.).
- In logistics there is a separate drive and warehouse control system; the workstations are supplied with parts, tools and devices. The system is controlled and regulated by its own process control computer.
- Mobile robots used with the logistics equipment are small devices and have to be dealt with separately. They can be controlled and regulated locally or centrally. As such, they constitute a separate section within the VML.

There were a number of projects lasting several years looking at VML development, both at the Steinbeis Transfer Center for Engineering & Project Consulting in Constance and at the Steinbeis Transfer Institute for Dynamic Systems at Steinbeis University Berlin. The projects revolved around how partial modules are implemented although they also involved the specific transfer of findings into the business environment. For example, a collaboration with Hermann Paus' company, Maschinenfabrik in Emsbüren, involved the development and implementation of a processing machine for underground applications – a milestone project in the development of the company.

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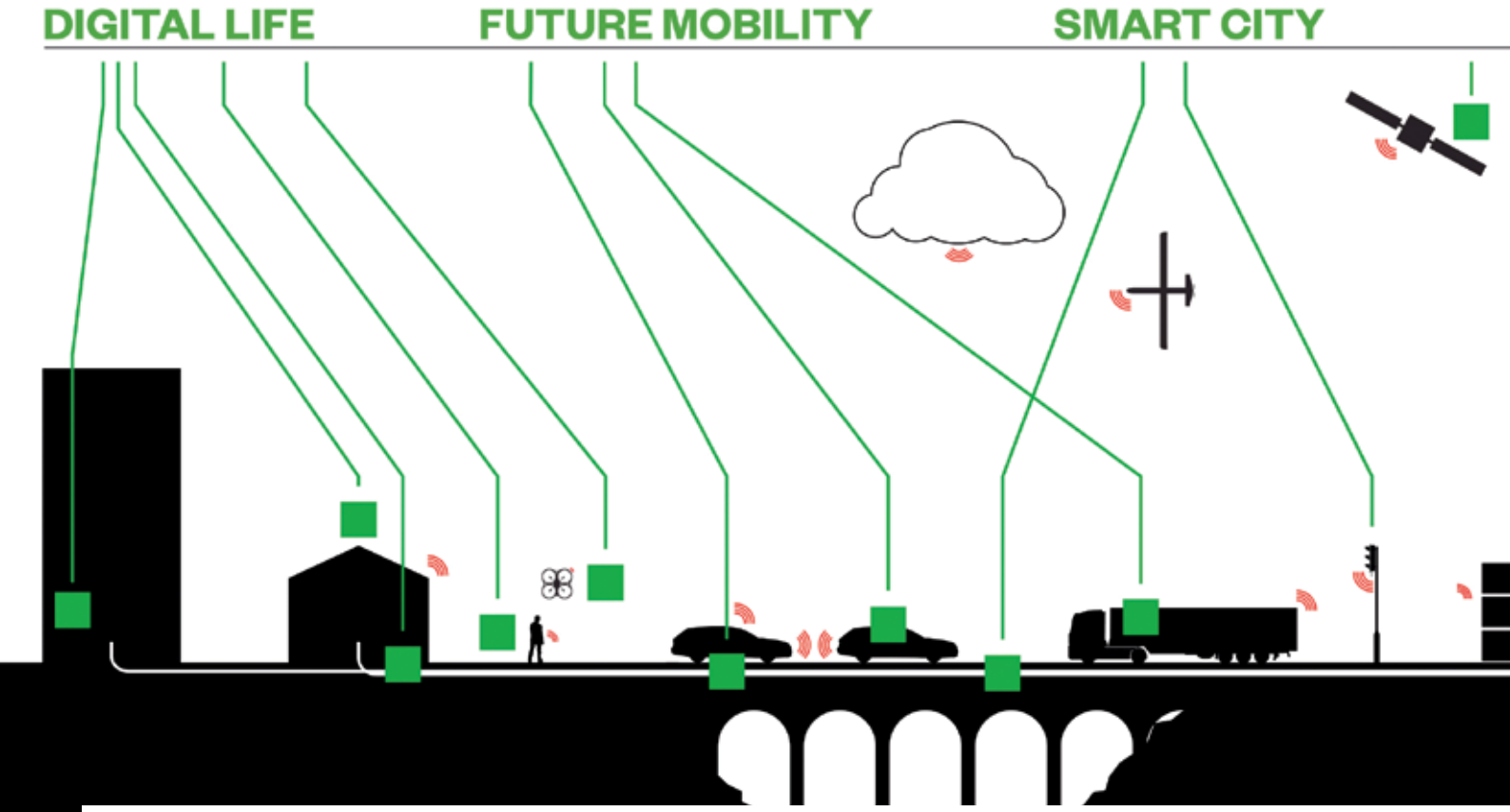


"We're Creating an Ecosystem for Avant-garde Thinkers, in Which 'The New' Can Flourish!"

An interview with Ulrich Dietz

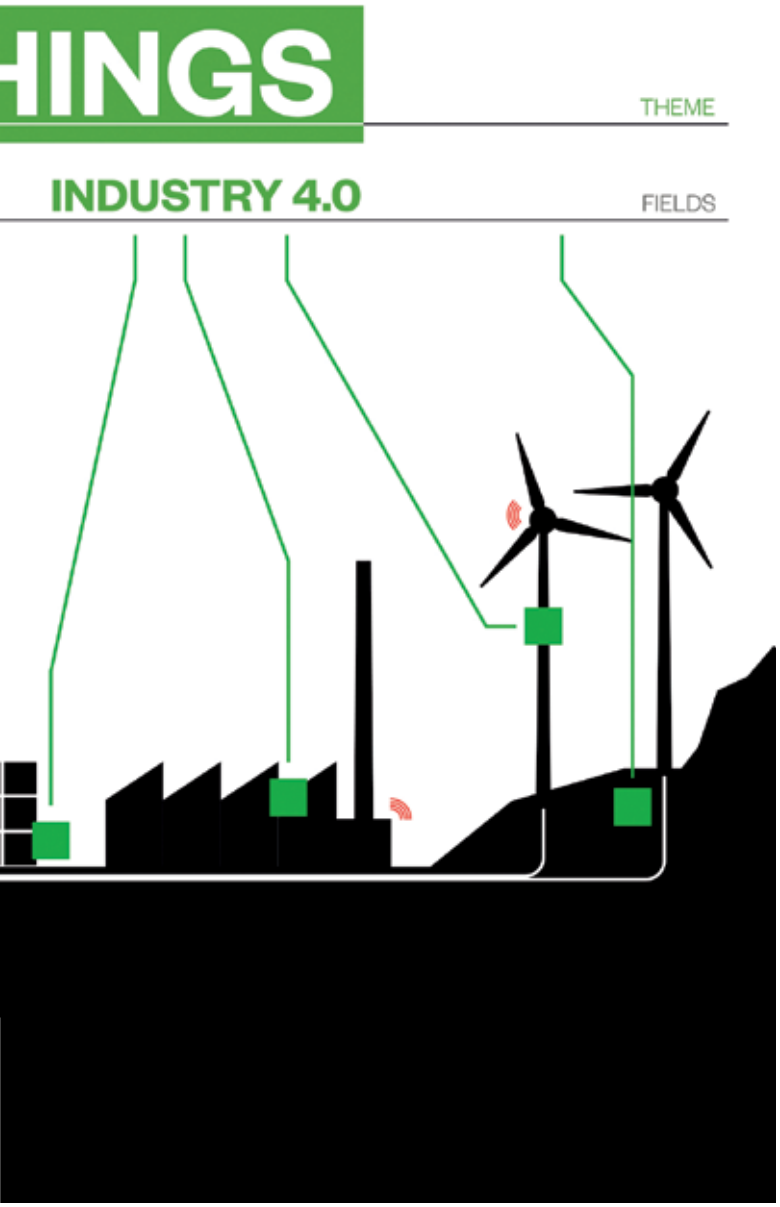
Mr. Dietz, between 1985 and 1987 you worked as a project manager at the Steinbeis Transfer Center for Information Technologies, which you also co-founded. What brought you to Steinbeis at the time?

The contact to Steinbeis was forged through the rector of the Furtwangen Technical College at the time, Prof. Dr. Johann Löhn. He'd been appointed by the then minister-president, Lothar Späth, to act as the government commissioner for technology transfer. Through the Steinbeis Foundation, he revived an organization that allowed ideas to become a reality. Working alongside Prof. Dr. Michael Schönemann in 1985, the opportunity came up to open the Steinbeis Transfer Center for Information Technology (TZI) in St. Georgen, which was one of the first technology transfer centers in Germany. It was a fascinating time, but also pioneering.

In 1987, the Steinbeis Enterprise became what is now called GFT Technologies, through which you successfully drive innovation in the software and IT industry. GFT now has a successful track record going back nearly 30 years. Which technological developments have had most influence on your work during this time?

When we started out with GFT there were no such things as "personal computers," let alone the mass-use product. The only people who knew how to work with them had programming knowledge. The advent of graphical user interfaces to interact with computer systems (as simply as with an Apple computer) in the early 1990s was a technological milestone that also had a decisive impact on GFT. Our first product was released in 1990 and it was called GRIT. It was a programming environment for exactly such user interfaces. There was a similar impact with the start of the Internet age around the year 2000. The World Wide Web revolutionized the way we find and share information. It has massively simplified access to international markets and significantly accelerated the rate of innovation. For GFT, just as much as our customers, this meant that we had to keep on challenging our existing business model and keep it moving forward.

This is exactly what we're experiencing at the moment with the digital change that is sweeping through our industry and society – just on a much broader scale. Everything can be networked with everything else. Companies have to recognize the threats and pick up on the opportunities by daring to do "something new." Our aim at GFT is to run with you on the road into a new digital era.



The aim of your current project, which is called CODE_n SPACES, is to set up Germany's first "innovation campus" in Stuttgart. This will allow you to achieve transfer through startups. Perhaps you can give us a sneak preview of this exciting project!

At the end of 2014, GFT moved into its new corporate center in the Fasanenhof district of Stuttgart. It's a five-story building which has been completely refurbished and redesigned to meet our needs – so we have our own staff restaurant, a visitors' center and high-standard event rooms. Parts of the building are intended strictly for GFT employees, but the rest will be completely dedicated to the topic of innovation, going by the name CODE_n SPACES. The area covers around 2,000 square meters (21,000 sq ft), with enough space and facilities for startups and innovation teams working to establish companies that will work together on the digital topics of the future. We're creating an ecosystem for avant-garde thinkers, in which 'The New' can flourish. For example, for the startups, we worked with the designer Tobias Rehberger to come up with an architecture and utilization concept that matches the requirements of young, creative companies. It allows for spontaneity and improvisation, but at the same time it portrays a businesslike image. We also want to promote dialog on topics relating to future digital solutions, with panel discussions, lateral thinking events and workshops, with opportunities for startups to network with big companies and champions of industry, technology, design and politics.

The focal topic in Stuttgart will be what we call "Future Mobility" – i.e., travel and transport, working with partners like EnBW. But we won't stop there. We're also planning more CODE_n SPACES in cities like Barcelona.

Your CODE_n initiative has become a unique setup in Germany, something that has also caught people's imagination outside Germany. What's the underlying idea, and what's the emphasis for 2015?

Businesses have to work on innovation at a much higher rate these days, just to keep pace with the dynamic nature of market developments. On an international level, there are so many exciting startups, continuously challenging the status quo with their creativity, daring and energy, and they can partner with established companies and add valuable impetus during the transition to a digital age. We first held an innovation competition for new companies in 2011, when we looked for the world's most interesting startups. Since then, we've taken the top 50 entries with us to CeBIT each year. For five days, we have a 5,000 square meter hall (53,800 sq ft) to host a unique event complete with a conference program. It's amazing to see the pioneering spirit taking shape when so many inspiring young entrepreneurs come together in one place for that length of time. And yes, the concept has been really well received. Last year, we hade 450 applications from 60 countries. There was media coverage on CODE_n in 50 countries. During the five days of the trade show, 17,000 visitors came to our hall. We hope to top this in 2015. This year the theme will be the Internet of Things (IoT) and digitalization of the industry and society. We've been working with the designers Clemens Weisshaar and Reed Kram to create an experiential world that really brings these topics to life in all facets.

Image: GFT Technologies AG

A passionate entrepreneur himself, Ulrich Dietz is always on the lookout for business opportunities and new ideas. The engineering graduate founded GFT in 1987 as a driver of innovation in the software and IT industry, where he now oversees the central disciplines of strategic planning, marketing, communication, investor relations and internal IT.

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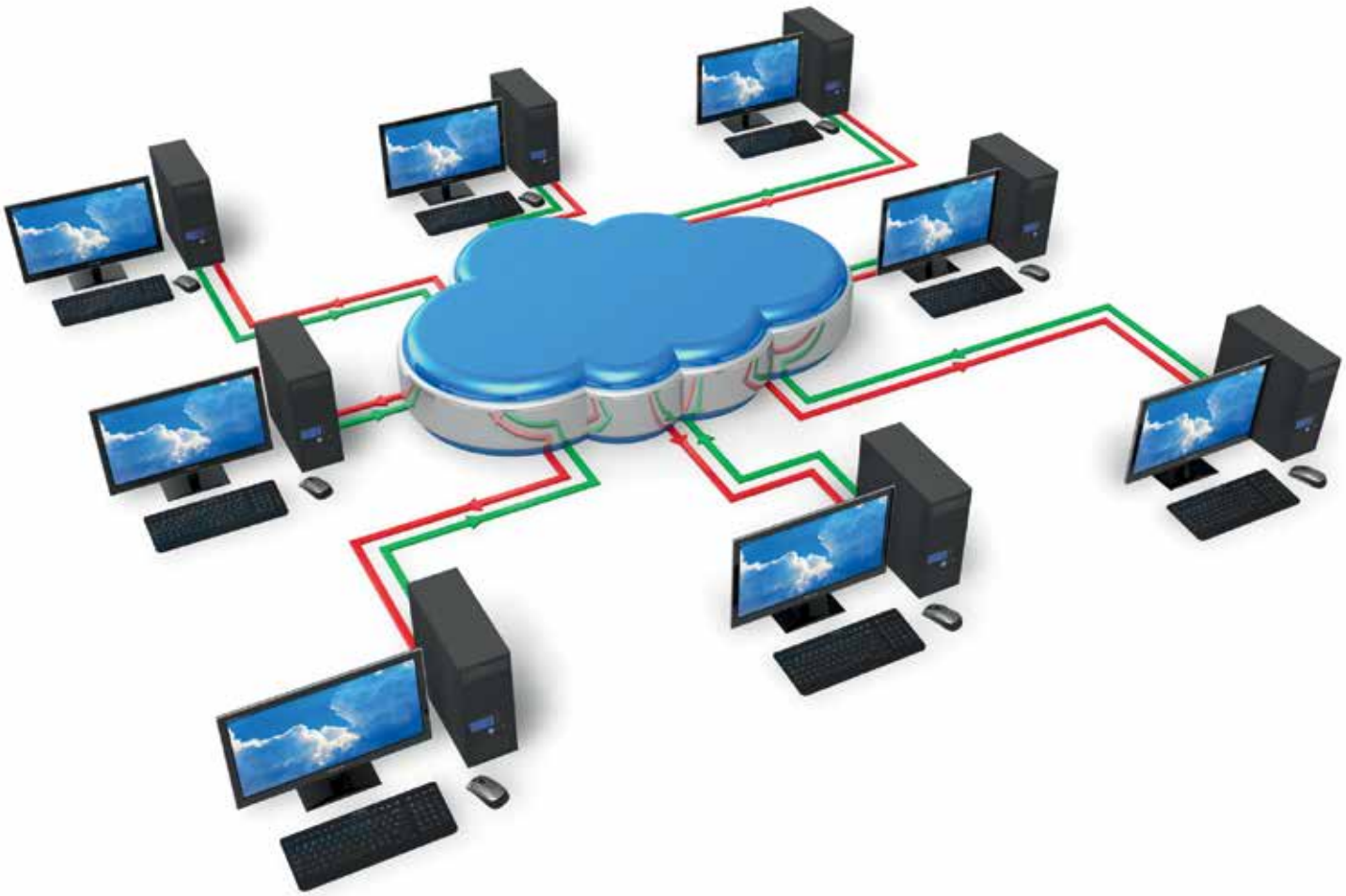

Yesterday's News Sold as Tomorrow's Revelation – or Simply the Industrialization of IT?

Cloud computing

In the last ten years, global markets have been strongly influenced by the likes of YouTube, Google, Amazon, Facebook et al. This happened in an incredibly short space of time and their influence resulted in phenomenal market growth. In the meantime, a new trend has emerged under the "slightly hazy" moniker of cloud computing.

Since the term "cloud computing" is used to describe a variety of things, and, strictly speaking, is something the marketing world came up with, it would be best to start by identifying the three primary aspects of cloud computing: technology, processes and business models. Actually, there isn't much new on the technology level. The core idea behind cloud computing is the central provision of resources for processes and data processing. The driver of this paradigm shift is the prospect of drastically reducing costs (once again turning our backs on decentralized data processing in favor of a centralized concept). The potential savings span the gap from locked up capital (there's no need to commit to large-scale investments) to better workload distribution in the IT department (more balanced use of available IT resources, especially on short notice). This type of central provision of IT resources was the primary technical approach used back in the 1980s and at the start of the 1990s, before the advent of the personal computer. IT was either handled in company-owned data processing centers or through outsourcing.

On a second level, cloud computing stands for the introduction of industrial processes in the provision and use of IT. Since IT is still in its infancy (e.g., compared to mechanical engineering), in abstract terms this trend is like the evolution of thinking from the craftsman's perspective to thinking in terms of industrial mass production. However, for such a transition to take place, customers have to focus on standardized options, which will ultimately force customized solutions off the market. This is where large companies have really done their homework by introducing concepts such as ITIL (IT Infrastructure Library) into their operational areas. ITIL is a prime example of a "best practice" model for IT operations, and it's an area where smaller companies have a lot of catching up to do. In some cases, not being sufficiently prepared for a transition to cloud computing could have a negative cost impact for these companies, since the time and effort required for making the move can have follow-on costs. For example, a company that employs internal IT technicians, who regularly go to their colleagues' workstations to carry out work tasks, probably isn't yet ready to quickly transfer pro-

cesses to the cloud. It would be worth recommending that such companies carefully consider their own identity management, create a documented infrastructure and formulate a clear description of internal business and operational processes before outsourcing processes in a cloud. On the business process level, a lot of companies are faced with the question of how willing they are to subject their own internal business processes to external pressures, just in order to standardize. Using standard, off-the-shelf software to support internal business processes provides opportunities in cost terms, but these can only really be seized if systems need no customization. This phenomenon isn't unique to cloud computing. It also affects companies that similarly implement a standard ERP software (e.g., SAP), but the effects are particularly noticeable with cloud solutions.

The third and most important dimension of cloud computing makes it possible to implement completely new business models. Gaining access to customers via the Internet can establish a foundation for new business models that will need to be implemented, and help roll these out to different target markets. In this respect, cloud computing can be both a blessing and a curse, in particular for smaller companies focused on local markets. A move to cloud computing could provide the basis for quickly tapping into new global markets, but on the other side, the company might come to feel intense competitive pressures in home markets as a result.

