TRANSFER

THE STEINBEIS MAGAZINE **01|21**

Steinbeis

STEINBEIS: A PLATFORM FOR SUCCESS

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.

Our network provides professional support to enterprises and employees in acquiring competence, thus securing success in the face of competition.

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DEAR READERS,

"Europe is the global leader when it comes to green growth." That is neither a vision, nor a goal for 2050 – it's the Green Growth Index 2020's finding.

In all four categories – resource consumption, social inclusion, green economic opportunities, and natural capital protection – the index certifies Europe as leading the way.

This validates the legitimacy of the European Green Deal as an economic growth program. In Europe, we have an abundance of utterly needed innovations and technological expertise, and investment programs will also now provide the funding needed to share and leverage on both innovation and expertise. For example, the Important Projects of Common European Interest (IPCEI) are already supporting new value chains in Europe in the battery, microtechnology, and hydrogen sectors.

One thing we've learned from the pandemic is how important it is to build European alliances between its different regions. Forming networks between the different ecosystems – in terms of innovation, economic collaboration, the joint development of suitable framework conditions, and the strengthening of synergies – will help raise potential investments, innovation capabilities, and growth opportunities in what is still the world's largest market: the European single market.

Launched in January 2021, Horizon Europe, the European research and innovation framework program, provides an important vehicle for industry and society as a whole to support such alliances in all kinds of areas. Public procurement on European level can also support innovation-driven companies in gaining access to new markets with their new products and services. Among other things, the European Innovation Council (EIC) is working on forging closer links between innovation ecosystems and making better use of public procurement.

With our experience and top performance in innovation we should get ready to support the development of European ecosystems, which are not yet that successful in generating innovation in their industry. Therefore, if Europe wants to stay ahead and in the top range of Green Growth, we need to join forces among all European Innovation Ecosystems.

This latest edition of TRANSFER Magazine highlights the potential challenges posed by future ecosystems and explores possible ways to make it a reality. Let's work on this together!

With kind regards

DR.-ING. PETRA PÜCHNER
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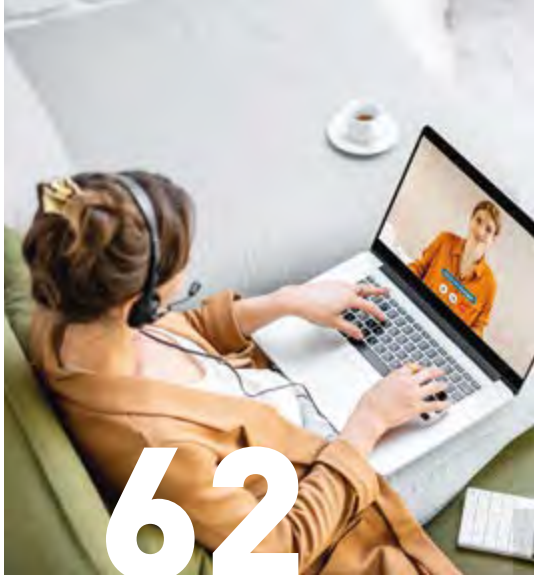
Since 2018, Dr.-Ing. Petra Püchner has been the Commissioner for Europe of the Baden-Wuerttemberg Ministry of Economic Affairs, Labor, and Housing. Her focus in this role lies in bolstering the innovative power of the economy in Baden-Wuerttemberg and making the most of European research and innovation capacity and initiatives. As head of the Steinbeis-Europa-Zentrum, she has been contributing to the Steinbeis Network with her expertise and experience in European cooperation for many years.

Steinbeis-Europa-Zentrum (Stuttgart)
www.steinbeis.de/su/2016 | www.steinbeis-europa.de



CROSS-SECTION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THE ECOSYSTEMS OF THE FUTURE – A MAJOR CHALLANGE

It could hardly be more challenging to meet the **REQUIREMENTS** of future **ECO-SYSTEMS** – not just environmental, but also business ecosystems, which will need to be **SUSTAINABLE** for **GENERATIONS** to come and make the future a 'livable' place for all. Meeting requirements poses a number of huge **CHALLANGES** – all at the same time – just two of which are finite **RESOURCES** and conflicting economic **INTERESTS**. But there are some promising **IDEAS** out there that already address these challenges – on environmental and economic levels – not only concerning **RAW MATERIALS** but also offering **BUSINESS MODELS**. In the articles that follow, our authors show how the Steinbeis Network is working on **ADDING TANGIBLE VALUE** for business, science, and society in order to pave the way for an **ECOSYSTEM** that delivers genuine **BENEFIT TO ALL** and becomes a reality of the future.

"WE THINK BACK FROM THE PERSPECTIVE OF THE FUTURE"

STEINBEIS ENTREPRENEURS KERSTIN SCHENK AND PROFESSOR DR. ESIN BOZYAZI TALK ABOUT THE CHALLENGES OF SUSTAINABLE BUSINESS MODELS

There is a tendency at the moment to associate the concept of sustainability with nothing more than simply acting in an environmentally friendly manner. But actually, the concept of sustainable action goes a lot further. Its focus lies in the responsible use of finite resources, whatever their nature or origin. As Kerstin Schenk and Professor Dr. Esin Bozyazi tell their clients at Business Models of the Future, their Steinbeis Consulting Center, sustainability must also become part and parcel of business models and corporate strategies. The duo talked to TRANSFER Magazine about the requirements that have to be met with sustainable concepts.

Hello Ms. Schenk. Hello Professor Bozyazi. The focus of your work lies in sustainability as a model for the future. Why did you decide to take this approach?

Esin Bozyazi:
If you consider our backgrounds, it was a fairly obvious next step. In addition to founding our Steinbeis Consulting Center, in 2015 I co-founded the Institute for Social Sustainability. From an ecological point of view, there's no questioning the rationale of sustainability. Now we've added social sustainability. I've returned to an area where I can add value for society and nature. Ultimately, that's what business models are all about.

Kerstin Schenk:
It's the same with me – part of my personal history that has evolved into a passion in life. I've always been involved in projects to do with sustainability, or developed sustainable work cultures.

This topic has been with me for more than 15 years now. I think Esin and I are both the kind of people who think about things from the perspective of the future. When you do that, you can't help but embrace sustainability as a topic. We're not trying to pick low-hanging fruits or get quick-wins, we're striving for things that give us long-term solutions and change society – whether that's at the workplace or in our personal lives.

EB:
Of course not all companies think about things from the perspective of the future. Some simply ask themselves what they can do now in actual terms. But the UN's Sustainable Development Goals have been pointing out the way ahead for a long time now, and a lot has already changed in society. To a certain extent, we've reached social consensus. For example, we're now finally tackling the climate problems we brought upon ourselves.

Why do you say companies should focus strictly on sustainable business models?

KS:
Viewed through marketing glasses, naturally there's always a danger that sustainability will just get used for branding purposes. But I still believe society and customers are now well-informed enough for people not to fall for it. It's also not the approach we're taking. If you look at the changes in values in our society, the kinds of issues that are becoming increasingly important are topics like health and environmental protection. This is an area – and thus a USP – that's bound to become more relevant in the future.

It's a phenomenon of our age, one that's become much easier to do your homework on. Things that used to be practically veiled in mystery – like production processes or how companies actually do business – are becoming more and more transparent and accessible to or understood by the general public. I strongly believe that future customers will increasingly want to know if companies are operating sustainably before they buy products.

EB:
Companies invest a lot of time and effort in the sustainability side of their business models, not only when it comes to human-centered thinking but also with regard to what their customers want. New technology, speed, but also the short cycles of business offer us new ways to design business models.

Customer wishes change, and technological development changes. So you have to keep an eye on how you keep your business model moving forward – for example, the payment options you offer: What impact will bitcoin, blockchain, or paying with an iPhone have on people? Developing business models takes all kinds of factors into account, from production to payments, and it makes adjustments in order to respond to innovations.

KS:
Should we come at it from another angle for a moment and ask ourselves what a business model is in the first place?

A business model is a cognitive model that attempts to capture as comprehensively as possible the activities and fields a company has to deal with these days, and which issues have to be managed. It's essential to think sustainably in all

THE UN SUSTAINABLE DEVELOPMENT GOALS (SDGS)

In 2015, the United Nations defined 17 fundamental goals for sustainable social, economic, and ecological development as part of the 2030 Agenda:

1 No poverty
2 Zero hunger
3 Good health and well-being
4 Quality education
5 Gender equality
6 Clean water and sanitation
7 Affordable and clean energy
8 Decent work and economic growth
9 Industry, innovation, and infrastructure
10 Reduced inequalities
11 Sustainable cities and communities
12 Responsible consumption and production
13 Climate action
14 Life below water
15 Life on land
16 Peace, justice and strong institutions
17 Partnerships for the goals

Source: https://sdg-portal.de/de/

VIEWED THROUGH MARKETING GLASSES, NATURALLY THERE'S ALWAYS A DANGER THAT SUSTAINABILITY WILL JUST GET USED FOR BRANDING PURPOSES.

areas, because we live in a highly agile world and short-term quick-wins are changing – faster and faster. If you also want to be future-ready and secure competitiveness in this area, it's important to adopt an approach based on sustainability.

What are the most important milestones when developing sustainable business models, but also the biggest obstacles?

KS:
When I hear milestones, I always think about roadmaps, and there's already a roadmap for sustainability in the form of the UN's SDGs, which we should use as orientation. You don't have to reinvent the wheel. You can break these overarching goals down into each individual area of your business model.

EB:
Absolutely. The obstacles we encounter are managing the supply chain and buying in the right resources from the right suppliers – intentionally or unintentionally. We see our role in this as building awareness. If you sell electric cars as something sustainable, but the batteries are produced in South America under the worst possible conditions and resources are ruthlessly depleted on a grand scale, that's not exactly socially sustainable. As a producer, this presents you with a problem: Where can you obtain the resources you need and do this truly sustainably – and can you find suitable ways to process them?

Sometimes the technology you require to do this is available; at other times it may be available, but it's too expensive to meet customer requirements. This is another aspect where we want to create a so-called circular economy – without compromise: If something is brought into the cycle of business, it must be as socially, sustainably, and ecologically acceptable as possible. Presently, developing 100 percent sustainable business models and processes is still a major challenge.

KS:
This may sound contentious, but I think companies don't think things through properly when it comes to the circular economy. The thinking stops when they get to the end of the business process. But if you're a business leader, you have to think beyond the value chain, not just in terms of your core competences. This is a way of thinking and a mindset you don't find everywhere. It's something we need to get into companies, into people's heads, especially in the corridors of management.

EB:
And this is exactly where we come in and try to instill this culture within companies. To do this, we come along with a number of new ideas and consulting methods, which allow us to plan things in collaboration with the company.

What do you think of the current situation? Are we making good progress in making companies more sustainable?

KS:
There are some good examples of this, and more and more are emerging in the startup scene. We use the search engine called Ecosia; it creates green electricity. But you have to look below the surface to work out how sustainable it really is. I think we've made progress in some sectors of industry, but there's still a lot to do in others. We're still getting out of the starting blocks, but at least the overall process is underway.

EB:
Too many things still feel like marketing. And of course sustainable thinking shouldn't just be lived out and believed in at companies, it should also be part of our private lives. Some of the methods and conditions are in place and they look promising. All that's missing now is the right mindset and coherent action! But we're happy to offer help with this – to medium-sized and large companies.

KS:
Our central concern is not just thinking about this topic in the right way, but actually doing something. We call ourselves co-creators and we tackle things in the same spirit!

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NETWORKNATURE: CONNECTING EXPERTS FOR CLIMATE PROTECTION AND SUSTAINABILITY

STEINBEIS OFFERS PLATFORM FOR EXCHANGING VIEWS ON NATURE-BASED SOLUTIONS, PROJECTS, AND BEST PRACTICE

A nature-based solution (NBS) is the term used by the EU to refer to natural or newly created processes that leverage the positive benefits of nature and intact ecosystems to foster sustainable development, particularly in cities. Such solutions will be crucial for implementing the European Green Deal and Biodiversity strategies. Following a call for tenders issued by the European Commission, Steinbeis 2i and a consortium of four further partners were asked to work on the NetworkNature project. The Steinbeis experts are helping to set up an NBS platform and will be providing support with its launch by developing new NBS business models.

It's a hot summer's day in the city. To escape the intense heat you decide to seek refuge under trees in a park – sound familiar? Above you, a green canopy of foliage opens up and you immediately notice the drop in temperature. We owe this cooling effect to shadowing, evaporation of water and photosynthesis. Plants extract heat from their environment and convert CO_2 into oxygen, which we breathe in. It's a sensory experience that shows how important plants and their unique processes are in our lives.

Sustainable urban development, restoring degraded ecosystems, climate change mitigation, and adapting to climate change were already central to the work carried out by a European expert group on "NBS and renaturing cities," which met regularly as part of the EU's Horizon 2020 program. In December 2020, the German Federal Ministry for the Environment joined forces with the EU and other high-profile international stakeholders to organize a Green Deal event aimed at sending a clear signal:

Protecting intact and restoring degraded ecosystems must be a central element of both the European Green Deal and international policy in the EU. Without NBS's, neither climate protection and adaptation goals, nor the preservation of biodiversity will be achievable.

NBS's pursue multiple goals, simultaneously offering ecological, economic, social, and cultural benefits. They leverage the positive benefits and influences of intact ecosystems. For example, they help protect and restore woodland, peatland, and soil, they pave the way for deforestation-free supply chains, and they allow nature reserves for endangered species to be expanded.

All of these measures have an equally positive impact on a slew of further sustainability goals.

URBAN FORESTS PROTECT THE CLIMATE AND PEOPLE

Steinbeis 2i has been involved in the NetworkNature project since the middle of last year. The aim is to establish a platform not only for pulling together recent research results, examples of best practice, and information, but also to promote networking. Resources offered online will be supplemented with events, sources of know-how, and recommended areas of action for certain target groups. Every six months a different focal topic will be featured. The platform concept is based on a community of more than 30 EU projects, which has already allowed knowledge gaps to be plugged and good examples to be shared.

One example of a city that has already become involved in a European urban

forestation research project is Gelsenkirchen. Its focus lies in the kind of arboricultural green infrastructure found in forested parks, urban woodland, and trees in public and private spaces. Such green infrastructure is massively important for the natural ecosystem, the climate, sustainable urban development, and human health. The focus of the research work and examples of best practice in Gelsenkirchen lies in an area of woodland on industrial land in the Rheinelbe district of the city, as well as a biomass park at the former Hugo colliery.

Gelsenkirchen is hoping urban woodland will bring about infrastructure changes resulting in social and ecological benefits.

CLIMATE PROTECTION NEEDS STRONG NETWORKS

By offering different ways to forge networks, receive training, and participate in events, Steinbeis 2i is encouraging different stakeholders to get in touch with new target groups.

For example, it offers a matchmaking area to allow project partners to offer services to a variety of target groups, including business leaders, managers of natural resources, landowners, urban planners, construction planners, and young people.

One such example was The Nature of Cities (TNOC) Festival on February 22-26, 2021, which offered new ways of looking at things and looked beyond the horizon at radical cities of the future.

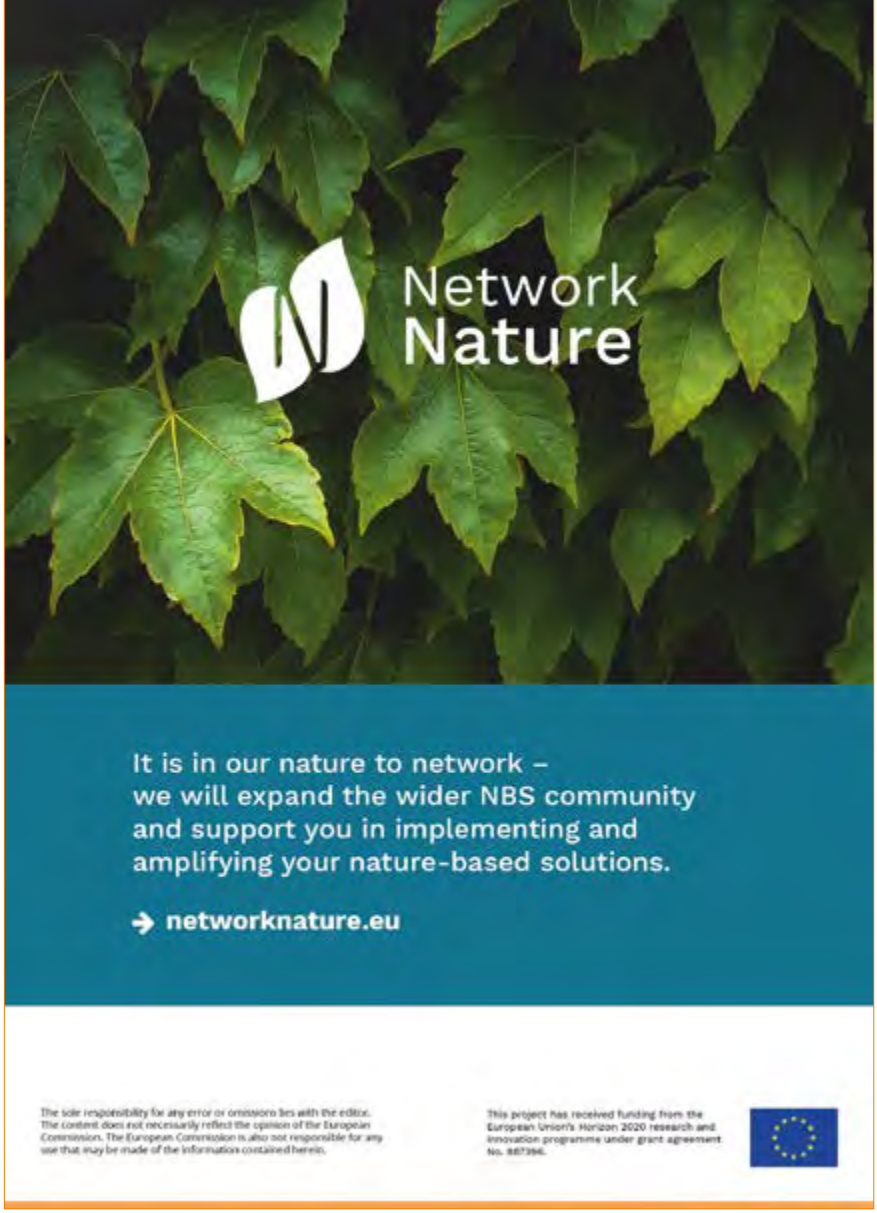
The virtual festival was organized in all regional time zones and staged in multiple languages, offering different ways to link local ideas with concepts on a global scale, adopt a much wider perspective, and appeal to a wider audience than was possible in the past in face-to-face situations in a city.

A platform for local, regional, and international collaboration

THE CORNERSTONES FOR IMPROVING CLIMATE PROTECTION ARE BIODIVERSITY IN URBAN AREAS, SUSTAINABLE AGRICULTURE, CONTROLS ON AIR POLLUTION, AND SUSTAINABLE TRAVEL SOLUTIONS

Steinbeis 2i GmbH is working on the NetworkNature project with four other partners: ICLEI Europe – Local Governments for Sustainability (Germany), the International Union for Conservation of Nature (IUCN) (Switzerland and Belgium), BiodivERsA (France), and Oppla (Netherlands). The team's expertise in sustainability, research, business strategy, public policy, and communications is well equipped to promote the expanding global community working on nature-based solutions. The goal is to scale up activities, drive NBS implementation and expansion, and provide access to resources, projects, examples of best practice, and different tools from a single source.

