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Feature Topic: Intercompany Transfer
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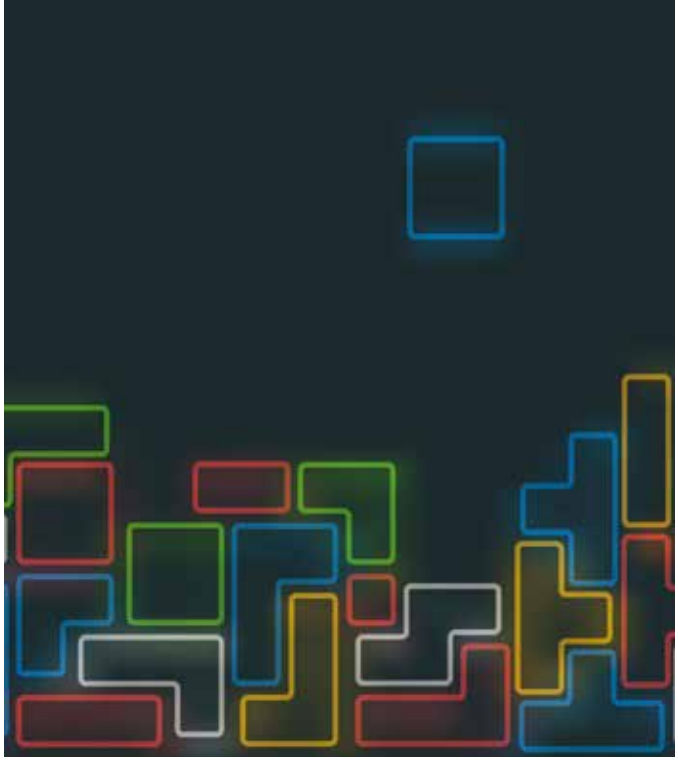
An Overall for Emergencies
Steinbeis experts work with project partners to design a patient cooling solution that can be used anywhere

The Innovation Dilemma
Steinbeis experts develop software for achieving the right balance in innovation projects

03 | 2018



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Dear Readers,

Uwe Haug is the director of a number of central Steinbeis Enterprises and the authorized officer of the board of directors of Steinbeis GmbH & Co. KG für Technologietransfer in Stuttgart. He also acts as a business development consultant at headquarters on behalf of Steinbeis Enterprises. In addition, Haug helps coordinate the international Steinbeis Network and acts as a project manager for the Ferdinand-Steinbeis-Institute team working on Micro Testbeds.

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The current economic situation in Germany – particularly for small and medium-sized businesses – shows all the signs of completely overheating and there's a sharp rise in economic volatility.

Aside from the challenges of changing business models and shifts in cross-domain ecosystems, largely fueled by advancing digitalization, the SMEs of the nation are confronted by changes in international politics and geostrategic developments. This is exacerbated by the fact that SMEs are extremely dependent on export markets.

With so many issues to cope with, not only does this affect the Mittelstand – the broad foundation of SMEs in Germany – it is also shifting the goalposts of entire business ecosystems. Partners who were the previous stakeholders are changing at a different pace and intensity. Organizations and the business partners who until now stood by the Mittelstand are increasingly relinquishing their role as the ones who provide orientation. Being a technology leader is no longer enough for companies to maintain the agility or competitiveness they need.

These challenges are initially resulting in the disappearance of traditional business ecosystems. When this happens, the long-standing sense of trust starts to wane. Companies find themselves challenged – perhaps for the first time – with fundamental issues of entrepreneurship. Simply "managing" the business enterprise is no longer enough. To not just be driven by change but actually drive change yourself, one key ingredient is an ability to derive business capabilities from core competences and turn these new capabilities into corporate competences. A large number of firms are overwhelmed by this multilateral challenge. They have to keep operations up and running and safeguard their ability to deliver to customers while at the same time tweak their business model or forge new paths into different ecosystems – and perhaps even create new business ecosystems themselves.

This latest edition of TRANSFER magazine provides you with a variety of examples and ideas for possible ways to forge new paths. Coming up with solutions together and exploring realms off the beaten track take different ways of looking at things and interdisciplinary expertise.

With kind regards,

Uwe Haug

Innovation Is an Acquired Manual Skill – From Ski Boots to Awnings

30 years of the Seifriz Award – the German skilled trades and science award

Year in, year out, the transfer award for German skilled trades and science highlights the interplay between the skilled manual trades and science. In fact it has been aptly demonstrating this for three decades. This year's anniversary award ceremony took place at the annual meeting of the Baden-Wuerttemberg Crafts Congress (BWHT) in Stuttgart. Three project teams shared the total prize of €15,000 for recently developed products. Professor Dr. Dr. h.c. mult. Johann Löhn also received a golden badge of honor from the BWHT during the event.

Two of the prizewinners were Marco Krückemeier, manager of the Cologne-based business go^3 ("The exercise experts") and Christopher Kreft of the German Sport University Cologne. Together they developed an orthopedic insert for ski boots, which can be customized to individuals using 3D scanning and printing. Their aim with the insert is to improve the performance of alpine skiers. Their 3D technology can be adapted to all anatomical needs of the customer in order to reproduce a sole at any time based on stored anatomical and biomechanical data. The new design with a padded longitudinal arched shell transfers more power from the skier to the ski, and this improves skiing performance.

A further prize was awarded to the master metalworker and managing director Hubertus Haking from Ladbergen (Haking Metallbau GmbH) and Professor Dr. Klaus Baalmann (Münster University of Applied Sciences). The partners developed a new awning: Wires used to extend and retract the shade are concealed within the rails of the awning. As a result, when it is in the closed position, none of the wires or rails are visible. This makes it possible for the awning to blend in inconspicuously with the overall appearance of a building, important for the visual appeal of facades on historical buildings.

Master hairdresser Frank Brormann, owner of the 360° Haare salon in Oelde, and Professor Dr. Jürgen Peterseim (Münster University of Applied Sciences) also received an award for their "calligraphic" cutting invention. Their device cuts hair at a uniform angle in such a way as to increase the surface area of hair tips. This makes hair more elastic, easier to manage, and more voluminous. The inventors' "calligrapher" was put through several rounds of testing with various cutting devices, allowing the project partners to demonstrate the effect of different cutting techniques on the quality of the cut. The instrument they developed also protects the tips of hair in the long term.

The award winners were congratulated by Dr. Nicole Hoffmeister-Kraut, Baden-Wuerttemberg Minister of Economic Affairs, and Crafts Congress President Rainer Reichhold. Reichhold then announced a further prize at the award ceremony: Johann Löhn, President of Steinbeis University Berlin and chairman of the Seifriz Award jury from 1989 until July of this year, was awarded the Golden Badge of Honor of the Baden-Wuerttemberg Crafts Congress. The BWHT praised Löhn's outstanding contribution to the Seifriz Award.

The transfer award of German skilled trades and science recognizes successful collaboration between the skilled manual trades and science and academia. The award is bestowed once a year by the Baden-Wuerttemberg Crafts Congress and the German Confederation of Skilled Crafts in cooperation with the specialist magazine handwerk, the insurance and finance group Signal Iduna, the Association of Skilled Trade Technology Transfer, the Baden-Wuerttemberg Ministry of Economic Affairs, Labour, and Housing, and Steinbeis.

Image left: The 2018 winners of the Seifriz Award and the jury
Image right: Prof. Dr. Dr. h.c. mult. Johann Löhn (left, Steinbeis), Rainer Reichhold (BWHT)
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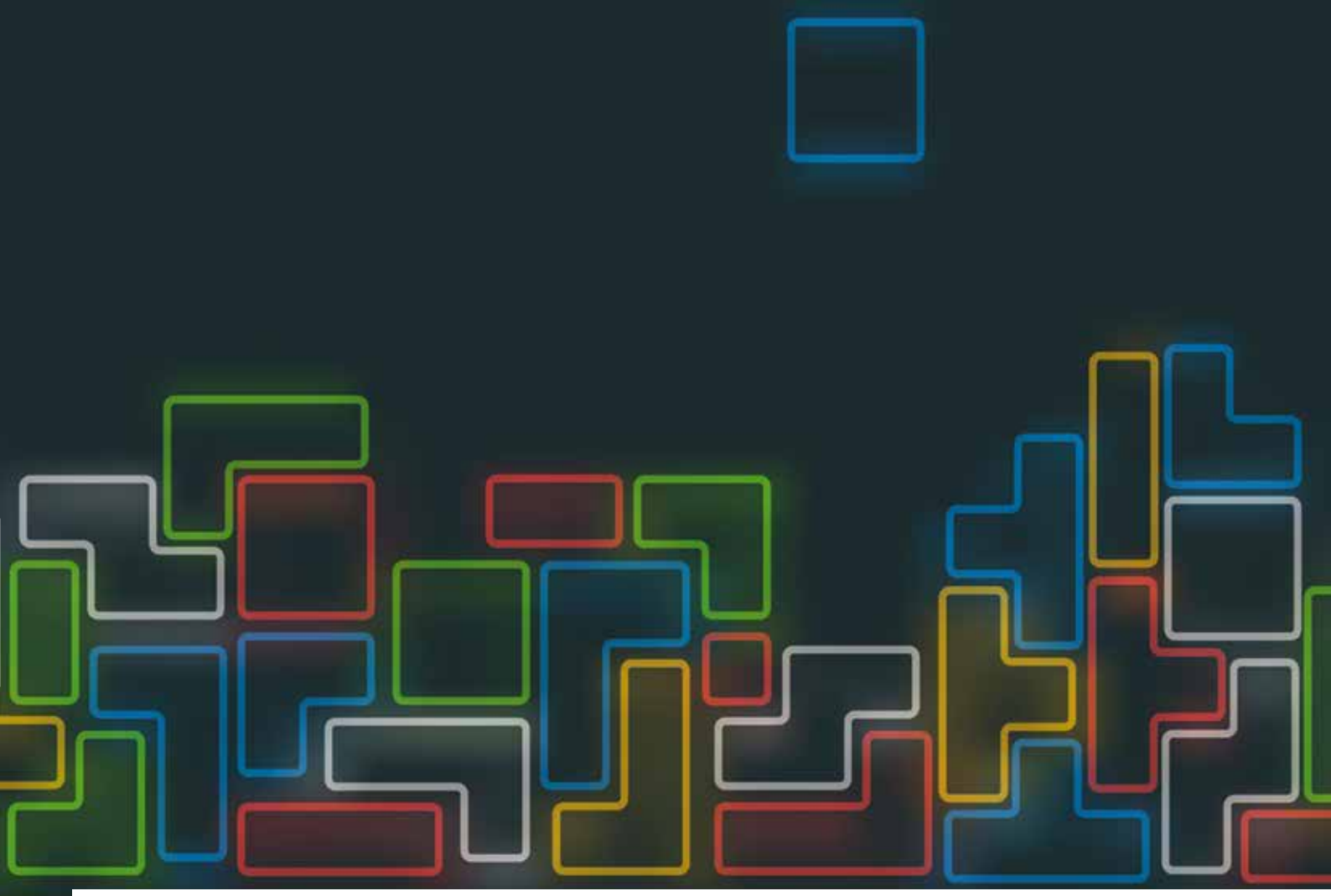

Feature Topic: Intercompany Transfer

Insights from Steinbeis experts into a variety of transfer processes

There is general consensus that successful knowledge and technology transfer is an important factor in business enterprises' ability to innovate. However, there is less general awareness of the fact that this encompasses more than transfer between science and business – a further form of transfer has received very little attention until now: transfer between different companies. Yet especially in times of networking and digital technology, this area is becoming more and more important.

For the focal topic of this edition of TRANSFER, Steinbeis experts look at this transfer process from a variety of angles. How does transfer actually work between different companies? What approaches are possible? What are the overarching conditions for this type of transfer both on a national and an international level? Our authors dig deeper into these questions. They also turn the spotlight on Steinbeis Micro Testbeds. These allow SMEs from different sectors of industry to develop new solutions capable of adding value by working in partnership with other companies and scientific institutions.

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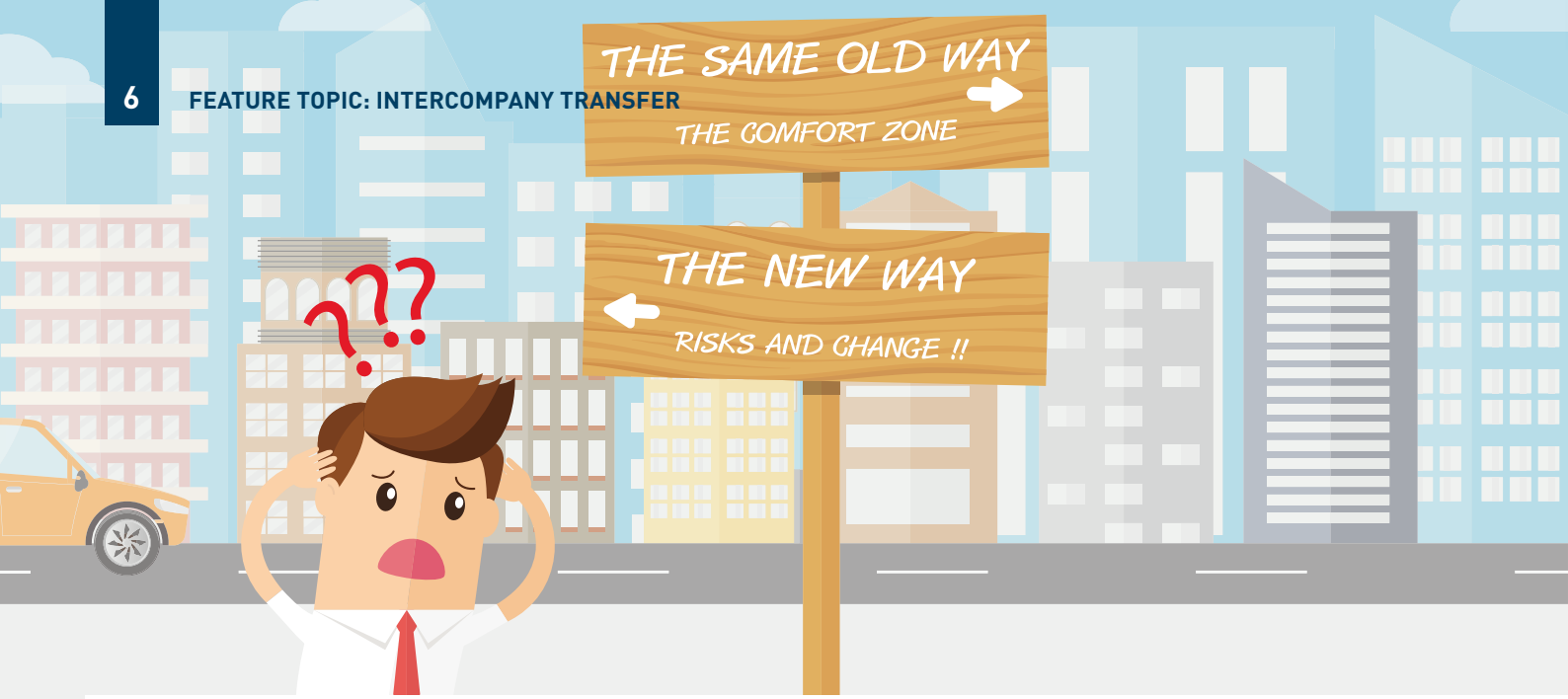

"Companies need to leave their comfort zone and establish new ways of thinking about things!"

An interview with Dr.-Ing. Jürgen Jähnert, managing director of bwcon GmbH

TRANSFER magazine asked Dr.-Ing. Jürgen Jähnert, the managing director of bwcon, an enterprise in the Steinbeis Network, why transfer between companies is becoming more and more important as a process, especially with regards to digital transformation.

Hello Dr. Jähnert. Most people you ask about knowledge and technology transfer think first about transfer between companies and research institutions, but they don't really think about company-to-company transfer. Why do you think that is?

We're currently seeing a trend toward lots of companies moving away, step by step, from mainly product-centric thinking and action, and replacing it with thinking and action in product-service systems, so-called hybrid bundles, and often this shifts the process of adding value into after sales. In essence, their thinking isn't new but for lots of companies it's a major challenge, especially those that owe their success as an enterprise to their focus on innovative products. Given this, the topics of knowledge and technology transfer need to be reconsidered or redeveloped. This is because the interplay between research institutions and companies has worked brilliantly in Germany until now, mainly by focusing on specialist disciplines. But we now face an extremely rapid convergence process involving different types of technology and more often than not, this is making it possible to add value in different ways. As a result, because value chains are normally linear, usually with clearly distributed roles, it's becoming necessary to think in terms of value chain networks. It's perfectly feasible for companies that basically compete against each other to collaborate every now and again. This is the exact area where transfer – and I'm consciously not saying technology transfer – will become more important between companies. In addition to transferring technology between companies, experience with corporate culture and value models will be transferred, as will knowledge. This means that companies will need a certain ability to be open; they'll need a re-engineering process and this will provoke resistance, especially among traditional companies. Public funding programs are also not sufficiently prepared for such multidisciplinary approaches. Too often, multidisciplinary thinking is taken to mean using different technologies; it's not enough about involving different specialist cultures. As a result, the multidisciplinary transfer that does happen will first revolve around transfer between business enterprises. In the medium term, it's perfectly possible that the pure technology projects of the EU, federal government, and individual states also start to look at scientific issues related to the humanities. That said, we've not got that far yet.

Why is transfer between companies especially beneficial to small and medium-sized businesses?

Small and particularly new companies are agile and adaptable, and they're in a position to react quickly to different market conditions. Bigger firms, but also smaller, established companies, have fixed processes and they often have a different (better) way of looking at quality – and they're in a much, much better position to enjoy economies of scale, and this makes products in a global market more appealing and, ultimately, more successful. Building value creation networks – with several smaller companies from different areas, that think in agile terms and work together on new services or new combinations of products and services – will become more and more important in the future. Continuous growth in the platform economy makes it possible to approach global markets in a really short space of time. Logically speaking, this also means that the competition will be knocking on your door much more quickly with its own services. If you keep thinking through this process, the cycles within which products or product-service bundles are successfully launched in the market will become increasingly shorter. So it's the small and medium-sized enterprises that have to be at an advantage here, together in networks, assuming they have a culture that's open to such ideas. Whatever happens, lots of different options will open up for such alliances or value creation networks in the near future.

What do you think are the challenges when transferring knowledge and technology between companies? And what are the differences here compared to transfer between companies and the scientific community?

The economy can still be described as excellent at the moment, although there are one or two indications that things are slowing down in terms of industrial workload. At such times, companies often become a bit sluggish in terms of underlying thinking and action. Digital transformation means that companies will have to think differently. But to do this, not only do they have to be open and prepared to think in terms of value creation networks; often a different company culture is needed. "Power and control" will be replaced by "let them get on with it" and "collaboration," which also means you need a different error culture, maybe a different management culture, but in any case a different approach to the topic of technology transfer. It will still be imperative that emerging technologies are transferred into companies in the future. But I'm certain that this won't be enough to safeguard the success of companies, not like it has been until now. Another important factor will be an ability to leverage several different technologies that work together as part of a process of convergence, and these technologies will need to find new ways to add value. Thinking in completely new ways and getting a traditional company into disruptive value creation means, first and foremost, overcoming resistance within the company and getting people to sign on to a transformation process. This isn't about using the right technology, it's a question of the key players in the company knowing their own organization so well that they can motivate their colleagues to adopt the new way of thinking. This is because creative innovation processes are not something the senior people at the company can prescribe. At this stage you would also expect lots of new collaborative relationships to spring up between different companies. And then the question is how the companies or the people involved in their processes will interact with one another.

Coming back to your question. Companies, no matter whether they're big or small, need strategies that define how they will deal with the challenges of digital transformation, including issues relating to intercompany transfer. They also need the entrepreneurial courage to systematically implement these strategies. Transfer between firms on the one hand, and science and academia on the other, is generally easier for a company. There's less work to do in terms of the company culture so the business is under less pressure to change itself.

What will intercompany transfer be like in the future? And what role will omnipresent digital transformation play?

Digital transformation will still be an extremely uncomfortable experience for a large number of companies – especially when new market players virtually appear out of nowhere in a traditional market and burst in with a disruptive value model. By then, at the latest, companies will need to have left their comfort zone and adopted new ways of thinking about things. Often there will be little time by then to do much about the situation. Digital transformation is leading to a new pact between young, agile, and smaller firms and the bigger companies already established on the market. It will be especially interesting to see how and in what ways the big companies deal with small companies. In essence though, you have to say that these change processes aren't exactly new – every new technology has had the potential to cause a certain degree of disruption until now. Digital transformation is nothing more and nothing less than a catalyst for a further transformation process that opens an amazing door to opportunity for lots of companies. But only the agile, quick, and creative ones. What we'll see are agile value creation networks – loose alliances between companies who collaborate as befits the situation in order to quickly get back to competing with one another again. We'll find there are firms implementing some parts of their strategies within the company and other parts of their strategies with other companies. In the medium term, we'll need to focus more on interdisciplinary or multidisciplinary issues, even in research. Also, digital transformation is forcing companies to think about their workforces' fear of the future, change management, new forms of value creation, and their own corporate culture. When a country like Germany, which is so passionate about technology, starts believing it can only solve the challenges of the future through technical competence, you find yourself in a dead end. So traditional technology transfer will be rethought and redesigned. In other words, cutting-edge technology is "only" crucial at the moment, but it's no longer enough for securing business success in the long term.