In addition to these three aspects of cloud computing, it's important to mention two general challenges for which society hasn't been given satisfactory solutions yet: With the increasing significance of travel and transportation mobility, and our collective desire to tap into our familiar IT environment from anywhere, we have to look for ways to make our communications networks available. Not enough has been done in this respect in Germany to date. Although the telephone network does the job, the Internet – and above all, the data networks – most likely won't achieve expected requirements anytime soon. That said, our dependence on these networks is growing rapidly as cloud computing begins to permeate existing systems. Availability of the (mobile) network infrastructure is the primary impediment, since there is no fallback option for switching data traffic to other network operators if the network fails. But even the data networks for landlines aren't designed redundantly closer to the end-user's side, and that means they aren't fit for growing bandwidth demand. States like Baden-Württemberg, which have dense industrial areas nestled in their more rural regions, will definitely feel the pinch here. The second challenge for cloud computing is the issue of security, which has been defined by terms like authenticity, availability, integrity, confidentiality and data protection. When it comes to integrity, authenticity and confidentiality, it is important to note that data stored in a cloud is not fundamentally less secure than data stored in an on-site data processing center. In both cases, it is important to carefully select a service provider or technology specialist who is clearly monitored within the scope of clearly defined contracts. The issue of data protection isn't quite as simple for cloud computing. According to the German Federal Data Protection Act (BDSG), data liability can either be transferred to another party or the company retains the right to process specific data. A transferal always involves overcoming strict legal hurdles, so this option is rarely an option for German companies. When it comes to the other option of processing specific data, the actual processing itself may be outsourced, but the liability for handling the data in accordance with the law remains with the company. Since this liability cannot be transferred, it is dangerous for companies to outsource unstructured processes as this can entail unknown risk.

Another thing that should be mentioned in closing, which hasn't received much air time in public debate: Aside from the network connection, cloud computing has taken sufficient precautionary measures to ensure that data isn't lost. This is done through mirrored drives, duplication and storing data in separate physical locations, if necessary, even on various media. That said, cloud users cannot yet be sure that all copies of specific data are removed when one instance of the data is deleted. This is an area where technological efforts should be made to ensure this is possible in the future.

In conclusion, it should be noted that it's not advisable for SMEs to ignore cloud computing, but an unconsidered jump on the bandwagon is equally imprudent. A carefully considered approach involves analyzing the IT infrastructure and checking whether internal processes are neatly and clearly documented – then it certainly provides a basis for reaping all the benefits that cloud computing has to offer a company.

Image: © istockphoto.com/scanrail

Dr.-Ing. Jürgen Jähnert is the director of bwcon GmbH, an enterprise founded in October 2014. The company aims to support businesses, organizations and individuals in the strategic use of technology by providing appropriate services. The enterprise helps foster transfer between public sources of knowledge and networks, but it also focuses on entrepreneurial transfer between knowledge sources in the private economy.

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"Together, this Creates the Portfolio of a Provider of Innovation Services"

An interview with Alf Henryk Wulf

Mr. Wulf, as chairman of the board at Baden-Württemberg: Connected e.V. (bwcon), you promote the interests of IT in Baden-Württemberg. What are the main topics bwcon is involved in?

According to our own statutes, the objective of bwcon is to promote strategic technology for the economic and residential regions of Baden-Württemberg. We perform two roles in this respect, which are mutually complementary and result in some interesting synergies. Firstly, bwcon is a high-tech network that has an influence throughout the whole state and beyond – the key word here is globalization. Secondly, bwcon is the biggest regional IT network in the central region along the Neckar river, with the most IT jobs amongst its members. We work with big IT companies like IBM and HP. Despite this, there are a multitude of smaller and mid-sized specialist hardware producers, plus some highly influential medium-sized providers of IT services and highly innovative software developers that run down the backbone of this network. Thirdly, bwcon is the network of user networks, which makes the results achieved in IT and science available to mid-sized users in industry and the creative business sector – the key term here is "first adopters." At the same time, we cooperate closely with other networks. The main focuses here are travel and transportation, health care, production and energy. Fourth and finally, bwcon has a strong commitment in its work to promoting talent and startups.

In 2014, bwcon e.V. joined forces with Steinbeis and founded the limited company, bwcon GmbH. What benefits does this bring to your members and how will this help the state of Baden-Württemberg?

We wanted to exploit the opportunities that have arisen over the years as bwcon e.V. gained stronger visibility and better positioning. To do this, we needed some kind of unit which would be in a position to carry out larger projects. Steinbeis was the right partner for us. bwcon GmbH is taking on the entire ITC business with the media and film company MFG Baden-Württemberg, and it will be the operative arm of the association, although it can also take on tasks for the Steinbeis organization. The benefits for bwcon member companies stem from the synergies that are already emerging for bwcon and Steinbeis. bwcon's strengths are its contacts and its work with industry in Baden-Württemberg. Steinbeis has exceptional access to sources of knowledge such as the universities. It has an especially strong position in terms of technology transfer, in the same way bwcon has with fostering innovation and startups. Together, this creates the portfolio of a provider of innovation services, which benefits all parties. Ultimately these are the companies and employees, and thus the economy and society in Baden-Württemberg.

Where do you expect bwcon e.V. to be in five years and where will bwcon GmbH be by then?

Companies will continue to network through the association, especially on a multidisciplinary level, to significantly enhance innovation and this fuels the competitiveness of companies from Baden-Württemberg compared to their domestic and international counterparts. The association wants to become the most powerful multi-technology business network in Europe, but not just in five years. The limited company with Steinbeis should fulfill the objectives of its umbrella organizations and always be financially independent. At the same it should bolster the impact and visibility of the Baden-Württemberg economy by working on state, national and EU projects, on behalf of, but also involving, the member companies of the association and Steinbeis Enterprises.

You are also a board member of BITKOM and the LVI. What other potential synergies do you believe that creates?

In its role as the network of user networks, bwcon e.V. not only should, but must collaborate closely with other networks. This by no means implies collaboration and competition are not possible in parallel – it's about open innovation. Instead, networks complement each other and help all that oblige. It's within that context that I fulfill my role as a board member for different associations.

Image: © fotolia.com/ kras99

bwcon/Regenscheit

Alf Henryk Wulf is board chairman of the non-profit association Baden-Württemberg: Connected e.V. (bwcon), a business initiative aimed at promoting innovation and Baden-Württemberg as a prime location in the high-tech industry. The association is a shareholder of the limited company bwcon GmbH which was set up with Steinbeis. Its role is to support companies, organizations and individuals in the use of strategic technologies.

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The Governance Structures of Knowledge and Technology Transfer in Baden-Württemberg

Processes of knowledge and technology transfer are reflected in business practice by a variety of mechanisms, channels, methods and procedures, however, these processes are always embedded into systemic interdependencies. Therefore, knowledge and technology transfer systems on the regional, national and also supranational level are coming, the systems underlying knowledge and technology transfer – on a regional, national, but also supranational level – are coming under more and more scrutiny, even if, until now, there have been no clear theoretical, conceptual or empirical demarcations. Mostly, the debate on the issue remains unclear with regard to the precise spatial and structural forms, but also with the specific and characteristic mechanisms and channels of these knowledge and technology transfer systems. (cf. Audretsch/Lehmann 2005; Edquist 2005).

One suggestion made in this respect is to use a heuristic model to capture and analyze knowledge and technology transfer systems. This would be based on governance research, making distinctions between six dimensions relating to the coordination and regulation of transactions with systemic interdependencies: the market, organizations, associations, the (regional) state, networks and communities. Despite trade-offs with using these six ideal or typical forms of institutions, it is possible to systematically pinpoint the key mechanisms, channels, methods and procedures of knowledge transfer for each one, including in terms of location (Ortiz 2013).

In regional terms (regional state), which should be the emphasis, drawing on this heuristic model results, in particular, in different ways to map the corresponding knowledge and technology transfer system and conduct a differentiated analysis. Turning to Baden-Württemberg, the region is strong, with network-like mechanisms of knowledge sharing, which are underpinned by associations and communal structures. State-driven mechanisms are of average importance and focus mainly on enabling more intensive coordination between industry players. With the exception of the Steinbeis Network, purely market-based mechanisms play a marginal role, whereas organizational mechanisms occupy a surprisingly strong position within the German context.

Key aspects that explain the specific emphasis of the knowledge sharing system in Baden-Württemberg include the strong sense of identity shared throughout the region, the cooperative and proactive business culture, a strong identification with the region in many sectors of industry, key corporate players with a strong sense of responsibility and an understanding of the region as a whole, regional political structures, and finally bottom-up initiatives that structure and promote key players in industry. On top of this, the business infrastructure is strongly influenced by a diverse variety of small and medium-sized enterprises and companies span a number of traditional core sectors including the automotive industry, mechanical engineering, chemical products and electrical engineering. These are underpinned by additional innovation processes as well as a university and research environment that matches – and to a large extent reflects – this manufacturing emphasis.

The Steinbeis model is based on entrepreneurial and competitive technology transfer within decentralized organization. It fits in well with the newly created or previously evolved structures of knowledge and technology sharing within the region. The model is focused on market needs and this complements the network-like mechanisms at the core of the region, which draw on association support and are driven by organizations and the community. It also relates closely to the bottom-up philosophy of regional key players, a key point of differentiation compared to other German regions. The broad scope of services offered under the Steinbeis model highlights the ability of this transfer model to adapt to specific transfer and innovation approaches in different industries and sectors. It is also adaptable to differing levels of complexity in terms of the requested transfer services.

The knowledge and technology transfer system in Baden-Württemberg has a strong competitive standing on a European level. But just like all areas in Europe with a strong economy, a priority for Baden-Württemberg will be to continue to provide successful transfer and innovation services in order to master current challenges, which are of a highly complex, non-regional and interdisciplinary nature, spanning several sectors. This is especially the case in the fields of sustainable transportation solutions (mobility), environmental technology/renewable energy/resource efficiency, medicine/health care, and ICT. Successful structuring, and the organization of collaborative processes of innovation and technology transfer are becoming key success factors and this will present new challenges not just to the region as a whole, but also in particular to Steinbeis.

This article is based on the findings of an encompassing empirical case study conducted by Dr. Michael Ortiz. The study includes an international comparison between the regional knowledge and technology transfer systems of six European regions in Germany, Spain and the UK.

Steinbeis Swipe! is a new section in Transfer Magazine. The aim is to examine specific topics at regular intervals. Occasionally, the author might take a swipe, left or right, up or down, along the lines of a critical commentary.

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More about the sources of this article

Giant Steps Toward Transport with No Carbon Footprint

Steinbeis works as partner on EU project MobyPost

Carbon-neutral vehicles are no longer a vision of the future. As part of an EU project called MobyPost, a consortium of organizations from four countries is developing 10 vehicle prototypes, completed with the required infrastructure for La Poste, the French postal service in the region of Franche-Comté. The technology is based on hydrogen powered fuel cells. Vehicle testing is already off to a successful start at two distribution centers used by La Poste. Steinbeis-Europa-Zentrum, which helped the project coordinator to submit the applications, is responsible for ensuring the consortium's research findings are put to further use.

Carbon-neutral transport will play a pivotal role in the future success of the switch to alternative energy. As such, it offers major commercial, environmental and social opportunities. Combustion engines are reaching the boundaries of technical feasibility and fossil fuels are coming under increasing criticism because of their negative impact on the environment, air pollution and noise emissions.

The aim of the MobyPost trial is to show the way forward for transport with a zero carbon footprint by developing a new and sustainable mode of transportation. The consortium comprises eight partners from Germany, France, Italy and Switzerland who aim to develop a sophisticated system that will combine carbon-neutral vehicles innovative powered by fuel cells and the hydrogen production infrastructure – a concept called solar-to-wheel. What's remarkable about solar-to-wheel is that over the course of one year, hydrogen production is carbon-neutral. The project is being co-funded by a European Joint Technology Initiative called the Fuel Cell & Hydrogen Joint Undertaking.

The teams are building ten e-vehicles for the French postal services provider La Poste. They are driven by fuel cells which are supplied by hydrogen produced from solar energy. The vehicles themselves are notable for their ergonomics, which have been tuned perfectly to match the constraints of the postal delivery. They have no doors to make it easy to get in and out, which naturally also saves time. Despite their diminutive size, the cars can bear a significant weight of up to 80kg. Testing of the ten cars will take place for one year.

In parallel to the vehicles, two hydrogen production and refueling stations have been developed for producing hydrogen from solar energy. These are installed on La Poste premises in Franche-Comté. The charging

stations will provide enough hydrogen to power five cars per day. The advantage with this new kind of concept is that the energy required can be sourced locally and independently in an environmentally friendly manner. The way energy is generated, and the production of the hydrogen itself for use as "engine fuel," reflect the environmental philosophy underlying the work of the MobyPost consortium: Only as much energy is produced as required – as the team says "on-board."

The MobyPost vehicles only need low compression to store the hydrogen on-board thanks to the use of metal hydride tanks. This also significantly reduces storage risk. The vehicles and the infrastructures are also being developed with strict regard for all required certification and registration procedures. Accordingly, the project involves comprehensive field trials to establish whether actually implementing the technology is feasible and how to promote it in niche markets. One of the primary goals of the consortium is to reduce the significant cost of hydrogen production and keep it under 13 euros per kilo. Another aim of the project is to further raise hydrogen technology acceptance amongst the general public, which can also be achieved with the planned feasibility testing.

Steinbeis-Europa-Zentrum (SEZ) is responsible for project activities related to administration and managing the finances. Its role is to support the project coordinator, the University of Technology of Belfort-Montbeliard, by organizing the collaboration within the consortium, reporting, and sharing and applying project findings. SEZ also is building the bridge to the European Commission. Another SEZ role is to support project partners in the protection of intellectual property rights, and it has run seminars for the consortium on how to protect intellectual property and make use of project findings. SEZ's central role as a project partner is a result of its wealth of experience and extensive expertise in such areas.

Fuel Cell & Hydrogen Joint Undertaking – a shared technology initiative

The Fuel Cell & Hydrogen Joint Undertaking is a joint technology initiative formed as a public-private partnership (PPP) with the aim of funding joint projects and demonstration projects, as well as coordination and support activities in the interests of European cooperation. With the fuel cell and hydrogen initiative, 50% of funds come from the budget of Horizon 2020, the EU Framework Program for Research and Innovation. The remaining 50% are provided as a non-cash benefit from industry and research institutions. A separate agency has been established to manage the administration tasks.

The initiative was re-launched in the summer of 2014. The allocated budget for 2014-2020 is Euro 1.33 billion. The compulsorily earmarked EU support amounts to a maximum of Euro 700 million (including EFTA funds), which is intended for meeting administration costs and operational outlays and is being provided through funding for social challenges captured by the Horizon 2020 EU Framework Program: safe, clear and efficient energy; intelligent, environmentally friendly and integrated transportation. Research activities are being jointly financed by the EU and partners from industry and research institutions.

The MobyPost car:
H/W/L: 155 x 100 x 280 cm. Weight: < 500kg.
Max. speed: 45km/h. Fuel consumption: 300g H2/day.
Max. additional load: 80kg; Tank duration: 2-3 hours.

Infrastructure:
36kW solar panels, alkaline electrolyzer – 1.5kg/day

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Retaining Digital Memory

Steinbeis experts safeguard the sustainability of digitization projects

Data storage is no longer a problem these days. The more interesting question is how to store the massive volumes of data we create in such a way that we can guarantee reliable and secure access to it in the future. This issue of administering digital documents and archived information has driven work at the Rostock-based Steinbeis Transfer Center for Databases, Search Engines and Digital Libraries (DBIS) for more than ten years. The center is involved in a number of research projects, particularly digitization projects, resulting in massive data volumes of digital documents.

Even digital documents have a so-called life cycle: They are created, evaluated and edited, released and published. They are then classified and shared, supplemented with metadata, researched and archived. Then, perhaps some day, they are sorted out and deleted. A life cycle can be very short, as in fast-paced websites; but it can also span hundreds of years, as is the case with antique documents.

However, whereas the content chiseled on a stone tablet survives several thousands of years, some floppy disks from the 80s and 90s are now no longer readable. The bits and bytes of a document are the first hurdle: Can these even still be physically accessed on a given data medium? Even if they can be physically read, there's no guarantee they are even useful anymore. The data will be stored in a certain format or in a specific document type that still has to be relevant many years down the line. What's more, we need the right software to open and display the files. Standard software is perhaps the best option, since it can generally take old data formats and convert these into newer ones. However, particularly with research projects, small groups of experts develop specialized, highly complex systems for processing digital documents and data. The difficultly comes when a project ends and the developers are no longer available.

The Rostock model was developed to ensure that users of such archiving solutions at the University of Rostock – which typically involves specialized software – can continue to work with and process their data. This model is aimed at those interested and invested in sustainability, to help them take on specific tasks and organize their collaboration. The German Research Foundation (DFG) has officially recognized the model as a method for promoting the sustainability of research findings.

To develop the Rostock model, the primary users of digital archive solu-

tions at the university – the university library, the university's data processing center and the faculty for database and information systems – committed to a collaborative project with the Steinbeis Transfer Center DBIS. In addition to laying down concrete action plans, it was decided exactly who would look after the technical side of things. The experts at the Steinbeis Transfer Center have taken on the technical maintenance of the special software developed for the digitization projects. Working with the university's information systems department, all of the functions needed for research will have to be analyzed in terms of sustainability, adapted, and, where necessary, transferred to a modern platform. The reason why it will not be possible for the university partners to take on this long-term maintenance job is simply the limited budget: They are not in a position to line up all the individual, fixed-term project tasks, which mainly consist of smaller maintenance jobs.

The Rostock model has already been tested and implemented in some initial projects. For example, the eNoteHistory project from 2003 involved digitizing hand-written sheet music. Using several specialized functions, the software identified the author by the penmanship. This project is vital for musicology but faces a serious problem: Use of this complex method may not be possible in the future without the aid of the original developers. This is where DBIS steps in, not just to monitor functionality, but also to attempt to migrate the functions to new hardware and software platforms. Another project, "Mecklenburg's Yearbooks," involves a cooperation between the Steinbeis Transfer Center and the university library thanks to close ties through the university's digital library.

The project WossiDiA involved digitizing the large paper-based archive created by the Mecklenburg folklorist Richard Wossidlo. After digitization, researchers and anyone else interested in the data could obtain special authorized access. The key to success on this project was the fact that everyone involved in the project was on board since the early development stage – something that is not to be taken for granted. The advantage of this is that, unlike on earlier projects, the right know-how didn't have to be painstakingly "re-engineered" and design decisions were made from the outset with sustainability in mind.

In another current project, a song repertoire from the 15th century is being digitized and will be made available online as the "digital archive of the Rostock song book." Here, too, the Steinbeis experts will maintain special access to the data once the project has come to an end in order to ensure sustainability, even in the event of a platform change.

Steinbeis Transfer Center for Databases, Search Engines and Digital Libraries (DBIS)

Portfolio of services
- Applied research and development
- Consulting services
- Expert reports and feasibility studies for software platforms and possible application solutions
- Training, continuing professional development

Key areas
- Object-relational and object-oriented databases
- Integrated administration of data and documents
- Search engines for the intranet and Internet
- Text searches in documents, structured data and multimedia documents
- Distributed, digital libraries and content management

Image: Online analysis tool for the Rostock song book

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Surgical Navigation by Tablet

Steinbeis team developing ingenious system to maturity

SurgeryPad is a digital navigation system that allows a conventional tablet computer to be used in operating rooms as a mobile recording and playback device. Using the tool ensures precise tissue incision and treatment. Designed for use in procedures such as tumor removal, the system was created as part of a research project at the German Cancer Research Center (Deutsches Krebsforschungszentrum, DKFZ) in Heidelberg and is now being developed to maturity by the experts at the mbits Steinbeis Transfer Center.

SurgeryPad helps surgeons carry out minimally invasive operations that require precise spatial knowledge of the patient's anatomy, including tumor structures and other risk structures. 2D imaging methods such as ultrasound and X-rays are inadequate for this purpose due to their poor image quality and lack of depth. SurgeryPad overcomes this hurdle by using augmented reality technology that allows 3D structures – digitally reconstructed prior to the operation based on computer tomography or magnetic resonance tomography data – to be superimposed onto live video footage of the patient. During surgery, the tablet films the surface of the patient's body and superimposes the 3D structures onto the video image in real time with exact precision, so the surgeon knows where the tumor and other risk structures are located before making the first incision. This reduces complications, shortens surgery time, and avoids unnecessary X-ray exposure.

The mbits Steinbeis Transfer Center specializes in advanced mobile radiology solutions. In addition to SurgeryPad, it is also developing MITK pocket – a secure mobile radiological image viewer that allows images to be analyzed outside the hospital or practice.