It will also be important to enter into dialog with political decision-makers in various areas with the aim of identifying solutions to the challenges of the Green Deal on a local, national, and European level.The cornerstones for improving climate protection and achieving the goal of climate neutrality by 2050 will be laid by biodiversity in urban areas, sustainable agriculture, controls on air pollution, and sustainable travel solutions. The project partners will bring together researchers, entrepreneurs, and experts in industry (engineering, construction, urban planning, landscape planning, natural resource management) who have already developed promising solutions in this area and offer the potential to boost communication in the scientific community. This should also make the topic more accessible to the general public.



SUPPORT FOR SMES

Steinbeis 2i is particularly eager to reach out to European SMEs by offering market assessments and support with the development of new business models, for example for manufacturers of building facades and suppliers of roof greening, tree planting, urban water, or urban farming services. To stimulate co-creation initiatives and the processes of internationalization, training courses are being designed and companies are being put in touch with investors.

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"IN ESSENCE, THE IDEA IS TO FUNDAMENTALLY MOVE FORWARD WITH YOUR COMPANY COMPETENCES"

AN INTERVIEW WITH PROFESSOR DR. CHRISTOPH ZANKER, STEINBEIS ENTREPRENEUR AT THE STEINBEIS TRANSFER CENTER INDUSTRIAL INNOVATION AND TRANSFORMATION MANAGEMENT

Some companies are taking the current recession as an opportunity to reorient themselves. The famous German Mittelstand is particularly likely to benefit from business ecosystems, says Professor Dr. Christoph Zanker. As an innovation consultant and Steinbeis Entrepreneur at the Steinbeis Transfer Center Industrial Innovation and Transformation Management, for over a decade he has helped numerous firms build up such networks. As a result, he knows exactly what to look out for to ensure choosing a business partner doesn't become a matter of luck.

Hello Professor Zanker. Many companies are struggling to stand firm with their core business at the moment. Is it even possible to think about new products and transformation processes in such situations?

My perception is that this is precisely the issue most industry decision-makers are grappling with. They're right to do this, because the current pandemic is

having a catalytic impact on many areas. Radical changes are going on, fueled by latent but foreseeable technologies – or market changes. Many companies know all too well that the competencies that previously underpinned their ability to innovate, create, and generate earnings will be partially – or in the worst case: completely – devalued after the crisis.

Can you provide an example of this?

Take maintenance or repairing complex machinery: Who would have imagined, even a year and a half ago, that all of a sudden it would no longer be possible to send out service technicians to any place in the world? But that's exactly what has happened. Practically overnight, lockdowns and travel restrictions have heightened demand for data-driven remote services. The technology and applications were already out there, but they were exotic ideas with very few users. What's now managed to establish itself won't simply disappear again after the pandemic. If anything, we can safely assume that remote services will become standard practice over the next two or three years. Within no time, a comprehensive network spanning lots of local service units – which used to offer genuine competitive advantage – will only have half the value it used to.

So what advice would you give to firms having to deal with these changes?

Most firms know that after the crisis, sooner or later there's a danger they won't be able to keep pace with market demands. Closing ranks, covering as much value creation as possible in-house, or putting risky innovation projects on the back burner are all the kinds of things you would read in management manuals, and at first glance they look like the right tactics. But they're exactly what could be fatal for companies, and it doesn't help with everyone saying you should "disrupt yourself." Asking "what" or "how" is anything but trivial. A tier three ultra-precision parts manufacturer doesn't become a data-driven supplier of medical technology overnight. But that's not the point, far from it. The goal should be to open up to new technologies, develop new applications, and establish service offerings that deliver benefit for existing and new customer groups. And that has to happen quickly.

In essence, the idea is to fundamentally develop company competences, to shift emphasis, and to add to them in order to plug the gaps. Basically there are two options. One is to build up the required skills yourself, although that's a long, drawn-out process and there's a significant risk when you only back one horse with your resources, especially if things are highly uncertain. You would be better advised to place more emphasis on business ecosystems, especially with complex, hybrid, or data-driven services.

Companies joining forces to offer new services is nothing new. So why is this any different to an ecosystem?

Ecosystems clearly go beyond conventional customer-supplier relationships. They're ongoing partnerships between different stakeholders with a common goal, namely to develop and deliver new and innovative services. So ecosystems are not sequential chains, they're much more akin to a network. The way different stakeholders interact with each other is more intensive, especially when it comes to knowledge-sharing, so there's an even stronger emphasis on innovation. There are significantly lower power imbalances between the companies. So each stakeholder becomes more important for the overall service on an individual basis, and that makes them less substitutable.

RADICAL CHANGES ARE GOING ON, FUELED BY LATENT BUT FORESEEABLE TECHNOLOGIES – OR MARKET CHANGES

That sounds like a good thing, but in your experience, why do so many companies have such a hard time finding partners?

I often encounter two extremes: More conservative companies appoint someone like a collaboration manager or, at best, a new business task force that should "finally take care of things." The supposedly progressive firms go for co-working spaces and innovation hubs and extol the virtues of a new value-based culture of failure, one that allows cooperative innovations to emerge – although at best, if they do, it's probably by chance. In practice, both approaches are aberrations because they do not bring about any substantial changes. Innovations don't come about because managers start walking around in white sneakers, and you don't build up ecosystems by allowing things to happen by chance – they're the product of a clear vision and goal. They're 98 percent hard work and, above all, plannable. The organization has to pull on lots of little and large levers, systematically, in coordination. You have to define the role you want to play within the ecosystem, new innovation processes need to be set up, and you need to put the right interfaces in place – internally and externally. These interfaces are characterized by so-called boundary spanners, across several different companies, and these support collective innovation processes, developing a common foundation of knowledge and channeling energy internally and externally so it can be leveraged.

Isn't it a bit dangerous sharing everything you know?

It is, yes, but you could say that about any business relationship. What matters is what you do with it, especially with ecosystems. You have to be clear about how strongly you depend on the input provided by the other party. If a partner drops out or starts seizing at opportunities, an entire portfolio of services can break down. But also, it sometimes makes sense for companies that used to be competitors to start collaborating. It's not impossible, but it does require different tactics and approaches. In a nutshell, there has to be a continual and very deliberate weighing up of opportunities and threats, and your company has to be organized to be open, otherwise you can't leverage external competences.

How does that work in concrete terms?

Here's an example: I had the pleasure of working over a three-year period with a medium-sized manufacturer of standard heating elements for white goods. It was a classic low-tech product and customers were increasingly being lost to low-wage countries, so the outlook was pretty bleak. The company had a choice – change, and build up huge innovation capabilities, or keep plodding along. By building up its own development competences, but above all by joining forces with other manufacturers and technology suppliers, it succeeded in developing a range of sophisticated hightech applications and a much broader, customer-specific portfolio of services. The company has undergone comprehensive transformation and it's now doing an excellent job in supplying the network with hightech applications for the mechanical engineering sector. If you do things systematically, setting up those kinds of ecosystems and the transformation it involves aren't rocket science, even for SMEs. Often, all you need to get some quick wins is someone to create impetus and a bit of support from outside with structuring.

An increasing number of big companies are now working with start-ups. Is that also a good thing for small and medium-sized enterprises?

Definitely – yes. In my experience, such partnerships often work much better than with big players. There are three main reasons for this. First, despite the number of people who say it won't work, SMEs are really good at adapting and they have a genuine interest in long-term partnerships and offering mutual support. Second, there's a much more symmetrical balance of power between the collaboration partners. New companies are often in a position to open new doors for SMEs in digitech areas, and at the same time they benefit from being able to work on actual use cases and gaining access to markets. Last but not least, the innovation culture at SMEs and start-ups is much more similar than between large companies and startups, because the focus always lies on coming up with concrete solutions and not just boosting your image.

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"THERE'LL ONLY BE A WIDESCALE RETHINK ONCE THE COSTS REALLY START TO HURT AND PEOPLE ARE SHOWN ALTERNATIVES"

AN INTERVIEW WITH STEINBEIS ENTREPRENEUR AND POWER ENGINEERING EXPERT DR.-ING. THOMAS FREITAG

It's easy to be critical of the "Greta effect," but one thing's for sure: The young climate activist has brought enormous publicity to climate change. Nonetheless, this will not be enough to bring about a long-term rethink in society and business, says Dr.-Ing. Thomas Freitag, Steinbeis Entrepreneur at the Steinbeis Transfer Center for Power and Environmental Engineering. His work at the center revolves around the development of complex energy concepts and energy management with the aim of minimizing energy requirements. He spoke with TRANSFER Magazine about the actual challenges we face in confronting climate change.

Hello Dr. Freitag. Managing energy resources responsibly is becoming an increasingly important issue for companies, but also for cities and local authorities. What do you see as the biggest challenges in this area?

One problem is that even in positions of decision-making you still find people who don't believe anthropogenic climate change and the problems it will create for us in the future area actually real, or something shaped by civilization. In some cases, there's a frightening lack of interest in these issues. Also, using energy resources responsibly is considered to be something that has financial implications. It's difficult to implement projects when people approach business from a short-term perspective, or they think there are high costs, or there's little potential to save money. Very little has been done until now to tackle the consumption levels of existing properties, since the costs associated with energy-saving measures can't be passed on to building occupants.

If the follow-on costs of generating energy from fossil fuels and nuclear energy were included in energy prices, they wouldn't be as low as they are at the moment. But unfortunately most so-called eternity costs are still passed on to society as a whole, because they're borne by the state.

Lots of companies are having to deal with the issue of energy saving at the moment, for both economic and environmental reasons. How would you recommend they approach this issue?

The first thing you should do is conduct a fundamental stocktaking exercise. There are some very lucrative subsidies out there, for a whole host of companies. My advice would be to bring competent experts on board who understand current technology, but also legal requirements. Time and again you see projects going badly in terms of financial viability or for technical reasons because they simply weren't planned properly.

What do you believe can be done to answer growing international de-

mand for energy, not just now but also in the future? Will it require a rethink in the economy and society?

The economy and society are extremely sluggish, so a change in thinking will only come about if other stakeholders impose drastic measures. The carbon pricing system launched this year is a first good step in the right direction. But there'll only be a widescale rethink once the costs really start to hurt and people are shown alternatives. Or we'll just have to wait until climate change has such a big impact on us human beings that we're forced to act. Unfortunately, our actions will then just amount to damage limitation.

Of course it's crucial to use energy efficiently. But it also has to be acknowledged that our fundamental lifestyles do necessitate a certain degree of energy consumption. Whether radically rethinking transportation systems and welfare is actually realistic is something I doubt at the moment. What would be important is that the leading industrialized nations work together and coordinate things to prevent the energy-intensive sectors of industry wandering off to other countries.

Of course meeting energy demands in a way that matches requirements is an important prerequisite for social prosperity. So inevitably, this will be more difficult if you have a heterogeneous energy system rather than a small number of large energy providers.

But as we can see from current developments, this is an issue that can be solved by control engineering.

What role does digital transformation play in this?

The last point I mentioned – coordinating the overall energy system, from controls to consumption – will only be possible with a certain degree of digitalization.

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GREEN HYDROGEN – FROM VISION TO REALITY IN FORTY YEARS

KEY TECHNOLOGY REPRESENTS AN IMPORTANT MILESTONE ON THE JOURNEY TO CLIMATE NEUTRALITY

Solar PV installations on buildings in the climate neutral district "Neue Weststadt" in Esslingen

Fossil-free and no longer dependent on oil – around 40 years ago, that was the vision of energy supplies in the future. Leading research institutes were working on this topic at that time as part of funding programs organized by the German Research Ministry (now called the Federal Ministry of Education and Research). The solar hydrogen economy is therefore nothing new in Germany. So how does this explain the current hype regarding "green" hydrogen? What has changed over the last four decades? Professor Dr.-Ing. Manfred Norbert Fisch of the energieplus Steinbeis Innovation Center examines this question. He is convinced that one of the key technologies for a zero carbon footprint in Europe will be based on water electrolysis, which will be used to convert electricity surpluses resulting from renewable energy into green hydrogen. The name for this concept: power to gas.

Forty years ago, the key priority was to find alternative energy sources to replace petroleum in the chemical industry in order to enter a post-oil era. Using hydrogen as a secondary source of energy – produced through solar and wind energy – was seen as a panacea for the future. The technical means were already within reach, but producing electricity from renewables was far too expensive. In the meantime, the goal posts have shifted. The priority now is to optimize the costs associated with cutting anthropogenic carbon emissions and minimize the impacts of climate damage. There has also been a dramatic drop in the price of electricity generated by solar systems and wind parks. In Germany, green electricity can be produced for less than 5 ct/kWh; in Southern Europe it costs 3 ct/kWh.

GREEN HYDROGEN – KEY TO THE ENERGY TRANSITION

According to Steinbeis expert Manfred Norbert Fisch, the goals of the green energy transition in Germany, which were drafted by the Federal Ministry for Economic Affairs and Energy in 2010, and the ambitious EU climate goals captured in the 2019 Green Deal are only just achievable, but only if there is

Delivery of an electrolyzer in the Neue Weststadt in Esslingen

a rapid expansion in the construction of photovoltaic systems and wind farms.

The required power plant capacity from renewable energy (RE) in Germany will rise by at least 500% (factor Five) by 2050 compared to the current level of approx. 110 GW. This is the same percentage as the rise in non-usable electricity surpluses resulting from fluctuating supplies of RE. As a result, green hydrogen is a key factor for the transition to alternative energy sources. Electricity surpluses should not be "regulated away," as is currently the case, but converted into hydrogen for use as a chemical energy source (power-to-gas). This green hydrogen (H_2) could replace carbon in many processes. For example it could be used as a reducing agent in steel production. Synthetic methane and synthetic fuels can be produced from H_2. It can also be used in fuel cells for conversion back into electricity.

In addition, green hydrogen will be needed in the coming years to decarbonize industry and transportation. At around 33 kWh/kg, its energy density is roughly three times higher than that of diesel, so H_2 offers significant potential as a fuel – for example in heavy goods transportation. To produce 1kg of hydrogen, 45-50 kWh of electricity are required for the splitting process in electrolysis. A considerable amount of tap water is also needed: roughly 16-20 liters. The heat that has to be dissipated, somewhere between 60 and 65°C, is usually released into the environment. The efficiency level of PEM and alkaline electrolyzers is about 60%. The key advantage of hydrogen molecules is that unlike electrons in batteries, they have zero-loss storage capabilities over long periods of time. This speaks in favor of medium- and long-term storage in green hydrogen, among other things in order to cope with feared "quiet periods," when no energy can be produced by wind and solar energy farms due to a lack of wind or sunshine.

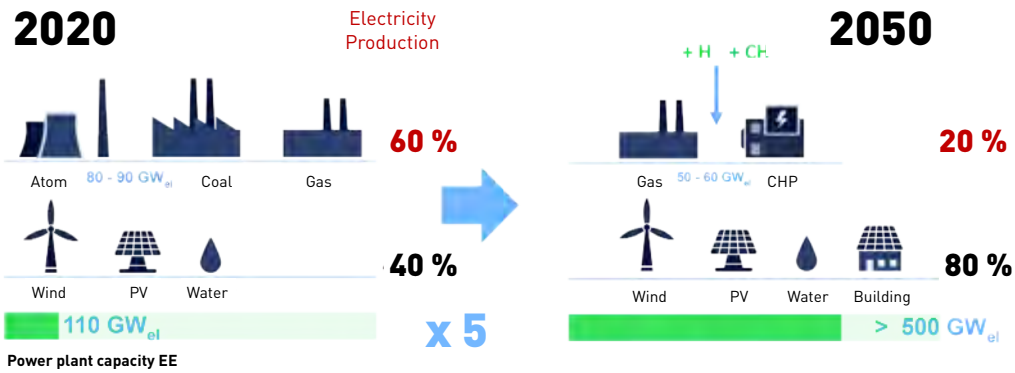
THE TIME TO ACT IS NOW

The current hype surrounding green hydrogen is fueled by the German government's National Hydrogen Strategy. Germany's aim with this strategy is to become a world leader in hydrogen technology in the areas of electrolysis, fuel cells, H_2 infrastructure, H_2 filling stations, and H_2 gas stations. It's an ambitious goal and to achieve it, German engineering will be needed as well as innovative companies that are willing to take risks so that production capacity can be built up to provide many gigawatts of power in Europe. By 2030, €7 billion will have been earmarked to ramp up projects in Germany, plus €2 billion for investments in "sunnier" countries. To create future-proof jobs and export green electricity and hydrogen to central Europe, it would be necessary to use a large part of the EU's €750 billion economic stimulus program as part of the Green Deal in order to develop industry and promote initiatives in Southern Europe. It's less important how much of the estimated demand for hydrogen in 2050 (around 15 million tons of hydrogen) will be produced in Germany and Europe, or imported from abroad; it's more important to understand that now is the time to act. Roadmaps and studies on various scenarios don't move things forward, they only eat into the time we have left to start doing something. The technology we need to produce green hydrogen is already available, it just needs to be made use of.

The approach of asking how much green hydrogen should cost compared to conventionally produced hydrogen – €1.50 or €2 per kilo – is completely out of touch with future oriented thinking. Asking this question in the context of the German government's climate protection plan gets us nowhere. Instead, the issue that should be addressed is which cost-effective measures can be applied to achieve the goal. Nevertheless, discussion is required regarding where and with which technologies the large volumes of green hydrogen will be produced, what prices will be offered to customers, and what impact can be expected on commodities that are produced with it.

ELECTROLYSIS – USING ELECTRICITY TO DECOMPOSE WATER

The cost of green hydrogen mainly depends on the cost of generating electricity, the operating time of electrolyzers, and the investment costs of electrolysis plants. Within years, it will be possible to produce green hydrogen for €3

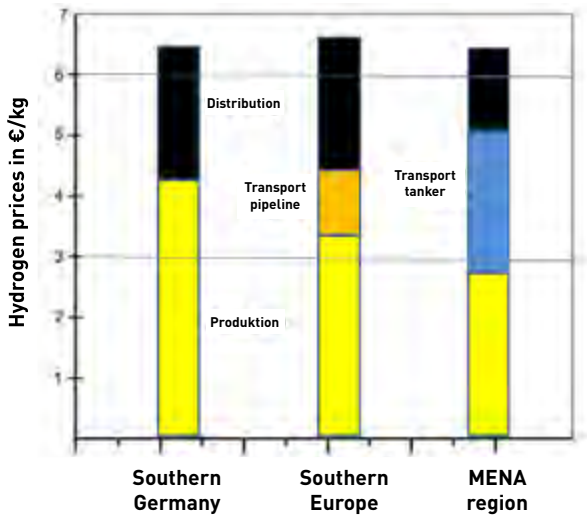


to €5 per kilo. Manufacturing costs for hydrogen will drop by at least two-thirds by ramping up industrial production on a gigawatt scale and making targeted investments of under 500 euros/kW.