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Dr.-Ing. Jürgen Jähnert is managing director of bwcon GmbH, a member of the Steinbeis Network. His enterprise sees itself as a service provider that offers support to companies with digital transformation processes by managing concepts, planning new business models, and making innovation processes more flexible. The services offered by bwcon include building an understanding of the different methods required to introduce a digital transformation process. This ranges from moderating innovation processes to subsequent advisory services and business process development, including financing. bwcon provides a framework for transfer out of public areas of knowledge into networks, especially entrepreneurial transfer between sources of know-how in the private sector.

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Not Possible Without Communication!?

Interpersonal communication as a prerequisite for successful intercompany transfer

Connecting and keeping others informed are the most important forms of social interaction. Exchanging ideas with others, sharing what you know, and learning from one another are central components of a successful transfer process. Especially in modern times, with so many different kinds of digital solutions all around us, it's important that personal communication is not neglected and it must never be forgotten. This is why know-how transfer between companies is also transfer between people. Reiner Lohse of the Göppingen Rural District Association of Economic Development and the Promotion of Innovation explains how this works.

Classic know-how transfer is, by nature, about research and development bodies such as technical universities, traditional universities, and research institutions sharing knowledge regarding topics such as technology, management, or organization with enterprises involved in business. For example, a company may be given expert advice or it takes part in symposia. It is also becoming more and more important that companies share knowledge among themselves and talk about different topics, share know-how, provide support and advice, or form alliances to add value together.

This is where organizations like the Göppingen-based WIF come in. The WIF is a rural district association that promotes economic development and innovation. The Steinbeis project manager Reiner Lohse is the appointed managing director of the WIF, which provides access to innovative services through the Steinbeis Network. The WIF has organized a variety of platforms for promoting bilateral exchange as well as regular workshops. Its services are targeted at different groups within companies and matched to local requirements. Importantly, meetings are always moderated. The work of the WIF has always reflected the importance of exchanging experiences and transferring knowledge between companies, for example on a senior management level but also among specialists and middle managers. To promote its ideas, the WIF formed a variety of entrepreneur and innovation circles, a circle that operates on a regional level, and a project working group.

Its origins go back to 1998 when, based on an initiative started by skilled health workers, it was recognized that a network was needed. Going by the name Health Wave, the common goal was to organize a healthcare trade show to raise the visibility of individual players in the local economy. The trade show was repeated in the same way several times, and was later successfully handed over to a trade fair organizer. The initiative picked up momentum when it participated in the ECOfit funding program in 2005. This program has existed ever since. It is run by the Baden-Wuerttemberg Ministry of the Environment, Climate Protection, and the Energy Sector and looks at environmental protection for companies and organizations. Each round lasts around one year so projects under the program have a time limit. An important part of the program consists of between six and eight workshops, mainly for specialists in related areas of business. The events look at various aspects of environmental protection such as energy saving, waste management, the use of water, clean air, etc. Aside from actually sharing knowledge, another important aspect of the workshops comprises speeches aimed at sharing experiences. The whole idea is to learn from one another. After successfully completing their ECOfit project, companies on the program receive a certificate and may call themselves an ECOfit Enterprise. The project was repeated in 2011 and 2018.

Based on previous experience, the 2013 WIF program set up a so-called business circle. This company meet-up acts as a regular, cross-sector convention of business leaders (especially owners), laying a priority on a personal and safe exchange of ideas on the overarching issues of business management. Discussion does not go into individual topics relating to specific companies. The group is invitation-only and new members have to be voted in by existing members. Six meet-ups are organized per year by agreement among the members. A particular emphasis lies in friendly and supportive advice. This usually involves a systematic con-

sulting session in which the members answer questions in turn according to an agreed discussion model. This makes it possible to receive advice on issues relating to business management and other key topics and think up solutions together. The friendly and supportive advice is shared in groups of ten. The idea is for members to come with questions relating to the business, actual problems and certain "cases."

By comparison, the innovation circle set up in 2016 consists of a group of specialists from companies, so the discussion topics are of a specialized nature. The groups meet up two or three times a year and each meeting revolves around a thought-provoking talk, a debate, and a tour of a business. The participants at the event change considerably due to the length of the members' list and as a result, there is less emphasis on openness, commitment, and trying to solve problems. Despite this, people also form friendships at this market of opportunity and hear recommendations, which in some instances are followed up by the WIF. There are numerous positive examples of this. There is a further group worth mentioning on a local level, which was formed by neighboring companies in an industrial zone. This strong community has existed for over 30 years and from the very beginning, a culture of mutual support fueled a sense of openness and trust. Although the members of the group are all involved in mechanical engineering and machine construction, they are not competitors and they have enough common interests. The members also organize company walkabouts, resulting in new ideas and an exchange of views.

All of the described groups are moderated by the WIF, which has drafted a list of underlying principles, fundamental effects, and even success factors based on its experience with transfer between companies:

- Group members meet up on a level playing field. Independent of their position at the company, whether a member is a student, business founder, senior manager, or CEO, everyone is welcome to make a contribution and is taken seriously, contributing to the colorful mixture of information. This mixture is extremely beneficial and often results in different ways of looking at things. Innovations are often the result of overlaps between different sectors of industry, technologies, and value chains.
- Self-organization is an overriding principle. Group members participate on a voluntary basis, arranging the schedule and thus the frequency and duration of meetings, topics, the agenda, and how topics are dealt with. The first meeting usually defines whether members want talks, open discussion, or workshops. It's not possible to force certain results out of meetings. Although meetings are organized by the members, they still need a moderator who helps with preparation, procedures, discussion guides, and documentation of results. A good way to stimulate discussion is to talk about cross-sector or pre-competitive topics.
- The more detail members go into when talking about new insights, exchanging views on technology, or discussing company-specific topics (even confidential ones), the more important it is to provide a "forum of trust." Trust takes time and has to evolve. If need be, joint activities with an emphasis on leisure make it easier to get to know one another and explore and deepen areas of overlap. As well as trust, further important ingredients of successful partnership are commitment, a willingness to open up, openness regarding personal topics, honest feedback for others, and an atmosphere that allows for critical questioning.
- It is important to focus on the potential offered by the group and make good use of this so that members can offer each other mutual support but also profit from this themselves (adding value). If there are knowledge gaps resulting in an imbalance, this will not work in the long term. There needs to be a potential win-win situation.
- In addition to meeting everyone, members need to take the opportunity to forge direct (bilateral) contacts with others.
- Every group is different and the experiences of one group cannot necessarily be transferred to other groups.

Image: A meet-up of of the innovation circle on the Göppingen campus of Esslingen University of Applied Sciences

Reiner Lohse is the managing director of WIF GmbH (the Rural District Association of Economic Development and the Promotion of Innovation, Göppingen) and director of the Steinbeis Transfer Center for Technology and Innovation Management, Göppingen District. The WIF supports and advises local companies in the rural district of Göppingen on topics relating to innovation.

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"The process of transfer between companies opens the door to something new"

An interview with Dr. Jonathan Loeffler, CEO of Steinbeis 2i GmbH

Dr. Jonathan Loeffler is the CEO of Steinbeis 2i GmbH and an expert when it comes to intercompany transfer at an international level. In an interview for TRANSFER magazine, he provides insights into the advantages of knowledge and technology transfer between business enterprises, the ways in which it is different on a European scale, and why professional support is essential for the transfer process.

Hello Dr. Loeffler. How does transfer work between companies, for example in research consortia, and what role does the innovation process play at SMEs?

Within the innovation process, knowledge and technology transfer between companies provides an important point of overlap as a way of overcoming obstacles, including technological and financial challenges, which individual companies can't manage by themselves. An example: For a European R&D consortium, the project can often involve mapping an entire value chain for a product. The tasks and skills of each of the partners are complementary and because of that, they promote know-how sharing. With such projects, everyone stands to benefit from everyone else, so transfer can take place between all partners.

The companies themselves play an important role, particularly when it comes to the exploitation of the results of research and launching products. The companies can include developers, suppliers, producers, or the end-users – who'll for example try out and evaluate prototypes. So knowledge within a consortium is shared in a targeted manner and intellectual property is defined at the start of the project and captured in a consortium agreement.

Often SMEs don't have all the in-house resources and skills they require to go through all the steps themselves. Intercompany transfer processes give these companies new ways to move things forward, so they can accelerate the next stages of product development.

What advantages does intercompany transfer bring to the companies involved, but also what are the challenges?

There are three things: creativity, trust, and commercial viability! The process of transferring knowledge or technology from one company to another opens the door to something new, but it also takes commitment because it's of major strategic importance to future products, so ultimately it has to be financially viable. It's complex because success depends on lots of factors. Classic customer-supplier relationships aren't valid any more. Instead, it's about collaboration in a partnership of equals so you can form a successful innovation alliance.

Image: © istockphoto.com/francisblack

Because R&D projects involve all partners pursuing common goals and committing themselves to working together over an extended period of time, new expertise or technologies can be channeled more quickly and more effectively into ongoing developments and exploitation of that expertise or technology. So the benefits come from the time and money that's saved. That said, this is only possible – and here lies the challenge – if companies are not direct competitors. Mutual trust is a really important factor here.

For example with the Forwarder 2020 research project, there are 14 partners from six countries working on innovations for use in sustainable forestry. This has already resulted in the development of an innovative transporter crane spanning five equally innovative modules. It's currently undergoing live testing with the aim of improving energy efficiency and doing more to protect the forest floor. The companies involved in the project include three forestry firms and five component manufacturers.

Is knowledge and technology transfer in any way different when it takes place between companies on a European level?

When SMEs collaborate with European partners they gain access to developments, technologies, and expertise that in all probability they wouldn't have unearthed in their own countries. The international setting makes it possible to quickly get into new markets. EU research and innovation funding revolves around research into excellence, so it brings SMEs into contact with really successful partners who are innovative and one step ahead when it comes to key enabling technologies and technology trends. In projects of a strategic nature, companies can influence political areas with their innovations.

Which overall parameters do you believe need to be fulfilled for intercompany transfer to work, not just on a domestic level but also internationally?

It's important to have professional support with the transfer process. Supporting agents such as cluster organizations, the chambers of industry and commerce, and transfer networks can act as neutral stakeholders and play a crucial role in getting the process underway and providing support on the journey.

Practice shows that technology and know-how transfer really does work between SMEs. To keep supporting the process in the future, further funding programs and instruments are needed and this will require the involvement of small and medium-sized enterprises. Plotting a course for programs that works in favor of big companies or only focuses on fundamental research would be going in the wrong direction. Europe needs competition that is fueled by SMEs. At the same time, on a domestic level we need to sensitize people to European collaboration.

Dr. Jonathan Loeffler is the CEO of Steinbeis 2i GmbH. He has been an expert in innovation management, EU funding programs, international project management, and technology transfer for over 20 years. Steinbeis 2i GmbH (S2i) is the ideal partner for innovation projects in Europe. The enterprise keeps SMEs, universities, and research institutions in the picture when it comes to innovation and internationalization, also providing important support. As a member of the Enterprise Europe Network of the European Commission, S2i has access to 600 partner organizations in over 50 countries. The aim of the network is to provide support to companies on all issues relating to business in Europe, innovation, research, and technology transfer. It also helps firms exploit the findings of European research.

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Understanding and Achieving Digital Transformation

A key prerequisite for successful projects: collaboration

Everyone is talking about digital transformation these days, but introducing digital solutions in practical terms is often more difficult than people think. Transformation is not just about technical solutions; the nuts and bolts of processes and business models also have to be transformed. What's needed is a holistic solution, as Steinbeis experts have identified. They have now founded a Steinbeis Consulting Group called Networks & IT Structures to support companies with the challenges of digital transformation.

For businesses, digital transformation is an essential process, nd only a few conscientious managers are likely to buy into the idea that they can introduce new software and then everything will be "sorted." Most managers have now worked out that technical solutions and software are only one side of the coin. Transformation is about change – and that's the other side of the coin. All change presents organizations with new challenges, and depending on the company culture and history, communication styles, and levels of hierarchy, there are a variety of important things to think about when undergoing transformation.

The Steinbeis Consulting Group (SCG) Networks & IT-Structures was founded to help companies pinpoint and implement solutions that are individually matched to both sides of the coin. The group helps with the selection, design, and introduction of software and also provides advice and support with all kinds of changes involving technology. The SCG consists of a number of experienced experts in digitalization and business transformation. They currently work for a variety of Steinbeis Enterprises, offering a diversity of skills under one roof to secure successful project outcomes for their clients.

There's an old saying: garbage in, garbage out – and it's perhaps even more valid for digital transformation. When inefficient or bad processes are digitalized like for like, all you get are inefficient or bad "digital" processes. As a result, it's important to start by analyzing processes and if necessary, making improvements and changes – or making things lean – first. Only then can the process of developing suitable standard or customized software begin. It is also advisable to go back and set priorities first and work through these step by step, especially if there are lots of processes involved. Experience shows that there is an above-average likelihood that major software development projects will be suddenly put on hold or come in completely over budget. To do something about this, the SCG offers a list of agile software development methods. By using prototyping, initial results can be quickly scrutinized and optimized one after the other. The consultants help firms work in compact, self-organized teams because this produces better architectures, requirements, and designs. These tend to be more reliable and useful and make it easier to work on a more abstract level. To avoid falling into the usual trap of drafting a detailed, time-consuming, and expensive functional specification list, firms are provided with an analysis of requirements backed up by expert advice.

By this method, Employees at the company are brought on board just right from the start. After all, they're generally familiar with the things a solution will need to do, so they contribute content and later they will actually be using the software anyway. This allows these key stakeholders to be part and parcel of the change process from the outset. Step by step, they are introduced to new ways of working and become sensitized to the reasons behind the change. A key aspect of this is the user experience (UX) – a comprehensible and appealing design for using software – because this is a decisive factor in whether a new solution is accepted, even though this is often underestimated. The Networks & IT Structures unit is aware of the significance of such aspects and – accordingly – gives these priority when selecting and developing software. By involving people affected by change, valuable feedback is gathered early in the process and integrating their ideas is therefore inexpensive. Carefully coordinating requirements also helps when buying standard software, because features are then only acquired if they're actually needed. This also makes it possible to reduce the overall number of systems in use, with fewer interfaces and potential media transition points. This can be a huge relief for users. One example of a successful software solution that made it possible to digitalize old processes and redesign existing software is a documentation, analysis, and data management application for technical product developments. The team succeeded in reducing the time needed for engineers to find data, evaluate it, and produce graphs. They also managed to harmonize processes, which had previously been hampered by a large variety of sometimes redundant procedures. By introducing new and lean customized software, the team significantly reduced the extra time and effort that had to be invested.

Our brains tend to make us react subconsciously to things likely to provide a reward. When an organization is about to undergo change, the people involved often have to adjust to new goals. It is incredibly important that they don't run out of steam halfway through the journey. It is therefore crucial for management to provide suitable incentives for employees in the form of rewards that are worth going for. It is also tremendously important that management understand the reasons why change is needed, plus the causes, and that they are able to communicate this to others. This makes it possible to deal with any resistance to change, which is only normal when employees' skills are eroded by changes or when people are expected to take on new and unfamiliar tasks. The consultants of the SCG Networks & IT-Structures also offer help in this respect.

To provide support with the digital transformation process, the SCG experts advise clients on topics such as change management, strategic diversity management, cultural change, conflict management, communication, and new working methods. Individual service packages are offered alongside teams that are specially tailored to each project to ensure they offer solutions that are the best possible fit with each challenge.

Partners of the SCG Networks & IT-Structures

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- Dr. Oliver Braun and Johannes Eckstein | Steinbeis Consulting Center NuCOS
- Dr. Holger Gast, Associate Professor | Steinbeis Consulting Center for Agile Development of Information Systems
- Ruben Maier | Steinbeis Research Center Simulation
- Birgit Nüchter | Steinbeis Consulting Center Leadership Competence
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Maximilian Werling is a project manager at Steinbeis Headquarters and looks at the topics of business competence evaluation, digital tools, the setting up and supervision of Steinbeis Enterprises, and the setting up and moderation of micro-networks in the Steinbeis Network, as s the case with the SCG Networks & IT-Structures.

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"Interpersonal factors should not be underestimated"

An interview with Dr. habil. Gernot Barth and Bernhard Böhm, directors of the Steinbeis Consulting Centers for Mediation of Business in Leipzig and Vienna

The intercompany transfer process usually revolves around the sharing of knowledge and technology. Dr. habil. Gernot Barth and Bernhard Böhm explain why communication and even emotions are also important in the process and how any conflicts that arise in the process can be resolved.

Hello Dr. Barth, hello Mr. Böhm. When you think about knowledge and technology transfer between companies, and business mediation, the two topics don't immediately seem to have much in common, but in what ways are they connected?

Barth: With knowledge and technology transfer, the channels of communication are often extremely complex. Of course the main priority is to share knowledge and information, but as it is often the case with processes like this, interpersonal aspects such as trust, fairness, communication, and appreciation are also important. Also, company cultures can be completely different. So one thing that can happen if there's no moderation with transfer projects is that there's conflict and things start to escalate. This is where business mediation can be helpful. This can be prophylactic, in parallel to the process, or when something actually blows up.

Böhm: I think you also have to think about what happens when there's "unwanted" knowledge-sharing, for example with a joint venture. Companies often become embroiled in lengthy legal processes, and this pushes their attempts to move closer to the actual goal – of working together on new innovations and markets – into the distant future. This is where it really makes sense to enter mediation because it helps find quick solutions for both parties. But whatever the circumstances, it's recommended that both parties bring in patent attorneys. That said, a business mediator can provide help and guidance with procedural aspects, and this helps identify more integrated approaches than if you get involved in confrontational negotiations in court or between legal departments.

Conflict has been around for as long as human beings have trodden this Earth. There's conflict in all areas of life with others, so it's also encountered in intercompany transfer. What's the best way to deal with conflict, and what are the particular challenges you face?

Böhm: The first step is to get everyone to agree to bring in help from outside and establish a level of trust with a mediator. Then of course it's important that the different parties involved in the process meet up personally and talk. I know this sounds trivial but the thing is that people involved in these kinds of processes communicate in different ways. In practice, this is usually the biggest challenge. The challenge is to articulate concerns, goals, and expectations in such a way that the "other side" understands them and can respect them, and this makes it possible to find a viable and lasting solution.

This then provides a basis for a functioning relationship, and with knowledge and technology transfer the idea is to just get a relationship up and running to solve the actual tasks. When the mediation meetings happen, all the different people might start talking about their expectations of the specific transfer process. What's important is that everyone who's involved in the process takes part in this. One particular challenge is getting the communication process to work beyond the hierarchies that are in place or beyond people's allegiances to the different companies. So it's perfectly normal for things to get quite tense in these situations – especially if the different companies around the table are actually competitors or have different cultures like universities, research bodies, corporations, and SMEs. What's important then is that on a

communication level, everything is kept as transparent and fair as possible. Another important tool of the trade for mediators is that they don't get pulled in by one side or the other, but remain impartial and neutral.

Barth: In the same way, fear and power games also play an important role in intercompany knowledge-sharing. From our experience, the fear of losing out on something or existential fears are not brought to the surface in business; if anything it's taboo to talk about them because it might come across as looking like you admit you have a weakness. A lack of recognition that something is your "own know-how" could also be important. The emotions are there, but they're under the surface, and they dictate how people behave. You often notice this in a line of argument that seems irrational, but they're based on a deep-seated motive that stems from people's emotions. These kinds of situations are a rich breeding ground for a spiraling escalation of conflict in which different scenarios can develop based on diverging opinions, and this hampers knowledge-sharing.

Of course there's also knowledge transfer within companies when, for example, somebody leaves the company or a team is reorganized. The question that then arises is which knowledge should be shared with whom. A decisive factor in such situations is implicit expertise and how this affects the successful continuation of a business. This is also where a mediator can stand alongside a team or individual workers to provide explanations or moderate.

Intercompany transfer brings together different people with a broad spectrum of specialist knowledge. To mediate between these people, do you sometimes need shared knowledge from other (Steinbeis) companies?

Barth: Of course, we spend quite a bit of time preparing for consulting projects. Our networks, experts, and specialists are really important to us in this. They come from different areas and we've spent the last ten years building up our network. Looking specifically at the Steinbeis Network, we'd actually like to exchange even more ideas in this area.

Böhm: It's generally an advantage if mediators have a good overview of the way things work in a certain sector of industry and they're prepared for any potential conflicts that could flare up. That said, we've also found that it can be helpful if the person doing the mediation can stand back and look at things from the outside in. The mediator is, so to say, unencumbered when it comes to sectors of industry, structures, or actual subject matter. Often the fact that the mediator has to keep asking questions brings up some unexpected ways of looking at things and different approaches for the people involved.