SurgeryPad can also assist in kidney surgery for the removal of kidney stones.

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Better Conformity with Environmental Law

New "risk radar" added to Steinbeis software solution

The high volume of environmental legislation and frequent changes in this legislation pose challenges for companies. Enormous efforts are often required to ensure conformity with environmental law and to pass environmental audits. Compliance Center Professional (CCPro), a software solution developed by the Steinbeis Innovation Center for Information Systems for Responsible Organizations (IVO), lets companies efficiently and verifiably complete all key information and documentation management tasks and make decisions needed to ensure conformity with environmental law.

CCPro risk radar

With CCPro, the extent to which compliance management tasks have been completed can be determined at any time via standard evaluations and analyses. The program's company-specific legal register lists all legal standards that are important for the company along with their current relevance. Employees can use the access-controlled system to securely complete all necessary control, supervisory, data management and documentation tasks using the central database.

Comprehensive testing of CCPro at a Heilbronn-based manufacturing company in the chemical industry has spawned many new ideas for how to expand the basic software. In the coming months, the Steinbeis experts will explore novel approaches to data analysis for use in a "risk radar" to be added to the software. The risk radar gives companies even greater confidence in their adherence to all relevant environmental obligations, and helps protect the company and all other stakeholders from damage. A customizable dashboard will display key figures and risk indicators in the form of graphics, making it possible to see weaknesses, oversights and deadline violations at a glance, and introduce the necessary measures in good time.

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Learning to Trust Again – Thanks to Horses

Steinbeis experts run pilot project with Women's Correctional Facility in Vechta

"Equine-assisted intervention" – what does that mean? Learning to ride professionally? Not at all: just ask the experts at the Steinbeis Transfer Institute for Equine Assisted Therapy and Management, part of Steinbeis University Berlin. In the first project of its kind in Germany, pioneered by institute director Dr. Rosemarie Genn together with the Women's Correctional Facility in Vechta, horses were used to help resocialize young female prisoners as part of the institute's B.A. Social Management degree course.

"We were already running animal-assisted interventions here at the Vechta facility, but we'd never used horses", explains Genn, who runs Steinbeis University Berlin's social management degree course, focusing on equine-assisted therapy and management. Oliver Wessels, the director of the correctional facility in the northern German state of Lower Saxony, was open to the idea.

In August, the team began initial trials with young female inmates from the correctional facility's sociotherapeutic living complex. Under the tutelage of a qualified teacher and following a project plan, the women took part in regular two-hour sessions of equine-assisted intervention on the grounds of Steinfeld-Mühlen Riding Club. The aim: to help the women develop key social skills like trust, responsibility, respect and courage. Activities like leading the horse, being carried by the horse and steering the horse nurture these skills in a variety of ways; the ultimate goal is for the women to apply the skills they learned with the horses in all areas of their lives, in close collaboration with staff at the correctional facility.

At the end of October, the equine-assisted therapy group invited delegates attending a national conference on women's correctional facilities in Vechta to the riding club for a demonstration of their work. All attended, including directors of women's correctional facilities from across Germany, and were able to see the potential of the technique for themselves. Under the guidance of a special needs teacher, the female prisoners demonstrated the progress they had already made in developing key social skills through their work with the horses during the short trial period. Oliver Wessels, director of the Vechta facility, showed his recognition for the women's achievements by taking part himself, turning his back to one of the horses and allowing himself to be led.

"Now that the pilot phase is over, the results are impressive and form a good basis for continued collaboration," commented Dr. Genn, who is now beginning to elaborate a scientific basis for the project and monitor it as part of a doctorate being undertaken by her colleague. The use of equine-assisted intervention, and its evaluation and professionalization, are important goals of the state-recognized degree course spearheaded by Genn.

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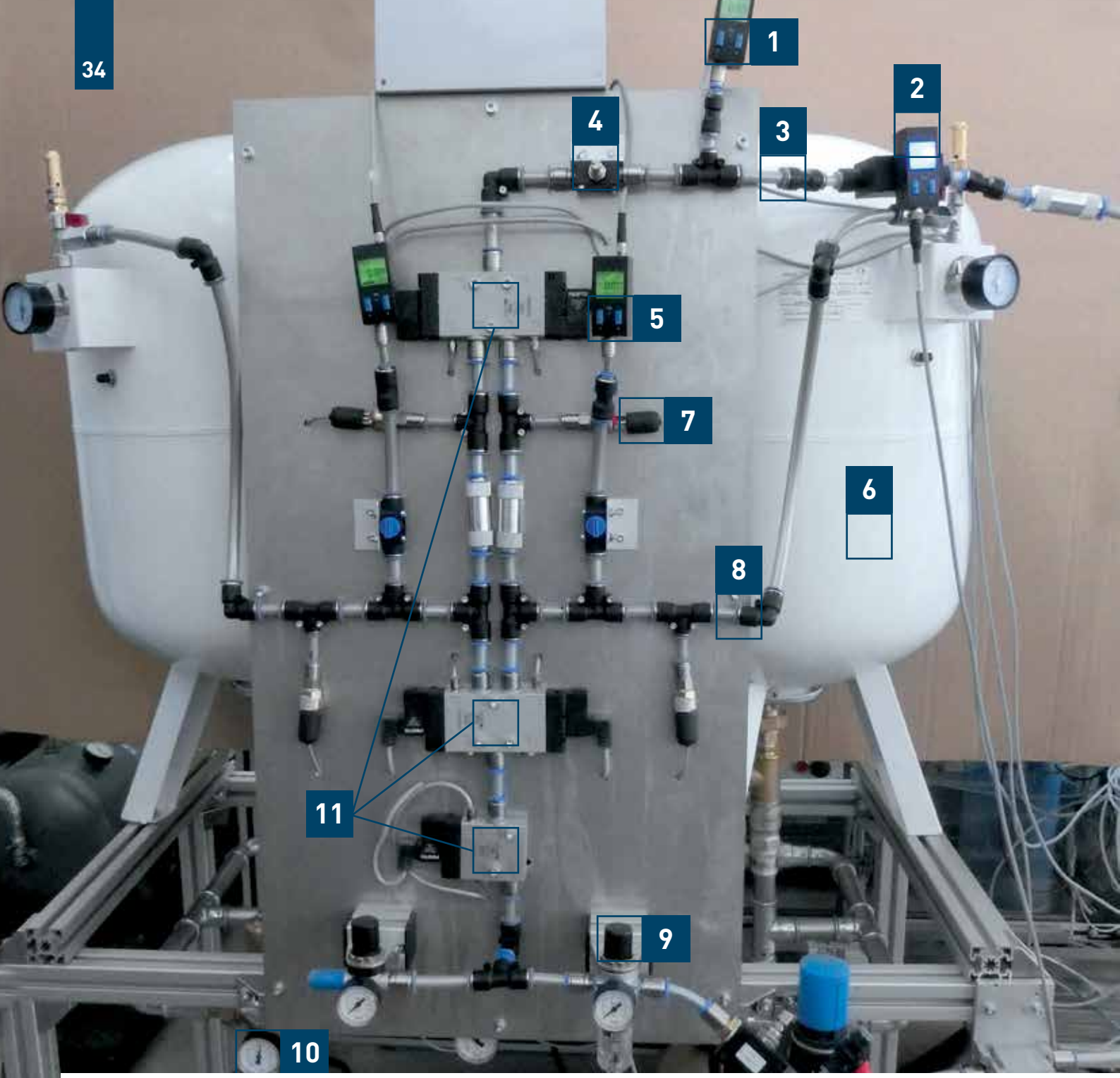

Efficient Reuse of Compressed Air

Steinbeis researchers co-develop technology to accumulate exhaust air

Used as drive air and process air in industry, compressed air is a multi-talent medium: it is easy to handle, available in large amounts and suitable for a wide range of applications, including cooling and drying tasks. Its only disadvantage is the amount of energy required to compress it. To counter this problem, the Chemnitz-based Steinbeis Innovation Center for Drive and Handling Technology in Mechanical Engineering in cooperation with the mid-sized company Drucklufttechnik Chemnitz and the chair for Technical Thermodynamics at Chemnitz University of Technology developed a technology to accumulate exhaust process air temporally and technologically decoupled to reuse for secondary purposes. The project was supported by the German Federation of Industrial Research Associations and the German Central Innovation Program for SMEs.

Based on examples, the Steinbeis team analyzed the use of compressed air in the cooling process of extrusion blow-molding machines. They determined that compressed air was used at pressures between 5.5 and 9.4 bar, with standard volumetric flows ranging from 53.4 to 550 l/min. Different operating conditions each showed nearly constant pressure levels and volumetric flow rates; in all cases, the compressed air used for blow-mold cooling was regulated via exhaust throttling. For using the compressed air application in the conventional way, the team had to control the exhaust parameters via the compressed air reuse system and ensure they stayed in the ranges determined. Combining a novel accumulator concept with a technology for connecting the accumulator system to compressed air applications ensured this requirement was met. In order to capture exhaust air at constant pressure without affecting the volumetric flow, an accumulator with a variable volume is needed. The accumulator system developed by the Steinbeis team thus uses a bladder accumulator, common in hydraulics, together with an adjustable pressure-limiting valve.

In its initial state, this bladder is completely filled with water. As soon as the exhaust air flows into the accumulator, the water is forced out of the bladder by the pressure limiting valve. The exhaust pressure is thus the same as the switching pressure of the pressure limiting valve, which can therefore be used to control it. A throttle valve in the exhaust duct regulates the exhaust volumetric flow following standard procedures; however, due to the accumulator pressure, there is almost no loss in pressure via the valve, and the volumetric flow can now be primarily controlled via the flow area. The compressed air thus retains its potential of energy. In order to meet the required parameters to reuse the compressed air, a pressure reduction valve ensures the air is extracted at a constant, adjustable pressure.

Should the volume of reused exhaust air prove insufficient for a particular application, the team also plans to add a bypass allowing users to connect to an additional compressed air source. During air extraction, the same volume of water displaced during accumulation must be returned to the accumulator to ensure the accumulator system operates stably and correctly. Therefore two of the accumulator units are connected to each other and used alternately. As one accumulator unit captures incoming exhaust air, the water thereby displaced enters the second accumulator; at the same time, the second accumulator provides the previously accumulated compressed air to the application. Once the first accumulator is completely filled with exhaust air and all of the water is in the second one, the two accumulators switch roles. Now, the second accumulator is filled with exhaust air while the first supplies the application with the previously accumulated compressed air. To realize this accumulator concept, the project team developed a pneumatic circuit – including sensors to detect the right moment for switching the functions of the two accumulators – and built a prototype. Lab experiments and practice tests with extrusion blow-molding machines proved that both the alternating accumulator system and the regulation of exhaust pressure and volumetric flow were effective. The team succeeded in accumulating the exhaust air with a constant pressure and volumetric flow rate and a pressure loss of just 0.5 bar and providing it to secondary applications. They also created a simulation model of the accumulator concept to support the design and the evaluation of future operation modes of the accumulation concept.

Two concepts for re-using the accumulated compressed air in other applications proved beneficial: direct supply, and an additional compression stage. Re-using compressed exhaust air in new applications means the energy otherwise needed to compress air extracted from the atmosphere can be stored in its entirety. However, to do this an adequate pressure and volume of exhaust air is needed. If the exhaust pressure is lower than the pressure needed by the new application, an extra compression stage can be added. As the compressor uses the already partly compressed exhaust air, this represents an energy saving – which depends on the pressure of the compressed exhaust air. Lab experiments in which exhaust air with a pressure of 4 bar was compressed to 10.5 bar showed an energy saving of 42.2% compared to the energy needed to compress air drawn from the atmosphere.

This solution for highly efficient reuse of compressed air enables major energy savings. The example of the extrusion blow-molding machine makes this clear: compressed air at a pressure of 8.5 bar and a volumetric flow of 550 l/min was accumulated, and after a tiny pressure loss of 0.5 bar, it could be provided for reuse at a pressure of 8 bar and an unchanged volumetric flow of 550 l/min. This means that applications can be directly supplied with compressed exhaust air. This translates to potential savings of 4.68 kWh per hour of operation compared with the energy otherwise needed to compress this volume of air.

A triumph for the researchers: they succeeded in developing a new technology to reuse exhaust process air that makes it possible to use compressed air highly efficiently. The next step is to transfer this solution into a marketable product.

Image: 1: Exhaust pressure sensor (to verify functionality), 2: Exhaust volumetric flow sensor (to verify functionality), 3: Exhaust duct leading from primary compressed air application, 4: Throttle valve, 5: Accumulator pressure sensor (to verify functionality), 6: Bladder accumulator, 7: Pressure switch (to determine correct moment to switch), 8: Duct to/from accumulator, 9: Pressure reduction valve, 10: Pressure limiting valve, 11: Directional control valves for alternating operation

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Working with Colleagues to Hone Management Skills

Steinbeis initiates leadership development series for SMEs

How can managers best develop the leadership skills they need for the future? And how can companies help managers to manage themselves? The HR development team at BOS GmbH & Co. KG, a medium-sized automotive supplier, is examining these and other strategic questions with the support of the Steinbeis Consulting Center Competences, Communication, Cultures.

To this end, Dr. Sabine Horst, director of the Steinbeis Consulting Center, worked with BOS to initiate a leadership development series. In seminars and follow-up transfer coaching sessions, participants received feedback from colleagues on actual situations at the workplace. They employed professional processes and communication techniques to help each other find solutions. This allowed managers on the seminars to benefit from a broader perspective and led them to an important conclusion: We can solve our problems as a team, without an external coach.

Having completed the series of seminars, in the future the managers will organize management circles to meet up and continue to apply the methods they have learned. This will not only facilitate the discussion of project-related topics, but also the active, ongoing development of the company's management culture. And it boosts use of existing in-house resources, which so often go untapped within companies. Managers now have an formal forum that allows them to continue working to develop their leadership skills, giving them an active role in shaping management culture. The methods taught in the seminars also foster a goal- and results-oriented mindset. After all, in a strongly competitive environment, success increasingly depends on optimizing existing competencies and leveraging synergies.

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Taking the Steinbeis Company Competence Check to the Next Level

New Steinbeis Consulting Groups are established

The Steinbeis Company Competence Check© (UKC) has moved into the next stage of development. In October 2014, two Steinbeis Consulting Groups met up to discuss the dimensions of personnel and strategy. Here Steinbeis experts and external experts will work together to develop additional methods of analysis, applications and implementation strategies, as well as ways to use the UKC to shape business models.

The groups are aiming to establish the UKC as an instrument of competence analysis within the Steinbeis Network and beyond and prepare it for live application. They also plan to develop training programs for consultants who wish to use the UKC.

Short-term milestones for the groups include completion of the "Master Check," preparations for programming the software and development of the database. The groups expect to present preliminary results in early 2015. Plans are also in place to launch additional consulting groups in 2015 to address the remaining dimensions of the UKC. All interested Steinbeis employees are invited to contribute to the work of the groups.

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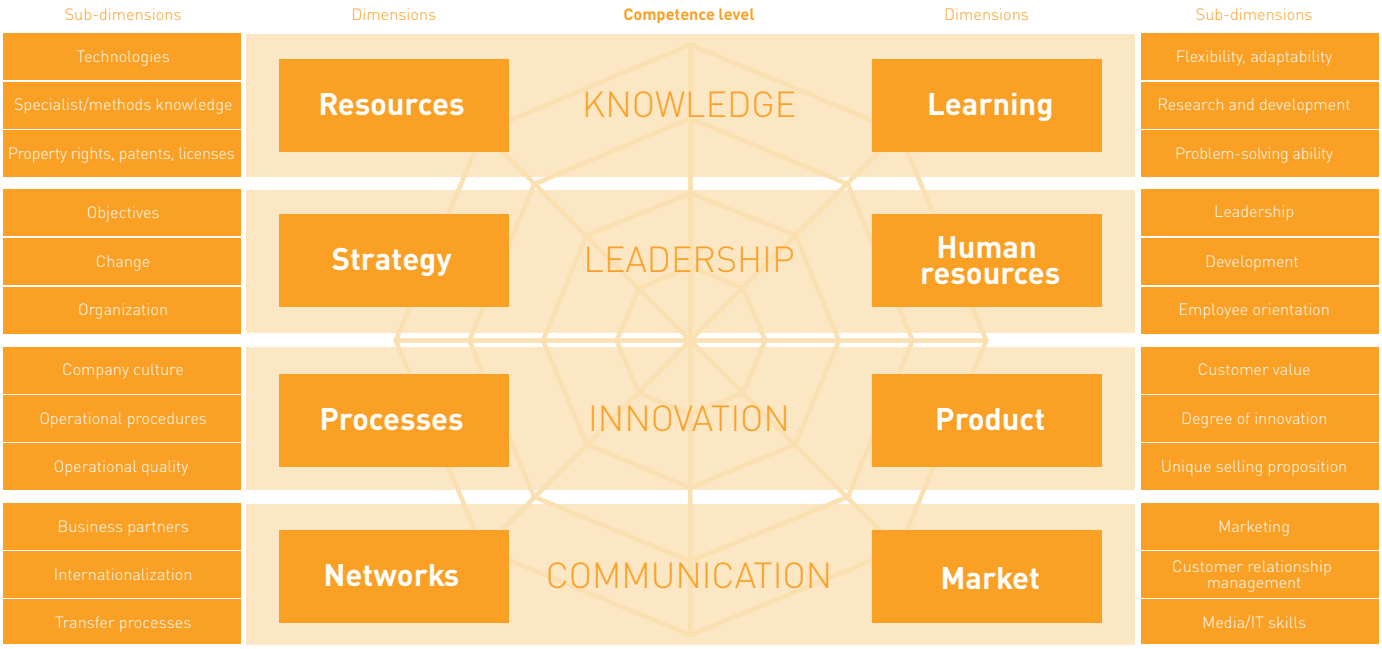

Staying Warm on the Road!

Steinbeis student designs energy-efficient interior heating system for electric cars

Electric vehicles are still in the starting blocks in Germany – for most people, they're a technology of tomorrow rather than something that already plays a role in their lives. But in the face of climate change and finite oil reserves, they're seen as ever more important: continuing global population growth, high demand for mobility, and tightening air pollution restrictions in large urban areas all point to the need for alternative drive technologies in the automotive industry. E-vehicles are key in combatting these problems. As part of her master's degree in business engineering at the School of Management and Technology at Steinbeis University Berlin, Julia Le Cocq designed a smart interior heating system for Daimler's Smart electric drive (Smart ed) car.

The German government wants to see at least a million electric and hybrid vehicles on the country's roads by 2020, with these vehicles making up the majority of urban traffic by 2050. To facilitate this, it founded the National Platform for Electric Vehicles in May 2012 with the aim of paving the way for eco-friendly driving on a broad scale. Although the most obvious advantage of e-vehicles is their lack of emissions, the charging stations that power them still result in local emissions, since they are connected to the national grid – meaning the energy that electric vehicles run on comes from coal, oil and gas power plants. So an e-vehicle can only be truly green it it's charged with renewable sources like hydroelectric or solar energy.

For her master's degree project at Daimler, Julia Le Cocq tackled the question of how the interior of Daimler's Smart ed car can be heated to a comfortable temperature in an energy-efficient way at outside temperatures as low as -7 °C. Her work focused on designing an energy-efficient heating system to keep the interior comfortable while increasing the car's driving range. As the interior heating runs off the same lithium-ion battery that powers propulsion, the driving range is reduced at low temperatures, since much of the energy is used to keep the vehicle warm. The Smart ed's electric motor also generates much less heat than a combustion engine, so recycling waste heat from the motor is insufficient.

Le Cocq ran several series of tests with people in the car, surveying them on their subjective experience of the interior temperature. Each time, different contact surfaces in the interior, such as the seat and steering wheel, were heated to different temperatures. The test persons were fitted with 7 temperature sensors on different parts of the body. Le Cocq analyzed the results with respect to energy efficiency and battery capacity, with the aim of developing a systematic solution combining thermal comfort and smart energy management that would appeal to end consumers.