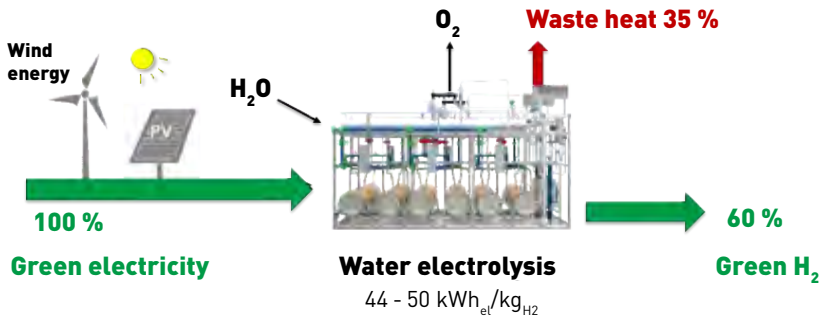
"A major proportion of hydrogen should be produced where the demand can be met directly," says Fisch. Shipping on truck trailers has its limitations, because ultimately a 40-ton vehicle transports a few hundred kilograms of hydrogen (15-20 MWh). The gas grids in Germany are fundamentally suitable for distributing large volumes of hydrogen and conveying it from Southern to Central Europe. During the transition period before 2050, there will be mixed networks accounting for a two-digit percentage of H2. In parallel, dedicated hydrogen networks will connect industrial regions across Europe. How green electricity, green hydrogen and green fuel produced in North Africa or other sunny regions should be transported to Europe is a fascinating challenge in technological, economic, and engineering terms. Producing hydrogen in sunny, arid areas requires large quantities of water, which can mainly be extracted from marine sources, although that also places a major drain on energy. In addition, liquefaction is energy-intensive, transportation is costly and results in energy losses, and such arrangements have geo-political ramifications – monumental challenges for which solutions still need to be found. "According to my calculations, taking into account all downstream expenditures before reaching the customer in Germany, there are no significant price advantages between hydrogen from Germany or Southern Europe and MENA countries," says Fisch. Also, this countries should decarbonize there one industry first, before they export green energy. The questions that then remain relate to space potential and acceptance among the population for building the required wind farms and photovoltaic installations in open areas. Expanding PV and wind farm capacity to 500 or 550 GW would not present space problems in Germany. There are sufficient roofs and empty spaces for PV systems. 250 GW of photovoltaic systems would cover the equivalent of only 2 or 3% of agricultural land, without taking usable roof areas into account.

Another advantage of integrated electrolytic hydrogen production in Germany is that it offers the possibility to use waste heat generated in the process of supplying buildings and neighborhoods. Around 30% of used electricity is converted into heat. This significantly improves system efficiency from around 60 to almost 90%. If only half of the green hydrogen required in 2050, i.e. around

Hydrogen prices for customers



Required expansion of PV and wind energy capacity (2020 to 2050)



Energy performance of hydrogen electrolysis

7.5 million metric tons per year, is produced in Germany, this will result in usable waste heat of around 110 TWh/a. This is roughly equivalent to current district heating levels and is enough to supply heating to around 14 million energy-refurbished homes. There is therefore considerable potential on a number of fronts, which can be leveraged with existing concepts.

THE JOURNEY TO BECOMING A CLIMATE-NEUTRAL CITY

The climate neutral district "Neue Weststadt" in the Baden-Wuerttemberg city of Esslingen revolves around generating domestic power from renewable sources, local hydrogen production, and the waste heat generated in order to supply the city district with heat. The green hydrogen is fed into the city's gas grid, thus contributing to decarbonization of the energy sector. Research will also be carried out into the technical and economic viability of making direct use of energy in the coming years in the transportation and industry sectors. This real-world laboratory ("Reallabor") for researching the green energy transition in an inner-city area measures 12 hectares and will be inaugurated in June 2021.

Currently nearing completion, the district will span around 500 residential properties, offices, commercial buildings, and new buildings for the local university. The aim is to create an urban district that is almost carbon-neutral. Carbon-neutral for this project is defined as achieving annual carbon emissions for housing and travel of under one ton per capita. To achieve this, among other things energy consumption will be reduced, many roofs will be fitted with solar panels (approx. 1,500 kWp PV), waste heat will be recovered from hydrogen production, and imported biomethane will be used in combined heat and power plants (CHP). A key element of the system for supplying the district with energy is a hydrogen electrolyzer with an output of 1,000 kWel. Electricity used in the district will be supplied by PV systems installed on roofs, with a major share coming from generation plants supplying surplus renewable electricity from outside via the national grid. Waste heat from the electrolyzer will be used to meet around half of the heating requirements of housing units, commercial buildings, and the university via a local heating network. This will raise the annual efficiency of electrolysis to about 85 to 90%. Studies are already underway to assess further commercialization options for green hydrogen, such as filling trailers or laying H_2 pipelines to nearby industrial sites.

The project is nearly ready and is one of six lighthouse projects under the auspices of the 6th Energy Research Program organized by the German Federal Government, as part of a funding initiative called "Solar Construction/Energy-Efficient City". Between 2017 and 2022, the project is receiving a subsidy of around €12 million. The enterprise responsible for financing, operating, and marketing green hydrogen and waste heat from H_2 production is Green Hydrogen Esslingen (GHE), founded in 2019. Depending on electricity prices (8 to 10 ct/kWh), it is currently working on the basis of a hydrogen price of 6 to 7 euros/kg. Trial operation is planned until May 2021, when a two-year monitoring phase will begin supervised by the energieplus Steinbeis Innovation Center.

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THE EFQM MODEL – A SIGNPOST TO SUCCESS

THE BENEFIT TO SMES OF MONITORING THE ECONOMIC ECOSYSTEM

The term "ecosystem" was coined by the British ecologist A. G. Tanslye in 1935. It has undergone a number of changes since then and acquired a variety of new facets [1], such that it is no longer just used to refer to the environment, but also other fields. For example, increasing digitalization and networking have given rise to internet-based ecosystems [2], while in business, the term is used to describe the environment in which companies operate [3]. This is the basis of the 2020 European Foundation for Quality Management Excellence Model. Dr.-Ing. Günther Schöffner of the Steinbeis Consulting Center for Business Excellence explains how companies can use the model successfully.

The European Foundation for Quality Management (EFQM) has looked at the fundamental trends of digitalization and radically overhauled the EFQM Excellence Model [4], which has been used for decades by a variety of companies to safeguard their long-term competitiveness [5]. The model has long been used by large corporations, although it is suitable for companies of all sizes and in all industries, including SMEs.

THE ECOSYSTEM AS A FOUNDATION OF SUCCESS

Key starting points for the 2020 EFQM Excellence Model are the business ecosystem and associated challenges in the future [6]. To prosper, a company must not only improve its performance and enhance added value for customers, it must also pay much closer attention to conditions within its ecosystem [7]. Applied to business practice, this means continually analyzing the company's own ecosystem and current megatrends, assessing their impact on the company's mission (purpose), strategy, vision, and results, and as a consequence of this: making appropriate changes [7]. This is only possible if all of the prerequisites of constant change are in place within an organization. This can pose major challenges for SMEs, as they generally have fewer financial and structural resources to fall back on compared to corporations. For them, change is often more about the portfolio or customers rather than on strategy, the organization, or corporate culture.

The factors that EFQM considers relevant for the global economic ecosystem in the upcoming years include climate change, disruptive technologies, societal trends, and the sharing economy. This presents a number of challenges to companies to adapt, especially SMEs:

- **Increasing volatility and permanent change:** Stability, minimizing risk, and a strong family culture are key success factors for many SMEs. In addition, many hidden champions have enjoyed long periods of continuity in management [8]. VUCA (volatility, uncertainty, complexity, ambiguity) challenges this stability, because avoiding risk can in fact become a high-risk strategy in the face of rapid change [9].
- **The pressure to digitalize; disruptive approaches:** The pronounced nature of core competences held by SMEs often results in dependency, and skills can easily become obsolete due to disruptive technology [10]. Digitalization is considered mandatory, but SMEs are often unable to embark on, implement, and operationalize it on their own.
- **New Work and demographic changes:** Future generations see things differently. This also applies to the way Generations Y and Z see leadership and work organization [11]. As a concept of digital work or agility, New Work therefore plays a more central role at SMEs [12], but the corresponding changes that need to be made are often difficult for them.

There are a number of methods for solving these issues and challenges, such as ambidextrous management or changing leadership approaches and the company culture. Ambidextrous or two-handed management involves further development of the core business

(exploitation) – simultaneously establishing new methods and ways of thinking (exploration) [10]. Ambidexterity is one of several possible ways to implement the requirements of the EFQM Excellence Model to manage the operational side of the business while undergoing continuous business transformation [7].

The second method – changes in leadership approaches and corporate culture – is aimed at adapting structures and management techniques. SMEs often have pronounced family cultures that leave little room for new management approaches due to organizational rigidity [13]. The family systems that are often encountered generally make it difficult to develop new top performers [14]. In particular, one crucial issue in such situations is gaining sufficient acceptance for the need to change [15].

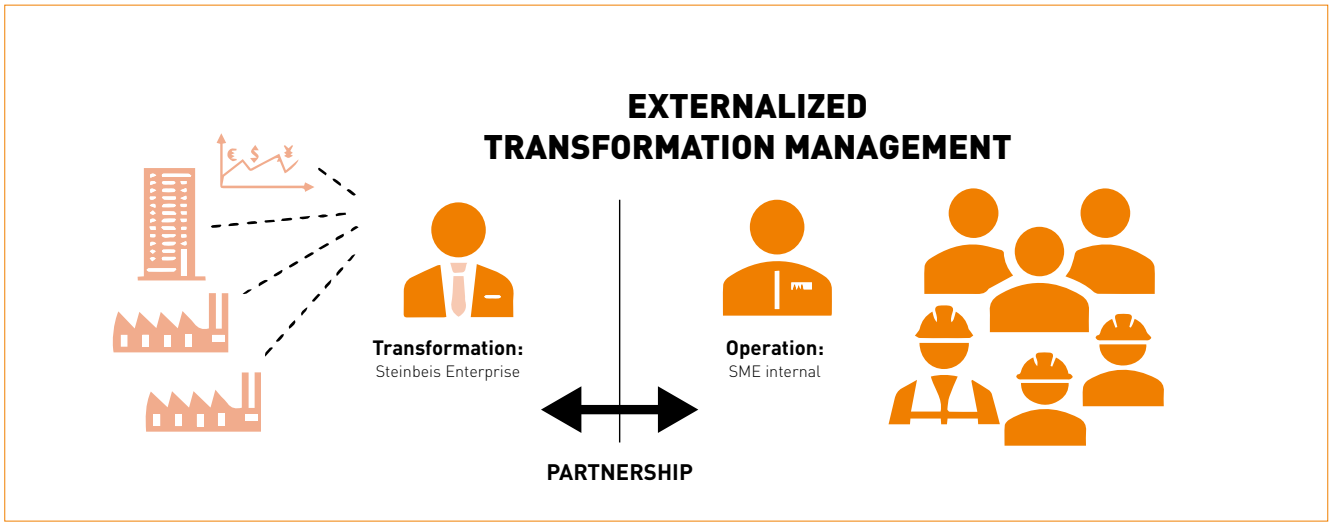
Without external support, it is usually very difficult for SMEs to introduce these approaches. It's rare for changes in company culture to succeed on a purely internal level. The exploratory part of ambidexterity – or a systematic strategic approach of EFQM to transformation – often have to be started from scratch [7]. Many SMEs lack the resources to do this, so the solution may be to externalize transformation to some extent by asking for support from experienced consultants, such as the support offered by the Steinbeis Network.

ECOSYSTEM MONITORING TAKES EFFECT

One example of the successful introduction of ecosystem monitoring comes from a small company called Hafner, a specialist in surgical instruments. Now in its fourth generation, the company produces extremely high-standard surgical instruments and forms part of a business cluster in Tuttlingen, considered the global center of medical technology. The company has been a successful international player for many years, with the U.S. accounting for more than 40% of sales. Despite this, management already noticed some time ago that the firm's business ecosystem was changing.

As a result, despite the coronavirus pandemic, in the summer of 2020 Hafner management had the foresight to seek the support of experts at the Steinbeis Business Center for Business Excellence, who have been helping the company ever since to adapt and implement its strategy as part of a corporate coaching program. The first step involved adapting business processes, which already resulted in visible operational improvements and a significant rise in orders. The next step will be to

↑ The 2020 EFQM Excellence Model © EFQM 2019



Transformation support by expanding views to include external perspectives

systematically digitalize the developed concepts.

The Steinbeis experts offer Hafner the assurance of knowing it has a competent partner at its side while adapting to its individual ecosystem. "Steinbeis provides us with valuable support in gearing our company to the future. We're not just being 'force-fitted' with a standard concept; it's a response that fits the situation and matches our company," says Jutta Hafner, order manager. All stakeholders at the company are being given close support as they evolve into their new roles, which involve more management tasks. This example clearly shows that SMEs have to meet the challenges of their business ecosystems, not only if they want to survive, but also if they want to prosper in the long term over the next decade. The maxim has to be: Observing the ecosystem is key, not only to survive, but to sustainably thrive.

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"BUILDING TRUST WILL BE CRUCIAL"

AN INTERVIEW WITH DR. MARIE-EVE REINERT, SENIOR PROJECT MANAGER AT STEINBEIS 2I

The concept of using hydrogen as an energy source has been around for decades. The gas was already being used in space travel in the 1960s, and in the 1970s and 80s researchers began experimenting with hydrogen in an effort to reduce dependency on fossil fuels. Today, hydrogen is central to our hope that climate neutrality can be achieved. But why hydrogen? TRANSFER Magazine posed this question to Steinbeis expert Dr. Marie-Eve Reinert, group leader for the field of hydrogen-based transportation technology at Steinbeis 2i. She has first-hand experience of the important issues in the use of hydrogen.

David Colomar, project coordinator at COSMHYC, topping up with hydrogen for a test drive in Karlsruhe, Germany

Hello Dr. Reinert. What benefits are offered by using hydrogen in vehicles?

Because it's a zero-emission fuel, hydrogen is really important for the transition to alternative energy sources and for climate protection – assuming you use so-called green hydrogen. To produce the gas, you only need zero-emission, renewable energy sources such as wind power or solar energy. Also, hydrogen can be used as storage and a buffer for forms of energy generation involving fluctuating consumption. Another advantage is its energy density: Hydrogen allows you to store more energy than electric batteries. This offers huge advan-

tages for vehicles because they can travel farther. In addition, the key by-product of the reaction between hydrogen and oxygen is water. So you get lower carbon emissions and consume fewer fossil fuels.

What are the other possible uses of hydrogen? And how can business, but also society, benefit from these uses?

You can use hydrogen as an energy source in many ways. There are lots of projects underway involving hydrogen in transportation, converting cars, buses, trucks, trains, or even ships to hydrogen engines. Trucks are driven many miles a day and transport big loads, so using hydrogen as a fuel here would be the number one choice. Hydrogen is also being put to intensive use in industry. The challenge now is to produce enough green hydrogen to decarbonize all sectors of industry, such as chemicals, metalworking, steel, and glass production.

Hydrogen is also the basis for other green fuels, such as synthetic gas. So for example INERATEC, who we're helping at the moment, is working on an innovative form of reactor technology to produce such "e-fuels." Among other things, the start-up supplies modular systems used in energy applications and solutions used in the field of power-to-gas.

But it's important to remember that many people still have concerns about the safety of hydrogen.The hydrogen industry has shifted into action and made good progress in this area in recent years by setting up working groups. Modern hydrogen technologies are safe, and communicating that and building trust will be crucial for the technology to gain acceptance in the market.

Hydrogen offers substantial potential, but there are still a number of hurdles to overcome before it enters widespread use. What do you think can be done about this?

Actually, there are already lots of fully-functioning technologies for producing, distributing, and using hydrogen. They just need to come out of research and demonstration projects and take the next step so they're ready for industry and can be used on a large. One of the

As a partner in five EU projects, Steinbeis 2i contributes to the transformation of transportation systems and supports the market introduction of hydrogen technologies in Europe:

- COSMHYC. EU funding: €2.5 million (Fuel Cells and Hydrogen Joint Undertaking). Participating Countries: Denmark, Germany, France.
  → **Read more: www.cosmhyc.eu**
- COSMHYC XL. EU funding: €2.7 million (Fuel Cells and Hydrogen Joint Undertaking). Participating Countries: Denmark, Germany, France.
  → **Read more: www.cosmhyc.eu**
- INN-BALANCE. Project funding: €4.9 million (Fuel Cells and Hydrogen Joint Undertaking). Participating Countries: Germany, Austria, Spain, Sweden, Switzerland.
  → **Read more: www.innbalance-fch-project.eu**
- FCHgo! EU funding: €500,000 (Fuel Cells and Hydrogen Joint Undertaking). Participating Countries: Denmark, Germany, Italy, Poland, Switzerland.
  → **Read more: www.fchgo.eu**
- H2SHIPS. EU funding: €3.5 million (ERDF, Interreg North-West Europe). Participating Countries: Belgium, Germany, France, Netherlands, United Kingdom

BECAUSE IT'S A ZERO-EMISSION FUEL, HYDROGEN IS REALLY IMPORTANT FOR THE TRANSITION TO ALTERNATIVE ENERGY SOURCES AND FOR CLIMATE PROTECTION – ASSUMING YOU USE SO-CALLED GREEN HYDROGEN.

big issues at the moment is how to significantly scale up hydrogen production to gigawatt levels. Another key process for using hydrogen on a wide scale is hydrogen compression, because it has a very low density. Hydrogen compression needs to be made more efficient so the required quantities can be made available and the price per kilo of compressed hydrogen becomes more attractive to end users. This is where we're working on an innovative solution through the COSMHYC project.

But we're also making huge strides toward a "future of hydrogen." In July 2020, the EU published its hydrogen strategy for climate neutrality in Europe. A number of member states also presented ambitious national hydrogen strategies last year, including France and Germany. So climate protection and hydrogen are now high on the political agenda. For the strategy to be implemented in concrete terms, we now need model hydrogen regions to demonstrate how this will happen in technological and economic terms in different sectors.

You've already mentioned one project. What other hydrogen projects is Steinbeis 2i currently involved in?

We're currently involved in five European projects. For the COSMHYC project I just mentioned, we're working with the European Institute For Energy Research (EIFER) and three other partners to improve hydrogen compression, and we're also testing prototypes under live conditions. The compression technology that's being developed will be extended into the second EU project, COSMHYC XL, which is about large hydrogen fueling stations. That's because the focus of this project lies in large trucks.

The next project, an innovation project called INN-BALANCE, turns the spotlight on the peripheral components of fuel cells and the so-called balance of plant (BOP). The project partners are working on the development of new components such as technology for supplying fuel cells with hydrogen and oxygen, components for use in heat management, and components used to monitor the function of entire fuel cells.

With the H2SHIPS Interreg project, EIFER and its partners are working on two pilot projects to demonstrate the technical and economic viability of hydrogen refueling systems and propulsion systems in shipping. In the Netherlands, a hydrogen-powered boat is being built for harbor areas and inland waterways, and in Belgium a hydrogen refueling system is being developed and tested for operation on the high seas.