With advancing levels of digital transformation and the trend toward Industry 4.0, knowledge and technology transfer between companies is becoming more and more important to business. What impact will that have on your work as mediators and consultants?

Barth: The world of mediation also keeps coming back to the possibilities of so-called online mediation. We see the development of online tools for use in mediation as a positive thing. We were already looking at the technical feasibilities of online mediation five years ago as part of an EU project, and we've done some pioneering work in this area in Germany. Five years ago, one of the difficulties we encountered was the unreliable nature of broadband internet connections. There's been so much criticism about the slow rate at which the broadband network has expanded that even in Germany things are now much better in terms of technology. Of course, videoconferencing technology has also moved on and it doesn't use up so much capacity. This is a really important technology for business mediation. So using digital media will become more and more important in the future, especially for consulting projects, coaching, and mediation processes. We're really sure of this.

Böhm: Of course for a mediator, it's important to ensure that processes run smoothly and there are no interruptions when you're solving conflicts, which is a really sensitive time. This will need to be practiced and rehearsed. You also have to think the whole time about confidentiality issues. Even if a lot of communication and knowledge-sharing now takes place through the internet – for example with the support of wikis – you mustn't underestimate interpersonal factors. Conflicts that were originally triggered by emotions owe their existence to the nature of human beings, and this is also reflected in interpersonal communication.

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Steinbeis Consulting Group Personal: Network Competence, Collaborative Advisory Services

Intercompany transfer à la Steinbeis

Steinbeis Consulting Group (SCG) Personal is an alliance of experienced experts from different Steinbeis Enterprises that deals with the topics of organizational development, personnel development, and competence management, spanning a wide portfolio of services. Its approach is to pool existing competence and offer clients an individual, networked, and holistic range of consulting services in the field of personnel and HR management.

SCG Personal is thus the answer to changes in customer requirements resulting from the continual digital transformation process in the economy, businesses, and society in general – a trend that is also mirrored in business and strategy consulting. Consulting topics such as Work Environment 4.0, agile organizations, process innovations, demographic change, and the shortage of skilled workers require networked expertise, holistic solutions, and interdisciplinary project delivery – something that can be offered by SCG by bringing together different kinds of experts. Digital instruments and tools required for the consulting process are also becoming increasingly important. As a result, SCG Personal uses a selection of the very latest software instruments of business analysis and evaluation in order to offer clients consulting services that are in tune with modern business and address specific issues. The tools that are used are developed and updated in collaboration with universities and enterprises from the Steinbeis Network. This ensures they continuously match the very latest scientific research in pertinent fields of expertise and are kept up to date.

SCG thrives on the exchange of ideas, and for around a year there have been regular quarterly group meetings and continual coordination between the different partners in the group. This merges the knowledge of each partner into overall service competence, allowing each area of competence to develop into valuable, irreplaceable, and individual points of differentiation that are difficult to copy, especially for competitors such as other consultants outside the Steinbeis organization. People in business face a number of challenges and problems, especially when managers and the co-workers are overloaded by work. It's at times like this that the way forward is to optimize processes, innovate, and meet increasingly rapid changes face-on. To remain efficient and powerful as a commercial organization, timely changes can bring tremendous competitive advantage to a company. SCG Personal not only provides its customers with food for thought and tools that are tailored to business practice, it also provides firms with tangible support – from the development of solutions to effective implementation, and the long-term application of innovative organizational instruments. To do this, individual project teams are formed within the SCG, supplemented where necessary by other partners from the Steinbeis Network in order to guarantee access to comprehensive advisory services and implementation instruments.

Conversely, the increasing importance of digital skills in the age of Industry 4.0 means that the job profiles and qualification requirements of HR consultants are also changing. Aside from fulfilling a company's legal obligations, important goals include raising levels of digital competence in Work Environment 4.0, improving corresponding levels of performance and productivity, and enhancing people's ability to cope with work. Recent studies in the field of HR monitoring have looked at the return on investment of personnel costs. They show that companies with advanced talent management systems generate 18% higher profits than their competitors. They sometimes also have higher sales revenues, productivity levels, and return on equity. These key outcomes have a domino effect on collaborative group activities and the iterative development of shared tools and services.

The experts at SCG Personal provide access to a specific set of tools that help lighten the load of overworked SMEs as a part of Steinbeis advisory

services. Consulting is based on the current business model of the sharing economy, a term which describes a shift toward "using, not owning" and "sharing, not having." This approach saves companies money and provides much-appreciated relief for managers. For example, instead of paying annual license fees for job applicant and talent management software, companies have access to a demand-competence tool – a solution that is based on solving bottleneck problems. This successfully transfers theory into practice in keeping with Steinbeis principles. The Steinbeis experts also develop company-specific solutions in areas such as specialist staff retention, competence management, onboarding, demographic-compatible HR management, corporate succession, management training, business coaching, cultures of communication, conflict resolution, risk assessment in the field of psychological strain, change processes, and team-building. By drawing on evaluations, recommendations, and front-line support at the place of business, sustainable productivity enhancements are made, especially through making structural and organizational changes and expanding the competence of workers. The result is robust and efficient business development.

The current status of SCG Personal as a networking project is shaped by the initial stages of concept development. The group has successfully worked up a joint, collaborative, and networked portfolio of services in three areas: enhancing work flexibility, human resources empowerment, and required competence tool. These are now ready for the group to enter the market together for the first time. The consultants started by taking part in a speed dating event at the Steinbeis Consulting Day on June 27, 2018 (see pages 36/37). The idea was to work in parallel on a common acquisition strategy so that consultants could not only work on individual or bilateral projects, but also acquire and work on larger projects by involving several other members of SCG. Detailed discussion about their own and shared personnel services certainly provided the consultants with some important insights, and SCG members continue to invest in collaboration between the consulting centers. Sharing topics is constructive and in the long term, collaboration will add value.

Developing services together to address the areas of enhancing work flexibility and human resources empowerment, and developing and testing the required competence tool together, have already resulted in live implementation and delivered benefit. One example of a project involved change processes during the introduction of lean management at a traditional company. Another project involved the integration of a startup into corporate structures. Building on the individual personality and patterns of requirements of the people involved, managers undergoing a Human Resources Empowerment Program were enabled to engage in effective change communication to accompany change processes. This had become necessary for operational reasons, and it was important than no one left the company and all employees felt motivated enough to carry out the necessary changes within the time allocated to the task. Given the shortage of skilled works, "staying on board" aspects are particularly important for top performers involved in change processes.

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Dr. Regina Brauchler is the director of the Steinbeis Consulting Center Demographics-based HR Management, which offers clients strategies for retaining skilled workers, competence evaluations for assessing HR development requirements, aptitude testing (including requirement and capability comparisons for optimizing personnel deployment), profiling, and talent management in personnel recruiting.

Günther Luber is a project manager at the Steinbeis Consulting Center Safeguarding Companies. The services offered by the Steinbeis Enterprise comprise stock-taking exercises with the aim of safeguarding the long-term viability of companies for the sake of employees, enterprises, and organizations, one-on-one coaching for business leaders, managers, and workers, and the Steinbeis Enterprise Competence Check.

Dr. Michael Ortiz gained a PhD at the University of Mannheim in the field of comparative innovation systems research. Since 2013, Ortiz has been a project manager based at Steinbeis headquarters in Stuttgart, working in business and strategy consulting, transfer management, business competence analysis, the setting up and supervision of Steinbeis Enterprises, digital transformation, and a variety of studies and evaluations.

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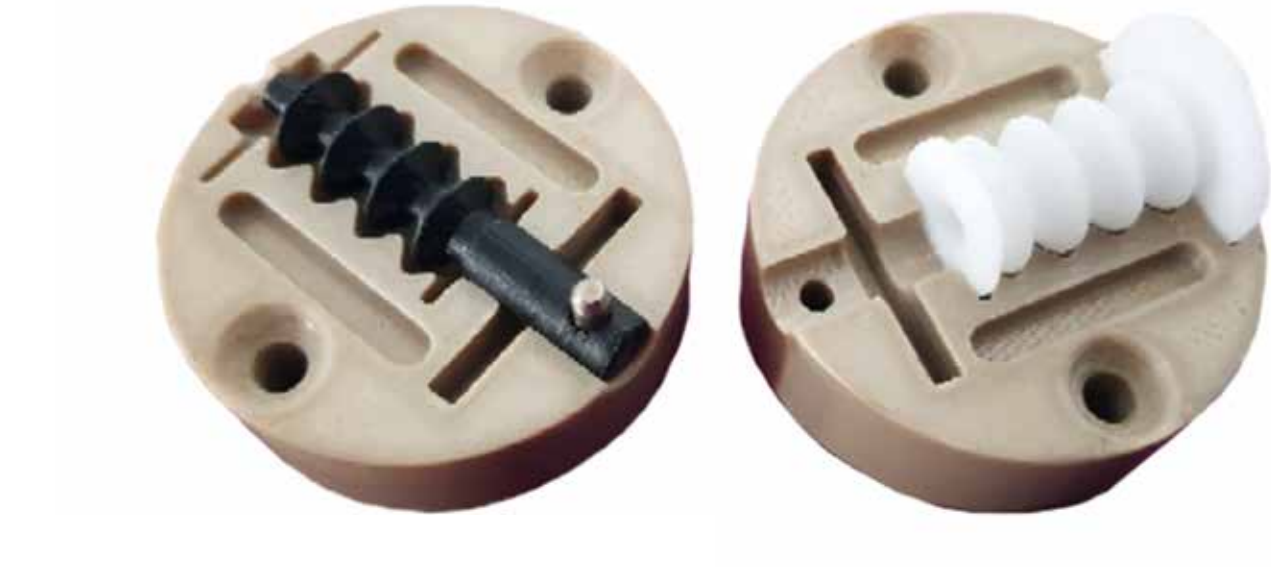

Applied Know-how in Additive Manufacturing

3D printing technologies require all-round support and broad-based knowledge

Although 3D printing has been becoming more and more important as an element of additive manufacturing in recent years, there are still a number of knowledge gaps regarding how best to deal with the technology and where and when to use it. A partnership project between the Steinbeis Consulting Center IMPAS (Institute for Material Applications & 3D Printing Solutions), and Apium Additive Technologies at the Steinbeis House in Karlsruhe has demonstrated how to plug such knowledge gaps thanks to intercompany transfer.

3D printing has developed from rudimentary uses in the home, such as producing simple models and key fobs, to a technology to be reckoned with, offering all the potential to disrupt industries. Until now, seven different possibilities and technologies have been identified for objects to be printed using additive manufacturing. In technical terms, additive manufacturing involves adding material to a blank surface and gradually building up a component. This compares to conventional subtractive techniques such as milling, which first requires a semi-finished part in order to remove material until the required object has been produced. This already highlights the benefits of 3D printing technology and additive manufacturing: it saves time and costs, because material is basically only used if it ends up in the component.

All 3D printing technologies require different types of tools that come together in the 3D printing device. The main differences between 3D printers lie in tolerances, precision, and material compatibility. People new to the world of 3D printing therefore face a whole host of possible options and different decisions that need to be made. What will the right technology or tool be? For someone new to 3D printing, certain things are not easy to work out without the right support. With so many different options out there, a variety of factors influence the right choice. One fairly straightforward approach is to start by identifying what the 3D-printed object will be needed for in the first place and which area of additive manufacturing you are dealing with. To do this, it makes sense to take a close look at the sector of industry – automotive, aerospace, electronics, medicine, oil and gas, or perhaps simply research and development. This makes it possible to whittle options down depending on the overall circumstances of the respective industry. There may be certain conditions dictating which materials may or may not be used, especially in areas where safety is important or in medical fields. Sometimes there are requirements regarding precision, tolerances, and mechanical features.

As a result, one of the best ways forward is to look at the specific application, because in such instances the overriding conditions are typically a given. That said, it should not be forgotten that 3D printing is subject to different requirements relating to component design compared to areas such as CNC milling or injection molding. This should not be a discouragement to people, however. If you're a beginner in 3D printing, it is at this point that it's helpful to bring on board experts experienced in the field of additive manufacturing. They will have an overview of the sometimes cluttered market. This is why the Steinbeis Consulting Center IMAPS has set itself the goal of offering customers comprehensive advice on additive manufacturing and 3D printing technology. Its services range from support with concrete projects to identifying applications, basic training, customized courses, implementation services, the optimization of 3D printing tools, and integrating tools into workflows. The Steinbeis Enterprise is based in the technology zone in Karlsruhe and it works on solutions for its clients with a variety of experts from industry and research. Its services make it easier for new entrants to the world of 3D printing to gain a foothold; for advanced users, they offer an opportunity to achieve optimum performance.

IMAPS was originally set up as a consulting unit under Apium Additive Technologies, a pioneer in 3D printing using high-performance polymers such as polyether ether ketone (PEEK). From the beginning, it became clear that comprehensive advisory services were needed for all kinds of technology and as a result, the services offered by the

Steinbeis Enterprise continued to expand. Apium is still a strong partner to IMAPS, primarily because know-how transfer also plays an essential part in its work. One particular example of successful knowledge and technology transfer between the two enterprises comes from a case study – a 3D printing consulting project involving mold inserts. The aim of the project was to optimize the time and cost of producing mold inserts with the support of Apium technology. This is a crucial issue in the field of injection molding, which is driven by cost and price factors.

The results of the project showed that Apium's P Series and the Apium P220, a high-performance 3D polymer printer used in additive melting layer processes, made it possible to process polymers like PEEK or composite materials reinforced with materials such as carbon fiber. Using 3D printing and Apium's P220 device with carbon fiber-reinforced PEEK (Apium CFR PEEK) allowed the cost of injection molding inserts to be reduced by 70%. The time required for the process was also reduced by one third compared to the time needed for conventional production.

CONVENTIONAL MOLD MAKING	COST IN BULGARIA	COST IN CENTRAL EUROPE (ESTIMATED)	TIME INVESTMENT
Prepare inserts	90 €	200 €	1 day
Mill electrodes	330 €	660 €	1 day
Mill contours	1,100 €	1,600 €	2 days
Write CAM program	120 €	480 €	1 day
Erode deep cracks	120 €	280 €	1 day
TOTAL COST	**1.760 €**	**3.220 €**	**–**
TOTAL TIME INVESTMENT	**–**	**–**	**6 DAYS**

APIUM P-SERIES – FFF 3D PRINTING OF INJECTION MOLD	COST IN BULGARIA	COST IN CENTRAL EUROPE (ESTIMATED)	TIME INVESTMENT
Prepare 3D model	120 €	250 €	0.5 days
Print (material, personnel, and depreciation costs)	77 €	77 €	1 day
Post-process finishing	40 €	120 €	0.3 days
TOTAL COST	**237 €**	**447 €**	**–**
TOTAL TIME INVESTMENT	**–**	**–**	**2 DAYS**

This optimization was made possible by the success of knowledge-sharing, a reflection of how important it is to gain access to new knowledge in an increasingly technology-driven world. 3D printing and additive manufacturing open the door to a variety of new applications, many of which have still to be identified. The Steinbeis Consulting Center IMAPS supports customers involved in this new area of technology by providing access to partners in industry and research.

Image left: 3D-printed CFR PEEK injection mold **Image right:** Result of the case study

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Pinar Karakas, Tobias Grub und Philipp Renner work at Apium Additive Technologies GmbH. The company provides its customers with products and solutions for processing high-performance polymers using a 3D printing technique called fused filament fabrication.

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SMEs on a Path to New Realms of Digital Technology

From IIC testing to the Micro Testbed

Digital transformation and the 4.0 phenomenon are a reflection of a whole host of changes, the impacts of which are still not understood, and as a result they are still largely new territory for our economy. To enjoy the fruits of success in the future it is essential for companies to join digital expedition teams and tackle the unknown. What this could entail on a practical level is being observed in international markets by the Industrial Internet Consortium (IIC). Companies belonging to the IIC hail from a variety of industries and they are experimenting with so-called testbeds, the aim of which is to add value in new ways across different sectors of industry. The Ferdinand-Steinbeis-Institute (FSTI), which belongs to the Steinbeis Foundation, has now transferred the testbed approach to small and medium-sized business and the manual trades and launched Micro Testbeds.

Asking somebody who knows what they are talking about is usually a useful way to solve a problem, a tried and trusted approach that has helped solve many a challenging problem in the past. But what do you advise somebody to do if that "somebody who knows" doesn't exist (yet)? For scientists and researchers, this is actually a nice starting position because they see this as a chance to discover something new and become that "somebody who knows" themselves. But what about companies? Perhaps it's still a challenge – an opportunity to enter new territory and exploit (still) unknown business potential (albeit associated with the risk of failure).

This is the situation with digital transformation and the "4.0" (smart or connected) phenomenon. It's new territory. There's no one to ask how to deal with the fact that open standards make it possible to control objects and processes anywhere, such that we can control things in other places, and others can control things where we are. There's no one to ask in what ways value creation will change if real processes are shaped in the virtual world. We can't find anyone who knows which values, benchmarks, methods, technologies, etc. will need to be taken into account when (re)planning our economy or businesses. Knowing that digital transformation is not something that simply happens, but something we can shape ourselves, is not just an opportunity but also a challenge. This is new territory and people are exploring it on all fronts and "conquering" it through experimentation – from individuals to large expedition teams. One such digital expedition team is the Industrial Internet Consortium, or IIC. The IIC was set up by AT&T, Cisco, General Electric, IBM, and Intel in 2014 and currently encompasses some 260 members from more than 30 countries. The IIC operates as an open consortium run by its own members. Its goal is to act as a pioneer in shaping internet-based networks within the context of multi-industry value creation using open standards. This involves exploring interdisciplinary and cross-sector value creation (in business) and different forms of technology. To this end, IIC members collaborate by experimenting with application scenarios capable of delivering benefit, mainly by connecting the physical world with the digital world. In doing so, they also take overarching issues such as security and trust into account. The term that became established for describing this approach of exploring new territory was testbed. Depending on the circumstances, a testbed consists of between five and ten companies working in partnership across a number of sectors of industry. Together, they investigate overlapping value creation scenarios within an actual business environment, and this may involve experimentation and adopting approaches that have never been used before. Around 30 testbeds have been set up, some of which have now been completed and some of which are still ongoing. They span a variety of topics to examine different scenarios in the energy industry, healthcare, the public sector, manufacturing, and transportation.

As the nominated host of the IIC German Regional Team, the Ferdinand-Steinbeis-Institute has been supervising testbed projects from the outset, pulling together key insights gained through the members' different experiences.

- In the new world of digital technology, value creation shifts from value chains into cross-sector value creation networks (cross-domain ecosystems).
- In the future this will mean that there will be more competition between value creation systems and less between firms.
- As a result, a key success factor in the new world of digital technology will be a culture of open, interdisciplinary collaboration in an environment based on trust.
- Using open source technology and open standards lowers the barriers to entry in the world of digital technology and reduces investment risk.
- It makes extremely good sense to shape the new world of digital technology by learning together and adopting an experimental approach.
- Pioneering work involving testbeds regularly results in new and unanticipated business cases for all companies involved.
- The digital territory entered into as part of a digital testbed offers major potential to add value, especially for SMEs and very small companies (e.g. in the manual trades).

As a result of the many things that have been learned, the FSTI is using its role as the IIC German Regional Team to adapt the testbed approach to the needs of SMEs and establish regional representation in German-speaking countries. This has resulted in the introduction of so-called Micro Testbeds operating under the auspices of the Steinbeis organization. The main emphasis of the Micro Testbeds lies in implementing small application scenarios with "unusual" partners. To this end, an "environment of trust" is being established with companies from different sectors of industry for firms to work together in partnership. By tapping into existing technology, working on this together on an interdisciplinary level, and merging the capabilities of different business partners, novel and often unforeseen – but highly useful – solutions are being developed in completely new areas of digital technology. Over the past two years, the FSTI has initiated and run 15 Micro Testbeds along these lines. From a research point of view, the experiences derived from the IIC testbeds were largely confirmed and in some areas, new insights were gained relating specifically to SMEs.

On the basis of these experiences, the FSTI was also able to develop an initial toolset for shaping the new world of digital technology with SMEs. These tools revolve around a methodical approach based on business capabilities. The approach is based on the assumption that SMEs can only enter new digital territory by merging business capabilities from different sectors of industry. The Micro Testbeds provide a framework not only for pooling the business capabilities of different partners, but also for developing and implementing new application scenarios. Business capabilities provide a backbone, forming a link between business factors and technology factors. They also provide a picture of different approaches and activities in abstract terms. This picture makes it possible for business capabilities to help companies define their positioning in the new realm of digital technology and differentiate themselves. What's important when this happens is that all parties involved in the process derive benefit from the testbed.