Based on the results, Le Cocq elaborated a concept for an energy-efficient heating system using heating elements integrated into contact surfaces in the car's interior. The system can also be used to precondition the car before driving at low and very low temperatures, thereby extending its range. For Daimler, Le Cocq's work can act as a guide in the future design and development of interior heating models for electric vehicles.

Image: © Daimler AG

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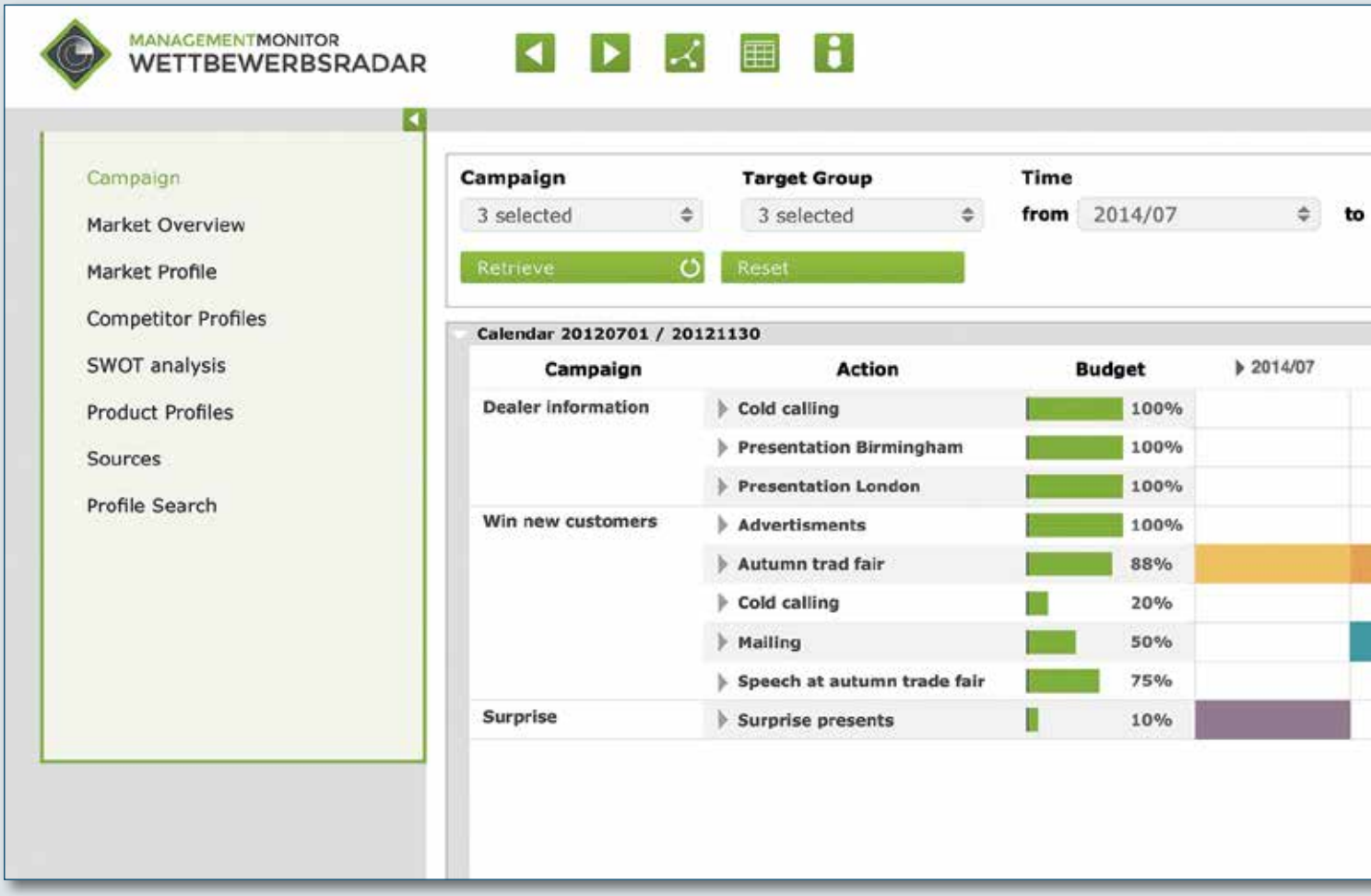


Understanding the Market and Keeping an Eye on Competitors

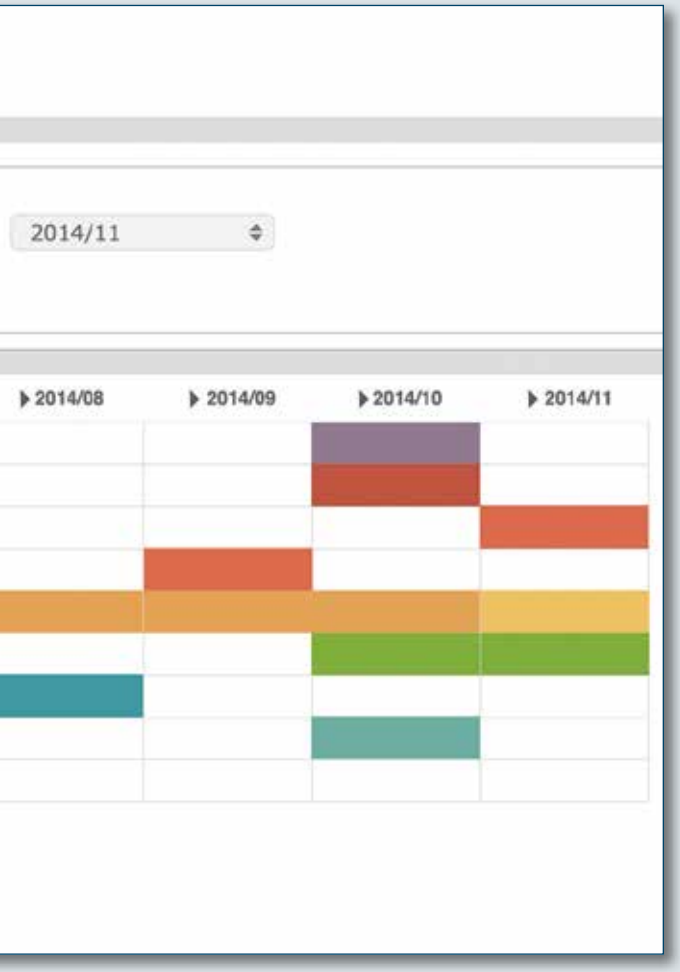
Management Monitor: Steinbeis tool helps analyze markets

Market and competitor analysis are core activities for many client-side market researchers – activities which demand continuous fact-gathering and observation of the market and competitors, plus a variety of analyses. Using a software tool makes this easier and can help build a permanent market and competitor database. To this end, the Steinbeis Transfer Center for Business Development at Pforzheim University has developed a software tool called Management Monitor. The new version offers an even greater range of functions.

Management Monitor provides business analysts with a centralized market and competitor database which is accessible via intranet or on a Software-as-a-Service basis. As well as setting up market profiles and evaluations, users can also prepare competitor profiles and conduct detailed competitor analyses. They can even analyze a competitor's marketing mix. Detailed product comparisons let companies contrast their products with those of competitors – then simply add sales arguments to the results to create a "battle card." The product analysis results can then flow straight into the sales process, giving the company a competitive advantage in sales pitches.

Many companies rely on leveraging internal experts' knowledge by involving and consulting their staff. This gives country managers a feel for the current status quo, developments in their local market, and competitors' positioning. By talking to customers, sales staff also stay abreast of news concerning competitors. The workflow module in Management Monitor lets employees enter such data on the fly – thereby providing access to the whole company via a central database. A variety of methods can be used to collect this data, including direct entry via the intranet and surveying staff via e-mail. As only a small number of internal experts tend to have this expertise, market researchers using Management Monitor can view individual figures and calculate and highlight averages and thresholds. The results can be summarized in reports for use in regular marketing meetings or annual planning – because employees will only be happy to supply data if they see it is actually used.

The new version of Management Monitor is able to display market and competitor data – such as turnover figures, market sizes, competition intensity, and production sites in national markets – on a map. Summarizing the data in this accessible way makes it easier to analyze and in-



terpret. Because the system allows users to manage maps and data within the same environment, data of any kind can be shown on a dynamic map.

Monitoring competitor activity and comparing this to the company's own campaigns is just one step away from corporate marketing planning. So Management Monitor is not just useful for business analysts, but also as a comprehensive marketing dashboard for all departments with close links to marketing. Marketing activities can be systematically planned, budgeted and scheduled, while taking strategic marketing goals into account. The inbuilt campaign planner helps marketing teams with planning by clearly assigning responsibilities, approvals and workflow processes by individual market and product segment. Continuous monitoring of the current state of activities makes it easy to keep an eye on budgets. And by augmenting its marketing planning with information on different media campaigns and the results of advertising effectiveness studies, the company can create a knowledge database that helps marketers identify best-practice campaigns and the most efficient communication channels. As serving consumer markets becomes ever more complex, this integrated process means the company stays well informed and keeps learning. The company can also correctly assess key factors relating to the business environment and the competition – and subsequently respond with targeted activities.

Management Monitor is a product of the Steinbeis Transfer Center for Business Development at Pforzheim University.

Range of services:

- Comprehensive marketing intelligence and marketing planning suite for B2B companies
- Competitor and market monitoring, including profiling and analysis tools
- Planning and management accounts of corporate marketing activities
- Product comparisons to help with sales and product management
- The Steinbeis team tailors the system to the customer, sets it up, and provides lifetime support
- Consulting on how to involve employees, encourage them to enter data into the system and help shape workflow processes
- Customer training and workshops

Functions of Management Monitor, the marketing intelligence software tool:

- Makes market and competitor analysis easier and faster
- Allows data to be stored centrally and managed locally, so the whole company has access
- Market and competitor data can be automatically gathered from a wide variety of sources and/or manually added to the database
- Monitoring of competitor websites
- Data collection results are displayed as dynamic comparisons of market, competitor and product profiles
- All data fields, key figures, structures and evaluations are tailored to the company's data needs
- Wide range of possible evaluations, including competitor and market profiling, portfolio analysis, SWOT and PEST analysis, and market potential assessments
- Turnover figures, market sizes and competition intensity can be shown on a map or graph for national markets and market segments

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A Company is Only as Good as its Internal Teams

Using HR and organizational development to solve problems in daily business operations

Southwestern Germany's strength doesn't merely lie in generating creative new ideas, but in seeing them implemented. Not to mention sound companies that are governed sustainably and with foresight – meaning they don't have to shy away from competition. Today these companies have reached an unprecedented degree of professionalism on all levels of business operations. However, in the technology-based medium-sized businesses so typical to the state of Baden-Württemberg, achieving an effective organizational culture is still not one of the core competencies of executives and managers. This might seem odd, because like it or not, they are confronted with issues of this nature each and every day. The Steinbeis Consulting Center called Accentus helps companies master these challenges.

Using HR and organizational development tools to professionalize organizational culture is a field that has grown and developed significantly in recent years. There is hardly a company that can claim complete inactivity here – although in many cases, organizational culture is still treated like an afterthought. In contrast to fields like finance, manufacturing, IT and process design, HR and organizational development often only impact indirectly on the company's bottom line.

So as organizational culture becomes increasingly professionalized, new approaches must also be found which have a direct and immediate impact on the company value chain. The aim must be to leverage the professionalization of organizational culture to tackle acute problems and urgent challenges head-on and solve them quickly.

The experts at the Accentus Steinbeis Consulting Center have introduced a modular technique to address concrete problems in the daily business operations of a medium-sized enterprise. The main difficulty facing this manufacturing company, which now employs more than 70 people, stemmed from its own success. The firm had grown steadily in recent years without any corresponding adjustments in structures, leadership behavior or forms of organization. On a strictly practical level, this led to the following problems:

- Executives and managers are overstretched
- Employees are not proactive enough
- Processes depend strongly on individuals
- Insufficient oversight and foresight in production planning
- Deadlines and delivery dates are only met sporadically

After senior management outlined the problems, a short, intensive analysis phase was launched to observe how these issues are reflected in daily business operations. At the end of the analysis phase, a clear con-

clusion was offered on whether a resource-effective professionalization of the organizational culture could solve the abovementioned business operation problems. This was accompanied not only by a thorough evaluation of causal relationships and overarching issues, but also a roadmap of specific objectives and activities.

To address the problems in daily business operations, the project team focused equally on personnel, structures and routines. The key to this approach is tackling the challenges precisely when and where they appear in daily work. This inevitably means involving all affected employees. The impact of change on daily business operations can be seen immediately, significantly increasing the speed of reaction and adjustment. Not only are sustainable solutions integrated quickly and smoothly into daily work, but crucial points and errors can be addressed immediately – before they can lead to long-term problems.

In their project with the medium-sized business, one overarching issue identified by the Steinbeis consultants was that the company had simply become bigger in recent years – without expanding operations. The company was still being run like a small family business whose success depends on its director, not like a manufacturing enterprise that enjoys success with the help of its directors. So change was essential on a structural and cultural level.

Sustainable leadership structures: The company needs departmental heads and a defined chain of command. Managers require support as they learn to exercise their leadership effectively within these new structures; management skills must become a full-fledged part of their job description.

Sustainable communication structures: Senior management must be able to speak to the company. Employees and managers need times and places to talk about and solve their problems. They must find a way to use these structures to achieve binding agreements and viable conclusions to their discussions.

Sustainable processes and workflows: Workflows which were allowed to develop haphazardly must be transitioned into defined processes. If the goal is for employees to work more independently, then the company's executives must empower managers and employees to take on more responsibility. Previously the executives kept decision-making out of the hands of the employees; now they must find ways to allow them to start identifying solutions independently.

Structural and cultural changes are interwoven – and it is this nexus which creates the immediate tangible benefit for daily business operations and justifies the claim that the professionalization of organizational culture gives the company a competitive edge. Two key aspects set this approach apart: First, the identification of causal relationships and overarching "meta" issues during the analysis phase. And second, the support provided during the rollout of new structures, allowing routines to become established to create sustainable solutions.

Image: © iStockphoto.de/franckreporter

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SHB "Automotive Bachelor Plus" Program

Training, master craftsman's certificate and bachelor's degree in five years

Vocational training or college degree? In the automotive trade, it has been possible to combine the two since the fall of 2014. The Automotive Bachelor Plus program is an innovative concept – a single, integrated model that combines training as a mechatronic technician, qualification as a master craftsman, and a bachelor's degree. High-school graduates can spend five years gaining job experience at a business while at the same time profiting from ongoing education in the form of training, professional development and college studies. The Steinbeis Business Academy at Steinbeis University Berlin (SHB) offers this integrated program in cooperation with the Carl Benz School in Gaggenau and the training academy of the Karlsruhe Chamber of Skilled Crafts.

Step by step, participants work toward their technical and academic credentials while receiving additional qualifications in the fields of high-voltage vehicles, exhaust emissions testing and gas systems. The multi-faceted program lets participants earn widely recognized qualifications, making it the perfect way to launch a career on a broad range of professional paths.

The coursework for the vocational training and the master craftsman's certificate takes place in two-week blocks. The vocationally integrated degree program consists of weekend seminars and lectures. Since the program dovetails with their professional employment, employers can count on the students' availability during the five-year program. The employers cover the training and professional development costs and pay the students a fair salary.

As part of the Project Competence Degree (PKD), students must also successfully complete a project for their company. Their bachelor's thesis is then based on this project work. Participants might examine how to choose the right location for a new subsidiary, for instance, or look at ways to optimize processes in complaints management.

After completing each of the program's qualifications, participants may also chose to leave the program and take a position as a journeyman or master craftsman. All students in the first program, however, are certain that they will stay until they have received their bachelor's degrees.

The Automotive Bachelor Plus program offers businesses an opportunity to train professionals with lots of hands-on experience. Thanks to the optimized integration of practical training and academics, the students are quickly able to take on responsibilities in the project order department, the workshop, customer service and sales, office management, HR or marketing. For small and medium-sized enterprises, the program is a great way to plan for the future and train up successors over the long term. Large car dealers profit from the participants' comprehensive, interdisciplinary training and the wide range of positions they can move into.

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Successful Premiere for Master of Arts in Criminal Investigation

SHB bids farewell to the first graduating class

In October 2014, the first graduating class of the Master of Arts in Criminal Investigation program at Steinbeis University Berlin completed their oral exams. This marks the first group of criminal science in Germany to receive their education not from a public agency, but from a state-accredited university.

In the four-semester program students not only examined questions of jurisprudence, but also looked at criminal tactics, evidence analysis and criminology strategies, learned interrogation and investigation techniques, and studied forensic psychology. "These are all necessary skill sets for a career in fighting all types of crime," underscores Birgit Galley, director of the Steinbeis Transfer Institute School of Criminal Investigation & Forensic Science | Institut für Kriminalistik (School CIFoS).

Among the first graduates are corporate security specialists, defense lawyers, private investigators and police officers who plan to apply what they have learned in their future careers. Philipp Grabensee, one of the first graduating students, says of the program, "As a defense lawyer, the casual learning environment here has provided me with exactly the network I need and supplemented the knowledge of criminology that was missing in my original academic studies."

The third class of criminal science students started the degree program in October 2014.

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Doing Something is Risky, but so is Doing Nothing!

Continuing professional development in risk management for managers

Every day, company employees have to assess the potential risks of situations, plans, activities, projects and decisions. To this end, businesses have risk-assessment methodologies – and sometimes entire departments – devoted to evaluating risk. But how do the employees actually carry out these evaluations and assessments? What factors influence their conclusions? These considerations are particularly relevant to SMEs who retain their managers and therefore have an interest in maintaining and improving their performance and leadership skills. Steinbeis Transfer Institute "StressManagement, Holistic Health Care and Preventive" has developed a program aimed at medium-sized businesses which incorporates these criteria.

In contrast to many other occupational health management programs, it specifically targets managers, a group who applies their experience and responsibility within the business to drive performance and lead their team by example. When they are absent, they leave a gap that is extremely difficult to plug in times of professional shortages. The Steinbeis Transfer Institute program systematically addresses precisely these topics. The program, designed as a modular toolbox, achieves appreciable results. As a variety of studies has shown, each euro that is invested in innovative and sustainable preventive measures can add up to sixteen euros in value.

The three modules in the program address the topics of recognizing and taking advantage of new resources, value-based leadership, and achieving a healthy work-life balance. Each module is presented by an expert team of experienced management trainers, consultants and psychologists.

The Steinbeis Transfer Institute "StressManagement, Holistic Health Care and Preventive" offers long-term solutions for maintaining health, quality of life and performance. In addition to continuing professional development in risk management, a mindfulness training course for managers and a management retreat on Lake Constance are also offered.

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Seal of Approval for OR Managers and Coordinators

SHB certification exam

Once a diagnosis and a decision in favor of surgical intervention have been made, what happens in the operating room (OR) will be a deciding factor in the patient's recovery. In addition to the ICU, the OR is one of the most cost-intensive workstations in any hospital. This means that perioperative planning and the organization of all surgical processes must be carefully implemented, monitored and documented. This is why the expertise of the OR team is important – not to mention professional workflow planning and the interactions with postoperative care and follow-up operations. To achieve these aims in a professional manner, hospitals have created the OR manager and OR coordinator functions. However, until now no standard training for these positions has been offered. The Association for OR Management (VOPM) and the Steinbeis Transfer Institute called Business Excellence, which is part of Steinbeis University Berlin, worked together to identify the expertise and organizational skills required for the two functions and developed a corresponding certification exam for future use.

To qualify to take the exam, participants must have completed training in a medical nursing field, be licensed to practice medicine or hold a degree in health economics or a similar field. Knowledge of OR management, patient management, financial management, HR management, project management, legal issues relevant to the OR, labor law, hygiene, risk management, supply chain management, quality management and marketing is also expected. Upon successfully completing the examination, participants are awarded the title "OR Manager certified by Steinbeis University" or "OR Coordinator certified by Steinbeis University." TQU Verlag publishes practice exams to help participants prepare for the written test.