The fifth project, FCHgo!, which is aimed at education scientists, educators, students, and teachers, involves a completely different goal. We're using a school competition, games, stories, and examples of everyday use to create a narrative that will make hydrogen energy more accessible to young people.

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RECOVERY OF ECOLOGICAL NUTRITION FROM AGRICULTURE

STEINBEIS EXPERTS CONTRIBUTE TO THE CIRCULAR BIOECONOMY

A plant used for the recovery of nutrients from digestate and manure at Agro Energie Hohenlohe in Füssbach
© Geltz Umwelttechnologie GmbH

Identifying profitable and environmentally friendly methods of reusing manure and digestate produced in farming – in ways that meet the practical needs of business – is as topical as ever. Agro Energie Hohenlohe was also trying to find a solution in this area, resulting in the construction of a plant for reusing agricultural residues in the region of Hohenlohe. The initiative formed part of a European innovation project called Agriplus: Efficiency Enhancement in Arable Farming in Hohenlohe based on Nutrient Recovery from Farm Manure and is being funded by the EU and the Baden-Wuerttemberg Ministry of Rural Affairs and Consumer Protection. Steinbeis 2i has been supporting and coordinating the project from the outset. Its role is to act as a communication channel and share results, and thus support the aims of the circular bioeconomy.

Spreading manure and digestate in farming is a common practice for supplying arable soil with valuable organic components and important nutrients. Identifying profitable and environmentally friendly methods of reusing manure and digestate produced in farming – in ways that meet the practical needs of business – is as topical as ever. Agro Energie Hohenlohe was also trying to find a solution in this area, resulting in the construction of a plant for reusing agricultural residues in the region of Hohenlohe. The initiative formed part of a European innovation project called Agriplus: Efficiency Enhancement in Arable Farm-

A plant for recovering energy from agricultural residues at Agro Energie Hohenlohe.

Ministerial Director Grit Puchan (left) presents a certificate for the Bioeconomy Innovation Award to Thomas Karle from Agro Energie Hohenlohe (right). Photo: Elke Lehnert

ing in Hohenlohe based on Nutrient Recovery from Farm Manure and is being funded by the EU and the Baden-Wuerttemberg Ministry of Rural Affairs and Consumer Protection. Steinbeis 2i has been supporting and coordinating the project from the outset. Its role is to act as a communication channel and share results, and thus support the aims of the circular bioeconomy. In areas heavily involved in livestock farming, as is the case in the Hohenlohe region, more manure and digestate is used than is actually needed to feed the soil. As a result, residuals (90% of which is water) have to be transported from the region to other regions with a higher demand for fertilizers, and this involves covering long distances. This is often a financial challenge for farmers and is not good for the environment. For example, nitrate leaches into the groundwater or nitrous oxide emissions are produced and these are harmful to the environment.

IMPROVING NUTRIENT MANAGEMENT AND THE EFFICIENCY OF ARABLE FARMING

Agro Energie Hohenlohe decided to tackle this problem by initiating a project aimed at enhancing the efficiency of arable farming by improving nutrient management. Steinbeis 2i helped Agro Energie Hohenlohe submit a funding application to the regional government in Stuttgart in 2018. The application was approved. As part of the European Innovation Partnership for agricultural Productivity and Sustainability (EIP AGRI), between January 2019 and December 2021 the project is receiving funding worth €1.3 million through the European Agricultural Fund for Rural Development and the Baden-Württemberg Ministry of Rural Affairs and Consumer Protection. Other partners involved in the project are Öko-Agrar Service,

BAG Hohenlohe Raiffeisen, the University of Hohenheim, the farmers Kümmerer GbR, Neff KG, Karlheinz Neff, and Klaus u. Rosemarie Käppler GbR.

To convert manure and fermentation residues, an industrial-scale plant was built in Füssbach, Hohenlohe, making it possible to transform manure and other residues from energy recovery (digestate) into an organic soil conditioner, as well as phosphorus and nitrogen fertilizers. These innovative fertilizers can then be used to specifically improve the efficiency of farming, or they can be transported inexpensively to areas with nutrient deficiencies. Aside from offering technological benefits, the project partners are introducing logistical methods of manure transport and sharing different ways to produce and market end products. Scientific support for the project is being provided by the University of Hohenheim.

In the summer of 2020, Peter Hauk, Baden-Wuerttemberg's Minister for Rural Affairs and Consumer Protection, visited the plant in Füssbach and highlighted the importance of active nutrient management in agriculture: "The Agriplus project optimizes nutrient cycles between livestock farming and crop production. It's a really smart approach with the potential to make a significant contribution to environmental protection and add more value in the region in keeping with the circular bioeconomy."

AWARD-WINNING INNOVATION

Extensive agricultural field trials have already shown that the effects of phosphorus fertilizers, nitrogen fertilizers, and organic soil conditioners made from manure and digestate are comparable with commercial fertilizers and humus-forming products. Further field testing will be conducted in the not-so-distant future in order to validate data and demonstrate the ongoing function of the system over several months.

In November 2020, the solution earned Agro Energie Hohenlohe an award under the first Baden-Wuerttemberg bioeconomy competition for new ideas. The prize was bestowed by the minister of agriculture, Peter Hauk. The competition honors innovation at all stages of the agricultural and forestry value chains. The five award winners were selected by a jury of experts from a variety of specialist disciplines. The winners each received a prize of €10,000.

The project illustrates how sustainable agriculture can be fostered in Baden-Wuerttemberg and exemplifies how nutrient cycles between livestock farming and arable farming can be merged. Agriplus is thus making an innovative contribution not only to environmental protection, but also to stronger value creation in the region in keeping with the principles of a cycle-oriented bioeconomy.

This project is receiving €1.3 million of funding from the European Union and the Baden-Wuerttemberg Ministry of Rural Affairs and Consumer Protection within the framework of the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI).

The European Agricultural Fund for Rural Development (EAFRD) invests in rural areas and receives co-funding from the State of Baden-Wuerttemberg.

Baden-Württemberg
MINISTERIUM FÜR LÄNDLICHEN RAUM UND VERBRAUCHERSCHUTZ

European Commission – Rural Development 2014-2020:
http://ec.europa.eu/agriculture/rural-development-2014-2020/index_de.htm

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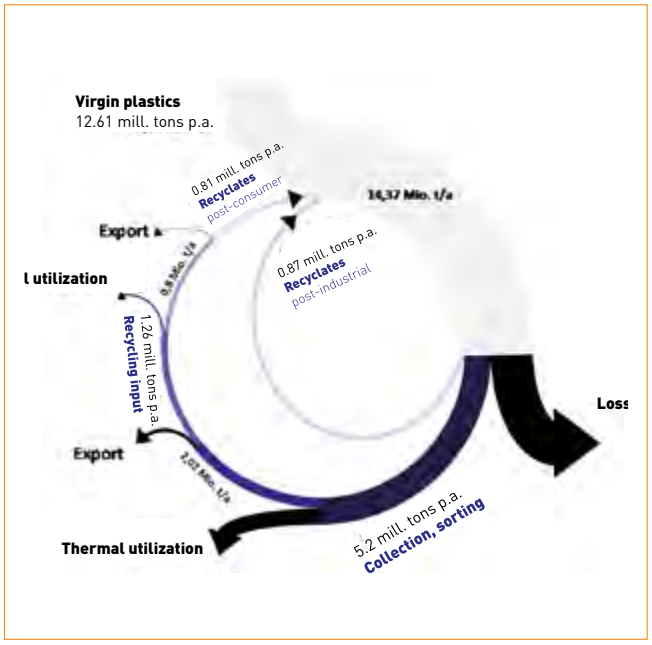
"WE'LL HAVE TO GET TO A POST-FOSSIL WORLD IN THE FORESEEABLE FUTURE"

AN INTERVIEW WITH STEINBEIS ENTREPRENEUR MARKUS KLÄTTE

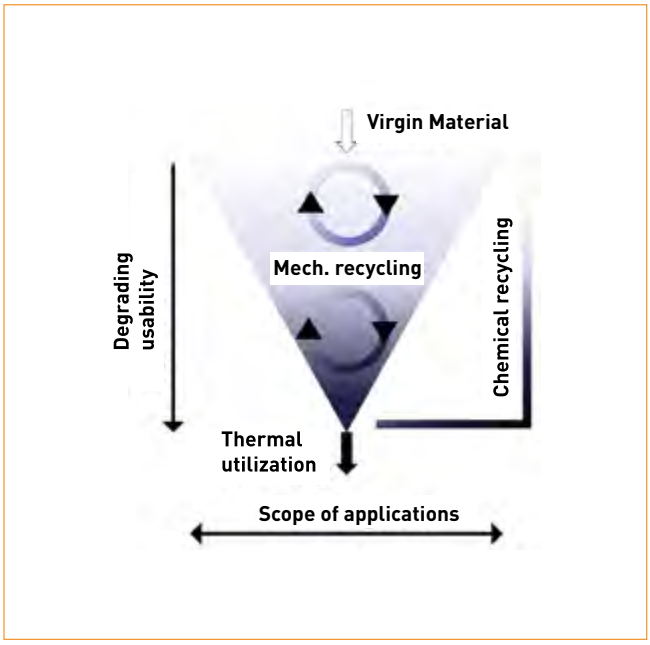
A circular economy makes maximum use of products and raw materials over time, based on the role model provided to us by nature. TRANSFER Magazine spoke to Markus Klätte about the role played by recycling and renewable raw materials in the circular economy and discussed the issues this role presents to companies. Responsible for two Steinbeis Enterprises – Resource Technology and Management, and Resource Efficiency – Klätte knows from personal project experience that using raw materials conscientiously lays a foundation for a well-functioning economy.

Hello Mr. Klätte. Resource availability is a prerequisite for a functioning business ecosystem. How important are recycling and the circular economy at the moment?

The circular economy is a very old and established concept. Nature is showing us how things are done. The economic approach has always been about reusing goods and materials in order to max-



The material cycle for plastics, simplified
© Deopolymerisationsverfahren 2020



The recycling principles of a circular economy
(quality and scope of applications) © Depolymerisationsverfahren 2020

imize benefit based on minimum effort. The concept got into a bit of a mess due to the massive use of fossil fuels and raw materials – especially crude oil and natural gas, which made energy and many materials so cheap that the materials industry was able to sidestep cycles in certain areas.

Some material cycles have been economical for a long time, such as glass, paper, and steel. In Germany, we have a material recycling rate of roughly 70% for paper. Plastics are more problematic, especially post-consumer waste. We know this for a fact because we've been looking closely into this area. The share of recycled materials as a proportion of total plastic production in Germany is only around 12%, and that already includes production waste. So there's still a lot to do in this area.

For closed-loop systems to work better, first they need to be kept as simple as possible. The more complicated they are, the less appealing they are. And that's exactly what we're seeing. The uses materials are being put to are becoming more and more specialized; they're increasingly being tailored to a specific use with more and more additives. This makes it more difficult to recycle materials using conventional methods, and recycled materials can be disadvantageous when it comes to potential reuse, so this narrows the range of usage options for such materials. We need to put thought into other closed-loop systems such as chemical recycling. For example, new raw materials required for producing plastics can be extracted from contaminated waste that would otherwise be difficult to recycle mechanically.

When you recycle plastics, the first step involves classic recycling methods – sorting and remelting it into regranulate. For some time now there have been solvent-based techniques that allow you to remove material impurities, although even those methods have limitations, so they'll need rethinking. Some methods that have been known for a while now – recycling plastics into oil, depolymerization, and pyrolysis – could have a role to play. But they've not made it into the starting blocks yet; there's still some development work needed on them. One thing that raises hope is that for some years large companies such as OMV and BASF have also shown interest in this topic and they're trying to support development in the longer term. One way to save even more fossil resources would be to use renewable raw materials.

Can renewables solve the problem with natural resources?

Yes and no. Naturally, sooner rather than later we'll have to stop using fossil fuels and fossil resources, for reasons we all know. A couple of decades ago all we really thought about was the danger that there'd be raw material shortages. Now carbon footprints and energy re-

quirements are also crucial. But to grow renewable resources you need agricultural land, and that's limited. You can't go and tear down virgin forests to create biofuels. You also quickly get pulled into "food or fuel" discussions. Ideally, renewable raw materials should therefore come from existing waste biomass such as straw.

Despite this, plastics made from renewables aren't all of the same standard. It should also be possible to fit them back into the loop. One thing you get with some bioplastics is that they're biodegradable but not necessarily recyclable. Another thing you have to consider is that often they might decompose more quickly, but ultimately you still have to sort them out of the compost as a nuisance material and incinerate them. On the other hand, polyethylene is versatile, it can be produced from both fossil resources and renewables, and it's recyclable – but it's not biodegradable.

But to come back to the original point, in circular economy terms renewables aren't always the best solution, but they're usually a pretty good one.

What topics are you currently working on at your Steinbeis Enterprises?

Mostly R&D projects focusing on our core topic, which is the development or testing of new materials, and different ways to recycle and reuse plastics in the broader sense. We identify partners, plan projects, and finally take care of financing issues, implementation, and – hopefully – successful delivery of the project.

One of the big topics we're dealing with at the moment is chemical recycling or plastic pyrolysis. We've been working with Professor Seitz from Merseburg University of Applied Sciences, which has brought an important expert onto the team. He knows pyrolysis and everything related to it like the back of his hand. Our main focus is how reliable certain technologies are.

Some of the topics we're working on are more of a theoretical nature. We're working with the universities in Aachen and Merseburg on behalf of the German Environment Agency to compare existing chemical recycling processes. We're also working on certain topics with a peripheral bearing on our specialty. For example, we're currently working on a project that involves investigating the problems of waste management during pandemics. To do this, we're enlisting the help of external experts, who can fill the gaps in our know-how.

What do you believe is the best way to ensure resources are used sustainably and efficiently, not just now but also in the future?

There's only a certain extent to which it'll be possible to get back to the ways of nature. The achievements made in developing materials are too good to forego now. But ultimately, the cycles will have to be made more efficient and thus more economical in terms of conserving material value. Presumably, there'll be a whole variety of different cycles. And yes, we'll have to get to a post-fossil world in the foreseeable future – whether we like it or not.

For more information on depolymerization processes, see the Steinbeis Edition publication (in German): Evaluation under Real Conditions of Thermal-Chemical Depolymerization Technologies (Decomposition Processes) for Recycling of Plastic Waste (Depolymerization Processes 2020). **https://bit.ly/3eLcycr.**

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COMING TO THE RESCUE IN A CRISIS

STEINBEIS EXPERTS HELP COMPANIES REALIGN BUSINESS WITH "RESCUERS IN A CRISIS"

There is usually little time left in everyday business to invest in moving the company forward. Day-to-day issues take precedence; thinking about long-term priorities is put off for another day. Once again, something like the current pandemic highlights all too clearly how important it is for business leaders to rethink their own companies and consciously make preparations for potential crises or disruptions. Without considering such issues, no company can develop a future-ready, crisis-resistant business model. Ulrike Staudenrausch, entrepreneur at Management Moves, Brand & Innovation, the Steinbeis Consulting Center in Bönnigheim, Baden-Wuerttemberg, uses a method she calls "Rescuers in a Crisis" to help firms steel themselves for the future.

"Going 'digital' seems to be a panacea for all sorts of things at the moment. Sure, it's one possibility, but conventional, analog business models will do just as well," says Staudenrausch. Her Rescuers in a Crisis service helps clients pinpoint a suitable positioning and an appropriate business model for generating value-added for the customer. The aim is to encourage business leaders and companies to actively spot trends and make them central to their business development. This is because the current situation makes one thing totally apparent in this respect: A crisis can hit any industry and a company of any size.

EMERGING STRONGER FROM THE CRISIS

The Steinbeis experts have been able to use the Rescuers in a Crisis business model to help in a number of areas under particular pressure at the moment – such as the travel industry. Not only has this helped firms make it through the current crisis, they have also continued to earn money with the business model. One example comes from a start-up in southern Germany, which would like to offer travel services for business leaders to visit innovation hotspots in all corners of the globe. Since travel will continue to be subject to tight restrictions for the foreseeable future, it was time for some lateral thinking. Business modeling addressed a variety of requirements. One was of crucial importance and entirely understandable given the circumstances: making money. To help the startup, the Steinbeis team came up with two measures: The founders should visit destinations themselves and create interactive content that is to be made available on demand. This would make it possible to quickly launch a scalable model. In parallel, a sophisticated hybrid congress was set up. As soon as travel is possible again, the startup will revert to offering conventional trips. To scale up the model, however, it is continuing to expand its interactive, asynchronous content. The Rescuers in a Crisis method thus makes it possible to scale up the business model under normal operating conditions without creating extra work.

Adopting an anti-cyclical positioning can also be a useful way to attract custom. The Steinbeis team demonstrated this to a wedding photographer, who was wondering how to raise his profile. There are already so many competitors out there beating their drums, and it feels like there are even more wedding photographers. The solution? Sharpen the

A CRISIS CAN HIT ANY INDUSTRY AND A COMPANY OF ANY SIZE.

pencil. Supported by Steinbeis, the photographer has developed a positioning based on same-sex weddings. In doing so, he is not playing to classic clichés, but is concentrating instead on the individual needs of the target group. In keeping with this, he never posts wedding photos on Instagram, which is his main communication channel. Instead, he posts images designed to pique interest and show the value he adds for the target group.

FINDING A SAFE BUSINESS MODEL IN THREE EASY STEPS

Staudenrausch brings a great deal of experience to her Steinbeis Enterprise: "We're emerging from a crisis-ridden industry ourselves and are currently experiencing the third wave of disruption in the same number of decades." She has only survived as an entrepreneur because she has kept reinventing herself. At the same time, she has also steered numerous other companies through troubled waters.

The principle behind the Rescuer in a Crisis method revolves around three fundamental steps:

1. Safeguarding what works
2. Building on lucrative areas
3. Developing something new

With these three steps in mind, the team at the Steinbeis Consulting Center for Management Moves, Brand & Innovation is also keeping floundering companies afloat through its website: krisen-retter.de. The team helps company directors, entrepreneurs, and manual workers with sustainable ideas, systems, and processes aimed at creating crisis-resistant business models – one set of entrepreneurs helping other entrepreneurs.