From a practical standpoint, the Micro Testbeds that have been organized until now have shown that the companies that participate in this process are provided with a stepping-stone to enter new digital territory, learn new things, and develop new potential to add value. One example of this was a Micro Testbed called Production Performance Management Protocol (PPMP). This involved the SMEs Rampf, Sick, and Balluff plus the Bosch group. Together, they embarked on an expedition into new digital territory. Within a year, cooperation was close and trusted, making it possible to identify a number of promising application scenarios, and the consortium conducted experiments on an actual machine bed. Project implementation was rapid and pragmatic, primarily because the companies used the open source protocol PPMP. Working together along these lines made it possible for all of the companies to gain new insights into the new field of digital technology, for the first time "cultivating new land" and as a result, gaining tangible benefit in ways they had not anticipated.

Image: Professor Dr. habil. Heiner Lasi and Dr. Marlene Gottwald, Steinbeis Engineering Day 2017

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Micro Testbeds – Research and Application in New Ecosystems

The one crucial factor is trust

Digital solutions are everywhere now, bringing about fundamental change not only in value creation processes but also in entire business ecosystems. This is resulting in the emergence of new business models, a challenge that only few companies know how to deal with. The Ferdinand-Steinbeis-Institute (FSTI) saw this problem coming and now offers companies a "forum of knowledge and trust" – a protected place where business models can be thought up and tried out.

One indication that digital solutions are now central to everyday life is that the trash can for recycling cardboard boxes is full again. It's a subtle thing, but a reflection of a dramatic change in consumer behavior. Ecommerce is currently growing at over 20% year on year – in stark contrast to plunging sales in bricks-and-mortar stores. It would be simplifying things to assume that substitution has been like for like. Ecommerce companies are not just wholesalers, which typically stock a wide range of items (from books to food). They are also involved in shipping, transportation, banking, big data analysis, and a lot of other fields of business. Of course digital solutions are not just found in (online) trade, but there is a good example that highlights an important feature of digital transformation: Value chains are changing and entire business ecosystems are now entering into competition with one another, involving a large number of different business capabilities. It's difficult to respond to the changes that are going on in the same way businesses used to react. Very few companies in the current business environment are in a position to rethink an entire ecosystem and reorganize it by themselves.

Digital transformation is not actually a technological challenge; it's an extreme change affecting our entire social and economic environment. In business, this will have an impact on organizations, how companies are managed, entire business processes, and the underlying process of value creation. Sweeping changes in value creation structures pose a fundamental challenge to previous organizational and management structures and as a result, this spells a loss of control on all kinds of levels. The Ferdinand- Steinbeis-Institute has been working on a variety of domestic and international projects that put it in a position to recognize the typical patterns of digital transformation and express this in abstract form. Building on this makes it possible to develop and subsequently introduce methods that allow knowledge regarding digital transformation to be shared with others, including SMEs where Micro Testbeds can be introduced. To set the ball rolling, consortia are regularly formed consisting of different types of companies, reflecting all business capabilities that would potentially be required within an ecosystem. Because Steinbeis is a neutral partner in this process, it is possible to identify medium-sized companies with complementary capabilities and get them to work together in a "safe area" based on mutual trust.

Working within the context of a Micro Testbed is always a decision of an entrepreneurial nature, and it also calls for trust in the abilities of Steinbeis – that means trust in the scientific and methodical know-how of Steinbeis and its ability to identify the right companies to be part of an ecosystem and motivate them to join in. Usually, neither the problem nor the solution are actually known when a Micro Testbed is being set up, so one challenge companies face is that they have to agree to take part in a project even though it's still not possible to say in tangible terms what financial benefit there will be for the individual companies involved. There's no point in going through the standard ritual of calculating economic viability or doing a cost-benefit analysis. Despite this, the potential pressure coming from the (digital) market to make a change and,

perhaps more importantly, the reputation of the FSTI, do lower the hurdles for companies to take part in a Micro Testbed.

Thinking in terms of ecosystems is not a new-fangled idea that has stemmed from digital transformation, but for companies it's not a central element of traditional practice either. Even major German companies find it difficult to set up teams that go beyond just thinking about the relationship between customers and suppliers, because there's no obvious neutral authority in this area. This is why the Ferdinand-Steinbeis-Institute has established the ideal vehicle in its unique "forum of knowledge and trust." It may sound trivial that a solution in one ecosystem is fundamentally different to a solution in an ecosystem developed through bilateral collaboration, because the overall know-how regarding a process or market cannot be pooled. Even if it is initially difficult for entrepreneurs to understand the potential benefits of a certain system, and even if they have to share a system with other companies because Steinbeis is involved as a moderator, it is actually possible to add value for everyone concerned.

Digital transformation is not restricted to an individual sector of industry or a certain manufacturing method. It is about adding capabilities to an ecosystem in order to enjoy the spoils of success in that ecosystem. One of the most important questions faced with all Micro Testbeds is which business capabilities mark out the individual companies involved in the process and how these can be used as part of a new business model. To demonstrate this, typical patterns and mechanisms are provided to show how the process works in other sectors of industry or application areas. The experience and the knowledge gained from the Industrial Internet Consortium (IIC) and other Micro Testbeds provide a good basis for this. Recognizing typical patterns and applying them within a different context is one of the important areas of support the project team gives with the transfer process. The task involves ensuring all parties and their business capabilities are integrated into processes in such a way that they develop one or several application scenarios, thus delivering benefit for all members and the system itself. One or some of these use cases are then tested by companies involved in a real business environment (brownfield). Only then do the companies move on from the business model for the ecosystem, entering the proof of concept phase by using different technologies. The aim now is to check the assumptions that were made when drafting the business model.

Experience with more than 15 Micro Testbed projects, which have spanned a variety of sectors of industry (the retail trade, manual trades, service provision, machine and plant construction, hotels and gastronomy, manufacturing, wholesaling, the automotive sector), clearly shows that small and medium-sized enterprises can learn to understand the facts about digital transformation and methods and apply these methods. They also learn how to re-examine their own business capabilities in the context of digital technology and adjust accordingly. Companies quickly learn that not all of the skills they will need to create an ecosystem can come from their own resources and that solutions that can be developed in an ecosystem go a lot further than the things that would be possible in their own company. There are knowledge gains in many areas, from how to pull together a testbed to identifying use cases and checking feasibilities. Also, companies get to try out new cultural skills. Modeling a new ecosystem, carefully checking assumptions, and understanding one's own capabilities provide a good foundation for finding a successful position for the company in the face of competition in the ecosystems of tomorrow.

Micro Testbeds are like a research and transfer lab in one. They deliver benefit for science and academia on the one hand, and the world of business on the other. In its role as a scientific advisor, a developer of the ecosystem, and a neutral moderator of its Forum of Trust, the Ferdinand-Steinbeis-Institute has worked its way into a unique position as a research and transfer institute in German-speaking countries.

Image: The output of a discussion on the application scenarios of a Micro Testbed

Michael Köhnlein

Peter Wittmann

Michael Köhnlein is director of the Steinbeis Digital Business Consortium, where Peter Wittmann is a project manager. The Steinbeis Enterprise supports its customers with the initiation and coordination of consortia aimed at developing and implementing digital technology strategies in trade and industry, the manual trades, and the service sector. It also offers analysis of value creation processes, the development of business models, and the organization of alliances in small and medium-sized businesses for dealing with digital transformation (Micro Testbeds). Its experts provide scientific support through the Ferdinand-Steinbeis-Institute, with Michael Köhnlein and Peter Wittmann acting as project managers with a focus on Micro Testbeds.

Simon Hiller is a research assistant at the Ferdinand-Steinbeis-Institute. His research revolves around the field of industrial internet and Industry 4.0, with an emphasis on additive manufacturing.

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"Everyone involved derives benefit from collaboration"

Micro Testbed participants describe their experiences

The Micro Testbeds organized by the Ferdinand-Steinbeis-Institute (FSTI) allow companies to introduce and test solutions to the specific problems they face, working in partnership with other organizations in actual application scenarios. By working together on a multi-sector basis using web-based ecosystems, it is possible to add value in new ways within an ecosystem. People who have actually taken part in an individual Micro Testbed describe how this actually works in practice and how the participating organizations benefit from the process.

Markus Glaser-Gallion

CEO Leadec Group
Lead partner, Industrial Services Micro Testbed

"We define our playing field for the testbed, understand the rules, and acknowledge that we will depend on one another in the ecosystem of future factories. Tasks and information are shared and the different roles are defined. As a manufacturer-independent service provider with production experience, we see this as an opportunity for Leadec to play a pivotal, lynchpin role in this ecosystem."

Florian Hermle

Managing Director, Balluff GmbH
Partner in the Production Performance Management Protocol (PPMP) Micro Testbed

"Our positive experience with the PPMP testbed acted as confirmation that digitalizing production within an ecosystem consisting of equal partners can be pursued in a way that matches targets and the practicalities of business. This is a way to add genuine value for everyone involved."

Dirk Slama

Vice President of Business Development, Bosch Software Innovations GmbH
Partner in the PPMP Micro Testbed and Industrial Services Micro Testbed

"Open source and lightweight protocols are important enablers in setting up cross-domain ecosystems in small steps. Such ecosystems make it possible for SMEs and big companies to interact with one another and add even more value. The Micro Testbed showed that everyone who's involved derives benefit from collaboration."

Prof. Dr. Herbert Kohler

Vice president of group research and sustainability, chief environmental officer at Daimler AG until 2015, expert member of the Industrial Services Micro Testbed

"Everyone is talking about Digitalization 4.0 and it can be considered the biggest challenge for industry worldwide, but it's also an opportunity to 'reinvent oneself' and become even more successful in the market. The only question is, what sort of tools do SMEs need to make things happen and in particular, what are the right methods and processes to move things forward and make a success out of this as quickly as possible. One highly efficient and, as it turns out, extremely practical option is to use the Micro Testbeds offered by the Ferdinand-Steinbeis-Institute. The implementation process is planned over the course of several workshops involving stakeholders from industry, SMEs, big companies, and technical experts, drawing on the scientific background of Steinbeis University and its experience with international projects. What makes this formula a success is that all participants benefit from implementation and they can become actively involved in the process. The aim is to achieve implementation as described, at least for the pilot project. As initial experience has shown, one decisive factor is selection of the right stakeholders. If you're clever about selecting the right people and they're a good fit on a personal level, you can find the win-win situation you wanted for everyone involved and this paves the way for successful implementation."

Prof. Dr. habil. Heiner Lasi

Director of the Ferdinand-Steinbeis-Institute

"From a scientific standpoint, applying Micro Testbeds to a practical setting confirmed that digitalization shifts value creation into open ecosystems – so consequently, key success factors in planning digital transformation are thinking (and acting) in terms of 'open ecosystems'."

Thomas Bürkle

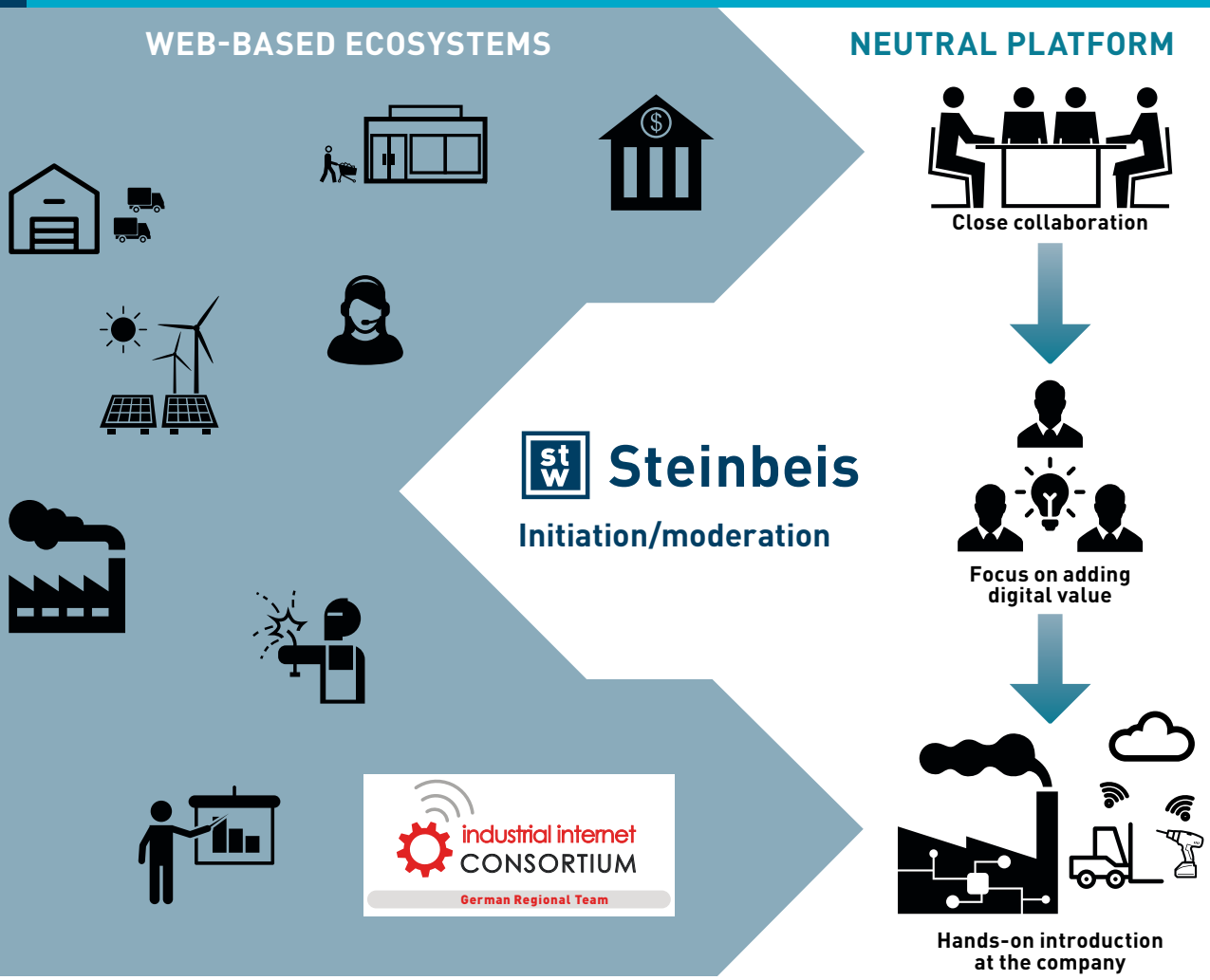
Managing Shareholder, Bürkle + Schöck KG, President of the Baden-Wuerttemberg Technical Association for Electrical Engineering and Information Technology and Vice President of the Baden-Wuerttemberg Crafts Congress
Partner in the Planning, Construction and Operating with Building Information Modeling (BIM) Micro Testbed and the Manual Trade Micro Testbed

"The BIM testbed allows stakeholders involved in construction to experiment freely and discover how BIM works together. We talk to each other about interfaces that are better networked between different parties involved in the process and advantages to planning, processing, and after sales procedures. This is all the more important given dwindling numbers of manual workers and the fact that processes need to be improved."

Bernhard Müller

Management board member for Industry 4.0 at SICK AG, partner in the PPMP Micro Testbed

"Open exchange within the 'Forum of Trust' offered by the Micro Testbed made it possible for us to work up application scenarios with the partner companies on a business level, and that allowed us to identify new business potential and application areas."



The Digital Transformation Process at SMEs

Practical examples from retailing, the manual trades, service providers, and tooling and mold-making

Digitalization is leading to a variety of changes in industrial processes, resulting in new kinds of service. This is also bringing about changes in industrial value creation that extend far beyond the actual production process. Small and medium-sized businesses are particularly likely to be highly specialized and as a result, they may have limited resources – meaning they will have to redefine their role in the changing value chain. This is where a Micro Testbed initiative comes in. The project is being organized by the Ferdinand-Steinbeis-Institute and the Steinbeis Digital Business Consortium with support from the Baden-Wuerttemberg Ministry for the Economy, Employment, and Housing.

In an era of digital technology, SMEs will have to learn how to organize interdisciplinary projects involving several companies without losing their independence. Many SMEs in retailing, the manual trades, and service provision have regularly attended talks and roadshow events to find out more about digital solutions, and they still do. But many firms still struggle when it comes to actually implementing what they have learned within their own business or entering into collaboration with other companies. The problem is, until now there has not been much support for them. This has been recognized by the Ferdinand-Steinbeis-Institute (FSTI) and the Steinbeis Digital Business Consortium, who have now prepared themselves to help SMEs thanks to the Micro Testbed program.

A feature of Micro Testbeds is that between three and five SMEs work together in partnership on a cross-sector basis in a "Forum of Trust" under the supervision of a neutral moderator. Together, they experiment with different value creation scenarios in a real business setting. The aim is to learn about pragmatic implementation options as quickly as possible, explore the benefit they would deliver for all parties, implement ideas, and learn about them together. A Micro Testbed can be expected to produce first results after six to twelve months. This approach allows for interdisciplinary collaboration, and using existing technology makes it possible for new products and services in the field of digital solutions and networks to be developed. A further aim with this approach is to add value that transcends different areas as part of a networked ecosystem. This should make it possible to build sustainable ecosystems for SMEs and companies in the manual trades.

Every micro testbed has at least one moderator, whose job is to facilitate discussion (by asking the participants questions) and moderate teams as they come up with possible solutions. One or two of the moderators may be experts from the industry or a scientist. The moderators raise issues, show possible ways forward based on other sectors of industry, point to different technologies that are already in use, etc. The scientific supervisors at the Ferdinand-Steinbeis-Institute work as observers and analyze people's actions in the group and the flow of conversation in order to develop instructions for key actions that need to be taken.

In the first round of the Micro Testbed project initially sponsored by the Baden-Wuerttemberg Ministry of Economic Affairs, Labour, and Housing, four sectors of industry were looked at: retailing, the manual trades, services, and tooling and mold-making. The main emphasis in each individual sector of industry lay in the blend of micro testbed members and choosing the issues to be looked at together. This was based on issues companies currently face with digital solutions.

The Retailing Micro Testbed worked up a virtual shop, which is connected up to all supplier shops, a bit like an "extended shop shelf." The aim was to try out whether goods in stock could be delivered together to different shops through some sort of digital process. This would allow individual retailers to access goods not currently available in their outlets, so it would enable retailers to fulfill customer wishes at short notice even before goods are ordered online.

The Services Micro Testbed produced a simplified track-and-trace solution for clocking in, monitoring work, and documentation. The aim was to make the various processes of the companies involved in the Micro Testbed (cleaning, janitor services, catering, repair services) transparent and understandable for customers by using simple digital tools. The companies involved in the Micro Testbed came from a variety of fields, but they soon realized that they all face the same issues and there are already some simple digital solutions to their problems, which just needed integrating into their processes.

With the Manual Trade Micro Testbed, work initially concentrated on building information modeling (BIM). The testbed members ascertained that collaboration at different stages of the value chain – between architects, planners, and manual craftsmen – was still not working properly. The main obstacles were identified as the interfaces, integrated processes, a uniform way of talking about things, etc. Another area looked at was data glasses for monitoring and quality control purposes in different types of manual crafts.

The Tooling and Mold-making Micro Testbed looked at the topic of additive manufacturing and examined associated changes in processes and the value creation it entails, also drawing on a specific example. What's the best way to produce spare parts based on existing drawings in a batch size of one? For instance, how could an old door handle, for which there is no longer any documentation, be manufactured using additive methods so that it is exactly like the original? The team looked at all of the required techniques and processes, which were then applied to a series of specific tasks.

All of the four projects showed that the approach being used by the Ferdinand-Steinbeis-Institute – of using Micro Testbeds to show firms the challenges faced with digital solutions and working with the companies to come up with actual solutions – is worth every effort. Many of the firms working on the projects saw for the first time how to think in terms of business capabilities and ecosystems. They also gained insights into how solutions can be developed in partnership with other medium-sized companies. The aim of the FSTI in observing the Micro Testbeds from a scientific standpoint was to gain insights into value creation in business networks. The first phase of the projects allowed the experts to understand the challenges faced by companies and the challenges faced when running projects. The findings will now be assessed and used to optimize the Micro Testbed method.

The results produced by the projects have motivated the Baden-Wuerttemberg Ministry of Economic Affairs, Labour, and Housing to initiate further projects as part of its digital solutions program. Potential areas of improvement in modeling business capabilities or experimenting with proofs of concept are currently being transferred to eight live Micro Testbed projects, all of which last from 2017 to 2019. To do this, further areas have been identified for showing more SMEs the new business potential offered by digital transformation and networking. In addition, one aim is to develop methods that can work independently of different fields and enable these to be applied to a spectrum of areas.

Image: Setup of a Micro Testbed

Daniel Burkhardt

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Daniel Burkhardt has been a scientific assistant at the Ferdinand-Steinbeis-Institute, a research institution for digital solutions and networking at the Steinbeis Foundation, since June 2017. The focus of his work lies in project implementation and research in the field of distributed ledger (blockchain and the industrial internet of things). His current projects revolve around business model innovation and delivery, IT service architecture, business processes, and emerging technologies.

Peter Wittmann has been a project manager at the Ferdinand-Steinbeis-Institute (FSTI), which belongs to the Steinbeis Foundation, since January 2016 and since December 2017 he has worked as a project manager for the Steinbeis Digital Business Consortium. An engineering and computer science graduate by background, Wittmann has worked as a board chairman assistant and then as an independent consultant for more than 30 years, primarily in the field of technology and innovation management at Steinbeis GmbH & Co. KG für Technologietransfer. He also has a wealth of experience in the field of technology-driven change processes within companies.