Participants benefit from having their skills recognized through formal certification, from being able to set themselves apart from others, from the opportunities for further professional development with the MasterStars© concept, from universally valid personal certifications and from the reduced liability risk with the applicable professional liability insurance. Hospitals and medical facilities, on the other hand, benefit from employees who master the skills necessary to perform the functions of OR manager and OR coordinator, which are so essential to the image and performance of the institution.

The Institute of Business Excellence at Steinbeis University Berlin has worked with well-known companies and institutes for many years. It works with experts to develop practice-oriented curricula and draws up regulations for examinations and certifications, sets up a professional examination board, maintains the quality of continuing professional development activities, trains instructors, and plans and conducts certification exams. A popular service provider, it has issued more than 1000 certificates.

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Excellent Management Systems for Training and Continuing Professional Development

Training provider consults with Steinbeis team

Like other industries, the training sector is subject to growing competitive pressure and there is stronger demand for proof of qualification and certifications. Until now there hasn't been a specific standard for training and continuing professional development (CPD), with the exception of legal provisions for the specific requirements of labor market policies and DIN standard ISO 9001. Compared to other regulations, the new DIN standard ISO 29990 is more closely oriented toward the concrete requirements of training and CPD providers, making it more suitable for this field. The Institute for Vocational Education in Health Care (IbBG) consulted with experts at the Institute for Quality Management and Organizational Development, a Steinbeis Consulting Center, to examine whether certifications should continue to be based on ISO 9001, or if the new standard for training institutions should be applied.

It quickly became apparent that a variety of key factors pointed toward a switch to the new standard. The Steinbeis consultants see many points in ISO 29990 that align more closely with the needs of training providers than the previous standard. The new standard specifies the needs of students, companies and sponsors, defines learning content and processes, evaluates the services and qualifications of training providers, and brings management processes in line with the particular nature of training and CPD. In addition, ISO 29990 conforms more closely to the needs and language of the organization as a training provider, while at the same time covering approximately two-thirds of the content of ISO 9001. From an international point of view as well, ISO 29990 clearly is a preferable alternative to ISO 9001 for training institutions.

The project team decided to transition the IbBG management system to the new standard when recertification came around. One focal point when realigning the previous management system was defining key processes for determining training needs, for designing, delivering and monitoring training services, and for evaluation. Attention was also given to configuring the management functions responsible for carrying out customer-specific processes. In addition to the classic and established functions, the following points in particular are essential:

- **Strategy and corporate management**
  The Steinbeis consultants worked with IbBG to create a business plan which defined the strategy and business targets, as well as outlined the management structure, key processes and the quality policy of the training provider.
- **Financial and risk management**
  To safeguard business continuity, the new standard required that an appropriate financial management system be rolled out and documented, as well as a system for identifying, assessing and managing risks.
- **Employee competence**
  DIN standard ISO 29990 requires contractual and temporary employees to have the applicable core competencies (interpersonal skills, business skills and skills relevant to the provision of training services).

IbBG was successfully certified under ISO 29990 in June 2014. From IbBG's perspective, realigning the management system to comply with the new standard was a complex and challenging task – but the pay-off was worth every effort. The positive impact is already being felt today. Acceptance of the quality management system has risen significantly among all employees. The team has now started systematically developing a nursing curriculum with the involvement of all teachers from the nursing training courses, and the organizational structures of the institute have been successfully adapted to the tasks.

Image: © fotolia.de/pixelrobot

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Stepping into the Future: Shoe Size Measurements 2.0

Steinbeis researchers use LED technology and tablet devices to take foot measurements

Determining the right shoe size is incredibly important, especially for kids. That's because children wearing the wrong shoes in terms of size, form or function can lead to long-term foot problems. Shoes with the right fit will give the foot the space it needs to expand when weight is put on it, without the foot rubbing the inner edge of the shoe. It is also important that shoes are a good match with the width of a foot. The Stralsund-based Steinbeis Transfer Center for Image Processing and Information Technology in Medicine has been working on innovative solutions for the footwear industry for several years. Their latest development uses LED technology and provides an innovative measurement system for shoe retailers. A tablet is used to take a picture of the foot, analyze the image, and determine biometric measurements as well as shoe size.

Determining the biometric characteristics of feet for accurate shoe size measurements is important for adults as well. And directly converting shoe sizes from one sizing system to another tends to be very error-prone without accurate knowledge of the length and width of both feet. Since kids find it difficult to sit still during foot measurement, it is important to develop ways to do the job quickly. Shoe retailers need measurement techniques that are cost-effective, practical, reliable, and, above all, low-maintenance and user-friendly.

The new patent-pending Steinbeis solution is easy to use and very robust. To take the optical foot measurements, customers stand on an illuminated panel made of Plexiglas and trimmed with LEDs. The more LEDs lining the side of the plate, the better the illumination and contrast between the foot and the floor surface. This makes subsequent image analysis easier. A second person holds the tablet, ensuring both feet are within the viewfinder. Real-time analysis gives the user feedback in the form of visual cues, helping them to adjust the position of the tablet so an initial rough estimate of the shoe size can be displayed. Tapping the touchscreen activates the shutter producing a high-resolution image. The image is analyzed within seconds and a precise shoe size is given along with various sizing charts. The algorithm uses the length and width of both feet, and the complete measuring process can be completed in less than ten seconds, much faster than conventional measurement options.

One problem with trying to determine actual measurements within the captured image is how to avoid perspective distortion when the picture is taken. The proportions in the image change as the distance to the camera is increased. A critical success factor for good results and practical use of the system was the decision to use data to determine the orientation of the tablet in relation to the measuring space. This is aided by the gyroscopic sensor contained in most tablets. As a result, it was possible to create a new technique that takes perspective into account when creating the image. This optimizes measurements down to less than 1 mm.

The fact that most modern tablets feature high-resolution cameras, fast processors, and gyroscopic orientation sensors has opened up entirely new prospects for implementing intelligent algorithms in optical foot measurements and shoe size calculations. In addition to this new technological achievement, using flat, illuminated panels with strong light gives this new measurement technique the competitive edge. Platforms of any size and shape can be used or the panel can be recessed into the floor. Alternatively, a terminal can even be provided to take measurements without assistance. Add to this the extreme robustness of the system on account of the simple construction and longevity of the LEDs, which last up to 50,000 hours without significant reductions in luminosity. Since most retail outlets already use tablets for a variety of purposes, the outlay on maintenance and the initial investment are low. As expected, shoe retailers have shown strong interest in the new system. That's why the design was registered along with the patent at the German patent office.

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Of Bathtubs and Underground Channels – Generating Energy from Wastewater

Steinbeis supervises innovation project for environmentally friendly power generation

Each day, the average inhabitant of Germany uses roughly 3,900 liters of water – the equivalent of nearly 24 bathtubs. Of course, trade and industry account for the lion's share of this figure. These vast volumes of wastewater flow through 550,000 kilometers of sewage channels. Having exploited nearly every means of generating renewable energy above ground, wastewater is rushing relatively undisturbed through these sewage channels. The Steinbeis Consulting Center for Strategy & Innovation has supported a young company in its development of an innovative turbine for generating energy from this wastewater.

There have already been a number of attempts to generate energy from wastewater. It was assumed that this would provide a relatively cheap and environmentally friendly source of power thanks to wastewater's nearly ubiquitous and decentralized availability. The energy production systems would not cause any unsightly changes in the landscape since they would be installed underground. Expensive fish and wildlife protection measures required for similar systems in natural waters would also be unnecessary. But wastewater does require a number of highly specialized technical systems: sand, debris, toilet paper and other waste, or larger obstructions such as sticks or even old bicycles are sometimes found in the sewage system. Then there are the strong variations in water levels and expensive engineering costs which often torpedo the high hopes for such solutions.

Tobias Bergmann is the founder of Blue Synergy GmbH, which is based in Lindau on the shores of Lake Constance. His company previously specialized in generating heating and cooling solutions through wastewater, but he quickly recognized the untapped potential for generating energy as well. Without a doubt, this would entail extensive research and development for his still budding company. As a graduate of the Steinbeis MBA program, it seemed natural to carry out this innovative project together with the Steinbeis Consulting Center for Strategy & Innovation from day one, especially considering that the center is also located on Lake Constance in Langenargen.

Together with Dr. Michael Wannke, director of the consulting center, Tobias Bergmann fleshed out the idea in terms of the technical requirements and captured this in a patent strategy. The project team was able to garner extensive research funding from the Federal Ministry of Economic Affairs and Energy (BMWi) to develop their highly innovative technology for generating environmentally friendly energy. The R&D activities would hardly have been possible without this funding. The company also managed to find a project partner for the pilot phase: one of the largest municipal drainage operators in Germany. And initial investors quickly showed interest in the project. Finally, at the start of 2014, spotlights illuminated a room with energy created from wastewater.

Nearly three years of development was channeled into the new wastewater turbine: the BlueSyn® One, a unit specially designed for the medium of wastewater. The novelty of this turbine lies in its design as an outrunner. The blades line the outer edge in a circular design while the mid-section of the turbine stays free. This allows the flowing wastewater to drive the blades while obstructive objects can simply pass through the turbine without too much difficulty. Thanks to this design and a few other technical tricks, the turbine can run continuously with very little need for maintenance. The wastewater turbine was designed for standard sewage canals. In contrast to conventional hydroelectric plants, it can be installed where necessary without great effort within only a few hours. And since wastewater is freely available, it is an incredibly cost-effective way to generate power. In the meantime, several municipalities and urban wastewater operators, as well as private companies, have inquired about installing the turbines.

Tobias Bergmann has won several founders' awards and innovation prizes for his work, but he does not intend to rest on these laurels. Further patents are already "in the pipeline" and a number of additional application scenarios for the wastewater turbine are on the horizon – there's no question that he will once again turn to the support of the Steinbeis experts for his up-and-coming innovation projects.

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Swabian Noodles? That'll be Shaken, Please – not Grated

Steinbeis experts help entrepreneur from Tübingen get out of the starting blocks

What does it really take to provide an ingenious invention with the foundations needed to become a lucrative startup company? One important factor is the right support from the very start, so that the idea is not squandered or "ripped off" by established players. "At this early stage it's like a rollercoaster. If you're new to the market and get no support from agencies experienced in managing inventions, it's much harder surviving this difficult phase with your concept or business idea," explains Susann Hartung. Hartung and her son are the inventors of the Spätzle Shaker. Until now, making Spätzle – a traditional Swabian specialty akin to egg noodles – was a laborious process involving a noodle press or a grating board. With the Hartung's invention all the ingredients are thrown into a mixing cup and the rest is done by metal balls: simply shake the dough and squeeze the Spätzle into boiling water. The invention consultants at the patenting information center at the Stuttgart House of Commerce and consultants at Infothek, the Villingen-based Steinbeis Transfer Center, were a tremendous help for the inventor in exploring ways to protect her intellectual property with patents, a registered design and a brand name. In the meantime, over a quarter of a million Spätzle Shakers have been sold.

One central aspect was funding of the copyright through the SIGNO initiative. "If you miss a key point at this stage, it's much more difficult to establish a thriving company with your invention later on," concludes Wolfgang Müller, director of the Infothek Steinbeis Transfer Center and chairman of a Baden-Württemberg inventors' award foundation called the Artur Fischer Erfinderpreis. Once the castle has been built, it's time to do battle with public opinion and gauge the potential of the invention. "The inventors' fair in Nuremberg, the IENA, was a great place for that," recalls Hartung. "The Spätzle Shaker really whetted the media's appetite and there were lots of queries from the public. Lots of people wanted to buy it right away from the Artur Fischer Erfinderpreis booth." The Hartungs knew in an instant that they should keep working on the concept.

After IENA 2008, it was clear that the invention would have to be fine-tuned and made ship shape. It was also clear that this had a price tag, a big one at that: developing the necessary prototype would be expensive. Drawing once again on the support of the Steinbeis experts in Villingen, the inventors applied successfully for innovation vouchers under a scheme offered at the time by the Baden-Württemberg Ministry of the Economy to promote product innovations. "This allowed the Hartungs to fund the most important material testing and construct their first prototypes. It also helped them gain an oversight of the most important next steps," says Wolfgang Müller. To optimize their chances with respect to production and the launch, in 2009, Hartung brought more experts on board. She also received a cash injection through a Euro 50,000 loan from the Baden-Württemberg "Guarantee Bank."

Susann Hartung also quickly realized that self-employment has its downsides. "There were arguments from the start. People wanted to take the invention off us," says Hartung, looking back. "I'm a fashion journalist by trade so I know all about the dog-eat-dog things that go on in the fashion industry, but without professional support we would never have made it through that part, which was unusually tiring, even for me," says the single mother, thinking about the atypical and often challenging startup phase. "Apart from the fact that we're the sort of family that comes up with new ideas from dawn till dusk, and we really go about things playfully, what kept me going was this strong love for my child and an iron will to not let anyone take his co-invention off him," continues Hartung.

Looking back, she would not want to go through the startup phase again without effective support. Of central importance for Hartung were the cerebral support carefully securing property rights, and the financial backing for making the prototypes and developing the invention into products that would be ready for series production.

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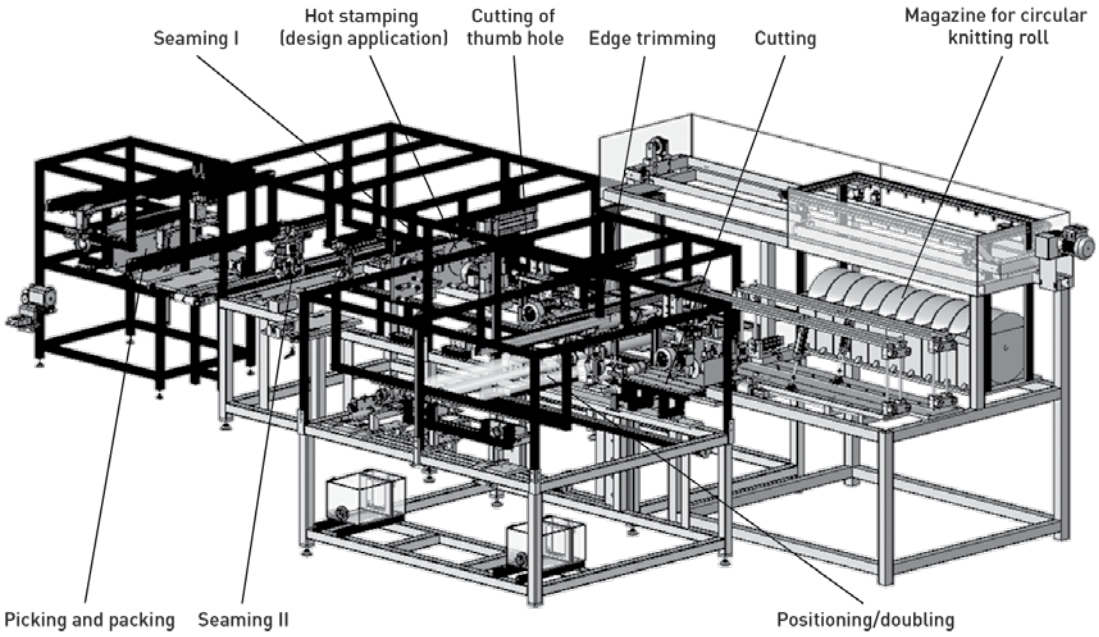

Spinning a Convincing Yarn

Steinbeis helps develop fully automated process for using bonded materials in a circular-knitting process

Protective sleeves made of cut-resistant materials are used to avoid injury in industries where glass and metals are processed. For improved comfort and ergonomics, various materials are often combined in sophisticated sewing processes: yarn made of aramid fibers on the exterior help protect against cuts, natural protein fibers on the inside make the item more comfortable and ergonomic to wear. Flexitex GmbH, the Steinbeis Research Center for Automation in Lightweight Construction Processes (ALP) and the chair of the department of Lightweight Structures and Polymer Technology at Chemnitz University of Technology came together on an R&D project that involved creating a process for manufacturing protective gear on a circular knitting machine. These items are made of highly durable cut-resistant yarns and natural fibers, offering ultimate comfort for the wearer. They can now be manufactured in an endless production process. Based on the results of the research project, the specialist machine builder Sotex Sondermaschinen GmbH produced a fully automated material assembly machine.

Several important elements come together in the prototype machine: the cutting technology used to process the cut-resistant fabrics, the airflow-based doubling process, and the sewing technology used to seam the semi-finished product, which is open-ended due to the nature of the knitting process. An innovative conveyor system featuring pneumatically driven hand-off stations links up the individual process modules. For the project, tests were conducted with various sizes of cut-resistant sleeves and forearm protectors made of different fiber-based materials with ultrahigh molecular weight. A material made of natural protein fibers was added in the stitching process (avoiding an additional sewing step), thus ensuring that the product is comfortable to wear thanks to its interior, simultaneously guaranteeing optimal protection against cuts on the exterior. To meet all of the many requirements involved, the automated process produces both single- and double-layered cut-resistant gear.

To test and enhance the main qualities of the protective sleeves, the project partners created a bonded fabric made of aramid and natural fibers. They then analyzed the product for comfort and protective properties. As an alternative to aramid, a yarn made of ultra high molecular weight polyethylene (UHMW-PE) was used, as it offers excellent stiffness. Processing cut-resistant items made of bonded fabrics by means of circular knitting meant analyzing and modifying the systems used to feed in the yarn. Ensuring constant tension on the threads was a significant challenge in this respect because consideration had to be given to the greatly varying levels of firmness, stiffness and friction properties of the materials to be bonded. The optimized bonding process developed during the project makes it possible to manufacture semi-finished products by combining innovative materials, opening up new application areas for circular knitting technologies.

The ratio of the fabric's strength to its stretchiness is central to why the protective sleeves are so comfortable. A highly stretchy structure allows for elastic deformation of the cut-resistant sleeve on the arm. The fabric has to be less stiff in the cross direction of the weave. To allow for a greater range of motion in the wrist for versions with a thumb hole, it is important that the structure of the fabric is also stretchy lengthwise. The pilot machine developed for the project makes it possible to manufacture numerous options without extensive retrofitting. There is also no need to use product-specific combinations of individual processing steps. Similarly, there is no need for system add-ons later down the line. The protective sleeves can be manufactured from the semi-finished product in a flexible, fully automated process. The material assembly machine was designed to reduce downtime by using a magazine to quickly mount spools. As a result, it can process up to ten spools at a time, automatically taking care of spool changes.