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THE CASHIU MODEL: SIX WARNING SIGNALS THAT URGENT ACTION IS NEEDED

- There are no customers, or not the right Kind of **C**ustomers
- Nobody is interested in your **A**ssortment, even though the company has a lot to offer
- You're not at all sure how the company can even **S**urvive
- There are no signs of qualified **H**uman resources
- There are no new **I**deas
- Your business can't Scale **U**p

THE BREMEN-UNTERWESER INNOWERK PROJECT: A SUSTAINABLE APPROACH TO THE MANUAL TRADES

STEINBEIS EXPERTS DEVELOP A VISION OF THE FUTURE: INNOVATIVE AND SUSTAINABLE SKILLED CRAFTS STEINBEIS EXPERTS DEVELOP A VISION OF THE FUTURE: INNOVATIVE AND SUSTAINABLE SKILLED CRAFTS

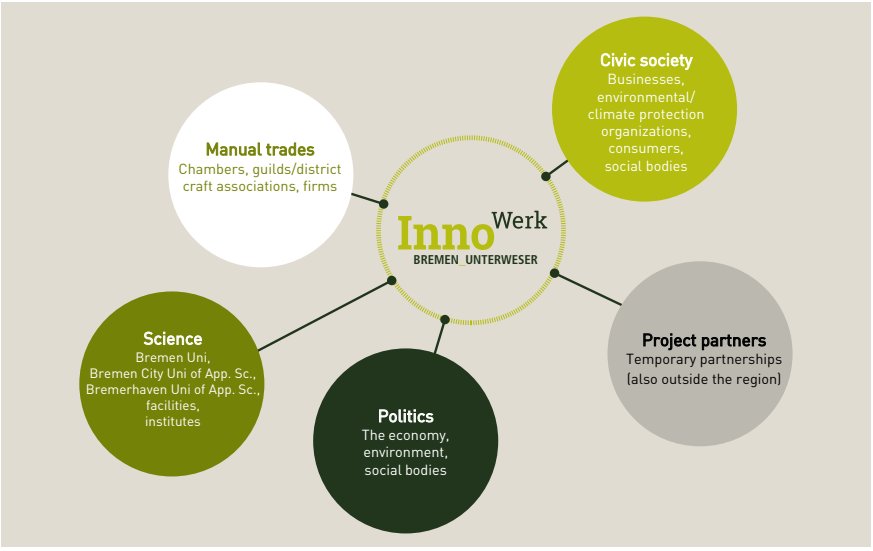
The InnoWerk project in Bremen and the Unterweser Region is an alliance revolving around sustainable innovation among firms crafts and small manufactoroing companies. It arose following a successful application jointly submitted by the Bremen Chamber of Commerce and the Institute for Labour and Economy (IAW) at the University of Bremen. The initiative falls under a BMBF funding program called WIR (a German acronym for "change through innovation in the region"). The Steinbeis Transfer Center Sustainable Innovation and Design is supporting the alliance in the areas of strategy, design, and communication.

The aim of the InnoWerk initiative is to set up cooperative ventures, joint projects, and experiments with the goal of identifying sustainable solutions that would benefit the environment, society in general, and the manual trades. This is because the entire world can be expected to face major challenges in the future, which will require new solutions. Not only the climate, but also the diversity of flora and fauna, the prosperity of companies and the economy – all depend on intelligent, resource-saving, circular approaches that work to the benefit of everyone. The InnoWerk project in Bremen-Unterweser is working on a whole host of ideas. It is a network comprising traditional handicraft companies, new startups, researchers, experts, inventive "tinkerers," politicians, civil servants, chambers, and the guilds. The aim is to become a workshop for ideas and innovation – a space for discussion, education, and exhibitions.

DEVELOPING AND SHARING VISIONS – INTERNALLY AND EXTERNALLY

Even in the early stages, a multi-layered initiative like the InnoWerk project requires effective communication, not only in order to develop a common vision of the future within teams, but also to attract other parties to the project and encourage external partners to join the network – corporations, the manual trades, scientists, researchers, members of the general public, and politicians.

To achieve this, the InnoWerk initiative in Bremen-Unterweser has brought a professional partner on board: the Steinbeis Transfer Center for Sustainable Innovation and Design. With the support of the other alliance members, the experts have developed a vision: "The InnoWerk in Bremen-Unterweser. A Network for Sustainable Manual Trades." The Steinbeis team also designed the required communication tools, from branding to visual imagery, wording, and presentation materials.



In addition, the Steinbeis experts spearheaded by Professor Detlef Rahe have helped InnoWerk highlight to the manual trades why membership offers benefits:

- **Savings:** Innovative ways to save resources (e.g. lower material usage, efficient operations, lower emissions and costs)
- **Attracting young talent:** Sustainably innovative companies are attractive employers for the younger generation and career-changers, who place importance on sustainable development.
- **Increase competitiveness:** Innovative solutions strengthen competitiveness and open up new markets for the skilled crafts.Innovative companies form a professional interface between industry and customers, allowing them to gain competitive advantages.
- **Reduce risks, seek opportunities:** Working together on solutions and intercompany partnerships not only creates more opportunities, but also gathers knowledge and know-how resulting in new synergies.
- **Knowledge:** Forming networks between the manual trades, research institutions, politics, and business is a good way to pool and share existing know-how. This results in new knowledge and new applications that solve problems.

Create, pool, exchange, and share

The alliance focuses on forging links between known sources of know-how, proven processes, innovative methods, experimental undertaking, and the latest findings from science and research. Establishing networks can spawn solutions that give individual firms – but also industry as a whole – a key role in sustainable, cycle-oriented business endeavors. To achieve this, InnoWerk is setting up the InnoWerkZentrum, a design and innovation center that will play a pivotal role in acting as a point of contact for innovative partnership projects. The center will become a melting pot for questions, problems, knowledge, and know-how – a space where innovation projects are initiated, promoted, managed, and shared, where the latest findings from material developments, process engineering, business management, and business administration are made available to others and can be linked to the everyday work of skilled enterprises.

INNOWERK ACTIVITIES AND SERVICES

- Consulting for the manual trades: sustainable business processes, sustainable processes and materials, sustainable business consolidation and succession
- Lining up and setting up of partnerships between skilled crafts and science
- Optimization of technologies, materials, and processes (adaptation to new markets, new products, digitalization)
- Consulting and projects on resource conservation: reduce, reuse, recycle
- Education services (staff training, seminars, workshops) focusing on planning, consulting, and implementation skills
- Support with creative processes involving the planning and design of exhibitions, forums, lectures, events
- Project management involving challenging projects
- Advice on subsidies, support, or the submission of applications
- Annual presentation of the Bremen Innovation Award in the Skilled Crafts Sector – InnoWerkAward

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CLIMATE-NEUTRAL BUILDINGS: A HERCULEAN TASK … BUT ACHIEVABLE

STEINBEIS EXPERTS IMPLEMENT CARBON-NEUTRAL PILOT PROJECTS

In 2018, the EU Commission presented its plan for a climate-neutral Europe at a summit in Katowice, Poland. In 2020, the plan was adopted and coined the European Green Deal, laying down targets for net-zero climate-damaging greenhouse gas emissions by 2050. This provides a solid basis for reliable long-term planning in European countries, particularly when it comes to the economy. The future goal of low carbon emissions, across all sectors of the economy, goes hand in hand with a transformation process, which will require annual investments totaling hundreds of billions of euros. The scale of this investment is considerable, but as Steinbeis expert Professor Dr.-Ing. Manfred Norbert Fisch explains, the consequences of damage to the climate resulting from doing nothing would likely be far graver.

↗ The Stadt-Aktivhausbuilding in Frankfurt, which adheres to Effizienzhaus standards (HHS Planer + Architekten, Kassel)

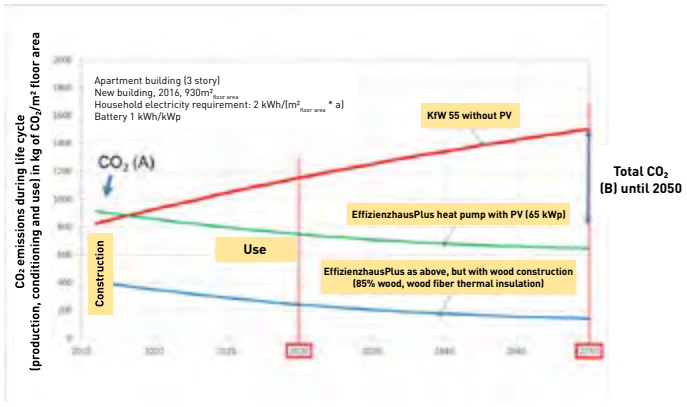
The German government has set binding limits on permissible carbon emissions generated by the energy industry, manufacturing, buildings, transportation, and agriculture. Under the new regulations, greenhouse gas emissions must be reduced by at least 55% by 2030 versus 1990. The building sector should reduce two-thirds of climate-damaging emissions by 2030 and ensure existing buildings are as good as climate-neutral by 2050.

In Germany, 2014 emissions stood at around 900 million metric tons of CO_2, or roughly 11 metric tons of CO_2 per inhabitant per year. Regarding the source of emissions, around 120 million tons of carbon were directly attributable to buildings. Indirect carbon emissions caused by the use of materials and resources during construction and renovations – as well as imported "final energy" (attributable to building occupants using resources such as electricity) – are attributed to the energy and industry sector.

CO_2 POLLUTERS: NEW BUILDINGS AND RENOVATION

According to calculations made by Manfred Norbert Fisch and his colleagues at energieplus, the Steinbeis Innovation Center, assessed according to "principles of origin," every year a significant proportion of indirect emissions (also known as gray emissions) are caused when buildings are constructed or renovated. Every year, the building sector expands by an area of around 80 million square meters, generating about 60 million tons of CO2. Roughly 50 million square meters of buildings are renovated per year. The resources required to do this – and the release of climate-damaging emissions – result in around 10 million tons of CO_2 per year. This is a considerable amount, but significantly lower than for new buildings.

According to the German government's climate protection plan, by 2030 net local emissions from buildings should be reduced by 50 million tons of CO_2 per year, i.e. 42% versus 2014. With new buildings being added over the next decade, and the additional carbon emissions they generate, existing buildings will therefore need to be "decarbonized" by at least 55%. The new buildings that will be constructed by 2030/2050 will also heighten pressure to cut energy use in existing buildings, although in absolute



Three alternatives for a three-story residential building completed in 2016, the cumulative carbon emissions it caused, and electricity used by occupants. Constructed according to the KfW 55 standard and with no PV system, the building increases emissions. Basing the building on the Effizienzhaus Plus standard with a PV system (70 Wp/m2 of living area), absolute carbon emissions will drop by 30% by 2050. The curve in the lines on the graph is partly the result of greener electricity from the grid and partly driven by reduced carbon credits relating to PV electricity fed into the grid. Based on hybrid construction using 85% wood, the Effizienzhaus Plus standard – including a PV system and battery capable of achieving 1 kWh per kWp – almost results in a zero carbon footprint by 2050.

terms they will have little impact on the carbon reduction goal. Tightening energy performance regulations applicable to new buildings (under the 2020 Building Energy Act) is insignificant when it comes to the climate protection targets for 2050. Gray carbon emissions will already decrease by 2030 with de-carbonization of the energy sector and industry, as well as potential reductions in the number of new buildings.

"The building sector is facing a herculean task, with a whole host of overlaps with energy-relevant sectors of industry. Based on our recommendations, I believe that the desired climate neutrality is feasible, however," believes Steinbeis expert Manfred Norbert Fisch. The heating requirements of private households, commerce, trade, services, and industry are around 670 TWh p.a. for heating rooms and roughly 130 TWh p.a. for producing hot water. Together, that corresponds to around 32% of the total heating requirements covered by final energy, which is roughly 2,500 TWh p.a. In 2020, the share of this covered by renewables was only 14.5%. At 42%, the contribution made by renewables to gross domestic electricity consumption is already much better.

To accelerate changes in heating habits and the decarbonization of buildings, energy refurbishments will need to accelerate to more than 2% per year, fossil fuels (oil and gas) will need to make way in the market for electric heat pumps, the expansion of wind and PV farms will need to accelerate, and a progressive start needs to be made with the development of green district heating.

THE CO_2 LABEL – A KEY PERFORMANCE INDEX FOR BUILDINGS

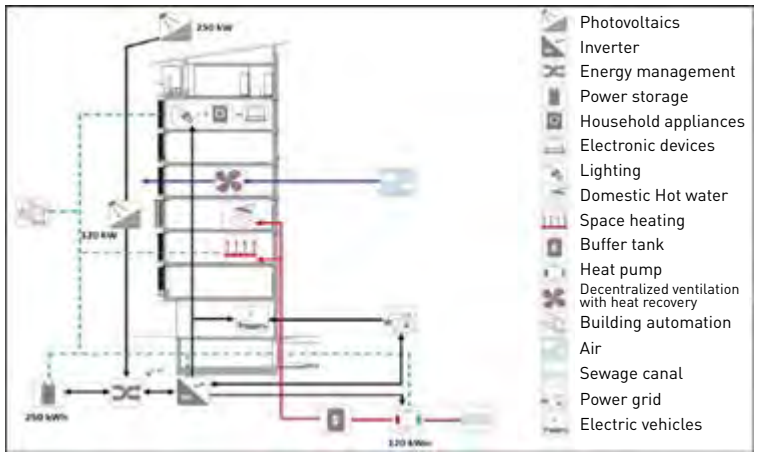
The experts at the energieplus Steinbeis Innovation Center have been proposing the introduction of a carbon assessment system for buildings for years. By distinguishing between CO_2 (A)emissions (caused by new buildings or renovations) and CO_2(B) emissions (caused by the operation and use of buildings), a calculation basis is provided for evaluating circumstances from a holistic perspective.

The CO_2(A) value is calculated at the point of construction or renovation based on fundamental building mass and the related carbon scores of materials catalogued in eco-databases. A multi-story residential building with solid walls would achieve a score of between 700 and 1,000 kg of CO_2 per square meter of net floor area (CO_2/m2 NFA). For a renovation, the score would be less then 200 kg CO_2/m2 NFA.

The CO_2(B) value is based on annual net end energy performance when the building is in use (according to German building energy regulations). Electricity used by occupants is added to this number. CO_2(B) decreases over time as a result of the ongoing decarbonization of electricity, district heating, and gas supplies, as well as the increasing use of solar energy in existing buildings. The CO_2(B) value for existing buildings constructed after 1995 is 40 to 60 kg CO_2/m² p.a. In the future, new buildings and renovations should be expected to achieve below 20kg CO_2/m² p.a. Progressive decarbonization of electricity from the grid may make it possible to achieve a CO_2(B) value under 10 kg/m² p.a. by 2030. The Steinbeis team recommends regularly updating readings taken for the CO_2(B) label – at least every five years, based specifically on the current carbon performance of fossil energy and renewables for the share of final energy imported to or exported from the building. It also recommends that data be compiled in a central database to create a reliable carbon emissions register for existing buildings, which could also be used for tax assessments.

IMPRESSIVELY CLIMATE-NEUTRAL PILOT PROJECTS

In 2009, the Steinbeis experts applied the concept of a building acting as a power generation plant to a single-family house called the Berghalde in Leonberg in the state of Baden-Wuerttemberg[1]. The success of the project spoke for itself: Since 2012, more than 40 Effizienzhaus Plus homes have been based on this



The energy and technology concept behind an Electricity Only house (EGSplan, Stuttgart)

concept, as part of a funding initiative target called Zukunft Bau ("the future of construction"). The ambitious goal was to be carbon-positive and positive in terms of annual end energy consumption. The aim was also to test required construction and building technology.

The Steinbeis experts have drawn on their experience with the planning, construction, and operation of the first model projects to compile a list of EffizienzhausPlusplanningrecommendations[2]. "Our building projects are based on a holistic approach: economic optimization during the life cycle, through the reduction of energy consumption, and through the efficient use of renewables," says Fisch, summarizing the work carried out at the energieplus Steinbeis Innovation Center. This approach goes beyond Efficiency First thinking and is fundamentally based on open technology systems.

The Steinbeis experts also succeeded with the Aktiv-Stadthaus project in Frankfurt. This initiative, for the first ever climate-neutral apartment building, was also funded through the Zukunft Bau program. Completed in 2015, the eight-story building houses 74 apartments covering an area of 6,634 m² (net floor area). During the first two years of occupation, technical and sociological monitoring took place[3]. The Aktiv-Stadthaus building is based on Electricity Only principles. Room heating and hot water are provided by an electrical heat pump (120 kWth). A heat exchanger covering an area of approximately 100 m² was fitted in a sewage canal in the adjacent street (Speicherstrasse) to provide heating. To minimize domestic electricity use, the apartments were equipped by the landlord with ultra-high-efficiency household appliances.

Electricity consumption is covered by photovoltaic modules integrated into the

RECOMMENDATIONS FOR THE REAL ESTATE INDUSTRY

Real estate industry stakeholders need to become active and develop medium-term strategies for climate-neutral building portfolios. The Green Deal gives them a reliable planning foundation for this. Based on its experience implementing the model climate-neutral buildings project, the energieplus Steinbeis Innovation Center has drafted the following recommendations for buildings:

- **Building envelope**
  - New buildings – residential building: Effizienzhaus EH 55, non-residential building: EH 70
  - Renovation – residential building: EH 70, non-residential building: EH 100
  - Consider gray energy based on outline provided with the label
- **Energy supply**
  - Avoid fossil fuels
  - New buildings: no gas, no gas cogeneration units, no exhaust gas stack required
  - Electrical heat pumps
  - Transfer systems, if possible with low-temperature surface heating
  - Buffer storage and energy management system (EnMS)
  - Maximum use of roofs for solar panels
  - Energy storage: 1 kWh/kWp
- **Optimized operation**

  Based on technical monitoring systems (non-residential)

facade (120 kWp) and roof (250 kWp). There is a 250 kWh storage system to boost solar electricity self-supplies. The battery works in conjunction with a charging management system to reduce peaks during power feed-in and operate the system in harmony with the grid. Monitoring confirmed that the carbon footprint estimate during planning (value CO_2(B) was achieved. Roughly a third of carbon emissions were caused by the heat pump using electricity to cover demand for room heating and hot water. The lion's share of this demand, 55%, was generated by building occupants. On average, solar energy and the share of energy generated by the building per year stood at around 47%. At around 18 kWh/m² p.a., electricity consumption (including energy used for ventilation equipment) was around 20% below demand levels defined during planning (Effizienzhaus Plus standard). During the first two years of occupation, the annual carbon footprint was neutral. Electricity required to run the building and the amount of electricity used by occupants – roughly 0.9t CO_2 p.p. per annum – was almost offset by carbon credits awarded for feeding in surplus solar electricity. The building provided an impressive demonstration that climate neutrality is even possible for an eight-story apartment building under actual occupancy scenarios.

Building refurbishments are a decisive factor in achieving climate protection targets. The Steinbeis experts developed a concept for the comprehensive renovation of the Riederwald housing estate in Frankfurt, which dates back to the 1960s, based on Virtually Climate-Neutral requirements. Following the renovation, the building envelopes met KfW 55 standards. Heating is provided by electric heat pumps that use vertical geothermal probes in combination with ambient air heat exchangers as a heat source. The roofs lie east to west and are covered with as many PV units as possible. Carbon emissions, including those accounted for by occupants, were successfully reduced by 60%. When the new system went live in 2016, they stood at approx. 17kg CO_2/m² p.a. As electricity supplied by the grid is gradually decarbonized, the CO_2(B) value will reduce to less than 10kg CO_2/m² p.a.

These projects demonstrate that climate-neutral buildings and housing districts are possible with the existing technology, but it will still be important to invest in R&D in the coming years. Being climate-neutral is not possible being cost-neutral, and the Green Deal will require extensive financial resources and effort. This makes it all the more important to summon up the courage and increase acceptance among society for the aims of achieving climate neutrality as well as develop a social fair balanced finanzing for all humans.