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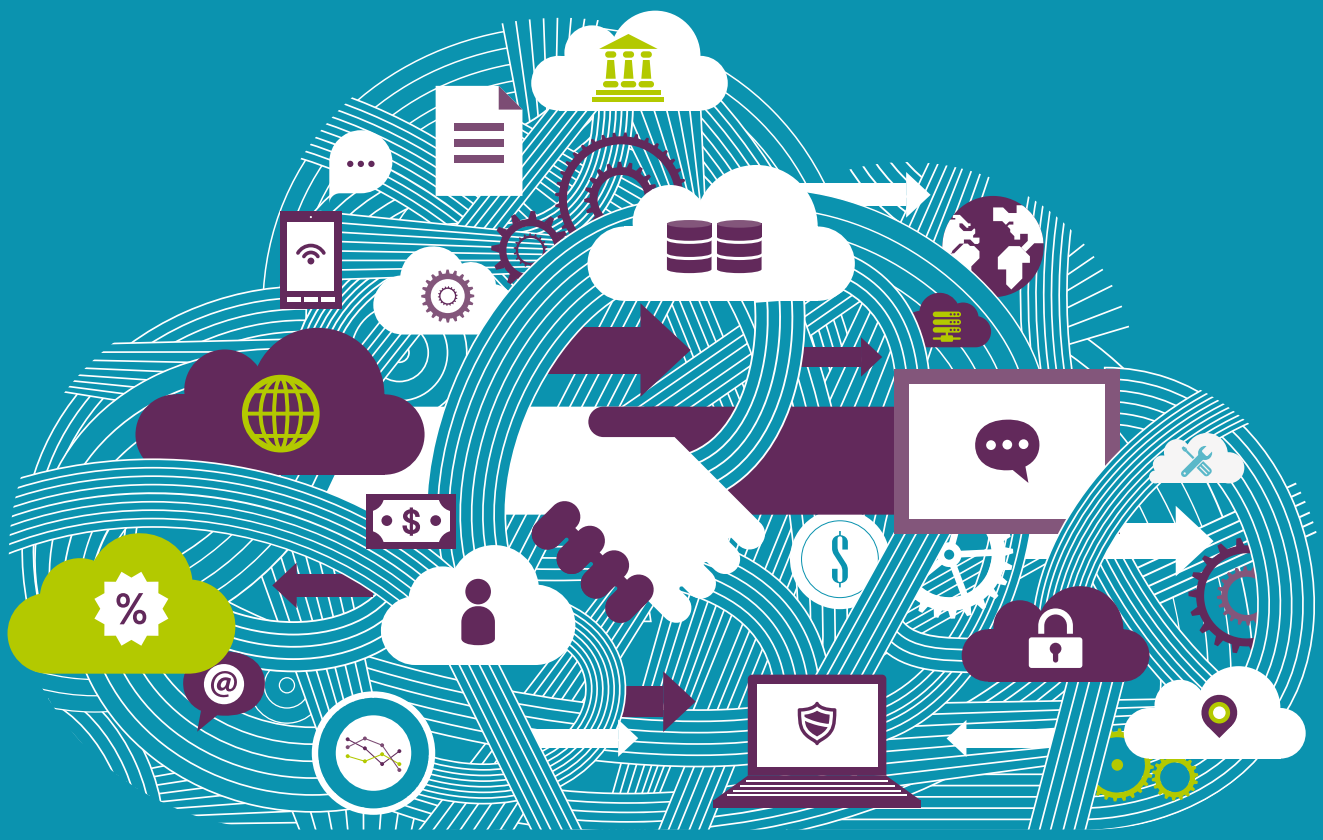

Three Success Factors Affecting the Introduction of Micro Testbeds

Selecting the right participants – trust – organization

What are the most important factors when it comes to the success of a Micro Testbed? How important is it to have a network for administration and organization purposes? And what is the best way to recognize potential areas of conflict in collaborative networks and deal with them? Experts at the Ferdinand-Steinbeis-Institute (FSTI) examined these questions in order to ensure that Micro Testbeds initiated by the FSI are a success in the long term.

Three factors were identified at the Ferdinand-Steinbeis-Institute after reviewing the first round of Micro Testbeds. These are considered crucial for getting collaborative projects off to a good start, especially in the field of digital transformation. First, participants should be carefully selected, focusing on compatibility and complementarity. Second, a "Forum of Trust" has to be established. Third, a Network Administrative Organization (NAO) has to be planned and set up, in this case represented by the FSTI and the Steinbeis Digital Business Consortium (SDBC). These insights were based on interviews with the initiators and moderators of the eleven Micro Testbeds and the Expert Network X.0.

It is important when selecting participants that close attention is paid to the complementary nature of business capabilities and that scrutiny is given to the culture of companies and the personalities of individual participants. These are things that are already known when bringing stakeholders on board from your own network, but when people are going to be brought in through "cold acquisition," establishing compatibility will require several rounds of discussion. Nonetheless, it is important that all potential candidates show a strong interest in being part of a partnership during exploratory discussions. The biggest drains on resources for potential participants are time and effort, so there are certain advantages if partners are located near each other. A collaborative project will also suffer if partners have extremely full order books when participating in a Micro Testbed. As a result, stakeholders will be asked to make certain things a priority during exploratory discussions so that first meetings can take place quickly.

The FSTI and the SDBC act as the initiating NAO and provide participants with a safe place – a Forum of Trust – to engage in successful collaboration. An important component of this Forum of Trust is a mutual sense of goodwill, in that all parties actually want to be fair to one another and enjoy comparable benefits. Of course this also means they have to know they can rely on each other to prioritize the project and agree schedules.

Trust stems from the professional reputation of each of the stakeholders, who should also input with their business capabilities to solve the collective challenge. Further important ingredients are honesty and openness. This relates first and foremost to each stakeholder's goals in terms of the things they want to gain from a Micro Testbed. Knowing this makes it possible to recognize and deal with potential areas of conflict. To establish trust, it is key that everyone understands that all stakeholders are of equal importance. This creates a sense that everyone involved in the project is indispensable, something that is particularly important for SMEs entering into partnerships with big companies. A willingness to adhere to reciprocal codes of conduct also helps companies establish the right balance in terms of autonomy and synergies. Stakeholders stay in control of their own core business but at the same time they benefit from the resources offered by project partners, assuming they also make their own resources available.

Experience with the first rounds of the Micro Testbed showed that by initiating and moderating the process and acting as the NAO, Steinbeis played a crucial role in the success of projects. On the one hand, it is difficult for stakeholders to decide or organize who should carry out or share administrative tasks when a Micro Testbed gets underway. This includes coordinating schedules, planning meetings, defining a framework for work, but also drafting an agreed agenda and setting priorities that make sense for all parties. Again, it was found that allowing the NAO to select and apply suitable moderation techniques and tools in a way that matches the specific context of each project was a crucial element of success during the initiation phases of the Micro Testbeds that have taken place until now. It is also important to establish a starting point and a framework for stakeholders to come up with ideas and define common goals together. Experience with managing networks makes it possible for Steinbeis as the NAO to adapt ideas precisely to the requirements and resources of stakeholders in the process, who are often highly heterogeneous. It frequently proves to be highly advantageous that Steinbeis already has a reputation for establishing a Forum of Trust for companies to collaborate with one another in networks. Frequently, this perception that Steinbeis can act as a "neutral go-between" and moderator promotes a certain willingness among competitors and a diversity of potential partners to enter into partnerships with others. By acting as an NAO, Steinbeis helps reduce the sense of hesitancy experienced between competitors, different members of the Steinbeis network, SMEs, and large companies – not to mention hesitancy between companies and science.

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Digitalization at SMEs – Why Aren't Firms Benefiting Properly?

Steinbeis experts provide advice on launching digital transformation processes within companies

German firms in the Mittelstand – the broad base of small and medium-sized businesses – believe digital manufacturing offers little benefit for customers; it is more useful for optimizing production processes and enhancing flexibility. This has been experienced firsthand in projects being carried out by Dr. Maja Jeretin-Kopf and Prof. Dr.-Ing. Rüdiger Haas, directors of BAT-Solutions, the Karlsruhe-based Steinbeis Transfer Center. Despite this, even if they have optimization and flexibility programs on the agenda, German SMEs don't really seem to have any precise plans for how they will work. So what kinds of challenges will they have to deal with?

In the past, the most obvious indication that a firm was being innovative was that it used new machines and technologies. Capital expenditures in new machines, production facilities, and the control systems that came with them delivered competitive advantage for a company. This was especially the case in mass production, where manufacturing processes would be optimized and the tasks performed by skilled workers were often adapted to match smoothly functioning, predefined production chains. Firms were convinced that investing in new machinery was a key prerequisite for competitive advantage, and this conviction is still firmly cemented in the German Mittelstand. But by itself, this is not enough. To optimize production and keep it flexible, the following measures must be taken:

1. Reduce resource investments
2. Raise flexibility
3. Create transparency
4. Make tasks more appealing

Why is it so difficult for SMEs to sink their teeth into the process of improving production and enhancing flexibility? For workers, the benefits companies would gain from digital solutions – more flexible production, quicker turnarounds, and enhancements in the overall effectiveness of machines – are associated with even more complexity, hand in hand with less time to get things done. People in factories believe they will have even more to do and their work will become more intensive, while their managers face the task of trying to explore new potential to come up with innovations and enter new markets. This means that on top of the existing work carried out by the workforce, new tasks will be added.

From the perspective of senior management, the problem looks different, however. Enhancing flexibility in production is considered a technical problem for which technical solutions already exist, but they are not being applied effectively enough or in the right manner. It can seem like there is a huge gap between the views of factory workers and senior management.

To get to the crux of the matter, one has to understand the situation currently faced by German companies. Many firms are as successful as they are because they found a niche technology. As a result, entering the world of autonomous manufacturing processes depends on the expert knowledge of their workers. So one has to wonder whether workers are already in a position to start the required innovation processes themselves. This is because innovation processes are in essence change processes. They require a strong degree of curiosity, a can-do attitude, motivation, and a sense of enjoyment in one's work. Without these magic ingredients, expert knowledge goes to waste and will not be used for change processes. People who don't feel this way react with resistance and allow the process to simply pass over their heads. In recent decades, many companies had the wrong company culture and this did even more to fuel such reactions. The consequences of this are dire. The things that the workers at these companies often need most are personal development goals and work objectives. Another important factor is that

employees are usually in a good position to assess the innovative capabilities of their own company. So if their assessment is negative, there will be a high turnover of staff.

So what can be done? Workers need to grasp the social meaning of their work, not just for themselves but also for the company and society in general. Without a social context, work loses its meaningfulness. Particularly when things are about abstract technical issues, as is the case with digital transformation, workers find it difficult to relate to the meaning of technological development. If people see no sense in what they're doing, they don't try to move things forward.

But what can companies do about this? The Steinbeis Transfer Center BAT-Solutions offers a variety of consulting and training services based on foundations laid by a multi-perspective approach to technology teaching. To understand technology in all its forms and to contribute to further technological development, three skill dimensions are required from a technological education perspective:

1. Knowledge and understanding: this is not just about knowing the right facts, but also understanding the ways in which technology is integrated into structural relationships.
2. Action and ability: the ability to act based on expert knowledge.
3. Judgement and evaluation: the importance of the understanding that technology always has a bearing on value and that needs, interests, and the efforts of different stakeholders shape the process of technical inception (Schlagenhauf and Wiesmüller 2018).

The services offered allow specialists and managers to acquire teaching and technology training skills, and this enables them to run workshops for co-workers at their own companies. They learn how to involve co-workers in the development processes of the company.

At one SME, there had been a dramatic rise in resignations following a number of changes and updates in production. To identify the reasons for the resignation spike, workshops were organized with people at all levels of the business. The aim was to identify the strengths and weaknesses of the firm from the point of view of the workforce. It was soon discovered that workers in the factory were extremely unhappy, mainly due to four factors: poor communication/insufficient information, a bad working atmosphere, fuzzy lines of responsibility, and a demotivating style of management.

The first step taken was to train foremen to run workshops on managing improvement measures. Acquiring an understanding of training and methodologies helped them define the goals and content of workshops, plan their structure, and actively involve co-workers in them. One of the most important aspects of the workshops was a chance to reflect on what sort of things you do yourself. Workshop participants were also continuously challenged to ask themselves about the importance of the things they do, both inside and outside the networked value chain.

Within weeks, the foremen had worked up a code of conduct and standards for information sharing with the entire workforce. The company now also has a new intranet page to create more transparency. One team introduced a CIP program. The CIP team and the foremen now also report directly to the boss of the company. As a result, within a short space of time the whole working atmosphere has improved noticeably. Information flows are quicker, and this has also improved the throughput times of products. Overall, the number of resignations has been significantly reduced.

Digital solutions are only useful to a company if the people who work for the business are actually involved in the innovation process. This will be more successful if skilled workers and managers also acquire training and teaching skills. Providing skilled workers and managers at a company with training also brings two further benefits. On the one hand, in-house training can be matched to specialist areas and the qualitative requirements of the company. On the other, training measures are much more likely to stay in place in the long term, because they come in line with a sustainable culture of continuing professional development at the company.

Image: © fotolia.de/Robert Kneschke

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Straight from Research into Practice: Facade Components Revisited

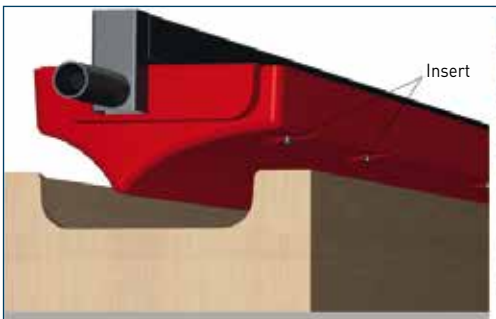
Steinbeis experts at FiberCrete develop fiberglass-reinforced construction concrete

For a number of years, there has been an increasing tendency to erect buildings with curtain wall facades – exterior walls covered by elements mounted on the outside. This building method requires thin and light free-form facade components. In view of minimum concrete strength requirements, classic reinforced concrete is not an option. Concrete that is strengthened without steel, such as short fiber- and textile-reinforced concrete, offers plenty of potential, however. These new types of concrete are typically made with non-corrosive materials. They are not subject to traditional minimum concrete strength requirements, making it possible to construct intricate concrete structures that are extremely lightweight. An alternative way to strengthen facades is to use short fibers, textile matting, or rods of alkali-resistant glass or carbon. FiberCrete, the Steinbeis Innovation Center based in Chemnitz, has been working on the development, testing, and production of new fiber- and textile-reinforced construction materials and compounds, as well as novel production technologies. As part of a network project, the Steinbeis experts have developed a fiber-reinforced construction concrete called BetoLamina®-Cast, along with the technology to produce thin-walled facade components from the same material. Their technology is now being used for the first time at the Kaiser Hof development in Cologne.

Kaiser Wilhelm Street in Cologne has a rich history and it will shortly be home to a new and exclusive office property, the Kaiser Hof, designed by Meyer Schmitz-Morkramer Rhein. One highlight of the new building is its stylish facade. Measuring approx. 5,000 square meters, it will be made from fiber-reinforced construction concrete. The bright outer facade contains vertical elements at different angles, so-called pilaster strips, to cast unexpected shadows that change continuously depending on the angle of light. Construction concrete is subject to particular requirements. It has particularly flat surfaces which not only adhere to the highest standards for exposed materials, they also appear matte to the eye and offer strong weather resistance.

The facade was developed on behalf of Art-Invest Real Estate Management as part of a close partnership between three companies, who joined forces to form the "Kaiser Hof Cologne Fiber Concrete Facade Company Alliance Working Group" and add a special front to the building. The FiberCrete Steinbeis Innovation Center in Chemnitz was responsible for the concrete formula, also helping with the approval process and technology advice. FIBER-TECH Products from Chemnitz planned and carried out production of the fiber-concrete components, including mold-making and delivery. Medicke Metallic was responsible for the complete planning process for the facade and assembly of the fiberglass concrete parts.

Developing the materials and the technology for the project involved a variety of complex factors, many of which overlapped, from assembling the adapted short fiber concrete to molding the concrete, mounting anchors for attaching the facade to the building, reshaping and reprocessing facade components, and final installation on the building. One of the main priorities during development was mapping the overall sequence for the process, beginning with the mixing of the formula required for the fiberglass concrete to logistical considerations. To develop the material, the experts used a modified white fiberglass concrete



Schematic representation of the mold

Concrete elements after removal of the mold

Concrete elements with mounting attachments

Concrete elements on the construction site

called BetoLamina®-Cast, which was also developed at the FiberCrete Steinbeis Innovation Center. Not only does this material offer outstanding mechanical properties, it is also amazingly durable and has excellent visual attributes as an exposed concrete. It is based on a 5-substance system consisting of Portland cement, aggregates, additives, and admixtures developed specially for the project. Because of the complex geometry of the pilaster strips, the freshly mixed concrete has to flow readily, but at the same time remain uniform in terms of material consistency. To achieve this, an admixture was developed specially for the project as a private label product in close collaboration with the building chemicals firm MC-Bauchemie. There were no high-performance or high-speed mixers available at the precast concrete works for mixing the formula, as would normally be the case. As a result, the BetoLamina®-Cast concrete had to be modified for mixing in a simple pugmill mixer. This also ensured that the fresh concrete remained 100% homogeneous.

Currently, there are no certified systems for mounting these kinds of thin-walled concrete components, which are only between 14 and 30 millimeters thick. The project team therefore had to develop a suitable mounting solution itself. The idea was to create a system using inserts, which could be integrated into the mold before casting and thus ensure components are positioned exactly as required. The inserts were designed using bionic principles to allow uniform forces to be applied to specific points on the thin-walled concrete facade components. During development, the experts designed inserts of different sizes and shapes, calculated their properties, and simulated performance using finite element methods. The parts were then 3D-printed (selective laser sintering) and examined using pull-out testing before the calculated results were validated. Particular attention was given to the effect the insert design had on connections between the bearing load of metallic elements and the textile-reinforced concrete, as well as cracking and failure properties. For the pull-out testing, special test specimens with thicker material around the cast inserts were subjected to unidirectional tensile loads at angles of 0°, 45° and 90°.

In total, the facade cladding on the Kaiser Hof building consists of 1,619 three-dimensional concrete elements and 137 different types of plates. In terms of molding technology, the concrete casting tools were designed with the surface requirements of facade elements in mind. The concept behind the molds also had to take the required quantity of facade elements and expected service life into account. Depending on how often individual concrete elements would be needed, there were two material options for making the molds. Facade elements required in larger quantities were produced with fiberglass-reinforced plastic, because this makes it possible to deliver a useful life of 150 molding processes or more. For elements required in smaller quantities, the molds were made from wood for reasons of economy. To finish, store, and safely transport components to the construction site, the concrete elements were mounted on specially developed racks. The parts were then mounted by facade professionals on the construction site. Completion of the development is scheduled for October 2018.

Image left: First impression of the building (June 2018)
Image right: The construction technology

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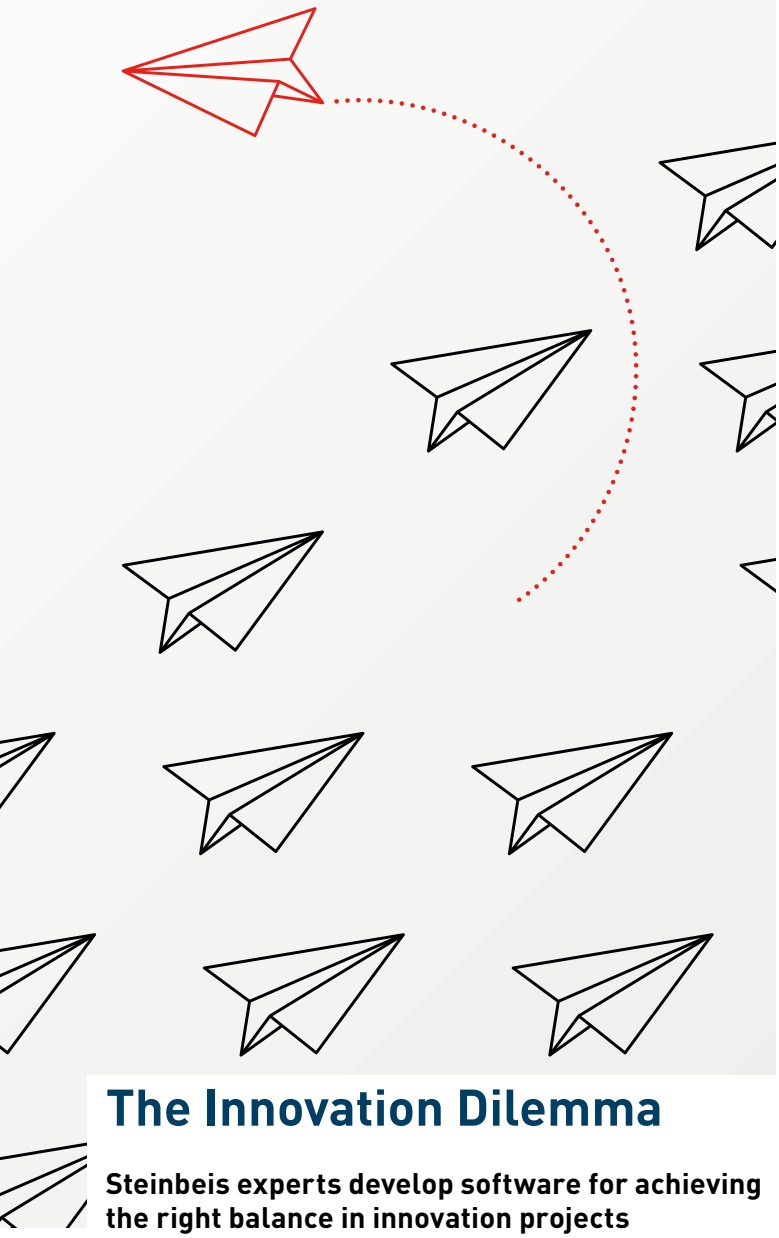

The Innovation Dilemma

Steinbeis experts develop software for achieving the right balance in innovation projects

There are two approaches to innovation that – purely by themselves – are not really an option for innovation-centric companies: exploitation and exploration. For innovation to be viable in the long term, a healthy balance needs to be achieved between the two: innovations based on improvement and actual product innovations. Considerable innovations in the past, often based on close customer relationships and well-versed teams of innovators, typically lead to exploitative forms of innovation projects. These gradually entice companies into a "success trap" and pose a threat to their market standing. It is possible to address or even avoid such innovation imbalances, however, by fostering individual creativity among the members of innovation teams. Prof. Dr. habil. Achim Walter and Gerrit Jochims, two Steinbeis entrepreneurs from Kiel, have been working with two software specialists to develop a special software solution.