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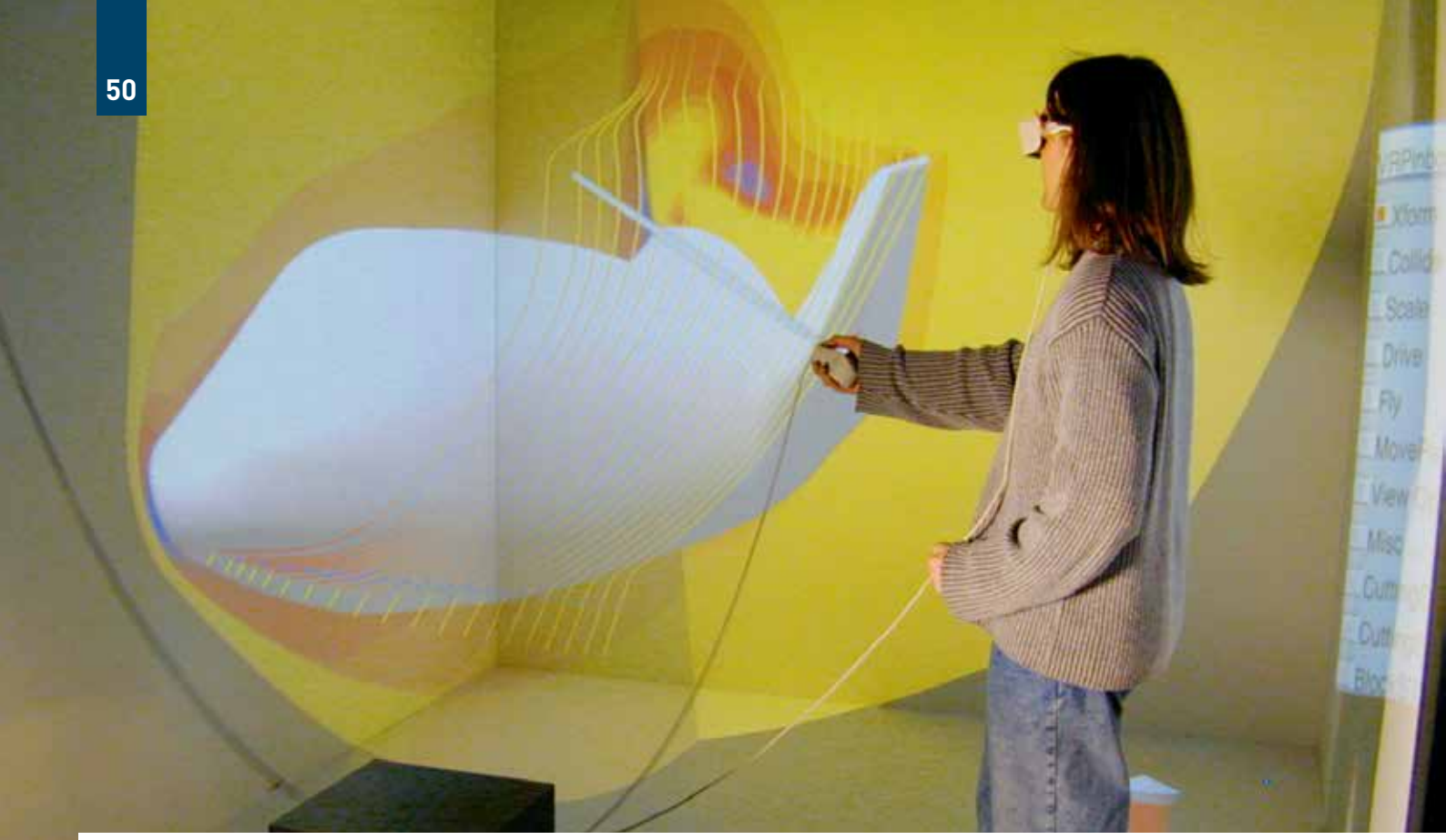

Kickoff for the Industry Work Group for Virtual Aircraft

Collaborative initiative between LRBW, VDC and Steinbeis

With increasing globalization, virtual engineering serves as an important basis for distributed engineering, particularly for small and medium-sized suppliers. That's why the exchange of practice-based information and relevant application experience is so valuable for companies in assessing added value and their strategic positioning. A collaborative initiative between the LRBW aerospace forum, the Virtual Dimension Center (VDC) and the TransferWorks BW, a Steinbeis Transfer Center, is working on a platform called "Virtual Aircraft," which is designed to efficiently network companies with the aim of promoting the use of virtual technologies in engineering.

The work group will address the myriad of issues surrounding virtual technology in the aerospace industry. This includes 3D-based product development methods, virtual mockups, virtual design studies, ergonomics and usability research, the graphical representation of calculation results, virtual courses and even 3D image capturing. The industry work group will promote the exchange of information between companies, provide updates on networking activities, draft competence portfolios and develop new contacts. In addition, a platform will be set up to depict application scenarios, opportunities and obstacles for virtual technologies together with practice-based examples. As a result of the collaboration between the project initiators and regional players, new partnerships and projects can be initiated and implemented, and overarching position papers can be developed.

In the first round, topics for key areas and priorities were selected, based on a survey of LRBW partner companies. Although the platform has no membership restrictions, it is aimed primarily at members of the LRBW and the VDC, at people in companies responsible for innovation, and at directors of small and medium-sized companies who are interested in the selected topic areas or in potential partnership projects and cooperative initiatives. The kickoff meeting for "Virtual Aircraft" was held at the beginning of November, where key players came together at the Bernd Kußmaul company, an industry supplier located in Weinstadt.

The VDC Fellbach has been active as a network hub for digital product development since 2002. Its focus lies in virtual engineering, virtual reality, 3D simulation, 3D graphical representations and content creation. A non-profit organization, it concentrates on high-synergy partnerships in value chains. The LRBW aerospace forum represents the aerospace industry in Baden-Württemberg. Together with its members, it fills the gap between business, science and academia, and political decision-makers, as well as other socially relevant groups. The forum drives national and international partnerships along the value chain. The Steinbeis Transfer Center TransferWorks BW offers professional networking activities for technology projects. The aim of this enterprise is to handle project coordination and communication across industries and organizations relating to the introduction of new technologies. The expansion of knowledge transfer – specifically between companies – and the setup of efficient collaborative work contributes to a structured and modernized process, which the TransferWorks BW coordinates.

Image: "Raumgleiter" © HLRS

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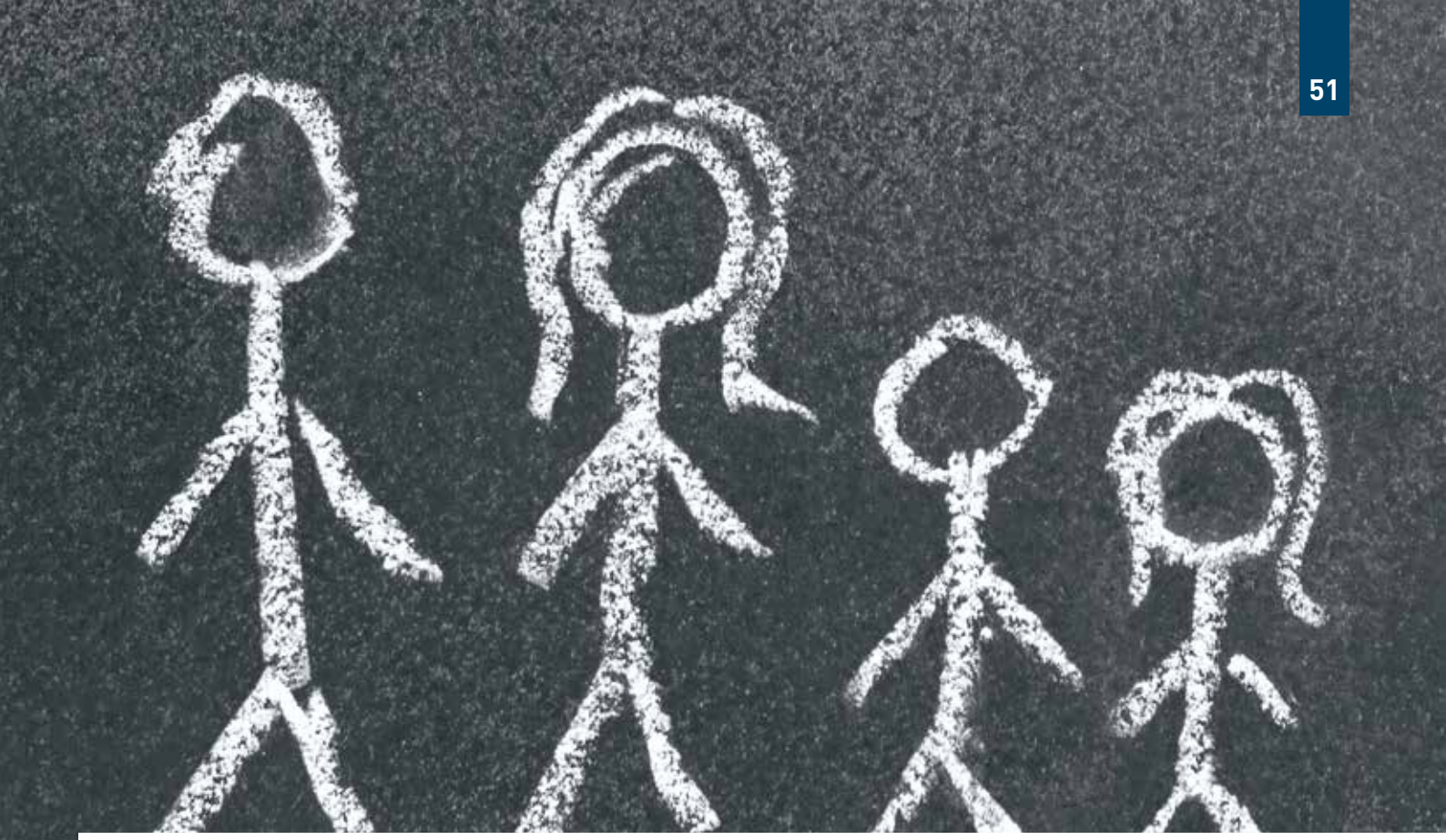

Making Family Friendliness Measurable

SHB experts develop online tool for controlling the reconciliation of work and family

In recent years, helping employees balance work and family has become increasingly important to German companies. Studies conducted under Professor Dr. Dr. Helmut Schneider at the Steinbeis Research Center for Family-Friendly Employee Policies (FFP), part of the Steinbeis Transfer Institute Berlin Institute for Society Research at SHB, have shown that investing in measures aimed at improving the reconciliation of work and family has paid off for businesses. But how can companies measure how effective and efficient the family-friendly policies they have introduced actually are? In cooperation with the Bertelsmann Foundation and with the support of the German Federal Ministry of Family Affairs, Senior Citizens, Women and Youth, Helmut Schneider and Frederik Ferié of FFP have developed an instrument that can answer this question for any company.

Through its research on the status quo of work-family balance in Germany, the Research Center for Family-Friendly Employee Policies has helped raising awareness and reinforcing the importance of the issue. To make sure that family-friendly policies are hitting the mark, the FFP experts first collaborated with a number of DAX, MDAX and "Mittelstand"-companies to figure out how the instrument needed to work. They learned that HR managers were primarily interested in obtaining conclusive results – while keeping the time invested as low as possible.

VB_kompass, a free online instrument developed by FFP, meets these criteria. The tool only requires a few general inputs, such as the industry, the size of the company and monthly data on the family-friendly policies which are currently in place. Furthermore it regularly inquires the status quo of a company's family-friendliness.

With these few inputs and based on the FFP representative studies, VB_kompass calculates the effectiveness and efficiency of the company's investments in the reconciliation of work and family. The results can be downloaded as a Microsoft Excel file. This includes informative tables and graphs which can be inserted e. g. into reports and presentations.

VB_kompass also features a "diary function," which allows HR managers to create a log for each of the measures currently in place at the company. This can be useful for analyzing any changes in effectiveness and efficiency.

VB_kompass, which is available online for free since October 2014, can help companies answer questions about the effectiveness and the efficiency of its family-friendly policies. On www.vereinbarkeitscontrolling.de (currently only in German), they can also find additional information on the methodology used by VB_kompass, a detailed tutorial as well as a short explanatory video.

Image: © photocase.de/soer alex

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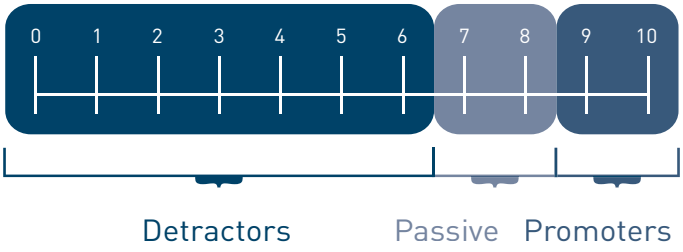
How the NPS is calculated

Concept:
Measure the success of services based on how likely people are to recommend them to others

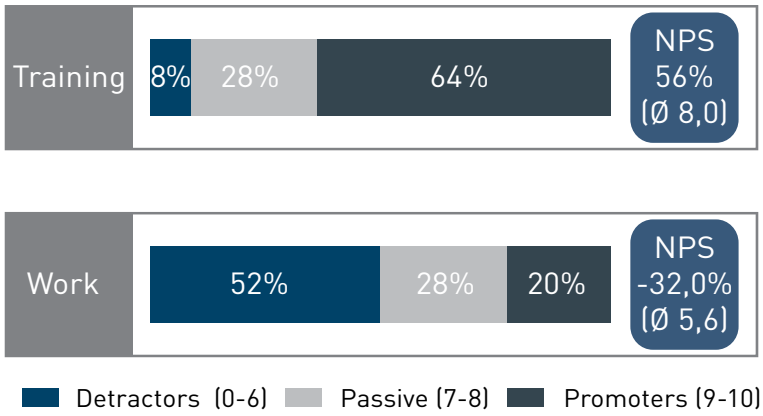
Response scale:
0 = Recommendation extremely unlikely
10 = Recommendation extremely likely



NPS = Promoters% - Detractors%

Example

"Would you recommend the training / work as a medical specialist at the clinic to others?"



Future Prospects for Medical Specialists

Research team examines the career prospects for specialists at university hospitals

Why do medical specialists at university hospitals keep leaving and how could they be encouraged to stay at hospitals for longer? These were just two issues looked at by zeb/business.school, a Steinbeis Transfer Institute belong to Steinbeis University Berlin, in collaboration with the management consultants zeb and the University Hospital Muenster (UKM), in work conducted in its clinic for anesthesiology, operative intensive care and pain management. It was all part of a joint research project called FacharztPlus. The aim was to establish why people left the hospital and define measures to keep specialists on board by improving working conditions and career prospects.

The aim of the project, which was sponsored by the Federal Ministry of Education and Research (BMBF), was to identify suitable measures to encourage medical specialists who have just completed their five- or six-year training to stay on for another five years, if not longer. The project covered three main research topics:

- More flexible and individual working patterns to match career prospects
- Life-long supplementary training for attractive careers
- Skills-based duty rosters to combine medical care with additional medical qualifications

One important part of the project was an assessment of the current situation at the UKM. Measures previously introduced at the clinic to address issues of a specialist, methodical and technical nature had not been enough to address the shortage of doctors, so as the project progressed, attempts were made to identify possible solutions from outside the industry. Any solutions identified to solve the problems at the clinic will be checked from a statutory, organizational and technical standpoint and translated into an action plan. The initial work carried out at the clinic and subsequent evaluations serve as the foundation for implementing the measures for further testing in other pilot projects. This additional work will be carried out at selected departments of the UKM, as well as on-site at project partners: RWTH Aachen University Clinic and the University Medical Center in Rostock.

The situation analysis in the first stage of the project involved over 50 interviews – nearly the entire sample of senior doctors and specialists at

the hospital. The senior doctors were invited to imagine they were in the situation faced by the specialists. The interview latest around 90 minutes, with questions covering perceptions of strengths, weaknesses and suggested improvements, especially in terms of work organization, leadership, work ethics and staff development. The interviews were based on a technique called "generative dialogue" – conversation in a safe, private setting aimed at thinking up ideas. The results of such interviews give pointers in terms of strengths, weaknesses, hurdles and challenges at the hospital. For the majority of the interview, open questions were used and around 2,000 qualitative statements had to be assessed before being sorted by topic and evaluated as positive or negative. This resulted in a strengths and weaknesses profile of the hospital as described by the specialist doctors, with indications on areas where action was needed and the priorities for further research.

With the help of net promoter scores (NPS), a technique used in market research, the project team was also able to use the interviews to quantify the satisfaction levels of senior doctors and specialist when it came to staff training and the work of senior doctors. The aggregated NPS of the respondents showed how many were actively supportive ("promoters") and how many were more critical ("detractors"). The respondents were asked to rate on a scale of 0 to 10 whether they would recommend certain areas to others. The ultimate NPS is the relative difference between the number of promoters and detractors. The results showed that medical specialist training was generally recommended by the specialists, but that they were not likely to recommend subsequently working as a specialist.

Another market research technique that was used in the interviews to gain quantitative feedback was the semantic differential. This involves scoring the item being investigated using attributes on opposite ends of a scale. The Likert scale was also used. Both questioning techniques were applied to the company culture.

To identify potential improvements that could already be made during training and understand the prospects in other areas affected by specialist shortages, a random sample was also included in the situation analysis, consisting of assistant doctors and nursing staff. To do this, another interviewing technique was used based on repertory grids, in order to evaluate items based on an individual rating system with opposite poles and scales from the respondents. The underlying idea behind this kind of personal construct was strongly influenced by the American psychologist George A. Kelly. According to his theory, people distinguish and organize their surroundings into individual constructs, some of which are similar or dissimilar. So in the interviews, respondents were asked to what extent groups such as their own or different professions were more like each other or different, and to define opposite poles for different terms. This was also carried out for the clinic, versus the whole UKM. The method made it possible to derive differences between care workers and doctors, or the changing attitudes of doctors as their job progresses.

The problem with the lack of doctors is not just on a superficial level. It is actually threatening the performance of the hospital in the long term. By exchanging notes with industry associations, chambers of industry and commerce, and hospital operators, the project team members ascertained that the problem is by no means limited to the UKM. Many German hospitals share the same structural problems, especially university hospitals. There is clearly no simple solution: the problem must be solved on a holistic level and not just through individual measures. The market research confirmed the suspicions of the project partners, namely that within the hospital sector there are only a few feasible solutions. Also it would be of little use to transfer solutions directly from other industries. The FacharztPlus project will thus concentrate on developing solutions that can be adapted individually to the problems faced and optimized in order to do justice to future challenges.

An important part of the FacharztPlus project will therefore be to keep the lines of communication open between industry representatives, scientists and external institutions and companies. Many conferences and conventions were attended in 2014. The project team also organized a scientific conference in November 2014 on the topic of demographics and skills management, which also looked at the project findings and issues related to gender and age differences. The speeches and articles submitted at the conference will be published in due course in a volume of proceedings.

Steinbeis Transfer Institute zeb/business.school

Portfolio of services
- University certificate courses
- Bachelor of Science in Financial Services
- Master of Science in Financial Services with following specializations: bank management, insurance management, wealth management, organization/IT
- Doctoral supervision under the SHB doctoral program
- Research in all management areas, especially the financial services sector

Key areas
- Financial services
- Bank management
- Insurance management
- Wealth management
- Organization/IT

Image: the net promoter scores of specialist doctors

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Univ.-Prof. Dr. Klaus Hahnenkamp
Anesthesiology, intensive care, emergency medicine and pain medicine at University Medicine Greifswald (UMG)

Soft Skills Helpful to Helpers

Steinbeis experts assist in disaster zones

Global partnerships and tapping into markets on every continent are becoming a standard part of profitable business practice. To forge and maintain partnerships in this international context, an understanding of regional cultures, ways and customs is just as important as innovative products, services and professional skills. This not only applies to the business world, but also to the field of humanitarian aid and disaster relief. Safety & Security Training (S&S T), a Steinbeis Consulting Center, offers assistance with preparation and training as well as consulting services during deployments, missions and projects.

Current events clearly show how dynamic and unstable security is – and thus how high risk potential is – in numerous parts of the BRICS nations (Brazil, Russia, India, China and South Africa). Acute danger to human life comes not only in the form of man-made crises, but natural disasters and epidemics as well. And due to climate change, we can expect an increase in the frequency of natural disasters and catastrophic events in the future. As a member of the medical emergency response team at Johanniter-Unfall-Hilfe, a German emergency rescue organization, Maik Schiefer, deputy director of the Steinbeis Consulting Center, was sent to the Philippines immediately following the devastating Typhoon Haiyan. One of the mission's objectives was to provide basic health services.

"In emergency relief situations following a natural disaster or a similar crisis, there aren't typically any problems with visas or customs duties when you go in – in times like that, it's usually easy for an aid organization to enter the country. It's more problematic when it's time to leave," explains Maik Schiefer, who was on the ground in the Philippines during the project. Especially when no customs officers were present when you entered the country – to certify the items you brought in – it is often difficult to take them out again. It's one of the reasons why machines and generators often remain in the crisis region when the helpers leave.