RECOMMENDATIONS FOR THE ENERGY INDUSTRY AND POLITICS

- Significantly expand the amount of renewable electricity generated by PV systems and wind energy. 15 to 20 GWp will be required. Currently, only 2.5 to 3 GWp/a are achieved.
- Decarbonization of district heating, decentralized feed-in through large-scale heat pumps, exploitation of waste heat generated by industry, power-to-gas technology (hydrogen production)
- Introduction of a CO_2 evaluation system for buildings (construction, renovation, operation, use)
- Review of CO_2 labels every five years (building inspectorate audits)
- Introduction of a building-by-building database for carbon emissions
- Promotion of achieved carbon savings
- Higher carbon penalties on fossil fuels (> €100/t CO_2)
- Electricity prices must go down, swift abolition of the EEG surcharge
- Social fair balanced financing concept required

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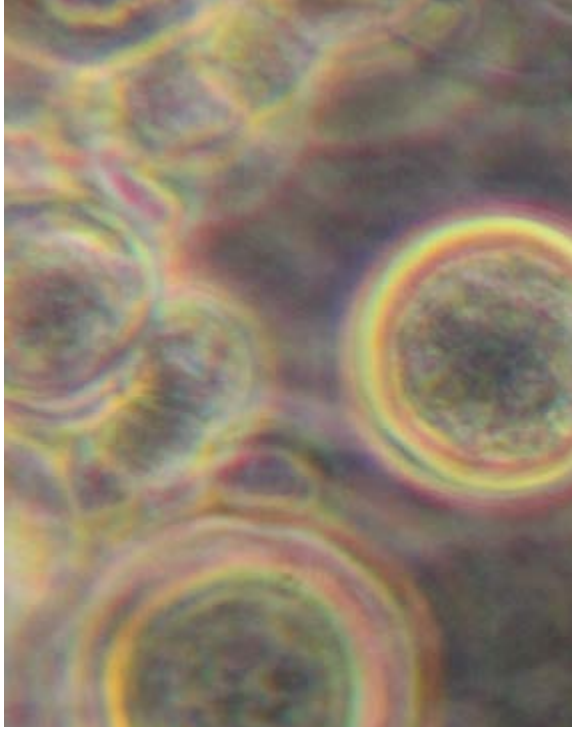


EVERY CHANGE BEGINS WITH A VISION

AN EXPOSÉ OF THE FUTURE OF ECOSYSTEMS AND THE ECOSYSTEMS OF THE FUTURE

The unnatural separation between humans and the world's ecosystems is a key cause of the steadily worsening biodiversity crisis and the degradation of so many natural habitats on our planet. 2021 is the first year of the Decade on Ecosystem Restoration announced by the United Nations, in which decisive action is to be taken to reverse this trend. For wildlife habitats, the most important goal may be preservation or restoration, but for our cultural landscape – i.e. where we live and operate – the issue will be people's new attitude towards "nature." The big challenge for us will be to understand ourselves as living organisms directly connected to and dependent on these ecosystems. Steinbeis expert Professor Dr. Michael Weiß presents his vision of how.

As ecosystems in their own right, soils play a central role in modern-day ecological research. Rapid developments, particularly in the high-throughput sequencing of minute amounts of DNA, are providing us with increasingly detailed insights into the full spectrum of organisms in soils. A key characteristic of healthy soils is an abundance of biodiversity, dominated by fungi and bacteria, with animals and plants performing a less significant role. The methods available to us at the moment still have a long way to go to provide us with a proper understanding of the complexity of interactions between different organisms, however. What we do know with certainty is that methods developed in the industrialized nations in the last century with respect to nutrition and the protection of agricultural crops largely neglected this complexity.

FUNGI AND FOOD WASTE SUPPORT SUSTAINABLE CROP PRODUCTION

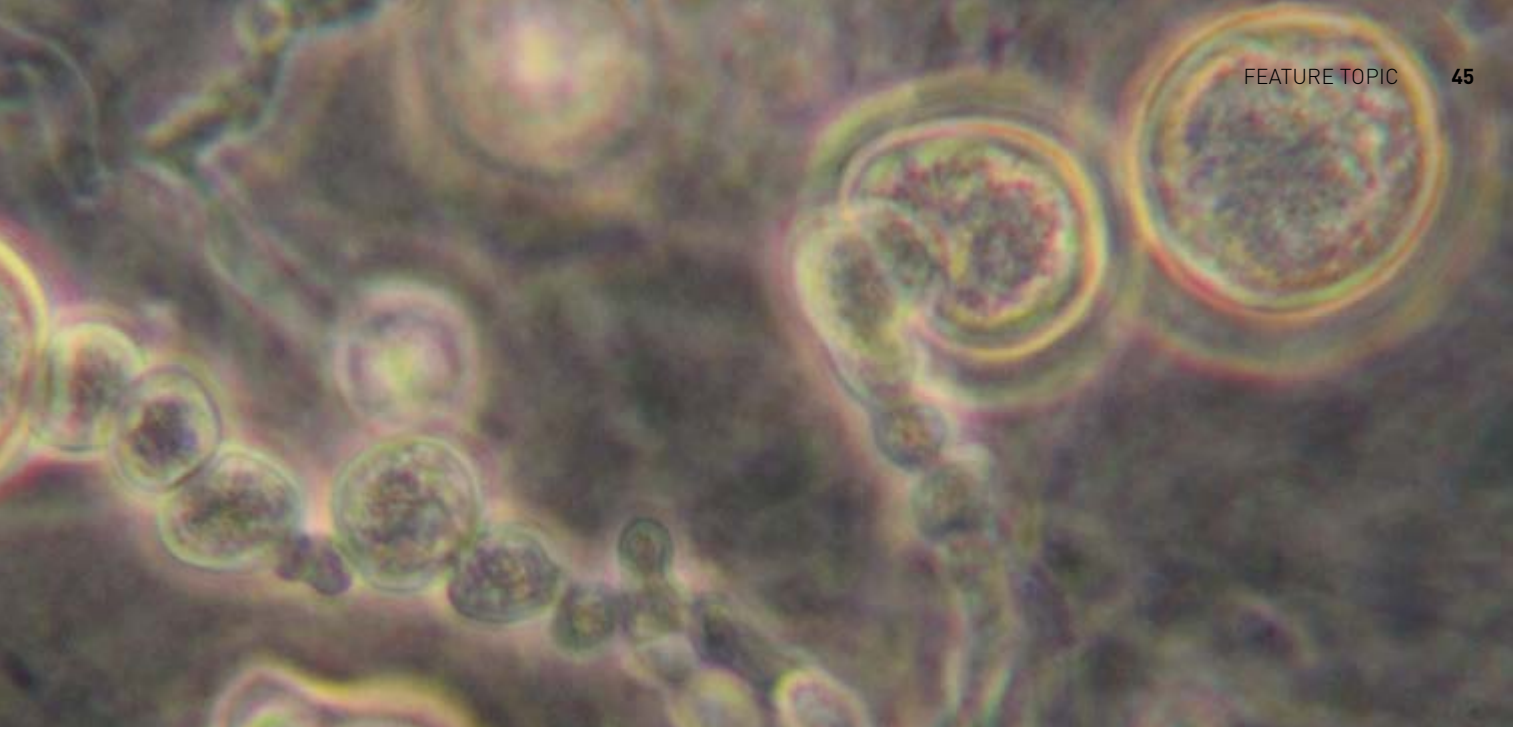
Industrially produced salts requiring large amounts of energy (artificial fertilizers) and increasingly effective organic pesticides are still the central pillars of modern industrial farming. This is fueling continual decline in humus, the organic component of soil. In turn, a large number of soil organisms (the edaphon) have vanished, leaving soil compacted and eroded, with decreasing capacity to absorb recently applied fertilizers, which then end up in the streams, rivers, and groundwater.

For some time, the Steinbeis Innovation Center for Organismal Mycology and Microbiology has been working on transferring the findings of fundamental biological research into methods of sustainable plant cultivation. Its current focus lies in fungal strains that colonize plant roots, resulting on the one hand in interactions that have a systemic impact on growth promotion. On the other hand, the strains make plants more resilient to various types of biological stress (e.g., drought, pathogenic fungi or bacteria, or animal pests). The second area of focus for the Steinbeis expert lies in the development of plant-based fertilizers from the material flows of food production, which were previously underexploited and offer an opportunity to raise long-term humus content and improve the ability of soil to store water. By not sidestepping into composting, which results in half of the energy offered by raw materials being lost, innovative fertilizers support the food chains of soil life directly in the areas around roots, which is beneficial to plant crops. But this is just one step of many in making ecosystems sustainable.

HUMAN LIFE IN 2050

Michael Weiß is responsible for the Steinbeis Innovation Center for Organismal Mycology and Microbiology. To illustrate how to improve developments in the ecosystems of our cultural landscape in the coming decades, he fast-forwards to the year 2050 and takes a look back at changes over the last 30 years.

It's 2050. Our cities are interwoven with a rich and diverse cultural landscape. We have succeeded in halting further eradication of natural countryside and the colossal levels of land consumption for industrial farming prevalent until the 2020s. Just as importantly, this was made possible by no longer keeping animals for meat production. In 2020, 60% of agricultural land was still being used to grow feeds for animals, which only provided two percent of calories required by humans. To do this, more and more forests were being cleared. Today, in 2050, we only use the most fertile arable land to grow our food. This



Serendipita, a genus of root-endophytic fungus (pictured using a light microscope)

has enabled us to turn our cultural landscape back into highly diverse habitats. To this end, we systematically restricted field sizes. Every field is now surrounded by hedges or coppices. This change alone has helped reduce soil erosion, which in the early 20th century resulted in over 10 million hectares of fertile land being lost worldwide every year. Many fields are surrounded by coppiced land which is used to produce timber materials for industrial requirements. Such hedges and coppices alternate with herbaceous strips of land rich in biodiversity. This diversity around the fields ensures pollinating insects are able to find suitable habitats.

The widespread reduction in meat production has led to stronger demand for plant proteins in our diets.Cereals are now mostly grown in mixed crops with legumes. A major advantage of this is that legumes help supply cereal crops with nutrients through their root symbiosis with nitrogen-fixing bacteria.

In keeping with regional and local conditions, a variety of agroforestry systems have developed worldwide, with both crops and woody plants grown side by side. Trees and shrubs act as windbreaks for fields. Planted in the right density, they also provide shade and help reduce heat stress for field crops. The foliage of trees contributes to the natural humus fertilization of the land. This also significantly reduces surface erosion. The overall productivity of such systems is consistently higher than wood-free farming, which was still dominant worldwide at the beginning of the 21st century.

ENERGY PRODUCTION IN 2050

The energy required to power our fully electric agricultural machinery in 2050 is produced by different forms of field-based agro-photovoltaic systems. The modules these contain are entirely transparent to allow crops more sensitive to heat stress to thrive underneath them. The large number of ecological niches that characterize today's cultural landscape have resulted in a halt in insect decline and a continual rise in the biodiversity of our cultural landscapes. Following the ban on biomass burning for energy production in the 2020s and a steady rise in the share of timber production associated with coppices around fields and agroforestry systems, there has been a decisive reduction in the pressure to exploit our forests. Today, basically only the edges of forests are used, resulting in minimal soil damage following the abandonment of combine harvesters and large farming vehicles. Inside forested areas, while the roads and path networks are safeguarded by regular tree maintenance such that forests are still among the most popular areas for recreation, only few interventions are made in areas away from trails, so that forests are well on the way to developing into modern virgin forests. As a rule, deadwood is no longer removed but remains in the forest. This has allowed the forests of Central Europe to once again become effective regulators of the regional climate and develop into highly biodiverse ecosystems that capture increasing volumes of carbon dioxide in the soil through continual rises in the proportion of humus.

Following the complete renunciation of fossil carbon and biomass combustion, carbon fixation in the soil became the most effective tool in enabling Europe to succeed in becoming climate-neutral and thus meet the goal laid down by the EU Green Deal in the early 2020s. This success gives us hope that we will eventually succeed in limiting global warming to under 1.5°C this century. A decisive contribution to this was made by the widespread rewetting of bogs and peatland, which was drained in the 20th century for peat ex-

traction and to make way for agricultural land. The return of peatlands, which are once again storing growing amounts of carbon, became possible when vast swathes of land used by the meat industry for feed production were no longer needed. Slurry spreading on open land has also been discontinued, resulting in a reduction in nitrate contamination in the groundwater. Grasslands now primarily consist of biodiverse meadows, which rather than being harvested to supply livestock feed are only cut once or twice a year to produce plant fibers. In combination with wood from managed land and coppice areas next to fields, plant fibers play a pivotal role in providing raw materials required for both the production of packaging materials and biorefineries. Foams – that only several decades ago were still manufactured from synthetic plastics – are now mostly produced by using fungal mycelia based on plant fibers.

OUR CITIES IN THE YEAR 2050

The appearance of our cities has changed radically over the past 30 years. After systematically limiting the number of cars used by individuals, tarmac and concrete could be removed from many spaces previously used as parking lots or roads and the land could be returned to nature. Green facades and roofs have become standard practice. The number of trees in urban areas has risen sharply. Most of these trees are being cultivated along the lines of the Stockholm biochar technique developed at the beginning of the century. Biochar is produced by pyrolysis of biomass in the absence of oxygen. This involves heating the biomass to temperatures of 600 to 800°C, which completely converts it into carbon chars. Synthesis gases produced by this process are extracted and burned in a low-emission combustion chamber, generating the heat and electricity required for the process. Surplus heat is fed into local heating networks. Biochar is highly effective at retaining water and nutrients due to its immense inner pore surface. This allows it to act as a valuable substrate for plant life. Its long half-life also offers long-term benefits to the atmosphere by acting as a carbon sink. More and more inner-city soil is being replaced by this substrate, which is ideal for sequestering rainwater.

One outstandingly successful model, which almost every city has now joined, was the Edible Cities network launched at the beginning of the century. Fruit trees are now highly prevalent in urban areas, and a large number of city parks have been planted with berry bushes and vegetables that are free for all residents to use. Community-based urban gardening and urban farming projects make a significant contribution to meeting the food requirements of the urban population – another factor that has improved the quality of life in cities and formed a link between people and the fundamental source of their livelihoods.

THREE FACTORS THAT WILL SHAPE THE JOURNEY AHEAD

Michael Weiß's conclusion for his vision of the year 2050: "Looking back, we can see that there were three critical factors that made an effective turnaround for the better possible, two of which were the products of globalization. First, in the early 2020s a highly motivated generation of young people saw the acute threat to their own future and succeeded in organizing themselves into a dynamic movement on a global scale, rallying increasingly large swathes of the older population behind them and thus asserting the required political pressure to take action. Second, indigenous people increasingly had a say in this global movement, offering their valuable experience with alternative ways for us to use our natural resources. And finally, a new feature of democracy at that time that came with the emergence of citizen councils at various levels within politics played an increasingly successful role in resolving and healing polarization and divisions in society." What was the key outcome of these processes? A broad realization that human life is only possible in the long term within functioning ecosystems. The term "nature conservation," which is still in wide use today, will give way to different approaches to preserving and actively creating biodiverse ecosystems. In 2050, we will preserve the planet's surviving ancient wildernesses in many protected areas and make shaping and caring for the ecosystems in which we live our number one priority.

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BRICK BY BRICK: MAKING INTELLIGENT USE OF CIRCULAR ECONOMY METHODS TO CREATE A SUSTAINABLE ECONOMY

HOW TO MAKE USE OF AN ANCIENT PRINCIPLE OF NATURE IN THE ECONOMY

Circular economy concepts are currently experiencing a boom, not least fueled by setbacks caused by the current pandemic. Not only is this reflected in increasing public interest, but there is also growing business demand for solutions with a strong focus on practical application. Steinbeis expert Dr. Christoph Soukup explains the underlying reasons for this and describes how firms can benefit from this trend.

Everybody is talking about the circular economy at the moment, and reports such as a PwC study in 2019 [1] are even declaring that it will soon be the new normal. The underlying idea is quite simple. It's based on a principle of repeated cycles found in nature. In nature, nothing goes to waste. Everything is organized in such a way that anything left over after one process can be used in the next. Leftovers either become a nutrient in a new cycle or the starting product for another natural process that dovetails with that cycle. Whether it's blossoms and pollen in spring, fruits in the summer or leaves floating down from trees in the fall: In the cycles of nature, everything is put to good use.

THE CIRCULAR ECONOMY – A LONG-ESTABLISHED PRINCIPLE

The idea of applying this system to business is not entirely new – quite the opposite. Whenever there have been raw material shortages or more scarcity than abundance, materials have been recycled – over and over again. This was the case in the Middle Ages, it has happened in post-war periods, and it is still the case today in less developed countries.

For example, in the years following World War II, the rubble recovery company TVG became famous the world over for recycling war rubble in Frankfurt. It ran a plant for processing and recycling rubble to produce building bricks and roof tiles needed to reconstruct parts of the city destroyed by bombing.

The concept of using something and then simply throwing it away afterwards only caught on slowly after World War II. But even then, companies continued to produce recycled goods. The best of example of this is the EUR-pallet, which celebrates its 60th anniversary this year. It's a model of success that has proven its worth a million times over and is respected far beyond Europe. The interior dimensions of modern trailers and vans are now even made to match standard EUR-pallet sizes.

THE THROW-AWAY SOCIETY

Our current economic system is based on growth and a focus on linear principles. Raw materials are extracted and used to make products, which are then used by customers.

At the end of their usable lives – short or long – those products are segregated and become waste. It's a one-way street that concludes on the garbage dump. In Europe, we consume resources the equivalent of three Earths' worth of renewable raw materials. With non-renewable mineral resources, which took several million years to form, there are many indications that reserves will be depleted. One thing is clear: In the long run, this doesn't look good. An example that's quite enlightening: 100 – 200 tons of rock have to be shifted (mostly by blasting) just to produce one kilogram of gold. The yield is much better with cell phones, which all have electrical contacts containing gold: 6 – 8 tons of discarded devices are needed, meaning that an "urban mine" contains 25 to 30 times the amount of gold compared to natural deposits.

REVISITING AN OLD CONCEPT

So let's get back to the idea of the circular economy. Adidas, Fairphone, IKEA, Philips – a number of firms are now

A brick made from rubble (X.2010.040,03) (© Historical Museum, Frankfurt. Photo: Horst Ziegenfuss)

looking into ways to bring circular economy principles back to life again.

The only difference is that whereas previously, this was out of economic necessity, now the idea is being taken up again for environmental and sustainability reasons. At the end of the product life cycle, materials won't be simply thrown away, ideally they can be re-used. This is in keeping with the aims of the circular economy and it pays dividends for companies. This is also seen in the example of Lorenz Meters, a Swabian manufacturer of water meters that a few years ago set up a "disassembly line" in its factory. Used water meters – that were originally produced by the company and have been taken out of service – now come back to the disassembly line where they're dismantled so components can be cleaned, recalibrated, and put back into brand-new meters.

"Like so many others, normally we'd be in China now. But by taking back our meters, we've succeeded in slashing material costs and not only has that protected our production activities in Germany, it even offers price advantages versus manufacturers of disposable products in low-wage countries – right now, the Supply Chain Act is closing in on those competitors," says Wilhelm Mauss, CEO at Lorenz.