One question firms constantly have to deal with is whether the right way forward for them in safeguarding the future will be to engage in exploitative innovation or exploratory innovation. Both approaches have their merits and both forms of innovation can to a certain extent also run in parallel. The aim with exploitative innovation projects is to safeguard the company's current chances of survival, usually by working on smaller innovation steps, so-called incremental innovation. For example, a firm can carry out ongoing improvements and optimizations to products and services it has already launched. The idea here is to exploit the development, production, and sales resources that exist within the enterprise, or in other words make gains through creative ideas derived from efficiency advantages. The idea with exploratory innovation is to safeguard future viability by entering new markets. To do this, products and services are needed which are capable of offering high levels of functional novelty. If an offering delivers significantly enhanced customer benefit and the knowledge used to achieve this is also highly novel, this is sometimes referred to as radical innovation.

Unilateral exploitation and exploration lead firms into certain skill traps from which they find it difficult to extricate themselves, putting the long-term existence of the business at risk [1]. Numerous empirical studies into innovation practices [2] confirm that the right recipe for the long-term success of an innovation-centric business is to strike the right balance between exploitation and exploration. That sounds like simple advice, but it does not go without saying that it's always possible.

The task facing managers is to ensure they continually weigh up how much they want to engage in which type of innovation and when. The recommendation that Achim Walter and Gerrit Jochims give to companies is that they should already start thinking about the right balance between different types of innovation when developing original concepts. Innovation-centric companies should under no circumstances channel resources exclusively into exploitative projects, at least not in the medium to long term. Instead, between 40% and 60% of resources should be placed into exploratory development projects. Companies that are successful in the long term are in a position to replace their offering or top it up with innovations at a time they do not yet depend on the profits of recently developed products or services. Adding to or discontinuing products that used to be innovative – by offering new solutions to problems – frequently happens in niche markets, which are initially underestimated by the majority. Exploratory innovation should therefore be planned early and carefully. Investments in incremental product innovations (product adaptations, updates, and improvements) and corresponding innovations that save money in production must not negatively affect a company's ability to come up with product innovations that are clearly distinguishable from those of the competition (through fundamental research and experimental development).

The most common skill trap companies are likely to fall into when they are innovation-centric is the success trap. Companies tend to introduce exploratory innovations as a follow-up to bigger innovations that were already successful. These are much less risky and can relatively quickly bring money back into the company and build robust relationships with clients. As a result, having already gone in the direction of exploitative innovation, firms discover further improvements and adaptations, and this results in a process whereby they slip into the success trap. If there is a predominance of exploitative innovation over exploratory innovation in a company over an extended period, this prevents a firm from acquiring new skills and identifying new selling opportunities. The company finds itself out of kilter in terms of skills development, a situation that often goes unrecognized – as do the long-term consequences for

the business. In the majority of cases this imbalance is even consciously accepted (the Innovator's Dilemma). Once a company finds itself out of kilter, this can be a particularly precarious situation, since the people who hold responsibility in key areas tend to keep doing things the same way they always have. Indeed, this was once successful.

Previous experience and knowledge from the past in the heads of developers and decision-makers usually define the direction of innovation within a company. Such knowledge forms the basis of things that are considered important and what should be learned further down the line. The more comprehensive the previous knowledge or the experience people have had with past innovation projects, the more likely a firm is to keep pursuing the approach to innovation it has already learned. Especially in the early phases of an innovation process, when people are generating ideas, companies are particularly prone to entering into self-reinforcing learning processes that keep them within traditional comfort zones. Afterwards, it's not uncommon for them to find themselves in a success trap, or their business models start disintegrating.

The strategic focus of a business also dictates the dominant approach to learning and innovating. A business strategy that revolves closely around efficiency only rewards companies in a position to implement routines as specialists who really know the ropes. They are effective at drawing on existing knowledge and directly accessible resources when coming up with new and innovative ideas. The special ability to correctly assess new technological developments and knowledge held by external partners gradually trickles away. If a firm adheres rigidly to focusing on efficiency, it's almost predestined to fall into a success trap. Older and larger companies in particular often become too rigid when it comes to their core competences, time and again going through a rehearsed repertoire to enjoy the benefits of their economies of scale. The approach obscures the outlook of employees and their perception of new developments beyond traditional markets.

Companies are most likely to engage in exploratory innovation if they access the individual creativity of employees and make full use of it. In practice, there's a tendency for people working on new product developments to be thrown together to form innovation teams. Creative ideas are often then the result of a process of re-merging individual knowledge circulating within innovation teams, or sometimes around them. As the personal ties between people in an innovation team grow stronger and the pressure to conform mounts, this increasingly prevents team members from fully unleashing their individual potential to work creatively – which in turn stifles individual creativity [3]. The companies that are particularly prone to this happening have a manageable number of experts and decision-makers. The people at such companies are almost inevitably brought back to work in innovation teams on a regular basis. As a result, they get to know each other even better and develop close personal ties. When innovation teams work together over an extended period and can look back on earlier successes, a certain pressure develops to conform. In such teams, creative "deviators" are sometimes stigmatized ("We never do it that way", "You'll never get that signed on to"), or people sanction them through social isolation. If people want to make things happen with their innovative product developments, knowing the right people will be advantageous, because this helps to pull valuable resources on board and form groups when it comes to decision-making. However, close personal ties between team members are generally a drawback when it comes to coming up with novel and useful concepts. As a result, people develop tunnel vision because they accumulate redundant knowledge. Adopting new approaches to solving problems requires knowledge in different forms and varieties so that it can be combined in the right way. Peer pressure results in teams routinely agreeing to the same things, and people are less willing to take risks. This is reflected by general consensus, and completely novel ideas are often simply nipped in the bud. There is an interesting term for this phenomenon, confirmed by insights gained from research into innovation projects: groupthink [4].

So what can companies and management do to avoid or diminish the negative effects of people sliding into such close relationships? According to Achim Walters and Gerrit Jochims, one good way to get out of the success trap is to staff innovation teams in such a way that they reflect what's called deep-level diversity. A team marked by plenty of diversity makes it much easier to keep knowledge circulating within the team without redundancy, even if team members do know each other well. In addition, such teams are much better at coming up with creative ideas and entering into constructive debate. To bridge the gap between the recommended approach and typical practice with innovation projects, Achim Walter and Gerrit Jochims draw on support from innovation software they developed with two software specialists. The solution of the two Steinbeis directors was based on scientific findings. Their concept management software makes relevant development processes and results measurable as early as the initial stages of an innovation project. Measurements can be compared with other concepts and this makes processes more tangible. It also makes it much easier for a company to strike the right balance between exploitation and exploration in the innovation portfolio and maintain this situation in the long term.

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Consulting X.0 – Networking. Digital Transformation. Convergence.

A review of the 2018 Steinbeis Consulting Day

The transformation sweeping through society, business, and technology, which is especially noticeable when it comes to digital solutions, is not just having a fundamental effect on companies, it is also changing different areas of business and technology consulting. Approximately 200 people attended the fourth Steinbeis Consulting Day, which took place in Stuttgart on June 27, 2018. The aim of the event was to look at the challenges posed to technology and management consulting by this (digital) transformation.

The first speech was given by Prof. Dr. Christof Schimank (Horváth & Partner), who presented the different guises of digital transformation and its impact on business models from the standpoint of a consultant. Thomas Hösle (Elabo) then took to the pedestal and gave a speech on Management and Technology Consulting X.0 from a client perspective by looking at the example of Elabo. During the second round of presentations in the afternoon, Dr. Ralf Finger (INFORMATION WORKS) offered an overview of the digital tools of Management and Technology Consulting X.0 and the ways in which its importance is now changing, also considering the factors consultants will need to adjust to in the future, plus how this is changing the nature of competition. In a talk given by Prof. Dr. Marc Drüner (Steinbeis University Berlin), an assessment was offered of "Networks and Platforms – New Consulting Markets X.0" by asking in what ways the interaction between advisory services and digital transformation is changing the nature of competition, also taking a particularly close look at the topics of big data and data transformation.

Four formats were offered for the interactive part of the event, providing an opportunity for guests to consider specific aspects relating to the challenges of Technology and Management Consulting X.0 and to discuss trends and developments. As part of a session called Meet the Keynoters, guests were given the opportunity to talk to the speakers and engage in conversation with other people at the event. The discussion, moderated by Klaus Jancovius, was a tremendous success and offered a chance for everyone involved in the event to exchange ideas, find areas of overlap, and forge new contacts.

The day also included guided tours of different Spotlight Topics, allowing guests at the Consulting Day to gain insights from the Steinbeis experts into current topics. For example, the Spotlight on the Industry 4.0 Transfer Platform showed how much emphasis is placed on actual business practice in leveraging the research and transfer potential offered at the universities of Aalen, Esslingen, and Reutlingen, which are also contributors to the Steinbeis Platform. Experts from the Ferdinand-Steinbeis-Institute were also at the event. As a research institute of the Steinbeis Foundation and a research faculty at Steinbeis University Berlin, they also fielded questions on a wide variety of topics covered by Industry 4.0 – from its impact on business models and business strategy to process models for successful transformation. The International Spotlight introduced expertise in the field of domestic and international funding programs, at which point the team of Steinbeis 2i answered questions from the audience. Two issues that came up for several Spotlight Topics were leadership and innovation. The Steinbeis experts at the event included a team from bwcon, which provides support to companies involved in the digital transformation process at all stages of the value chain, thus promoting technologies and markets that are key to the economy and society.

As part of another format offered during the day, a speedmeeting session, guests had an opportunity to hear more about three micro networks in the Steinbeis Network, as well as their partners: Steinbeis Consulting Group Personal (HR), the Steinbeis Consulting Group for Networks/IT Structures, and Steinbeis Expert Network X.0. Steinbeis Consulting Groups are networks of experienced experts with a focus on a particular area of consulting or specialist field. Expert Network X.0 is an alliance between component manufacturers in the field of Industry 4.0 solutions (connected manufacturing) and technology and management experts from the Steinbeis Network. It is seen as the answer to increasing levels of convergence between sales and consulting services stemming from "Business X.0." The friendly conversation between the guests at the event and different members of the groups resulted in a number of new insights

The 2018 Steinbeis Consulting Day: Keynote speeches and Makeathon coaches

Prof. Dr. Marc Drüner
Professor of marketing and innovation management at Steinbeis University Berlin

Dr. Ralf Finger
Managing director of INFORMATION WORKS Business Consulting & Information Systems GmbH

Ralf Haack
Managing director of Steinbeis Digital Solutions GmbH

Alexandra Hofmann
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Thomas Hösle
Managing director, Elabo GmbH

Klaus Jancovius (Moderation)
Independent journalist, moderator, media and personal presence coach

Prof. Dr. Christof Schimank
Partner, Horváth & Partner GmbH

Prof. Dr. Achim Walter
Professorial chair, startup and innovation management at Kiel University, director of the Steinbeis Consulting Center COMMIT

and personal contacts, as well as immediate project partnerships. During a "Makeathon" session on Design Thinking Essentials, Alexandra Hofmann (Innovation Academy, bwcon) outlined how design thinking methods can support teams during transformation processes, also highlighting how structures and processes in an organization can be reorganized. She used the session to give participants a chance to experience this firsthand with practical tools. A second Makeathon session on the future of innovation management, which was run by Ralf Haack (Steinbeis Digital Solutions) and Prof. Dr. Achim Walter (Kiel University, Steinbeis Consulting Center COMMIT), presented a recently developed Steinbeis Innovation as a Service concept, showing how the model can be used to master the current challenges presented by powerful, market-ready innovations.

After the event there was an informal get-together, which the guests used as an opportunity to talk more about the results of the highly rewarding day. At the same time, they watched the soccer match between Germany and South Korea at the World Cup Finals (not quite as successful as the rest of the day).

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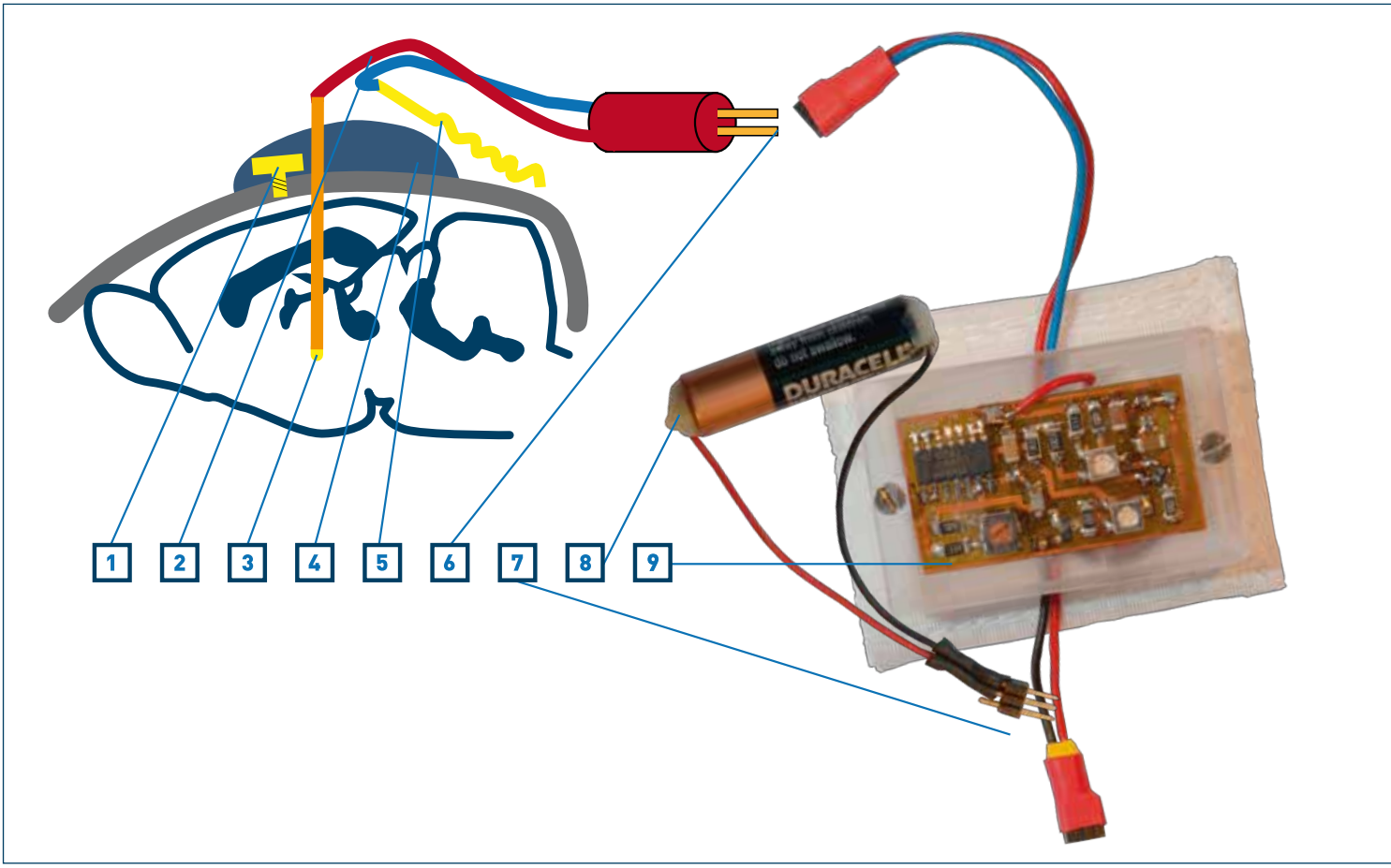
Welcome to the Steinbeis Network

The platform provided by Steinbeis makes us a reliable partner for company startups and projects. We provide support to people and organizations, not only in science and academia, but also in business. Our aim is to leverage the know-how derived from research, development, consulting, and training projects and to transfer this knowledge into application – with a clear focus on entrepreneurial practice. Our platform has now resulted in the foundation of more than 2,000 enterprises. The result is a network spanning more than 6,000 experts in approximately 1,100 business enterprises – working on more than 10,000 client projects every year.

And this network continues to expand. For an overview of our most recently founded centers, go to www.steinbeis.de/en/news. Welcome to the Steinbeis Network!

More on recently founded enterprises in the network can be found at www.steinbeis.de/aktuelles

...or go to https://twitter.com/SteinbeisGlobal.



Brain Stimulation

Steinbeis experts develop stimulator for researching Parkinson's through animal experimentation

Parkinson's disease is a disorder of the brain that leads to the progressive degeneration of nerve cells. A relatively new procedure called deep brain stimulation (DBS) involves sending electrical impulses to a small region of the brain below the cerebral cortex, which, among other things, is responsible for the subconscious control of voluntary muscles. Recent developments make it possible to use DBS to treat the symptoms of Parkinson's during early stages of the condition. Despite the recent medical success of DBS, there is still speculation regarding its exact mechanisms, such that until now it has only been possible to make empirical improvements in therapy. As part of an alliance with the professorial chair for biophysics at University Medical Center Rostock and Rückmann und Arndt from Berlin, the Steinbeis Transfer Center for Cell Manipulation and Monitoring Systems (CMMS) has now developed a stimulation board and stimulation electrodes that make it possible to conduct long-term DBS studies.

Treating advanced Parkinson's disease originally involved lesion surgery. This destroyed a core area of the thalamus in the division of the forebrain called the diencephalon. This alleviated the symptoms of the disease, mainly by interrupting faulty "connections" caused by the progressive loss of black nerve substance. To locate the optimal area for the lesion during surgery, doctors used a stimulation electrode. The positive impact of this electrical stimulation was already noticeable during operations, leading to the idea that a DBS therapy could be developed. One unusual feature of this process was that an operating technique had been discovered for humans without prior experimentation involving a suitable animal model.

Because systematic invasive examinations are forbidden on humans for ethical reasons and cell-based in vitro methods are unfortunately unable to reflect the complexity of this particular clinical condition, there is currently no other way to conduct research into the neuronal mechanisms of DBS and its optimization than to use animal models, such as rats. However, the difference in the size of the brain of a rat and a human being means that the stimulation conditions of clinical treatment cannot be compared like for like with animal models. In order to achieve meaningful results from testing nevertheless, the professorial chair of biophysics at University Medical Center Rostock has been working with Rückmann und Arndt and the Steinbeis Transfer Center for Cell Manipulation and Monitoring Systems (CMMS), which is also based in Rostock, on the development and testing of electrodes and stimulators specially matched to the anatomy of rats. The advantage offered by these mobile stimulators is that they make it possible for the first time to conduct representative long-term studies on animals, which are completely free to move around for up to six weeks or more under continual stimulation. In human terms, this is the equivalent to a trial

SCHEMATIC OVERVIEW OF THE ANIMAL MODEL

Location of the DBS electrode in the lateral section

1. Anchor screw for the sealing compound on the skull
2. Electrode wire
3. Unipolar electrode
4. Biocompatible sealing compound
5. Gold wire return electrode
6. Electrode connector
7. Battery connector
8. Pulse battery
9. Stimulator and pouch

period under continual stimulation of approximately 4.5 years. This overcomes the limitations of previous animal studies due to equipment, such as obstructive external cable harnesses.