Steinbeis Consulting Center for Safety & Security Training (S & S T)

Consulting – Coaching – Training
- Safety planning
- Personal preparations
- Travel planning
- Cultural awareness
- Business etiquette
- (De-)escalation and exit strategies

Using global networks:
- Risk maps
- Foreign office/departments
- Domestic border controls/customs
- GDACS
- UN/EUCP
- Humanitarian aid/disaster management networks

Target groups
- Development agencies
- Organizations and associations
- Universities and students

Once in the country, it is essential to know and respect rules and customs – not just as a way to facilitate contact to locals, but as a first step toward significantly boosting your personal safety. This is part of the security plan, which also includes planning for accommodations, how to handle money and your personal appearance. It is very important to maintain contact with the organization in your country of origin and report any incidents which occur so that your evacuation or escape can be planned in an emergency. "Anyone who fails to take these points into account is being negligent," emphasizes Maik Schiefer.

The Steinbeis Consulting Center's project in the Philippines was highly successful and demonstrated that thorough planning and good training are very effective in preventing mistakes in situations where there are often no second chances. "Rapid change and escalations often mean that in certain situations, you can only fall back on procedures you have practiced and planned in advance. Part of this is your increased level of adrenaline, which can make it hard to think clearly," adds Mirko Sicksch, director of the Consulting Center. The factors that make an operation in a crisis region a success are soft skills such as coping with local rules and customs, planning your personal safety and the right professional skills.

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Fresh Wind Fills Green Sails

Steinbeis assists with the introduction of an environmental management system

When it comes to the environment, the Evangelische Heimstiftung (EHS) is thinking big. By launching an environmental management system, EHS isn't just showing that it takes its responsibility to the environment seriously, it is also fostering innovation and growth in its 82 nursing homes and 17 mobile home care services in Baden-Württemberg – not to mention awareness and competence. The facilities will be subject to an audit and receive the Grünes Segel certificate ("Green Sail") in recognition of compliance. The Steinbeis Transfer Center for Applied Management at Aalen University is assisting EHS in the development and rollout of its environmental management system.

Managers at EHS turned to the Steinbeis Transfer Center in Aalen to design a suitable system, based on the idea of the Green Sail – which bears a similarity to the EHS logo – in collaboration with Professor Dr. Ulrich Holzbaur, director of the center. The team drew on experience from similar projects in the business world and on the city of Aalen's "Green Eel," adapting and integrating them into the EHS sustainability and environmental management project.

Getting everybody involved is one important aspect of Green Sail – by working together to formulate environmental targets, an environmental roadmap and an environmental declaration, full use and can be made of the experience and motivation of the entire workforce, fostering involvement in the project. The result is that the environmental team and nursing home managers work hand-in-hand to protect the environment.

"Representing the potential of 83 facilities, 7,200 employees and 10,300 persons receiving care and assistance, EHS can and must make an important contribution to environmental protection and sustainable development. Sustainable corporate governance is anchored in EHS's code of conduct, because God's creation is not endlessly renewable or limitlessly available," says Bernhard Schneider, CEO of EHS, underscoring the importance of Green Sail.

The Green Sail project has led to the initiation of a continuous improvement process at EHS – allowing it to serve as a model for environmental performance and encourage the careful use of existing resources. Indirect effects include the positive image of EHS as well as the sharing of environmental information and awareness among employees, home residents and third parties. Introducing Green Sail also led to an even deeper integration of sustainable development at EHS.

The Green Sail project has been honored by the German UNESCO Committee for its contribution to the UN Decade of Education for Sustainable Development 2005 - 2014. The first two EHS facilities launched the Green Sail process by the end of 2013. The environmental teams started their work in two nursing homes with the assistance of the Steinbeis Transfer Center and planned first activities. Two of the project's highly motivated and committed supporters are the environmental teams in the Haus im Schlösslesgarten nursing home in Eberdingen-Hochdorf and the Paul-Gerhardt-Stift nursing home in Giengen. Guidelines and checklists have been drafted to assist the nursing homes. One special feature of Green Sail is the peer audit, in which an evaluation of environmental management is carried out not only by EHS management and auditors, but also by sites which have already been certified and qualified external auditors from the municipal or care sectors.

The first facility to be audited was the Haus im Schlösslesgarten nursing home in Eberdingen-Hochdorf. The audit of the second pilot site in Giengen took place in February 2015. The Steinbeis Transfer Center for Applied Management is assisting the EHS sites during the launch of Green Sail and working with them throughout the process until the quality standard has been established.

Image: © iStockphoto.de/rsester

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Cooperating to Create a Network for Sustainable Logistics

Steinbeis works with Leuphana University Lüneburg to develop concepts for vocational education

One of the major challenges of our time is to chart a course for a carbon-neutral, socially responsible society. Although it is necessary, there are many hurdles along the way – and it poses new challenges for vocational education. Teachers at vocational schools have a key role in educating the next-generation workforce in responsible and sustainable behaviors. This not only involves fundamental changing mindsets and identifying opportunities to introduce sustainable practices to a multitude of professional fields, but also nothing less than the overhaul of an education system in which, until now, sustainability has played a minor role. But how can motivated teachers communicate and exchange ideas on ways to address sustainability in the classroom? With an eye to making vocational education more forward looking, how can they work together to improve teaching? The Sinsheim-based Steinbeis Innovation Center for Logistics and Sustainability looked at these questions as part of an initiative called Energy Efficiency: Logistics. In cooperation with a project at Leuphana University Lüneburg's called BBS future 2.0, it shows how sustainability can find its way into vocational education. Both projects are funded by the German National Environment Foundation (DBU).

Motivated teachers must have a forum for sharing ideas about their classes. But here is where the problems begin: Where do I find colleagues who are willing to discuss ways to integrate sustainability into the classroom? How can I present my ideas, concepts and materials quickly and receive feedback from colleagues at the same time? Is it even worth it, since communicating with colleagues also means more work for me? Professor Dr. Andreas Fischer of Leuphana University Lüneburg has a quick answer to the question of whether sharing ideas with colleagues actually means more or less work: In the long run it is more effective for teachers to network, because they can profit from others' knowledge and experience. That is why he initiated BBS future 2.0. Its objective is to build a cross-regional network of vocational schools with a focus on sustainability. Using a Moodle-based community website, teachers can discuss the integration of economic, environmental and social issues in the classroom and in educational development.

The Energy Efficiency: Logistics initiative launched by Jens-Jochen Roth, director of the Steinbeis Innovation Center for Logistics and Sustainability, also leverages the benefits of networks. Here the primary focus is on creating a network of key players in businesses and schools with the aim of using workshops, excursions and courses to foster energy efficiency and sustainability in logistics. The two initiatives share the goal of transferring knowledge to promote education in sustainable development.

Instruction concepts and individual projects addressing sustainable development and sustainable logistics have long existed in the field of vocational education. However, until now, only rudimentary attempts have been made to systematically exchange information. The BBS future 2.0 online forum (bbs-futur2.leuphana.de) can now be used by teachers in schools all over Germany to work together in field-specific teams to develop targeted classroom materials. This allows teachers to feed innovative projects into the vocational education system – from the bottom up. As they use the networks, teachers receive professional support. This keeps the hurdles to online collaboration as low as possible. As part of BBS future 2.0, the Steinbeis Innovation Center for Logistics and Sustainability has taken on responsibility for topics related to sustainable logistics and is acting as moderator. At the second BBS future 2.0 conference in September 2014, a workshop was held to collect and share teacher experiences and ideas for vocational lessons within specific fields of sustainable development.

It is now up to the network users to collaborate and explore multifaceted approaches to future-oriented instruction – and to deploy the sustainability teaching materials in the classroom, thus paving the way for field-specific vocational education for sustainable development.

Image: Moderators at the 2nd BBS future 2.0 conference

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Sharing Experience Across Borders

Steinbeis Brazil organizes a German-Brazilian water resources seminar

A new chapter has been written in the success story of German-Brazilian collaboration in the Steinbeis Network. On August 26, 2014, organizers Diego Nascimento and Professor Dr. Nazem Nascimento of Steinbeis Consulting Services – Brazil welcomed more than 90 participants to the first German-Brazilian water resources seminar, held in the city of Resende near Rio de Janeiro.

The host of the seminar, the Association for the Management of the Paraiba do Sul River (AGEVAP), under the leadership of its managing director Dr. André Luiz de Paula Marques, placed a spotlight on the sharing of information and experience between Germany and Brazil, touching on topics such as technology, systems and the targeted monitoring of activities in the water management field.

Around the globe, Germany is considered a model and benchmark for the management of bodies of water. The German delegation was represented by Professor Dr. Lars Ribbe and Georg Meier, two speakers from the Institute for Technology and Resources Management in the Tropics and Subtropics (Cologne University of Applied Sciences) as well as Jörg Steinhardt, managing director of Steinhardt Wassertechnik, and Sandra Haltmayer, part of the international team at Steinbeis headquarters. To form a picture of the local situation, the German delegation was offered the chance to visit a hydroelectric power station near the city of Piraí, which is operated by Light S.A.

During the event, speakers presented specific examples and processes from the German water management sector, rainwater management methods for flood prevention and safeguarding the local environment, as well as ways to share technology between Brazil and Germany.

Brazil was represented at the seminar by Victor Sucupira, head of water resource management at the country's national water agency (ANA). He spoke about the operational details of managing Brazil's system for water resources. In addition, Dr. Ney Maranhão from Brazil's Ministry of the Environment gave comprehensive insights into the host country's water management, underscoring the responsibility of its water ecosystem committee, a key organization for implementing measures aimed at revitalizing and safeguarding the management of bodies of water in Brazil.

Feedback on the first German-Brazilian water resources seminar was extremely positive and the joint project was an highly positive experience. This will serve as an impetus for further seminars and projects as the two countries continue to collaborate on water resources.

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New Centers in the Steinbeis Network

The Steinbeis Network comprises nearly 1,000 Steinbeis enterprises spanning all fields of technology and management. Depending on the nature of their work, these may be Transfer Centers, Consulting Centers, Innovation Centers, Research Centers, Transfer Institutes or separate legal entities. The following Steinbeis Enterprises have been newly established since February:

Chemnitz

Steinbeis Innovation Center Joining Technology

Prof. Dr. Peter Mayr
E-mail: SU1839@stw.de | Web: www.steinbeis.de/su/1839

"The Steinbeis Innovation Center for Joining Technology provides you with professional support in all fields related to the joining of materials. Our areas of know-how range from the development of suitable joining strategies to the optimization of joining process and investigation into the properties of joined parts."

Services

- Development of joining strategies and connection technologies
- Joining- and process-compatible design of assembly modules
- Characterization of joint features – assessment of join quality
- Process analysis and optimization of joints by measuring significant process indicators

Steinbeis Research Center Technical Vibrations

Dr.-Ing. Thomas Risch
E-mail: SU1845@stw.de | Web: www.steinbeis.de/su/1845

"It is often difficult to totally avoid vibrations and oscillations in technical equipment. It is event more difficult to deliberately create specific oscillations. Whatever the challenge, we're here to help!"

Services

- Vibration measurements
- Acoustics measurements
- Analysis and optimization of dynamic systems
- Modelling, calculation and simulation on system dynamics
- FEM and DEM simulations
- Vibration and vibrating conveyor technology
- Implementation of experimental studies
- Dimensioning and optimization of system components
- Development of concepts
- Development of expert´s reports
- Seminar/Training
  - Basics of vibration engineering
  - Basics of the dynamics of technical systems
  - Introduction into the Discrete Element Method with LIGGGTHS
  - Experimental analysis of dynamic systems and interpretation of results

Chennai (Indien)

Steinbeis Solar Research Centre (SSRC)

Vishwaa Ramanathaswamy, Nivas Vallavan
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„To develop a strong base for solar R&D activities which will enhance the quality of solar application research in India and to provide a better platform for industries to conduct their EPCM activities."

Services

- Solar product development
- Solar application research
- Solar consultancy activities
- Solar training programs for students and working professional

Cyberjaya (Malaysia)

Steinbeis Malaysia Foundation

Dr. Abdul Reezal
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„Outsourcing innovation."

Services

- Short consultancy services
- Setting up transfer centres between industry and academia
- Identifying needs of the industry

Freiburg

Steinbeis Innovation Center Biomechanics & Electrophysiology

Prof. Dr. Albert Gollhofer
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"Health promotion based on professional and competent health and fitness consultation."

Services

- Consulting
- Applied research and development
- Expert reports
- Evaluations
- Clinical studies, scientific testing procedures
- Continuing professional development programs, seminars
- Prevention and functional rehabilitation
- Basic motor functions/motion phenomena
- Performance and movement diagnostics
- Motoric, athletic-motoric and physiological testing procedures

Karlsruhe

Steinbeis Innovation Center
Innovation and Knowledge Optimization SCI.KO
Prof. Dr. Esther Rösch
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"Competitive advantage through knowledge, innovation and the right corporate culture. The key to optimizing knowledge management in order to fuel the long-term viability of the company lies in facilitating a corporate culture such that knowledge sharing is part of the DNA. In the near future, knowledge will become more and more central to competitive advantage, especially as the baby boom generation starts to enter retirement. We help you achieve the right balance in the company culture, freeing up the knowledge potential of your business so it can be applied to innovation."

Services

- knowledge management analysis of companies and related consultancy
- seminars, trainings and workshops for knowledge management, innovation, and change management
- scientific order research in the area of natural sciences and managenemt (e.g. chemistry, pharma, innovation, knowledge management and related topics)
- advanced expert trainings for natural sciences and managerial topics
- support and preparation of scientific publications and industry reports

Königstein

Steinbeis Transfer Center Business EcoSystems
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"Steinbeis Business EkoSystems is establishing an international meta-network for local and regional business clusters. Its aim is to support third-parties – such as other Steinbeis Transfer Centers – to network on an international level with key partners and clients."

Services

- b2b networking events
- Mediation
- Market studies
- Online content and tools

Lahr

Steinbeis Transfer Center International Education
Prof. Dr. Jürgen Wagenmann
E-mail: SU1847@stw.de | Web: www.steinbeis.de/su/1847

"There are three key developments in the business environment of today: accelerating globalization, the rise of the Asian economies, and demand in trade and industry for education that is more closely matched to business needs. Universities and other educational establishments have to react to these developments and provide needs-based training. Companies, institutions and pubic bodies must foster a global mindset and the international skills of their employees to bolster the local economy."

Services

- Consulting, design and implementation of training programs for internationally oriented companies and institutions:
  - Management seminars / training / coaching in the field of „Internationalization"
  - Lifelong learning in an international environment
- Consulting, design and implementation of international programs for educational institutions with an emphasis on East and Southeast Asia:
  - Education programs with an international focus
  - Training programs for teachers and lecturers
  - Preparation of students or prospective students from East or Southeast Asia to study in Germany
- Promotion of intercultural exchange between Germany / Europe and the Far East region

Langen

Steinbeis Transfer Center
Lean Production, Logistics and Organization
Prof. Dr. Christoph Roser
E-mail: SU1853@stw.de | Web: www.steinbeis.de/su/1853

„Organize your Industry!"

Services

- Consulting and project work in production, logistics and organization
- Project work
- Research
- Implementation of trainings and further education
  - Bottleneck recognition and management
  - Basic training lean production
  - Creativity techniques for improvement projects
  - Understanding connections between supply chains

Lohne

Steinbeis Transfer Center
Vocational Training Center HLA Lohne
Dipl.-Hdl., Dipl.-Kfm. Ernst Escher
E-mail: SU1848@stw.de | Web: www.steinbeis.de/su/1848

"We are committed to promoting sustainable commercial training and continuing professional development in our region."

Services

- Training
- Further training
- Continuing education
- Incentive measures
- Cooperation
- Consulting

Meckenbeuren

Steinbeis Transfer Center Vision Systems
Prof. Dr. Jörg Eberhardt
E-mail: SU1840@stw.de | Web: www.steinbeis.de/su/1840

"Vision Systems are complex optical systems that require appropriate skills in development, including illumination systems, imaging optics, sensors, image processing and automation technology. A professional partner to industry, our portfolio ranges from simple, inexpensive optical sensors to the design of highly sophisticated 3D systems."

Services

- Development of optical camera systems (2D, 3D, color measurement)
- Consulting in the fields of optical measurement technology, lighting development, 2D and 3D technology
- Applied research in the field of optical measurement technology and 3D camera technology
- Courses and Training
- Seminar/Training
  - Methods for image processing
  - Technical optics
  - Optical 3D technology
  - Lighting design

München

Steinbeis Transfer Institute Medical Education for Health and Nutrition - MEHN
Dipl.-Biol. Jürgen Skuda
E-mail: SU1841@stw.de | Web: www.steinbeis.de/su/1841

"Training and continuing professional development needs to identify new ways to develop medical professionals, doctors and nursing staff. In many areas, topics are not "state of the art," and, in particular, there is a greater need for more input based on scientifically valid schools of thought relating to established methodologies. Combined with partners with the right experience, innovation and quality are the foundations on which STI-MEHN now stands."

Services

- Advanced training and continuing education for doctors and medical staff
- Concept, organization and implementation of certification courses
- Cooperations with national and international educational institutions
- Implementation of blended learning
- Seminar/Training
  - Nutritional medicine BDIi

Ravensburg

IWT Wirtschaft und Technik GmbH
Prof. Dr.-Ing. Heinz-Leo Dudek
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Services

IWT Wirtschaft und Technik GmbH is a statutory corporation based in Ravensburg. Its aim is to focus solely on providing support of a direct charitable nature in keeping with German statutes relating to "tax-advantaged purposes." The aim of the statutory corporation is to promote vocational training, including student support and the promotion of science and research. One purpose within corporation articles relating to "vocational training" is fulfilled through the development, organization, implementation, commercialization and quality assurance of scientific training, with or without extra-occupational options, also with other training institutions, especially in the fields of economics and the social sciences, engineering, natural sciences, media science and communication science. Training revolves primarily around services relating to extra-occupational development, e.g., seminars and similar services. The other purpose within corporation articles relating to "science and research" is fulfilled through fundamental research (the open search for new knowledge) and/or "directed research" (targeted, pre-competitive research into new knowledge within predefined areas with the support of bodies such as the European Union or the German Federal Ministry for Education and Research (BMBF), involving the open exploitation of acquired knowledge) in the fields of engineering and economics. Research is conducted by internal human resources or freelancers working on behalf of the company. Acquired knowledge is quickly made available to the public through publications in the scientific media and/or public events, e.g., through conventions organized internally. As a non-profit organization, the company may conduct all forms of business which serve to fulfill the purposes and aims of the company. Accordingly, it may acquire other companies of the same or of a similar nature, including companies which complement the purpose of the company in a meaningful way or represent or participate in such companies. Furthermore, it may establish subsidiaries by itself or with third parties.To fulfill the aims of the statutory corporation, the company may conduct collaborative research by itself or with the involvement of other establishments of training, in keeping with Article 2, Section 1, Clause 5 of the State University Law.

Stuttgart

bwcon GmbH
Jürgen Jähnert
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Services

The object of the company is to support enterprises, organizations and individuals with suitable services for the use of strategic technologies. For this purpose the company operates a network involving different technologies, enterprises and organizations. Furthermore it advises individuals, enterprises as well as organizations, carries out events and projects for networking and enables the establishment of companies. It organizes a transfer of public sources of knowledge into networks and especially also the entrepreneurial transfer between commercial sources of knowledge.

Forschungs- und Innovationszentren gGmbH der Dualen Hochschule Baden-Württemberg
Dipl.-Wirt.-Ing. August Musch
E-mail: SU1835@stw.de | Web: www.steinbeis.de/su/1835

Services

The object of the company is the promotion of applied research. For this purpose the company establishes with members of the Cooperative State University Baden-Württemberg Steinbeis research and innovation centers. With these centers the company carries out freely chosen research projects, contract research and cooperative research. The company pursues exclusively and directly non-profit purposes according to the paragraph "Steuerbegünstigte Zwecke" (tax-privileged purposes) of the German tax code (Abgabenordnung) (§§ 51 ff. AO).