THE CIRCULAR ECONOMY IS MORE THAN JUST RECYCLING

Current forms of recycling focus heavily on optimizing waste recovery, whereas business models based on circular economy principles consistently take a different approach.

Recycling is only the last stage of a multitude of (better) options for re-using resources. Aside from the aforementioned example of re-manufacturing, materials can be repaired, refurbished, or repurposed. Recycling is only the final option, when no other ideas can be found for unwanted products without a function. The moment you start developing products with an eye to re-using them later, you invest less and less energy in the idea that "garbage" needs to be recycled.

A NEW MINDSET IS NEEDED IF WE ARE TO CONSISTENTLY FOCUS ON THE CIRCULAR ECONOMY

Of course, restructuring the economy into closed-loop systems is no mean task, and it takes time. The first steps have already been taken, but a new mindset is needed if we are to consistently focus on the circular economy.

STEINBEIS EXPERTS SHOW THE WAY

The Steinbeis Consulting Center for Circular Economy accompanies and supports companies seeking to make decisive improvements in the sustainability of their products and services without neglecting profitability.

"We offer a toolbox of different circular economy instruments that provide a starting point for achieving quick results. We also have lean workshop formats that offer an uncomplicated point of entry for a reasonable investment in terms of time and money," says Christoph Soukup, who leads the Steinbeis Enterprise.

One of the topics he works on is material efficiency. Doing costings on material flows offers manufacturing companies an opportunity to significantly improve material efficiency. Materials that end up in the trash are already written off on the accounting ledger, because they are costed into prices from the outset. Analyzing material flows in production highlights energy and materials that don't end up in products: offcuts, residual materials, waste, scrap, or overproduction.

Resources – that should be invested in value creation – also flow into such activities, and aside from fueling purchasing costs they also require extra effort. This quickly makes it possible to find ways to optimize processes. The good thing about this: "Material savings have a direct and indirect impact on operating results, especially under current circumstances," highlights Soukup.

ONCE ADVISED BY A STEINBEISER – NOW A STEINBEISER HIMSELF

Soukup was once advised by Mario Buric, who has been advising business founders and startups for many years and supported him with his move into self-employment. As part of the Steinbeis EXI consulting program, they developed the idea, formulated the specific offer, and embarked upon the first customer projects. One particularly interesting task was deciding what type of company to set up. A variety of models were considered, including a number of unconventional options. In the end, the decision was made to set up a Steinbeis Enterprise. "A number of things won me over about the idea – the reputation of the Steinbeis brand, the almost inexhaustible pool of experts at Steinbeis, and flexibility in designing my own portfolio," says the business founder.

What's the best way to safeguard the future of your company? The 2021 to 2027 funding period has started in the European Union, involving significant amounts of money (in total, more than €1,800 billion). A variety of funding programs revolve specifically around the circular economy.

Interested in finding out more? Simply get in touch!

Source

[1] https://www.pwc.de/de/nachhaltigkeit/pwc-circular-economy-study-2019.pdf

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SELDOM ARE TIMES THIS FASCINATING

MARTIN TROTIER ASSESSES THE TOPICS AND TASKS OF PERSONNEL WORK IN 2021

In the early days of 2021, the media once again started discussing the future role and tasks of the personnel department – or in modern terminology: HR. But this time something's different. The whole discussion is being overshadowed by the pandemic. Why should that affect HR? As HR expert and Steinbeis Entrepreneur Martin Trotier discusses in our latest Steinbeis Swipe opinion column, the importance of HR is growing for companies in these times. For Trotier, the pandemic is not a catalyst of the trends we're currently experiencing, it's just fanning the flames of certain processes that started a long time ago. The only difference is that these processes are now becoming more obvious and more embedded in the consciousness of those affected.

In the summer of 2020, consultants at Kienbaum ascertained that the pandemic is expected to raise the importance of HR at companies, offering an opportunity for HR departments to adopt an interesting position in the corridors of senior management. Naturally, they said, this comes hand in hand with a significant rise in senior management expectations regarding the HR function. [1]

In its traditional end-of-year review, the German Professional Association of HR Managers (BPM) sings off the same song sheet regarding the future of HR work. It also points to a sudden rise in the importance of the HR function for companies due to the pandemic. HR – a central axis of corporate management: The report said it's important to retain this significance in the future and not fall back into the pattern of traditional roles. [2] In her official statement, association chair Inga Dransfeld-Haase also points out that HR needs to hold on to this outcome of the pandemic. [3]

If you think about these notions, the pandemic has had an interesting impact. It "finally" resolves HR's dilemma of having to continually justify its existence and prove that it adds value for the company. The pandemic is making an important contribution to the HR guild not having to keep trying to persuade itself that it's valuable.

HUMAN BEINGS AS THE CENTER OF ALL ACTIVITY

The pandemic has impacted firms in a number of ways, but one thing that surely applies to all industries is that being ordered to remain physically distant has caused havoc for entire organizations and partnerships. Without delay, ways had to be found to organize work, working hours, communication methods, and leadership techniques in line with the crisis. This immediately affected human interaction at companies.

The crisis turned the spotlight on people – properly, not like we've witnessed so often in the past with management simply paying lip service to people. Making employees the center of everything at the company – suddenly this really did become essential for survival.

MEGATRENDS AND HR

For some time now, it has been generally accepted that HR is driven by a whole series of megatrends, which it has aligned itself to. Global events are becoming increasingly volatile, trends are becoming more uncertain and complex, and there are fewer and fewer clear answers to the questions. At the same time, fast-moving trends – such as digital transformation, demographic change,

climate change, and demands for diversity – are heightening the pressure on people and companies to change too. This pushes HR into the front row and it will have to align its activities with the support of and according to people in order to make these trends manageable within the company and organize how everyone collaborates.

SHIFTING THE FOCUS: THE BIG CHALLENGE FOR HR

So it wasn't the pandemic that came up with these trends, but it certainly amplified them once more and resulted in a shift in priorities.

Having to separate people in physical terms has placed new emphasis on how processes are organized – also introducing the term "working from home" (WFH). Almost instantly, people were expected to put everything in place to organize their work differently. Like a magnifying glass, WFH highlighted the complexity of interrelationships and how important it is to see and use HR as a management function and mediator between different parties. WFH separates employees into those who can work from home, and those who can't. Some find WFH a flexible arrangement that offers a new sense of freedom, others don't. Topics rise to the surface relating to working hours – or observing, monitoring, and spreading work over the day or week. WFH requires the right technology and much more advanced digital processes than was probably even necessary in the past.

Communication is undergoing a major transformation and has to be controlled much more tightly than it used to be. Staff and managers have not prepared for remote collaboration and can't always get their minds around it. How do you remotely manage people? Do you still need managers or is it now all about self-discipline and taking personal responsibility? How should WFH workstations be equipped and designed when it comes to ergonomics and health issues? And finally, WFH presents new challenges when it comes to collaboration between employers and workers' representatives. Employers and works councils must quickly work on how they collaborate and find constructive solutions.

All of this spells change at an unprecedented pace. The focus lies in redefining the processes of work and working hours within companies. The role HR has to play in this is to work with all stakeholders to come up with sustainable solutions and thus constructively overcome any conflicts that arise. We are highly unlikely to see a culture of "back to the workplace" like in the past.

The pandemic also draws attention to occupational health management and health and safety issues. HR's role in this is to manage processes beyond the pandemic. The importance of health issues should now be patently obvious to everyone in management by now.

These changes have a fundamental impact on how people interact and work together in organizations. To not only make it through these changes, but also shape them, HR has to find ways to help staff become more resilient. For managers, this entails a new direction in management development, seeing people from an overall angle and considering all of their individual facets. Managers must be enabled to reflect on their own roles, redefine them, and support staff as they learn how to organize their own tasks and assume more personal responsibility.

Another key aspect of current HR work: Economic pressures resulting from the crisis may trigger or accelerate a necessary process of restructuring. HR has a particularly important role to play in this by shaping working relationships within the company. The future of the company depends on smooth cooperation based on mutual trust.

Other aspects of HR management will become less important at first. So it's

entirely possible that recruitment will not be the main priority at the moment. But in view of long-term demographic developments, this will only be a temporary effect. However, it should not be forgotten that HR must continue to deal with the administrative sides of the business. Its aim here should be to seize the opportunities offered by digitalization and enhance processes. This will remain the case in the long term.

EXTERNAL SUPPORT FOR HR

HR faces enormous challenges during the pandemic and beyond, and it should not hesitate to call on external support.

Although these trends are universal, many prevailing conditions are also specific to individual companies. As a result, each company must decide for itself which priorities to set and how best to bring in support from outside. A specialist in HR consulting, SCG Personal can provide this kind of individual support and respond as required to the needs of its customers – whether the priority is to empower employees and managers to deal with change, or it's about making work more flexible.

MY PERSONAL CONCLUSION

The pandemic is not triggering trends, but it has been fanning the flames by reinforcing existing trends in HR and making dealing with the pandemic a matter of long-term survival.

How long the pandemic lasts will determine how profound change is, not only for the economy but also for companies. All of these issues have a fundamental impact on how people interact and work together in companies. HR therefore plays a pivotal role in processes over and beyond the pandemic. HR must now seize the opportunity to shape change, not just suffer consequences. Seldom have times been this fascinating. I agree with Inga Dransfeld-Haase when, despite the many challenges, she speaks of a "positive sense of changing into a completely new world of knowledge-based work with greater freedom and self-determination" [3].

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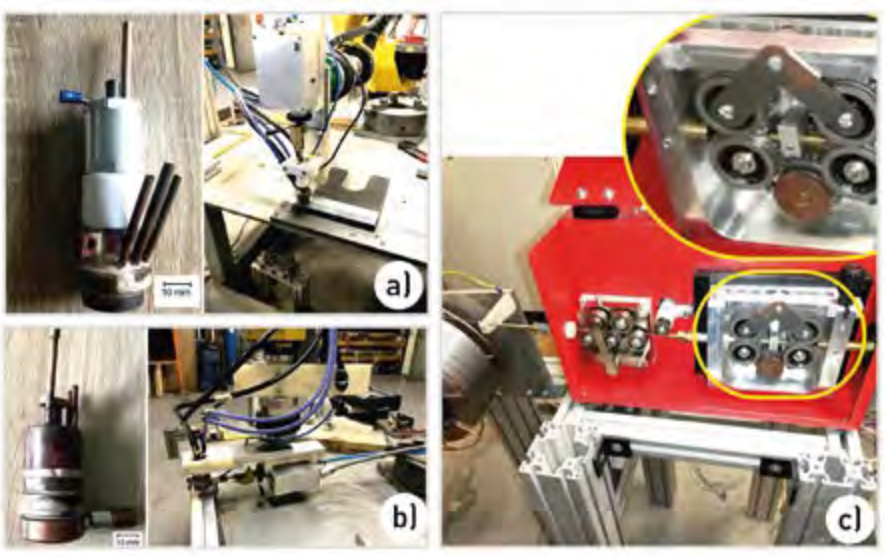
THAT SEALS IT

STEINBEIS EXPERTS DEVELOP PROCESS TECHNOLOGY FOR THERMAL JOINING OF MULTIMATERIAL COMPONENTS AND COMPOSITE STRUCTURAL COMPONENTS

The demand for multimaterial components, also known as multimaterial mixes, is rising continuously. This is particularly the case with lightweight materials made from a combination of metals and plastics, now used in lightweight construction, apparatus, vehicles, and aircraft. The key aim with such materials is to significantly minimize the amount of energy needed in transportation by making them lighter. The increasing use of multimaterial mixes also places demands on thermal joining processes, especially in terms of material use and technology. For example, processes may need to be automated to achieve defined levels of seal stability. Such composite material requirements now make it necessary to come up with new types of arc welding technology, along with the corresponding hardware. Experts at Intelligent Functional Materials, Welding and Joining Techniques, Implementation, a Steinbeis Innovation Center based in Dresden, decided to take on this challenge – and were successful!



a) A mounted torch head prototype with internal soldering wire feeding,
b) A mounted torch head prototype with external soldering wire feeding,
c) The new wire feeding system based on a chain feeding principle including control unit

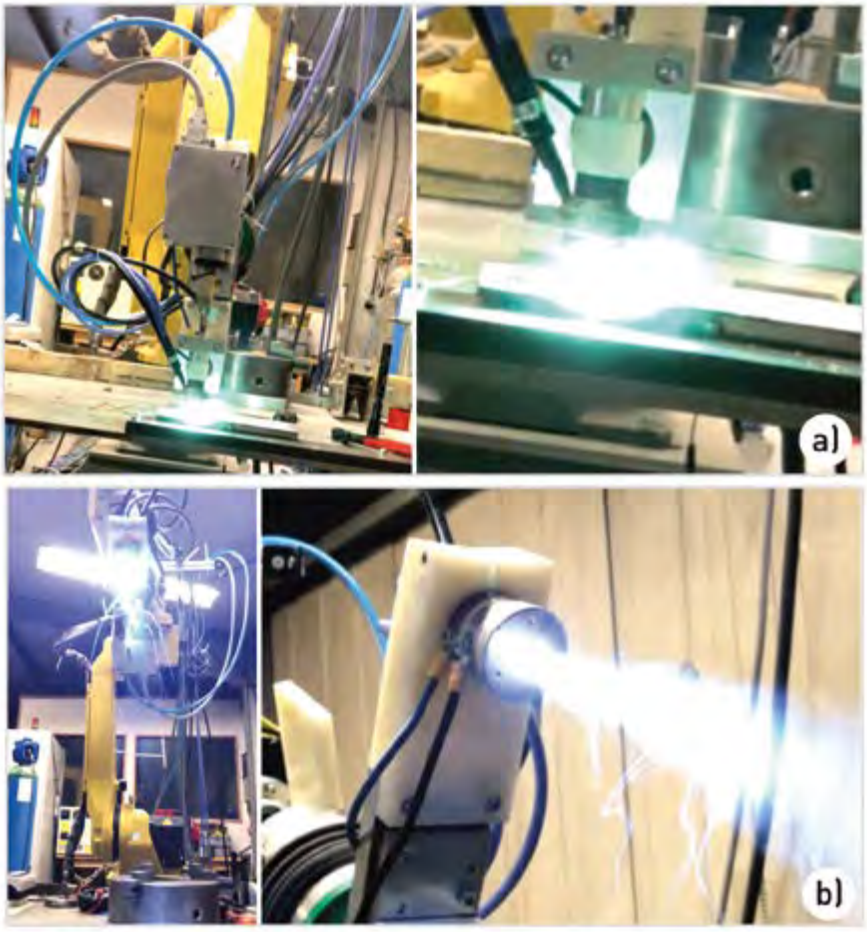
The new process solves some key technological problems encountered with materials: insufficient strength, breakdown of heat-sensitive parts due to excessive thermal loads, and material delamination due to exposure to extreme heat. The team members ensured the project also looked at gas metal arc welding (GMAW) with non-transferred arcs. Their work benefited from experience gathered on a previous R&D project with the welding equipment manufacturer Weber.

The focus of this follow-on project lay in developing a form of process technology representing a hybrid of arc soldering and GMAW welding, with corresponding torch technology for joining thermally sensitive multimaterial mixes. A compact welding torch technology was developed, based on a non-transferred arc with a non-melting and melting electrode, to provide a kind of torch prototype designed and built so that it could be tested and evaluated. Based on these technical and material concepts, the team defined a list of requirements for the MSG hybrid soldering torches developed and for the corresponding peripheral technology.

A BASIS FOR MIG AND TIG WELDING

The first concept developed by the team was based on the principle of metal inert gas (MIG) welding with a non-transferred arc. The filler metal – a wire electrode – was defined as the cathode (positive polarity) with a cooled copper nozzle as the anode (negative polarity). The second concept was based on the principle of cold wire tungsten inert gas (TIG) welding with a non-transferred arc. With this concept, the arc burns between the tungsten electrode (cathode, negative polarity) and a cooled gas anode (copper ring nozzle, positive polarity).

To develop the required wire-feeding unit, again the Steinbeis team joined forces with its partner from industry, Weber. The first step was to develop torch heads. These had to meet a number of requirements: faultless arc ignition, reliable arc stability, a reproducible and functionally reliable arc-soldering process, and reliable torch operation by building an effective cooling system and compact torch head. For the torch head variant to be used for MIG welding, a tungsten electrode was mounted along the side of the contact tip to deliver simple ignition and a stable arc process. For the torch variant with an external wire feed, the torch head was designed in such a way



The assessed torch head prototypes; a soldering test using CuAl8 as a filler metal:
a) The soldering process, an internal soldering wire feed, a torch prototype,
b) The soldering process, an external soldering wire feed, a torch prototype

that the cooled copper ring nozzle acts as the anode, with the tungsten electrode acting as the cathode. The filler material is fed from the side and melts into the arc area. This variant delivers reliable arc stability. Since this subjects the anode to high thermal loads, it has to be cooled.

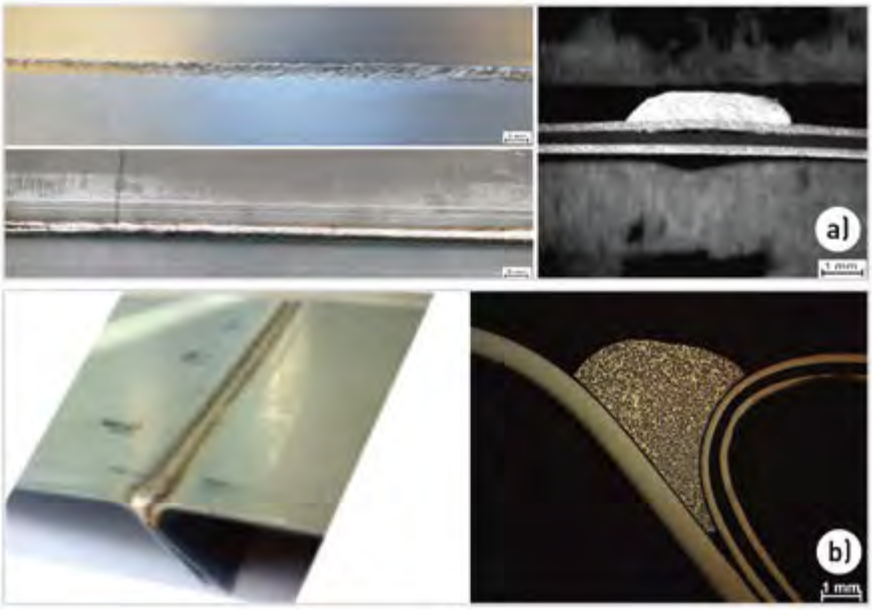
The research allowed the project team to evaluate process data from a number of angles. They were able to look at the physical effects of the non-transferred arc for both torch concepts, the impact on the melting process of adjusting certain process parameters, droplet transition/flow and corresponding thermal distribution, the cumulative energy balance, and the relationship between arc emissions and component surface activation. By carefully synchronizing the wire feed and joining speeds, as well as other parameters influencing quality such as the welding current, welding voltage, and droplet temperature, it was possible to optimize the performance of the welding process under marginal conditions.