Animal experimentation at the Clinic and Polyclinic for Neurology at University Medical Center Rostock involves inducing a one-sided so-called hemi-Parkinson condition. This makes it possible to test motor functions by comparing the healthy and the diseased sides of the brain. The stimulation electrodes are implanted in the subthalamic nucleus of the diseased side. Parallel testing also has to be performed on healthy, sham-lesioned and sham-DBS treated animals. To study the long-term effects of DBS on the sensorimotor functions and emotions, the behavior of the chronically instrumented mobile hemi-Parkinson rats is examined at different times during the course of the condition.

The project team working with the Steinbeis researchers successfully demonstrated significant lesion and therapy impacts during the behavior tests with the new system. The model thus constitutes an adaptable platform for testing different stimulation parameters, such as new types of electrodes or other, unexplored areas of interest. Stable chronic instrumentation is also suitable for further animal models of diseases in which clinical DBS may prove successful. In addition to motor disorders for which DBS approval has already been gained, such as Parkinson's disease, dystonia, and essential tremor, there are other indications DBS could be used on in the future, such as obsessive-compulsive disorders.

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Image: The positioning of a unipolar stimulation electrode in a coronal brain section

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Sustainable Fish Farming and Innovative Wastewater Recovery at Lake Victoria

Steinbeis is partner in the EU project VicInAqua, which supports knowledge transfer between Kenya, Tanzania, Uganda and Europe

Clean water is the basis for so much: food, the environment or agriculture. In view of the scarcity of water, wastewater treatment plays an important role. In the EU project VicInAqua, eleven partners from Denmark, Germany, Italy, Kenya, Malta, Tanzania, and Uganda are developing an efficient, flexible, and robust system for wastewater treatment and reuse in fish farming and irrigation around Lake Victoria in East Africa. The Institute of Applied Research at Karlsruhe University of Applied Sciences is coordinating the project which focuses on the construction of a pilot plant in Kisumu in Kenya. As project partner, Steinbeis 2i GmbH supports the exploitation of the project results, the administrative and financial management and the communication of the project progress.

The partners from research, industry, and public sector have adopted an integrated approach: they develop a sustainable system that combines wastewater treatment and a recirculating aquaculture system (RAS), making it possible to reuse water and improve the quality of fish farming in Lake Victoria Basin. The system should help reducing stress on the sensitive ecosystems of Lake Victoria and enhancing food and health security. The RAS technology makes it possible to raise high quality fingerlings through the optimal and constantly monitored water quality and supply. The fingerlings are then handed over to local fish pond operators for further rearing.

The project is also developing a new kind of self-cleaning water filter consisting of a membrane bioreactor (MBR) as main processing unit within the overall combined water treatment system. The biggest challenge is membrane fouling which requires frequent cleaning with expensive chemicals. As a result, the VicInAqua partners are developing novel self-cleaning membrane materials that not only perform better in the long term, but are also more environmentally friendly. An innovative, easy-to-operate monitoring system enables to control the system on site or via a smartphone. The filtered effluent water coming out of the MBR flows into the RAS and the surplus can be used for irrigation. The remaining sludge from the filter system is co-digested with local organic waste to produce biogas. This biogas, together with advanced photovoltaic panels, provides for decentral electricity supply.

"VicInAqua is developing an all-round solution that can be adapted for successful operation in Africa but also in further regions with water or food scarcity and that can finally contribute to develop new business opportunities for local people. The main challenge besides the technical innovations is to foster mutual cultural and technical exchange between the European and African societies, also to offer people in Africa new perspectives in their home countries", explains Prof. Dr. Jan Hoinkis, project coordinator and professor at Karlsruhe University of Applied Sciences. Susan Clare Adhiambo is the Chief Fisheries Officer in charge of Kisumu East Sub-county at the Department of Agriculture, Livestock and Fisheries (DALF) of Kisumu County, Kenya, and project partner in VicInAqua. She says, "We like the innovative approach adopted by VicInAqua, which gives very close attention to the problems in Kenya and the other countries around Lake Victoria – Uganda and Tanzania. This isn't just about general technological and environmental advancement, it's also about proposing an African solution for efficient water reuse and waste water pollution control." DALF brings

in its vast expertise in the planning, implementation and regulation policy of aquaculture and fisheries in Kenya. DALF will continue to operate the pilot plant after completion of the project, so it plays an important role in coordinating the construction work, which started in springs 2018 and should be finished in November.

To convince the local population, businesses and policy makers that the system and the innovative technology it encompasses actually work and are worth the investment, the project consortium also provides trainings on the different technologies and organises study visits and round-table meetings to increase local knowhow and awareness.

In addition, an academic exchange program was organised for ten students from Kenya, Tanzania and Uganda to get to know the VicInAqua technologies and follow the work of researchers at the European scientific partner organisations in Germany, Karlsruhe University of Applied Sciences, and in Italy, Institute of Membrane Technology (ITM-CNR) and University of Calabria (UNICAL). In May, half of the the students were invited to learn more about water treatment, membrane science, chemistry and organic synthesis at ITM-CNR and UNICAL. In June, the other students went to Karlsruhe University of Applied Sciences to to deepen their knowledge in the fields of of water treatment, membrane science and renewable energy. Both groups of students were offered a varied program of lectures, practical exercises and tours by the project partners. At the end, the students provided a feedback report on their experience during the exchange program.

The VicInAqua project team members already feel positive about the initiative. If the technology is used by fisheries organisations and local authorities in Lake Victoria Basin, it should create new and long-lasting employment opportunities and enhance the quality of local fish production through aquaculture.

VicInAqua has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689427.

Image right: © Karlsruhe University of Applied Sciences/Marion Broda

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10 Years Enterprise Europe Network

Steinbeis 2i GmbH remains an important member of the European Commission network

The world's biggest network for internationalization and technology transfer is marking its tenth anniversary. When the European Commission set up the Enterprise Europe Network in 2008, its aim was to provide business advice to small and medium-sized companies. It already had a number of precursors, but none matched its sophisticated structure and the large number of regional, distributed points of contact. The network now comprises over 600 member organizations with around 6,000 experts in 60 countries, who mainly help SMEs with issues relating to EU funding and innovation consulting. S2i is also part of the network.

The organizations that work within the Enterprise Europe Network offer practical support, for example to enterprises looking for business partners in other member states of the European Union, or to enterprises introducing an innovative idea and hoping to apply for EU funding.

Between 2008 and 2018, no less than 2.6 million SMEs have been provided with advice in all areas of Europe, and over 230,000 SMEs have taken part in technology and partnership meetings, exchanging business concepts as part of 700,282 individual meetings. Overall, 9,000 SMEs have thus benefited from made-to-measure innovation initiatives.

According to a survey conducted by the European Commission, 65% of SMEs who operate on an international level hope this will increase sales, 85% hope to create or be given more jobs, and 54% of SMEs anticipate gaining a larger share of international markets.

For SMEs in Baden-Wuerttemberg, the manual trades association Handwerk International provides comprehensive consulting services. Further partners in the network are Steinbeis 2i GmbH (S2i), the Baden-Wuerttemberg Ministry of Economic Affairs, Labour and Housing Baden-Württemberg, and six separate chambers of trade of industry. In September, members from Baden-Wuerttemberg took part in the SME conference organized by the Federal Ministry for Economic Affairs and Energy in Berlin.

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SMT meets SAP University Alliances

School at Steinbeis University becomes member of the SAP University Program

The School of Management and Technology (SMT) at Steinbeis University Berlin (SHB) has been providing SAP experts with training since 2010. These days, no company can afford to turn its back on digital transformation. Entire processes are going digital, which not only simplifies systems but also networks them. This makes it all the more important to ensure that specialists and consultants have the right qualifications. The new partnership with SAP University Alliances represents the next step forward for the SMT.

SAP University Alliances is a global university program spanning over 3,500 member institutions in more than 113 countries. Its stated aim is to shape the future of university education. Research, teaching, and innovation are not the only areas that benefit from membership in the SAP University Program: Collaboration also helps promote knowledge-sharing through projects carried out for partner companies.

Taking part in the program also allows the SMT to act as a new partner to the worldwide SAP Next-Gen initiative. The aim is to set up a Next-Gen Lab at the School of Management and Technology and offer access to state-of-the-art concept development and management methods, such as design thinking and business model innovation in combination with the latest SAP tools. This will also do more to promote entrepreneurial thinking and networking between students from different disciplines.

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In Good Shape for EU Applications and Project Management

S2i offers training to SMEs and research institutions

For business leaders, researchers, and other parties submitting applications to the EU, Steinbeis 2i (S2i) still offers a number of training options this year. Training is based on a modular system to provide the required understanding of the different phases of an EU project, from submitting applications to successful completion. Courses are also tailored to the needs of international and intercultural consortia.

The combination of exercises and presentations on intercultural and management aspects provides a vivid introduction to the world of EU funding, and consideration is also given to different organizational structures (SMEs, multinational companies, research institutions).

The next courses are scheduled to take place as follows:

- Oct 23 -24 and Nov 13, Karlsruhe: Certification course – Submitting Applications – International Innovation and Research Funding
- Nov 21, Karlsruhe: Submitting Applications 101
- Nov 23, Stuttgart: From Concepts to Products – Innovation Management and Innovation Partnerships in an International Context
- Dec 11, Karlsruhe: The Project is Now Live – Understanding Project Administration

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6th Steinbeis Entrepreneur Forum 2018

Event review

Representatives of SMEs, Steinbeis customers and partners, students and alumni of Steinbeis University Berlin – on July 20, a variety of guests came to the Steinbeis House for Management and Technology in Stuttgart to gain inspiration at the 6th Steinbeis Entrepreneur Forum and pick up on the very latest ideas.

The event revolved around two stimulating talks on the topics of blockchain technology and business startups. There was also a parallel talk on digital solutions in analog sectors of industry. In a speech on The Startup Code - The things SMEs can and must learn from startups, Johannes Ellenberg (Accelerate Stuttgart) examined seven key steps that should run down the backbone of every company aiming to bring about change in its organization. Dr. Gunther Herr (WOIS INSTITUT) and the multiple entrepreneur Benjamin Butscher looked at digitalization trends and highlighted the typical patterns of successful strategic planning in fields of business that are subject to dynamic change. Finally, Alexander Sachs (codecentric AG) looked at actual examples from business and showed a variety of concepts that demonstrate how blockchain technology might change our lives in the long term. After each talk, the audience was invited to take part in round table discussions to go into the topics in more depth with the presenters.

The occasion offers a useful information-sharing and networking forum and supports the process of sharing experiences. As an official networking event of the Steinbeis Network, the day is organized by the Steinbeis Center of Management and Technology (Filderstadt).

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A solution based on combination, not standardization

SHB student assesses the pros and cons of combined gravure printing cylinders in production

Two thirds of German packaging producers describe themselves as under pressure from foreign competitors in their domestic markets – foreign firms are catching up with German firms. Not only do they offer increasingly professional products, their ability to deliver reliably and on time has improved significantly. This is making the market even more aggressive for German producers. This was reason enough for the successful packaging company Huhtamaki Flexible Packaging Germany to actively start looking into new ways to address the differing needs of its customers, particularly since the market has become even more competitive. This challenge was taken on by Sabrina Guggemos as part of her bachelor's degree at the School of Management and Technology (SMT) at Steinbeis University Berlin.

When Huhtamaki Flexible Packaging Germany started looking into specific cost-cutting scenarios in its gravure printing production processes, this was not just due to changes happening in the market. It was also motivated by negative feedback on its pricing from a pilot customer. Sabrina Guggemos set about assessing the pros and cons of combining gravure printing cylinders in production as part of a project for her studies. Initially, the student's aim was to confirm to the customer that it was technically feasible to combine gravure printing cylinders. But she was also able to demonstrate that producing with combined cylinders would be more efficient than the standard procedure used by Huhtamaki Flexible Packaging Germany.

At the start of her degree project, Guggemos analyzed different changes that have been affecting market conditions in the packaging industry. She underscored her basic analysis by showing that combining gravure printing cylinders would offer a solution to the company's pricing problems. A central aspect of her project was to document her work from start to finish and share information with colleagues. Guggemos

captured each specific project stage during each phase of the process, before reviewing progress. To get her project underway, she pulled together a project team to allow the experts from different departments to outline their expectations for the project. Weekly meetings were organized with all project stakeholders, during which it emerged that one of the core tasks would be to determine all possible options for combining cylinders and the challenges each scenario posed. After an initial round of production testing, the team was able to conduct a cost assessment and after a second round of tests, the results of their calculations were confirmed.

Producing with combined gravure printing cylinders is Huhtamaki Flexible Packaging Germany's reaction to the trend toward smaller batches. A comparison between production using standard methods and production based on a combined approach shows that Guggemos was successful with her project and it was indeed possible to improve costs for the pilot customer by combining cylinders. Based on the insights gained, the approach of combining cylinders can now be extended to include other customers and market segments targeted by Huhtamaki Flexible Packaging Germany. The firm's positive experience with the pilot customer project has also resulted in a second parallel project getting underway with a major customer. Here too, the idea in the long term is to combine gravure printing cylinders to produce the client's products, also in order to cut costs.

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Digitalization Entails Change!

Steinbeis experts organize a Network event on the role played by the media in digital transformation

Digitalization is fundamentally changing the world of work. The fast rate of change continually fuels new forms of technology convergence, putting the meaning and diversity of networks and overlaps in a new light. To exploit this potential, make the best use of collaboration on all levels, and explore new avenues, communication will be crucial. The media will play a central role in this, and continual changes in the variety of media options now available to us and how different media are used open up new opportunities and fields of activity in all areas of society, business, and politics – although this also entails a whole host of challenges and different issues. A team of experienced Steinbeis experts will look into this topic in more detail at a Steinbeis Network event on Media and Digital Transformation – Shaping Change. The event will take place in the Steinbeis House for Management and Technology (SHMT) in Stuttgart-Hohenheim on November 29, 2018 at 1 p.m.

The partners cooperating on the event consist of two networks, Digital Media Women e.V. and Women in Film and Television Germany e.V. To set the afternoon proceedings underway, Christine Regitz, Vice President of User Experience and a member of the supervisory board at SAP, as well as a member of the Steinbeis Board of Trustees, will make a brief presentation. This will be followed by two consecutive sessions, each comprising three parallel workshops on a variety of key topics. Female experts from companies, universities, government ministries, and the two networks will dig deeper into current developments in new and social media, gaming, virtual and augmented reality, and animation. The spotlight will also be turned on role models, ethical challenges, and cultural changes resulting from digital solutions – not only in the media work environment.

Aside from providing a forum for experts to exchange ideas, the organizers would like the event to launch an overarching network to shape dialog in a way that not only focuses on opportunities but also promotes the ongoing development of media know-how against a backdrop of digital transformation in Baden-Wuerttemberg.

The event is free and anyone involved in digital solutions is welcome to take part, particularly if the emphasis of their work lies in the design, introduction, use, and application of media. Since participant numbers are limited, it will be essential to register online before the day.

For further information, the program, and online registration, go to
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An Overall for Emergencies

Steinbeis experts work with project partners to design a patient cooling solution that can be used anywhere

In Europe, more than 375,000 people suffer a cardiac arrest away from a hospital every year. Over 82% of all cardiac arrests in western industrial nations are caused by heart problems. Also, because of demographic developments, more and more people are having to be revived using cardiopulmonary resuscitation. The prognosis for patients who have to be reanimated outside hospitals is bleak: Less than 10% of people who are successfully resuscitated will survive the incident without any (or with only minimal) neurological problems. Subsequent neurological damage is a result of cell damage caused by a lack of oxygen. To help avoid cell damage after a cardiac arrest, Sika, dretex Textiles, PRIME-tec, and RÖSSEL Instrumentation joined forces with the Steinbeis Innovation Center Automation in lightweight construction processes (ALP) and the professorial chair for technical thermodynamics at Chemnitz University of Technology to work on the development of a mobile patient cooling solution for use in emergencies following an acute cardiac arrest.

Every tissue in the body has different tolerance levels to situations involving oxygen deprivation. The most sensitive organ in the body is the brain, which depends almost exclusively on the oxidative breakdown of glucose to maintain required energy levels. As a result, a person will already become unconscious if the oxygen supply to the brain is interrupted for a matter of seconds. After three to six minutes at the most, they will suffer irreversible cell damage and sometimes severe brain damage. So-called ischemic tolerance, i.e. tolerance to a loss of blood supply to brain tissue, plays a decisive role in the neurological condition of resuscitated patients. It generally lasts between three and five minutes.

When the body cools down to between 32°C and 34°C, this is called mild hypothermia. Controlled hypothermia has proven to be a particularly effective method used in bypass surgery and neurosurgical procedures. Clinical studies have shown that deliberately inducing mild hypothermia has a significant positive impact on patients in neurological terms following reanimation [1, 2]. Not only is there a significant improvement in neurological outcomes, there is also a reduction in mortality levels. Until now, there has not been a suitable method for carefully managing patient temperatures outside the hospital, at least not in line with recommendations under ERC guideline 2015 [3].

Because it's so important to resuscitate patients successfully, if possible avoiding lasting damage, experts in research and development are working intensively on a suitable system. As part of a ZIM project called HypoTrans, four partner companies – Sika, PRIME-tec, dretex, and RÖSSEL – have been participating in an R&D project with the professorial chair for technical thermodynamics at Chemnitz University of Technology and the Steinbeis Innovation Center Automation in lightweight construction processes (ALP). Their joint aim is to develop an overall that will provide comprehensive emergency care to resuscitated patients. The project is being funded by the German federal government. The project partners took early patient cooling in an emergency as their starting point. Their aim was to develop a cooling system to plug the gap between the moment a patient is reanimated by a first aider and the moment an emergency vehicle arrives so that the patient can be handed over for treatment in intensive care. The system should make it easier to adhere to the ECR recommendations under guideline 2015 regarding targeted temperature management.

The project alliance was successful and as a result of its research and development efforts, a new HypoTrans Overall [4] has been created. The solution has also been patented by Chemnitz University of Technology. The suit is made from strong materials and offers integrated tempera-

ture management for carefully cooling down patients. It was specially designed to match the needs of first aiders and was first unveiled to the general public at Hannover Messe 2018 at a stand shared with the Federal Ministry for Economic Affairs and Energy.

The overall works by storing heat in phase change material (PCM). A self-regulating passive process takes place allowing the PCM to absorb heat from the body and make it dissipate. This results in the thermal energy being stored by the PCM rising continuously, even if the temperature of the PCM remains almost constant during phase changes. This allows heat to be transferred out of the patient's body and as a result, the core body temperature drops as required. The process that takes place within the overall allows the defined temperature level to settle at around 34°C. The actual resulting temperature mainly depends on the melting temperature and actual mass of the PCM. To raise thermal conductivity, the experts working on the project modified the PCM and developed a PCM substance using graphite powder [5, 6, 7]. They packed this PCM substance into so-called macrocapsules so that it could be integrated into the overall. These capsules are produced in a vacuum using welding and they can be combined to create adaptable cooling elements of different sizes. With the HypoTrans overall, they are distributed throughout the suit and their job is to regulate temperature. Once in place, the macrocapsules can regenerate by being cooled down to a level below the melting temperature of the PCM mixture. They are then ready to be used again. Storage is an important aspect with the overall, which has to be kept below the melting temperature of the PCM material system.

The project team comprises experts in research, development, and business, and as a result of the HypoTrans Overall initiative they have successfully developed a robust, self-regulating, and self-supporting patient cooling system that can be used anywhere. The suit makes it possible to induce mild hypothermia in resuscitated patients even during first aid procedures away from a hospital. The experts believe the overall will be particularly useful in situations where trained first aiders are on hand with access to equipment such as automated external defibrillators (AEDs).

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Image left: The HypoTrans Overall
Image right: Macrocapsules

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A Good Way to Drum Up Business

Steinbeis experts provide help with the re-engineering of a stainless steel drum

"We wanted our drums to be even more perfect." This was how the managing director of BOLZ INTEC, Cornelius Mauch, describes his successful innovation project. The business leader from Argenbühl-Eisenharz in West Allgäu has never been one to say he is satisfied with the current state of technology. He is driven by a conviction that drums are crucial for storing and refining liquids and other materials, and as a consequence, he devotes lots of time to making potential improvements to his drums. Mauch finally got to put his ideas into action as part of a collaborative project with a number of other companies from West Allgäu and the Lake Constance Region, as well as Infothek, a Steinbeis Transfer Center in Black Forest-Baar. The result of their development work: an innovative stainless steel drum.

Cornelius Mauch's innovative company employs around 30 people from nine countries and produces thin-walled, round containers made from stainless steel. Aside from designing and manufacturing drums, the firm also makes symmetrical and asymmetrical funnels and pressurized containers. Its products are all produced in house and are usually one-offs, designed specifically to match individual clients. The customer base of BOLZ INTEC includes a number of chemical and cosmetics companies, as well as biotechnology specialists and a variety of leading international pharmaceutical firms.