Steinbeis Consulting Center Communication Culture.Conflict Control
Beate Faust, Christa G. Kober, Rechtsanwältin Marion Wolf
E-mail: SU1846@stw.de | Web: www.steinbeis.de/su/1846

"A cornerstone for sustainable business success. Marion Wolf, Christa G. Kober and Beate Faust have founded Communication Cuture. Conflict Control, a Steinbeis Consulting Center based in Stuttgart. "It's simple – but not easy": The consulting unit engenders a culture of communication rooted in mutual appreciation, drawing on instruments such as moderation, coaching, mediation and training. This allows companies to align themselves appropriately to their corporate values. It also makes it possible for companies to develop and establish their own conflict management systems. With the right culture of communication, employees can become more loyal to the company and conflicts can be resolved constructively as soon as possible."

Services

- Development of a communication culture
- Employer Branding
- Conflict solving/mediation
- Conflict prophylaxis
- Structured conflict control
- Coaching

Wilhelmshaven

Steinbeis Transfer Center Signal Engineering
Dipl.-Ing. Heinz-Hinrich Blikslager, Prof. Dr.-Ing. Jens Wellhausen, Prof. Dr.-Ing. Jens Werner
E-mail: SU1834@stw.de | Web: www.steinbeis.de/su/1834

"Communication issues, on the doorstep and far away: Competence relating to high-frequency engineering and EMC, condition Monitoring and remote sensing in the north."

Services

- Research and development
- Expert report, expertise
- Consulting
- Training courses

Wismar

Steinbeis Transfer Institute Laws, Economics and Operations
Prof. Dr.-Ing. Manfred Ahn
E-mail: SU1852@stw.de | Web: www.steinbeis.de/su/1852

"Degrees, careers and network – we make all three possible."

Services

- Online courses of study
- Certification training programs

Dr. Leonhard Vilser Awarded Honorary Membership

Chairman of Steinbeis Board of Trustees honored by Esslingen University of Applied Sciences

The Chairman of the Steinbeis Board of Trustees has been honored by Esslingen University of Applied Sciences. Dr. Leonhard Vilser has been granted honorary membership of the university. The university rector Prof. Dr. Christian Maercker awarded the 65-year-old chairman an official certificate in front of guests from the world of business, science and politics. The former university council member was described as an "important friend, partner and supporter" of the university. Leonhard Vilser has been a member of the Steinbeis Board of Trustees since 2001 and its chairman since 2011.

"A university's life is strongly influenced by its supporters," said Christian Maercker in his official speech. "Mr. Vilser has had connections with the university going back 23 years. So it is particularly special to us to honor him in this way." Dr. Leonhard Vilser was a member of the university council for six years and he was deputy chairman of the Association of Friends for 15 years.

Honorary membership is an award that can be bestowed upon important figures who are not directly active at the university. The award honors exceptional services that have helped promote the development of the university. Under state university statutes, an honorary membership is valued on a par with honorary citizenship.

Leonhard Vilser studied mechanical engineering at Munich University of Applied Sciences and machine engineering at Kaiserslautern University of Technology before earning a doctorate in engineering at Stuttgart University. In his early career, he worked for Wacker-Chemie AG and was an academic assistant at Stuttgart University. Between 1979 and entering retirement in 2014, he worked as an engineer for J. Eberspächer GmbH & Co KG in Esslingen.

In 1998 he was appointed director of vehicle heaters. This involved overall responsibility for the business division including all subsidiaries worldwide. In parallel to this position, he shared responsibility as managing director of three further subsidiaries.

Over and above his honorary duties at the university in Esslingen, Vilser was chairman of the Working Committee for Research, Engineering and Education at the Baden-Württemberg state association of industry (LVI).

Image: Honorary senators Dietmar Ness (Ness & Co. GmbH, left), Wolfgang Wolf (LVI, 2nd from left) and Heinz Illi (2nd from right) with the rector Prof. Dr. Christian Maercker (right) and the new honorary member Dr. Leonhard Vilser (center).
© Image: Esslingen University of Applied Sciences

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Standing Strong Together in Business Clusters

Steinbeis becomes partner of new Baden-Württemberg agency

Networking creates synergies and bolsters competitiveness – something that many small and medium-sized enterprises have recognized in Baden- Württemberg, motivating them to join business clusters and networks throughout the state. To help these regional initiatives and networks function more professionally, the Baden-Württemberg Ministry of Finance and Economy has launched a new agency called ClusterAgentur Baden-Württemberg. Steinbeis is a member of the alliance which will implement the activities of the agency.

Over the next three years, the new agency will help promote business cluster development in strategic areas of growth and industries, providing advice on managing clusters and networks to support new initiatives and SMEs involved in networking. The agency will be headquartered in the Haus der Wirtschaft (house of commerce) in Stuttgart.

Partners of the project in Baden-Württemberg are the engineering associations VDI and VDE-IT, Baden-Württemberg international (bw-i) and Steinbeis. They will work together in the ClusterAgentur to raise the visibility of cluster initiatives as a driver of innovation and help them become established as a powerful instrument of technology transfer. One of the agency's central goals is to involve more SMEs in business clusters.

Steinbeis will use its know-how to manage activities relating to the ability of SMEs to innovate. The action plan includes "cross-clustering" to improve collaboration between clusters, strengthening of technology transfer between different companies in business clusters, technology scouting, innovation matching and training for cluster managers. Other areas of activity for the agency will relate to helping to raise the profile of clusters, helping to make cluster management more professional and fostering the internationalization of business clusters.

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Bottlenecks in Business

Second successful completion of TOC Congress in Stuttgart

In September, stw unisono training+consulting and Alkyone Consulting GmbH & Co. KG organized the second TOC Congress in Stuttgart. The auditorium at Steinbeis headquarters was filled to the last seat. The day revolved around the presentation of a customer project and six workshops looking at the topic of bottleneck management, or in technical terms: Theory of Constraints (TOC).

The day started with Paul Seifriz introducing the fundamentals of TOC and how it is implemented within a company. Joachim Schneider, TOC project manager at Atlanta GmbH & Co. KG (Bietigheim-Bissingen), then added his views from a user standpoint, explaining how his company has applied TOC principles since 2014 and enjoyed extraordinary success with them. After the talk, delegates were invited to three out of six workshops that took place in parallel. The workshops examined ways to establish a general framework in order to fulfill key TOC prerequisites within a business.

Alongside quality management and lean production, TOC belongs to a trio of current management philosophies. First developed in the 1980s by Dr. Eliyahu M. Goldratt, it is based on the fundamental physical principle that in any chain there is only one weakest link. Relating this weakest link to the company or a process chain can thus influence throughput and performance, or even company profits. At first glance, the approach seems to contrast with classic CIP principles which involve trying to make improvements throughout the company, but TOC focuses primarily on the bottlenecks.

Simply introducing TOC rules and implementing the TOC software within a company can already reduce errors to nearly 0%, increase throughput times by nearly 70% and cut stocks by 50% while raising delivery reliability to 99%. This results in a business that has been reinvented and which is based on transparency.

Peter Schust, Paul Seifriz
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Fast-track Knowledge Sharing: Dialogue Between Business and the University

Event series at Karlsruhe University of Applied Sciences

To bolster the sharing of knowledge between science and academia on the one hand and business on the other, the Institute for Transfer Technologies and Integrated Systems (SITIS, a Karlsruhe-based Steinbeis Transfer Center) is embarking on a series of events going by the title "Business Dialogue with the University: Away from the Daily Routine!" The aim is to examine a multitude of topics relating to production technology. The starting shot was fired in October 2014 with the first event, which looked at "Human Factors in the Production Process" and "Away from the Daily Routine – Toward Safeguarding Competitiveness."

A variety of managers at small and medium-sized enterprises were invited. In a speech given by Prof. Dr.-Ing. Rüdiger Haas, director of SITIS and a professor at Karlsruhe University of Applied Sciences, people and their skills in the workplace were examined as a key factor within the direct environment of production processes. The sorts of questions that came from the audience in the discussion after the talk were: "What can one do about older workers who don't understand the new production technologies, and how can we get them to work with younger workers?" or "How can I motivate my co-workers to try out more things with machines and not be constantly worried about breaking something?"

In his speech, Dr. Heinz Schäfer then turned to the issue of securing competitiveness, drawing on his many years of experience as a business consultant with examples directly related to business. He appealed for regular checks of companies' key indicators and continuous improvement in business processes. Taking an analytical approach to work enables a company to be independent in the long term and to safeguard its future.

After the two speeches, the discussion that had already got underway was continued in separate groups. The majority of companies at the event made it clear that there is a dearth of engineers and specialists at small and medium-sized companies. This is exacerbated by the highly specialist nature of the requirements workers face on machines, especially when dealing with the very latest production technology. The reaction is the same among young and old workers: they are all worried about pushing machines beyond their limits. One way to counteract this is to see mistakes at work as an opportunity to learn. The contributions of delegations resulted in lively discussion and a number of topics were identified for future events.

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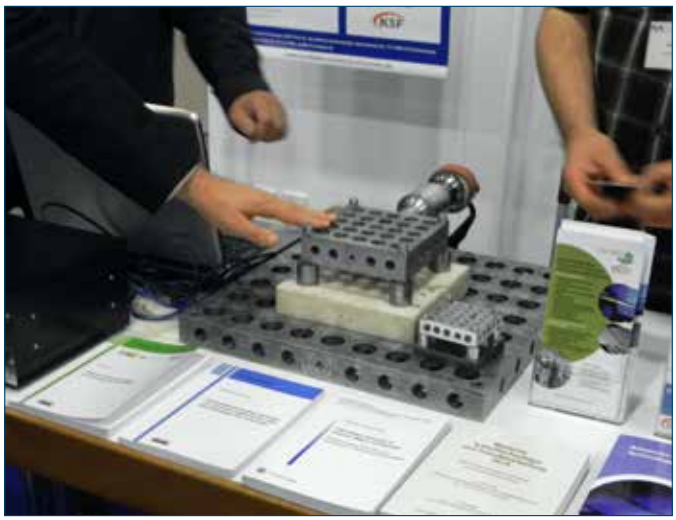

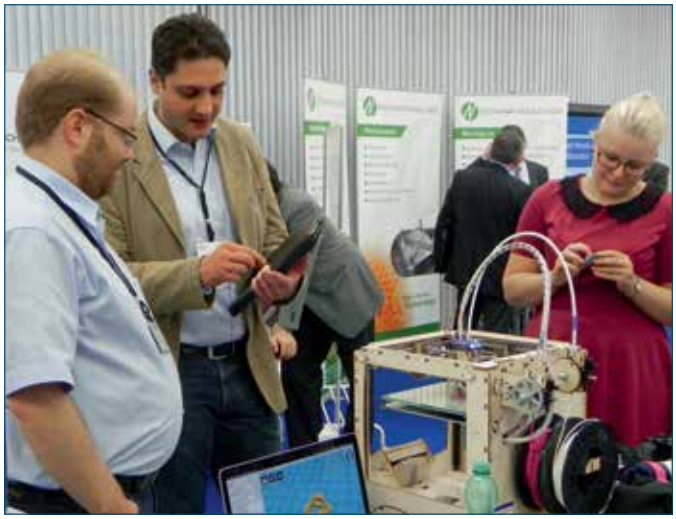

Wanted: Producer for our Product

Turning the spotlight on rapid technology transfer

Products seek Producer (PsP) is an innovative series of events designed to showcase new products and processes spanning a variety of different technology fields under one roof. The inventors of new product concepts can rub shoulders with idea seekers and look for a specific kind of partner. The events are run by Infothek, a Steinbeis Transfer Center.

"We've already invested major sums of money to take part in trade shows but we weren't always at the right events. With 'Products seek Producer' the firms and inventors at the event are always in the same industry. That really simplifies communication and we get to launch more quickly," explains Hubert Roth, CEO of EKM-Roth GmbH, who took his company to a PsP exhibition with a slant toward precision engineering, which took place in Pforzheim on October 24, 2014. To coincide with the exhibition, specialists gave talks on precision engineering and funding options.

The demands placed on mechanical engineering are becoming increasingly intensive and as the field becomes more and more specialized, there is a need for different ways to foster innovation to promote rapid technology sharing. This will be the main topic of the subsequent PsP, which, like the others, is all about concept exploitation: The Stuttgart Chamber of Commerce (IHK) will showcase new products and processes related to mechanical engineering on January 23, 2015 under the motto "Patented Ideas seek Partners, Producers and Sales Partners." The aim will be to give visitors to the exhibition an opportunity to talk part in presentations on current trends in the industry.

Images: Successful meetings at the trade show: products and visitors at the PsP in Pforzheim in October 2014.

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InnovateBW – A Catalyst of Innovation and Entrepreneurship

New initiative reaches out to students and entrepreneurs, but also established businesses

InnovateBW is a training program with a focus on entrepreneurship. It is aimed at people undergoing training, students and business founders, who can receive professional support with their technology ideas in an environment with a strong bearing on business. They can also receive training on drafting a business model and creating first prototypes. The program is being offered by bwcon, an enterprise in the Steinbeis Network.

However, InnovateBW is more than just an initiative for students and (would-be) entrepreneurs. Its services are also available to established companies. This is because participants on the program define the areas that are looked at, so they have an opportunity to include issues facing their company. This allows them to gain access to specialists in MINT areas, entrepreneurs, new concepts and state-of-the-art technology.

In an "open innovation process" lasting 6 months, the concepts of the young innovators are placed before a jury. Market players and experts provide feedback on ideas that make it to the next round. Once they get this far, there is a business training camp and a pitch to business partners. The jury then whittles projects down to 10 finalists from whom four winning projects are chosen at the final awards ceremony. Apart from plenty of good advice from the experts, the winners stand to win an award of Euro 10,000. Companies interested in becoming involved in the new initiative are welcome to contact bwcon.

Image: © iStockphoto.com/yganko

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Steinbeis Korea: Technology Transfer Excellent

Award goes to Steinbeis Technology & Innovation Center – Republic of Korea

A high honor has been bestowed upon Dr. Juwon Soh, project manager at the Steinbeis Technology & Innovation Center – Republic of Korea (STIC). He was awarded the honor – a presidential distinction for exceptional services to the electronics industry – at the 9th IT and Electronics Day in Seoul on October 14, 2014.

The IT and Electronics Day was first staged in 2005 to coincide with electronics and IT exports hitting the 100 billion Korean wons mark. Ever since, the award has been bestowed on individuals who have made exceptional contributions to the development of the electronics industry.

In 2014, the honor was awarded to DY EZtech, Korea Sprite, JY GNTm COWAY and the Steinbeis Technology & Innovation Center – Republic of Korea (STIC). All companies were honored for their innovative work in the field of product and technology development. The Steinbeis Technology & Innovation Center was honored for its support with the commercialization of public technology, services to technology transfer and advice on marketing strategies. Special mention was given to the center's training in global technology commercialization aimed at developing innovation skills in the Korean IT and electronics industry.

Image: Dr. Juwon Soh (2nd from left) received the award from Kwan-sup Lee, 1st Vice President of the Ministry of Trade, Industry and Energy.

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Jens Kleine, Maximilian Jolmes

2014 | Paperback, color | 82 pages, German
ISBN 978-3-95663-015-6

About the authors

Prof. Dr. Jens Kleine has been director of the chair of Financial Services at Steinbeis University Berlin since 2004. His research revolves around banking, asset management and payment transactions. Maximilian Jolmes has been an academic assistant at the Steinbeis Research Center for Financial Services since 2014.

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Sebastian Windhaus

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About the author

Dr. Sebastian Windhaus studied business administration at the university of WWU Münster. Between 2009 and 2013 he was an academic assistant at the SVI endowed chair for Marketing and Dialog Marketing. He earned his doctorate in 2014 at Steinbeis University Berlin.

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ISBN 978-3-943356-74-8

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About the authors

These publications resulted from collaborative work with the Steinbeis-Europa-Zentrum (SEZ). The SEZ is a member of the Steinbeis Network. Its role is to build bridges between the EU and companies, research institutions, universities and regional economic development organizations. It not only advises clients on European funding programs, bilateral technology cooperation with foreign partners, regional planning strategies and innovation, it also participates and runs technology exchange forums, entrepreneur tours, conventions, information events and training sessions.

The 2014 Steinbeis Day Proceedings

Steinbeis Foundation (publ.)

2014 | Paperback, B&W | 118 pages, German/English
ISBN 978-3-943356-19-9

More online

The Steinbeis Foundation Transfer Prize – The Löhn Award Winners 2004-2014

Steinbeis Foundation (publ.)

2014 | Paperback, B&W | 102 pages, German/English
ISBN 978-3-943356-20-5

About the event

At the Steinbeis Day, numerous Steinbeis Enterprises showcase current and recent projects at the Haus der Wirtschaft in Stuttgart. They also make short speeches on insights gained from transfer projects and answer specialist questions. The documentation summarizes speeches and exhibitor information, providing a useful synopsis of the event and a post-event review of topics looked at.

The transfer prize of the Steinbeis Foundation – The Löhn Award – recognizes excellence in competitive technology and knowledge transfer between science and academia on the one hand and business on the other.

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Perception – Idea – Implementation The dialogue between art and innovation

Steinbeis Foundation (publ.) | Philipp Liedl

2014 | Paperback, color | 90 pages, German
ISBN 978-3-943356-21-2

About the artist

Dr. Philipp Liedl has been working at STASA – Steinbeis Angewandte Systemanalyse GmbH – since 2005, where since 2009, he has served as authorized signatory. He previously earned his doctorate at the 2nd Institute of Theoretical Physics at the University of Stuttgart. Philipp Liedl experiments with colors and abstract shapes, taking inspiration from different materials. He creates his pieces by combining art with the analytical approach of physics, depicting the complex fabric of reality with formally minimized percepts.

More online

InnovationQuality. The Value of the New

Werner G. Faix, Jens Mergenthaler, Rolf-Jürgen Ahlers, Michael Auer

2014 | Hardback, color | 176 pages, German
ISBN 978-3-941417-41-0

About the authors

Werner G. Faix, Jens Mergenthaler, Rolf-Jürgen Ahlers and Michael Auer work in a variety of roles for Steinbeis. Their book on InnovationQuality looks at the twin/coupled phenomenon of Innovation and Quality, posing the question: What is the Value of the New?

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Corporate Mediation – 2014/04 Conflict skills - How to solve entanglement

Gernot Barth, Bernhard Böhm (publ.)

2014 | Stapled, color | 68 pages, German
ISSN 2194-430X

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 for Mediation in Business, and the Academy for Social Aspects and Law (a Steinbeis Transfer Institute at Steinbeis University Berlin). A qualified attorney and master of mediation, Bernhard Böhm is co-director alongside Dr. Gernot Barth of the Steinbeis Consulting Center for Corporate Mediation as well as the state-approved office of the Steinbeis Consulting Centers company (Steinbeis Beratungszentren GmbH).

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Steinbeis-Edition (Stuttgart)
edition@steinbeis.de | www.steinbeis-edition.de

Steinbeis

Publication details

Transfer. The Steinbeis magazine

The magazine on tangible knowledge and technology transfer
Edition 4/2014
ISSN 1864-1768 (Print)

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Willi-Bleicher-Str. 19
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Concept and design:
Steinbeis-Stiftung

Overall production:
Straub Druck + Medien AG, Schramberg

Photos and images:
Unless stated otherwise, photos and images were provided by Steinbeis Enterprises and project partners named in this magazine.
Titelbild: Bilder aus den vier Ausgaben des Transfermagazins 2014

Steinbeis is an international service provider in entrepreneurial knowledge and technology transfer. The Steinbeis Transfer Network is made up of about 1,000 enterprises. Specialized in chosen areas, Steinbeis Enterprises' portfolio of services covers research and development; consulting and expert reports as well as training and employee development for every sector of technology and management. Steinbeis Enterprises are frequently based at research institutions, especially universities, which are constituting the Network's primary sources of expertise. The Steinbeis Network comprises around 6,000 experts committed to practical transfer between academia and industry. Founded in 1971, the Steinbeis-Stiftung is the umbrella organization of the Steinbeis Transfer Network. It is headquartered in Stuttgart, Germany.

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