In addition to the company's innate urge to innovate, ideas and suggestions from its clients have been instrumental in the development of its Best-Cost stainless steel drum, which has already been selling successfully in the market for six months. Tight regulation and the fact that each industry lays down specific requirements with respect to hygiene mean that storage containers are governed by strict specifications. Despite this, the competitive situation in the markets BOLZ INTEC operates in and the fact that its client base mainly comprises medium-sized companies and multinational corporations mean that there is still

strong demand for its products, which have to be as inexpensive as possible. "There's also the aspect that the price of stainless steel on the raw material market is relatively high," explains Mauch, "so striking the right balance between these factors was a challenge. We quickly realized that such a complex project would be best managed by working together with others."

Without hesitation, Mauch grabbed the project by the horns. He sat down with a number of managers and carried out a stock-taking exercise. Even at this point, long-term considerations regarding protection and transportation were extremely important, as Wolfgang Müller, the patent expert and director of the Steinbeis Transfer Center Infothek, recalls: "BOLZ INTEC's innovation project was already well thought through and structured from the get-go, and this made it possible for us at Steinbeis to really get into the fine detail during the WIPANO session – which doesn't always happen to me." Müller also describes the decision to apply for a patent, which was granted two months ago, as "far-sighted and productive."

For Mauch and his team, it was immediately clear that they had a fundamental need to enter into partnership with someone, but the much more complex issue would be to identify the specific areas or processes that would need tackling, which it would probably make sense to outsource. This is where Steinbeis played an important role. As a third-party stakeholder, Müller could draw on his extensive experience and adopt a more objective approach by analyzing which parts of the project should be outsourced and to whom.

It didn't take long to find a suitable partner, and the team set about planning and coordinating next steps. The decision was made to involve SCHERZBERG-INTEC from Überlingen on Lake Constance, mainly due to its familiarity with the needs of the target market. The firm is managed by Bernhard Traube, and as a provider of technical services it has a good understanding of industry in a variety of fields of engineering. Traube assumed responsibility for managing and monitoring the technological aspects of the new drum and product testing. "The partnership was an extremely positive experience for us, not just in terms of the subject matter but also on a personal level – there was a sense of trust between us right from the beginning. The exchange of ideas was continuous, and being able to look at things from the other point of view was as good for BOLZ INTEC as it was for us," says Traube, looking back. After intense discussion between what were now three stakeholders working together, it was decided to involve a further company to optimize the timing of drum production. The aim was to produce at BOLZ INTEC but because the task of coordinating the project would involve a certain level of complexity, if anyone new was brought on board they would have to be based in the local area. The three partners were unanimous in agreeing that MZW should be involved. The toolmaker from Argenbühl is managed by Meinrad Zeh. "MZW has made an important contribution to the success of our joint innovation by developing and producing the tools we need and the production equipment," says Mauch, explaining how certain tasks were shared but also underscoring the important advantages of the two companies being based so close to one another. "Both we and MZW visited each other's premises a number of times to clarify issues and work out ways to make things better. It's just easier if you do it in person next to the machine than if you do stuff on the phone or Skype, or write an email – and it avoids misunderstandings." The processes needed to produce the planned drum were optimized by all four stakeholders in such a way that production times could be significantly reduced, also saving one third of costs but still meeting the quality requirements of each company.

The results of the partnership and the customer benefits speak for themselves. The new product has been designed as a high-standard and inexpensive solution made from stainless steel, available as a lidded or bung container offering remarkable stability and quality, with exquisite finishing. This makes it possible to fill the container several times with materials of a similar quality, without causing any contamination to the contents due to a reaction with the materials used to make the drum. Mulch is confident that "the product will also be a winner with customers who use plastic drums." Compared to standard bung drums, the Best-Cost Drum (as it has been named) offers a significantly lower entry price so it is also ideal for single-usage scenarios. This makes sense when it is not worth returning drums to the sender for economic reasons due to long transportation routes, in which case the drums can simply be recycled. The innovation can also be used in warehousing, for example in the chemical industry for storing ethanol. Demand is so good that the team is planning to introduce further variants to go with the 100-liter and 200-liter drums already available.

Three companies plus one Steinbeis partner – making four stakeholders with a single goal: innovation. Again, the innovation process was extremely complex and multifaceted for this project. Although success depended on a variety of key factors, collaboration between the different partners proved extremely productive. Without bringing in know-how from outside, none of the stakeholders would have been in a position to make the product a success. As such, one essential ingredient of collaboration is trust. Trust is not something that "lights up" between machines, materials, or mathematical formulae, it only lights up between people. The potential offered by the collaborative project extends far beyond the product the stakeholders developed together. This is because the know-how they acquired by continuously exchanging ideas has a lasting influence on the mindset of everyone involved, which has a knock-on effect on later projects, whether they are unilateral or involve partnerships with other stakeholders. Such collaborative projects are about much more than the material aspects of innovation. They actually result in cognitive innovation, which spans many more areas. Without doubt, a win-win situation and good way to drum up business.

Image: Proud project partners: Bernhard Traube (SCHERZBERG-INTEC), Cornelius Mauch (BOLZ INTEC), and Meinrad Zeh (MZW Werkzeugbau)

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Is the World of Work Forming a Chain?

Steinbeis experts examine the anticipated impact of blockchain technology

Within a handful of years, blockchain technology has transformed from a solution for computer specialists and cryptographers into a global phenomenon, now practically mentioned every day in the mass media. Horst Treiblmaier, professor at MODUL University Vienna, and Uwe Umlauff, a project manager at the Steinbeis Transfer Institute for Innovation & Business Creation, have been examining the different ways blockchain technology might affect the future world of work.

The origins of blockchain can be traced back through numerous publications over the last decade on the topics of cryptography and distributed databases. But it required a stroke of genius to create what is now widely referred to in modern media as blockchain: In 2008 a nine-page publication was produced with the unremarkable title Bitcoin: A Peer-to-Peer Electronic Cash System. Written under the pseudonym Satoshi Nakamoto, the whitepaper represented an ingenious amalgamation of existing know-how, and the potential impacts of blockchain technology, which was initially only used for the cryptocurrency Bitcoin, initially remained obscured from view due to the complexity of the technology. By around 2013/2014 Bitcoin started to achieve something that financial experts and economists had considered somewhat unlikely. It had engendered trust and achieved exponential growth, which continued unabated until around the end of 2017. A variety of books on the topic have been published since 2015, many of them targeted at a wider audience. They offer many ideas on the different ways blockchain can be used to solve the political, societal, economic, and environmental problems of our times. One key area that is affected is the world of work, which is already subject to continual change due to increasing levels of digitalization.

In early 2018, Horst Treiblmaier and Uwe Umlauff interviewed 24 experts who are actively working on the development and implementation of blockchain-based concepts as part of the City of Blockchain movement (www. cityofblockchain.org), an association that promotes the interests of blockchain technology in Vienna. The aim of their interviews was to develop different scenarios that summarize the impact of blockchain on the world of work. In a nutshell, the experts were generally of the same opinion and this resulted in three different scenarios, which can be expressed in simple terms: no impact, job losses in low-qualified areas, and

changes in the quality of work.

Some experts believe there is no need to expect blockchain to bring any significant new ideas to the world of work. Not surprisingly, these experts include blockchain sceptics who have general doubts about the underlying applicability of the technology. But some of the experts who were interviewed feel there are some meaningful uses for blockchain in areas such as the financial sector, although they doubt that there will be significant impact on work environments. The second group essentially sees blockchain as a continuation or acceleration not only of progressive digitalization in the world of work, but also the resulting exchange of ideas between people and computers or robots. With blockchain, this could first and foremost affect certain occupational groups in intermediary roles. For example, the immutable and simultaneous access of different types of business partners to blockchain systems could simplify supply chain processes significantly and make them more efficient. This would mean that certain steps within a process that was previously managed by people would no longer be required. Other examples affect intermediaries such as Uber and Airbnb, which themselves have put existing business models under considerable pressure in recent years. In addition, although blockchain will probably only form a small part of the large technology puzzle, the experts believe there could be negative effects on low-skilled workers as manual tasks are replaced due to increasing levels of rationalization. That said, more intellectual tasks could also be increasingly pushed aside by robots and computers.

In contrast to the possibilities pointed out by these two groups, there is a third scenario that postulates that changes in the quality of work would have both negative and positive effects. This group of experts believes that the threat posed by blockchain technology will manifest itself in job losses and a loss of manual work; nevertheless, there could also be a large number of positive effects, such as shifts toward highly qualified and creative work. According to the experts, these developments are easy to predict and as a result, there could be a significant rise in demand for well-educated workers with an understanding of fields like IT and law. So-called smart contracts are one important innovation stemming from blockchain technology. These are rules that are clearly defined by programming code; if an event occurs in line with predefined conditions, the rules are executed automatically. To write such programs, people with new qualifications will be required – people who are not currently available in the job market.

Another area that was looked at in the interviews carried out by Horst Treiblmaier and Uwe Umlauff was how we plan or design the world of work. For example, solutions based on blockchain technology are in a position to simplify how we log time and check performance. The efficiency improvements and more equitable rewards this offers compensate for certain negative impacts, such as increasing losses in privacy and comprehensive monitoring, which a significant number of the interviewees were critical about. Further areas of application that were named are the continuous and objective tracking of qualifications and more simplified payroll processes.

Central features of blockchain, such as the immutability of database entries or uniform views of shared data, are a double-edged sword for the world of work. Overall, the project team felt that these factors could have either positive or negative impacts. The opinions of the experts were divided regarding how extreme impacts will be and in which direction things could go. This once again highlights the need to actively seek and shape solutions that will secure jobs and enhance the quality of work from an employee standpoint. Blockchain technology is just a tool. What's crucial is how this tool is used.

Image: © pixabay.de/geralt

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Franciacorta Discovers How to Introduce Italian Sparkling Wine to the German Market

Steinbeis consultant helps entrepreneur with the launch of a niche product

What's the best way to stage a successful market launch in Germany with a premium Italian sparkling wine that nobody has even heard of? This was the challenge Alexander Heinzelmann, the managing director of Delicatissimo, presented at a startup consultation session with Doris Deichselberger, director of Change Management and Business Coaching, the Steinbeis Consulting Center.

"Champagne's a well-known way to welcome guests or celebrate a special occasion. But are there any alternatives I can surprise my guests or customers with?" This is a question Alexander Heinzelmann remembers well. He heard it from a business partner while on vacation in Italy in 2017 – when he first heard about Franciacorta. Franciacorta not only refers to the Italian province to the southwest of Lake Iseo in Lombardy, it's also the name of a sparkling wine that is only produced in the region. Similar to Champagne, Franciacorta is also produced using bottle fermentation. After visiting a number of wineries, Heinzelmann discovered a small vineyard business called Bonfadini. The passion of the owners for their Franciacorta was palpable and a sense grew in Heinzelmann that he could enter into a partnership with the winery.

First, however, it would be necessary to analyze the target group in the German market and define a pricing strategy for entering the market. During the market analysis it soon became clear that more than 90% of all Franciacorta wine is consumed in Italy and basically no one has heard of Franciacorta in Germany. The possibility of offering a highly exclusive and premium niche product in Germany hardened after extremely good feedback during tasting sessions in Germany, encouraging Heinzelmann to talk about the idea in more detail with the Bonfadini winery. The main topics of discussion were contractual arrangements, exclusivity, usage rights for the logo, any existing marketing collateral, and a handful of other issues.

Once the target group had been defined, the emphasis of the consulting session with the Steinbeis startup advisor shifted toward topics relating to developing and positioning communication instruments. Aside from considering trade shows, it was important to look closely into identifying and reaching out to potential customers. The questions that were asked included: How can I differentiate my products from the competition? How and where can I reach my target group? How can I get my product as high as possible in Google rankings? How can I position the Franciacorta brand successfully in the German market?

Assistance from an experienced management consultant like Doris Deichselberger gave Heinzelmann an important helping hand in entering the market. "Aside from a whole string of pragmatic ideas that really focused on finding solutions, a variety of contacts were lined up from her networks, so the sessions with Ms. Deichselberger ensured that all key points were considered for lining up potential business. At the same time, I picked up tons of suggestions that were a real help during customer acquisition," concludes Heinzelmann. "Not only that, having a third party make a critical assessment of your project makes things a lot better, and it makes you more confident as you get out of the starting blocks."

Doris Deichselberger sees herself as someone who's there to provide a helping hand as startups get off to a successful start. The expert knowledge of a startup consultant can be especially useful with issues relating to the very first steps of market entry. "Every business startup is different. It's important to tailor advice to the individual project and each business founder," says Deichselberger. She approaches the help she gives to business founders with a sense of enthusiasm, not only offering effective support but also working together with startups to work up a strategy in line with ambitions.

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Observing and Understanding in the Volkswagen Autostadt

Steinbeis experts make the logistics process easy to understand for customers

How do they get new cars to people? The pickup center at the main Volkswagen plant in Wolfsburg decided to make its technical processes more clear and easy to understand for customers. To do this, the carmaker turned to the Bremen-based i/i/d Steinbeis Transfer Center (Institute for Integrated Design).

Volkswagen has an Autostadt next to the Mitelland Canal at its production plant. It's an ideal location to introduce visitors, customers, and new car owners to the brands belonging to the VW corporation. With its fascinating architecture, gardens, brand pavilions, art installations, and a variety of entertainment options, the Autostadt has become an internationally renowned tourist attraction.

Many customers who visit the plant to pick up their new cars also drop into the Autostadt. With its pair of 48-meter-high glass towers, each containing around 400 new cars arranged on 20 levels in preparation for automatic delivery, the Autostadt has become a defining feature of the car factory.

Completely autonomously, cars are added to and removed from the twin towers before being conveyed directly to the customer center. To demonstrate the complex processes that underlie the system, the experts at the i/i/d developed a fascinating modular illustration, which not only provides an overview of the technology but also shows detailed views of each individual section, backed up by numbers, facts, and figures.

By combining animated graphics with real-time video sequences and interesting statistics, the sheer power of the system is highlighted, as are the complexity of the control unit and the skills required by the people working in the Autostadt. The technology turns a visit to pick up a vehicle into a brief lesson on the autonomous logistics of production – an amazing demonstration of Industry 4.0!

Steinbeis Transfer Center: Institute for Integrated Design (i/i/d), Bremen University of Arts
In its role as an interdisciplinary research and development center, the i/i/d analyzes, examines, designs, creates, invents, optimizes, advises on, and manages user-centric design innovations.

The focus of its work lies in the planning of communication and interaction (including interfaces, online content, and devices), systems, structures, processes (design on a meta level), and specific design innovations for B2B and consumer markets, brands, companies, products, and interiors.

Founded in 1998 as a research faculty at Bremen University of Arts, the i/i/d has helped companies with its design expertise on over 700 projects. The institute works in partnership with a variety of Steinbeis Enterprises, as well as other kinds of scientific institutions.

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Creative Pioneers in Rural Areas

Katja Wolter, Daniel Schiller, Corinna Hesse (eds.)

2018 | paperback, color | 578 pages, German
ISBN 978-3-95663-167-2 (print)
ISBN 978-3-95663-182-5 (non-print)

About the editors

Katja Wolter has a business diploma and heads up the Institute for Resource Development, a Greifswald-based Steinbeis Research Center. She also works as a lecturer and instructor.

Prof. Dr. rer. nat. Daniel Schiller is a professor of business and social geography at the University of Greifswald and has been director of the Steinbeis Research Center for Regional Economy, Innovation Systems and Municipal Finance (RIK) since 2016. The emphasis of his research lies in the fields of knowledge-based regional development, sustainable regional development, global transformation processes, and municipal finance.

Corinna Hesse has a master's degree in musicology, art history, and German studies. She is an art journalist, media producer, author, publisher, a speaker in the Kreative MV network, and a board member of Kreative Deutschland. The emphasis of her work lies in sharing media knowledge, continuing professional development for creative workers, and the creative industry in rural areas.

Rulers of Time

Gernot Barth, Bernhard Böhm (eds.)

2018 | stapled, color | 84 pages German
Mediation | Quarter III / 2018
ISSN 2366-2336

About the Steinbeis Enterprise

The Steinbeis Consulting Center for Mediation of Business was founded in 2004 and specializes in dealing with conflicts and mediation (primarily within companies), collaborative projects involving more than one company, and public bodies/government administration.

The Leipzig-based Steinbeis Enterprise has been publishing Mediation as a specialist magazine (formerly Mediation of Business) since 2012. There are four editions of the magazine every year with a focus on out-of-court conflict settlement, particularly through mediation. The publication is aimed at families, business, the arts, and government administration, offering a broad and practical entry point to the options offered by dealing with conflicts out of court.

A separate publication on Mediation and Conflict Management has been published since 2015. This publication, based on a magazine called Mediation – Specialist Magazine for Business, Families, the Arts and Government Administration, offers a variety of practical articles showing the options for dealing with conflicts.

Steinbeis Entrepreneur Forum 2018

Steinbeis Foundation (ed.)

2018 | paperback, b&w | 49 pages, German
ISBN 978-3-95663-174-0

About the event

The sixth Steinbeis Entrepreneur Forum took place on July 20, 2018 and was an opportunity for delegates to attend three different talks, including on topics such as digital transformation in former analog sectors of industry, and the things SMEs need to learn from startups to come up with new ideas they can adopt themselves.

The speakers at this year's Entrepreneur Forum were Alexander Sachs, Dr. Gunther Herr, Benjamin Butscher and Johannes Ellenberg. Guests were allowed to discuss individual questions with the speakers during round-table sessions.

The 2018 proceedings contain a summary of speeches given at the Steinbeis Entrepreneur Forum.

Technical Creativity

Rüdiger Haas, Maja Jeretin-Kopf, Christian Wiesmüller (eds.)

2018 | paperback, color | 259 pages, German
ISBN 978-3-95663-128-3 (print)
ISBN 978-3-95663-129-0 (non-print)

About the series and editors

The new series on Technology and Technical Training has been published in collaboration with BAT-Solutions, the Steinbeis Transfer Center under the directorship of Dr. Maja Jeretin-Kopf. This second volume is dedicated to technical creativity. The publication is an opportunity for authors in a variety of specialist disciplines to express their views and highlight technical creativity from their particular perspective. The scientific discussion looks at aspects relating to the psychology, teaching, and technical instruction of technical creativity. This is supplemented by personal insights into people working in completely different professions.

Prof. Dr.-Ing. Rüdiger Haas is the founder and director of the Steinbeis Transfer Center called the Institute for Transfer Technologies and Integrated Systems (SITIS, Karlsruhe). His focus lies in production methods, manufacturing systems, and technical fields of tooling and mold-making.

Associate Professor Dr. phil. habil. Maja Jeretin-Kopf is a project manager at the Steinbeis Transfer Center SITIS and director of the Steinbeis Transfer Center BAT-Solutions and has specialized in the field of knowledge and technology transfer. Further core topics of her research are rational and emotional factors in technical undertaking.

Prof. Dr. Christian Wiesmüller is director of technical training at Karlsruhe University of Education and board chairman of the German Society of Technical Training (DGTB). His work focuses specifically on the establishment of a subject offering general technology training and the aesthetic appeal of technology overall.

Management of Growth and Globalization – Volume 6

Werner G. Faix, Stefanie Kisgen, Jens Mergenthaler, Ineke Blumenthal, David Rygl, Ardin Djalali (eds.)

2018 | hardback, b&w | 639 pages, German/English
ISBN 978-3-95663-179-5

About the series and editors

This series of publications takes a close look at the topics of innovation and the optimization of processes, as required to secure entrepreneurial success in an increasingly fast-moving business environment. It examines a diversity of projects, also providing insights into the implementation of innovative ideas and the approaches adopted when dealing with the challenges of growth and globalization.

The School of International Business and Entrepreneurship (SIBE), an international business and law school belonging to Steinbeis University Berlin (SHB), is headed by Prof. Dr. Dr. h. c. Werner G. Faix and Dr. Stefanie Kisgen. SIBE has been offering master's degree programs since 1994 and currently has 800 enrolled students, over 4,200 successful alumni, and more than 350 partner enterprises. Dr. Jens Mergenthaler works as a project manager for scientific projects and is the academic coordinator of the PhD program at SIBE. Ineke Blumenthal is director of the SIBE management master program. Prof. Dr. David Rygl is the academic dean and program director of the MSc International Management degree at SIBE. Dr. Ardin Djalali is the director of the international & MBA program at SIBE.

Also available as an e-book:

Energy Efficiency in Manufacturing

Georg Kleiser

2018 | E-book (PDF) | 317 pages, English
ISBN 978-3-95663-180-1

Digitalization Options in Real Estate Evaluation

Thomas Bühren

2018 | E-book (ePUB) | ca. 80 pages, German
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The platform provided by Steinbeis makes us a reliable partner for company startups and projects. We provide support to people and organizations, not only in science and academia, but also in business. Our aim is to leverage the know-how derived from research, development, consulting, and training projects and to transfer this knowledge into application – with a clear focus on entrepreneurial practice. Over 2,000 business enterprises have already been founded on the back of the Steinbeis platform. The outcome? A network spanning over 6,000 experts in approximately 1,100 business enterprises – working on projects with more than 10,000 clients every year. Our network provides professional support to enterprises and employees in acquiring competence, thus securing success in the face of competition.

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