TESTING THE TORCH PROTOTYPES

The two prototype torches were tested for ignition, electrical insulation, sealing of the cooling system, and water/gas flow. The results were impressive, with no ignition problems when using the power source as a high-frequency device, and a stable arc process at low power levels. The watertight seal produced by the torch heads was flawless and the cooling system functioned well. Arc stability is strongly dependent on the wire feed and joining speed. Wire properties such as stiffness, electrical conductivity, and diameter are also important and have a strong influence on the stability and effectiveness of the soldering process. The project team managed to achieve high soldering speeds of up to 1.5 m/min with excellent solderability.

The soldered test specimens based on the two soldering wire types (SnCu3 and CuAl8) and the TIG torch variant produced defect-free soldering joints. When CuAl8 was used as a filler metal with different diameters, the soldered samples had excellent joints with high tensile strengths of up to 90% of the base material. A solid bond was produced with high adhesion properties in the soldered area on the substrate material. When multimaterial parts or sandwich materials with a variety of seal designs were soldered to the same multimaterial or galvanized steels, the polymer layer was preserved without damage.

With the MIG torch variant, the arc ignition process was based on an electrical source with a high-frequency ignition unit. With this approach, keeping the preset distance constant between the tungsten electrode and the wire resulted in the arc igniting quickly and evenly, such that the distance between the anode and the cathode no longer had a critical impact on the ignition process. The experiments and torch tests that were conducted demonstrated that the cooling system on the torch is effective and watertight, and the level of process gas flow meets functional requirements. Using welding current and voltages of 150 A and 27 V makes it possible to achieve soldering speeds of up to 1.5 m/min. At low torch power levels (30-50 A and 20-30 V), the arc is stable, but the join-



An assessment of seals produced by the soldering experiments; an I seal, parts joined with a flanged seam; use of CuAl8 as a filler metal with the newly developed torch head prototypes; an internal/external soldering wire feed; torch prototypes,
a) An overview of samples,
b) Seam connection: steel/polymer/steel

ing speed has to be adjusted. Ideally, it should be set right at the beginning of the process and synchronized carefully with the rate of wire feed. The soldering tests looked at different types of seams such as I seams, blind seams, and flanged seams. None of the soldered seams had brazing defects in the microstructure or seam joints, and the polymer material remained intact.

The wire feed system developed jointly by the Steinbeis experts and Weber showed that the welding filler material feed easily met technical fault-free feed rate requirements, achieving up to 10 m/min for diameters ⩽ 0.8 mm as well as diameters ⩾ 0.8 mm. In such cases, arc stability is strongly dependent on the positions of the wire ends and their dimensions, making it essential to ensure that wire feed rates remain constant. Using the wire feed system developed for the project resulted in good arc stability and correct synchronization of molten droplets with the joining speed.

Both of the torch head prototypes that were developed and constructed on the basis of a non-transferred MSG arc function flawlessly in process terms and are easy to connect to welding robots. The torch cooling systems are highly effective and meet torch performance requirements, and ignition processes are faultless using straightforward welding power on high-frequency ignition units. The new wire feeding system offers good arc stability with uniform and continuous wire feeding, paving the way for excellent soldering joints.

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INCONNECT: HOW AN INDEX CAN SHOWCASE THE BENEFITS OF COLLABORATION

STEINBEIS COLLABORATES IN RESEARCH TO ANALYZE THE FACTORS THAT DICTATE THE SUCCESS OF INNOVATIONS AND VALUE CREATION IN ALLIANCES

The concept of networks and alliances lays an important foundation for developing successful innovations. At a time when there is an increasing need to pool interdisciplinary know-how in the development of new technologies, very few areas of business are unaffected by the concept. But networks only become successful alliances if key questions are answered: How? With whom? and when exactly? Then collaboration boosts innovation and enables value to be created in networks. A particularly important role in this is played by the transfer process that develops between the participants of networks. The networks that develop between universities and companies as a result of research projects – and examples of best practice that are derived from successful partnerships – galvanize the ability of alliance participants to engage in innovation. This is seen not only on a micro level, affecting individual stakeholders, but also on a macro level spanning interregional networks. Against this background, a team from Steinbeis 2i GmbH and STASA Steinbeis Angewandte Systemanalyse GmbH has developed a kind of cooperation index. Its name: InConnect.

InConnect pools detailed data on research projects under the European Horizon 2020 program as well as national funding programs backed by a variety of German federal ministries (BMBF, BMWi, BMU, BMVI). The archive provides an overview of key collaborative research carried out on both a European and a national level in Germany.

On a micro level, InConnect pools data on specific collaboration networks, funding levels, and in particular, the topics looked at in research. Information is presented in summaries to provide meaningful indicators on the different links and overlaps between regional and supra-regional collaboration. Key figures provide a link between projects and stakeholders on a micro level, regional level, or macro level, providing a clear overview of both regional and supra-regional collaboration patterns. InConnect also forges a link between data gathered through partnership networks and socioeconomic metrics. This makes it possible not only to draw comparisons between regions and institutions, but also to conduct benchmark evaluations, and these assessments take into account the varying influences of collaboration on innovation. The solution includes a program that provides clear, interactive plots and diagrams of the indicators used by the index, making it possible to gain detailed insights into the nature of collaboration between different stakeholders and any relevant indicators on a regional level.

KEY FOCUS: BUSINESS RELATIONS BETWEEN BADEN-WUERTTEMBERG AND THE UNITED KINGDOM

InConnect has already been used successfully for a number of projects since it was first introduced in 2019, and it has been put to a variety of uses. For example, it was used for a study called "Gemeinsam stärker – Stronger Together": Successful Business Relations Between Baden-Wuerttemberg and the United Kingdom, which was published by Steinbeis 2i in the fall of 2020 on behalf of the Baden-Wuerttemberg Ministry of Economic Affairs, Labor, and

An automation and robotics heat map focusing on Baden-Wuerttemberg and the United Kingdom

An example of a heat map showing different regions involved in partnerships

Housing. The cooperation index was used to identify existing partnerships within strategic innovation projects and highlight the respective strengths and complementary competences of the two economic regions. Not only did this make it possible to identify sectors and topics offering major potential for collaboration between Baden-Wuerttemberg and the UK, it also shed light on partnerships involving individual organizations and made it possible to derive recommended actions.

For example, an analysis of the cross-cutting topic that extends over a number of areas – automation and robotics – revealed that there are already numerous alliances underway between Baden-Wuerttemberg and the United Kingdom. 92 institutions from Baden-Wuerttemberg and the UK are currently collaborating on 36 projects in this area alone, and a large number of these organizations are actively involved in several projects. Eight SMEs, 14 large companies, two cities, and ten research bodies in Baden-Wuerttemberg are involved in cooperation projects. In regional terms, this is mainly concentrated in the area around Stuttgart and the cities of Ulm, Karlsruhe, and Heidelberg. In the UK, 22 SMEs, eleven large companies, one city, and 23 universities or research institutions are actively involved in partnerships.

FOCAL TOPIC: R&D ALLIANCES BETWEEN UNIVERSITIES

Another practical example that shows how the interactive InConnect tool can be used is an evaluation that was carried out on the "R&D collaboration ecosystem," which Steinbeis 2i offers to universities and has already been applied successfully. The evaluation covered a number of objectives. First, it has provided a structured and transparent overview of the number, regional emphasis, and key areas targeted by publicly funded projects, for example by providing heat maps. In addition, it has identified key project partners in science and industry. Finally, a benchmarking on project involvements and topics with selected universities in other European countries can be established.

Reports presented in this way are designed to encourage different stakeholders to incorporate results in their internal strategy processes in order to position themselves on a more strategic level when acquiring public funding. This includes being more selective when choosing project topics and cooperation partners from science and industry – a factor that can positively impact success rates when applying for public funding.

The InConnect cooperation index thus offers major potential to a variety of stakeholders, such as research bodies, companies, and political decision-makers, not only for evaluation purposes, but also for defining the future direction of successful collaboration on innovation projects.k auf erfolgreiche Kooperationen in innovativen Projekten.

Interested in conducting an analysis with InConnect? Simply get in touch!

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MORE STRESSFUL, LESS SUCCESSFUL – MANAGEMENT IN TIMES OF PANDEMIC

STEINBEIS STUDY EXAMINES CURRENT DEVELOPMENTS IN TEAMWORK AND INDIVIDUAL PERFORMANCE

Surveys commissioned by the Robert Koch Institute show that second only to worrying about being infected by Covid-19, currently the biggest concern among respondents in Germany is what will happen to the economy. Sentiments within companies are somewhat contradictory. On the one hand, firms are suffering decline or in some cases enjoying a welcome slowdown in business. Others are under increasing pressure to raise output. For their study, the experts at the Steinbeis Research Center for Management Analytics – Institute for Leadership, Agility and Digitization joined forces with zeb.research to paint an objective picture of whether businesses' expectations have risen or dropped from a company standpoint, in which areas this is happening, and which companies are emerging from the crisis as more successful or resilient.

To date, there have been no studies based on scientifically validated methods into the changes in business requirements brought about by the coronavirus pandemic, or possible correlations with key success factors. There are also no studies to date in German-speaking countries that have looked in specific terms at the impact of "task loads" on individuals and teams, or the impact of leadership practice on the ability of companies to innovate. This was the challenge taken on by the Steinbeis experts.

SYSTEMATIC ASSESSMENT

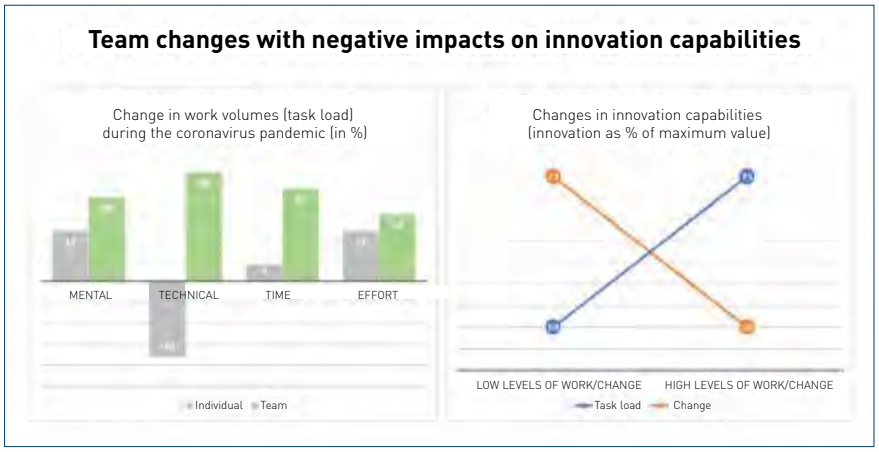
In the 1980s, NASA developed a measurement tool for its aerospace program to record workloads. Its name for the tool was the NASA Task Load Index (TLX) (see https://humansystems.arc.nasa.gov/groups/TLX), and it is still widely used in a variety of industries worldwide. Aimed originally at assessing individual workload, the test has been expanded in recent years to include teams.

Based on the TLX, the Steinbeis project team conducted an anonymous survey of 176 people at a variety of companies on their personal assessment of mental, physical, and "deadline" stress levels before and during the coronavirus pandemic. They were also asked about factors identified through scientific meta-analysis as typical of successful teams (team success – other people's opinions), and how successful teams considered themselves (team success – self-assessment). The survey finished with questions on the support provided by management, plus sociodemographic questions.

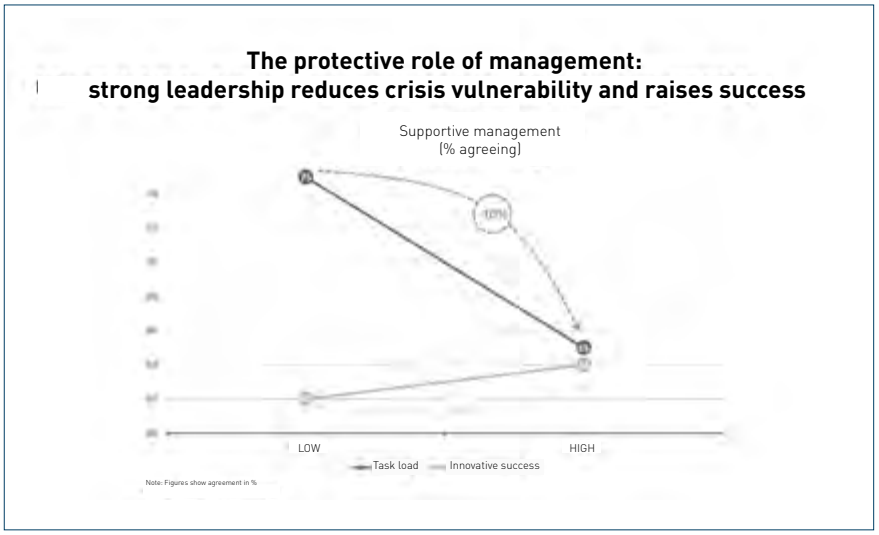
KEY RESULTS

Analyzing work requirements before and during the pandemic showed that workloads have risen particularly strongly among teams, although on an individual level they have actually diminished. Innovation improves when people intensify their efforts, but overall, due to the current crisis there have been few changes in this regard.

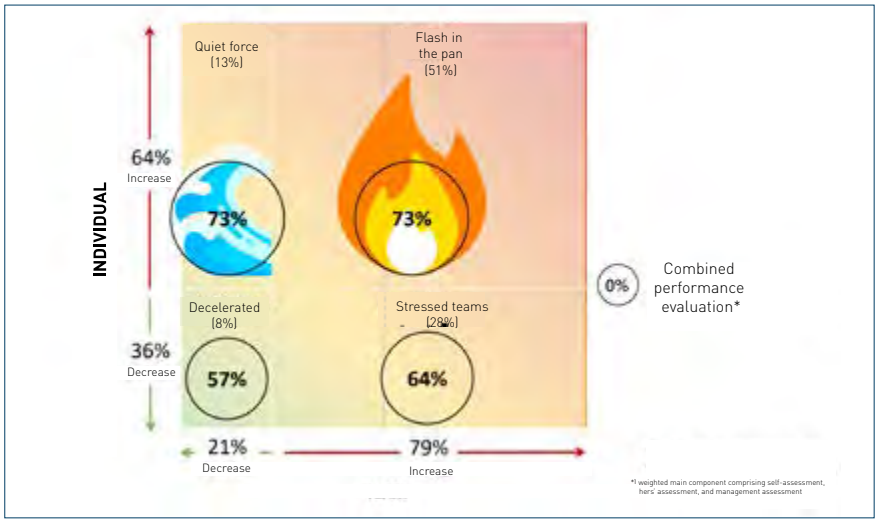
Good leadership seems to play a protective role in exceptional situations like the current one. When people see managers as supportive, their perceptions of stress



Reductions vs. rises in work demands during the coronavirus pandemic (percentual changes) and changes in innovation (in % vs. maximum value)



Positive assessments of management result in perceptions of low stress levels (-10%) but not better innovation (+2% in agreement).



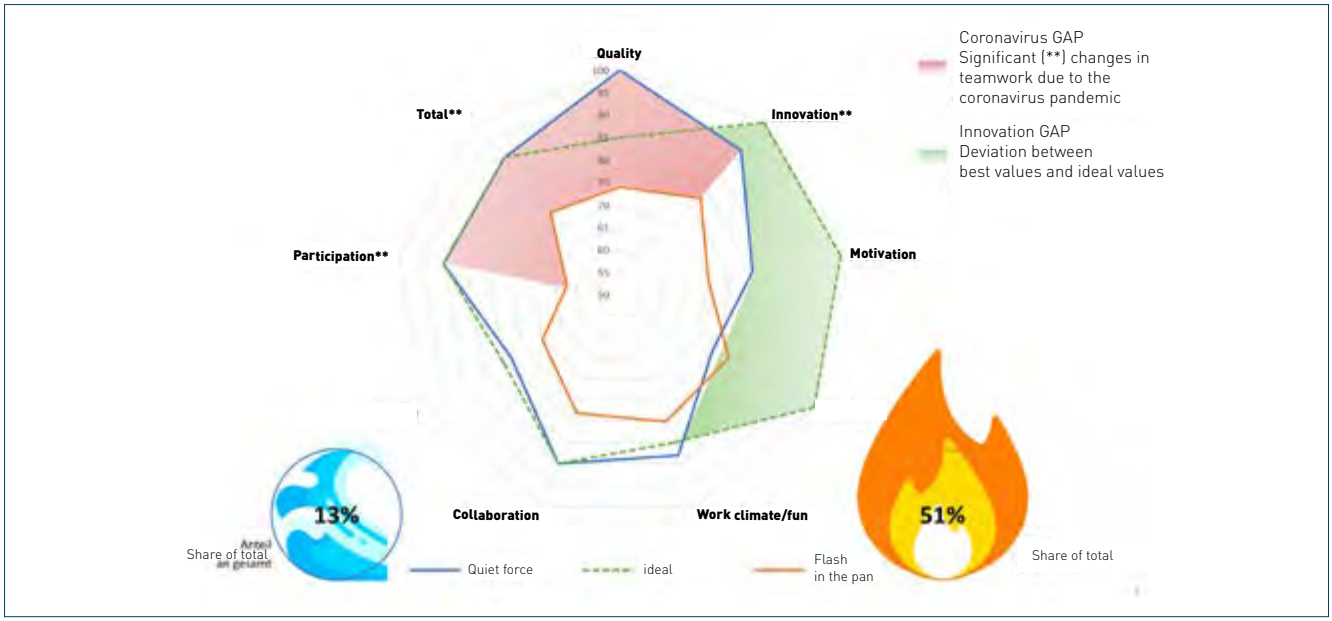
Greater effort does not equate to greater success. Only 13% of respondents succeeded in keeping up individual commitment without frictional losses within the team (% in agreement, values adjusted).

levels may go down, but this does not necessarily improve innovation.

What happens to personal commitment and team effort? One of the main effects of the coronavirus pandemic is that teams are making a greater effort (79%), but also personal commitment has risen (64%). Around half of all respondents said that demands on individuals and teams have intensified simultaneously (51%), but only a minority have witnessed a genuine slowdown (8%).

Considering these impacts, looking at objective success criteria and personal opinions together shows that exertion on two fronts results in a "flash in the pan." Only a minority of respondents, 13%, have been "pacing" themselves over time, raising their individual commitment with only little need of coordination. Exertion on two levels – the flash in the pan – also resulted in lower scores in almost all areas of teamwork performance. Effective teams (like a "quiet force") offer certain advantages when it comes to employee commitment and the quality of work. There is still a long way to go to work out what the success formula is, however: Innovation, motivation, and above all customer focus have suffered under the pandemic.

The sobering conclusion drawn from the survey by the Steinbeis experts is that management is committed during the crisis, but it doesn't change. Instead, it still keeps doing things "by the book." A great deal of energy is invested in providing individual support and organizing people's work. There may be a perception that workloads decrease, but there are no real improvements in teamwork or innovation based on future needs. Worse still, even when teams function well, a particular amount of time and energy is still invested in improving the quality of work. Innovative drive, work motivation and, above all, customer orientation fall by the wayside.



The perception that things are going better than people thought they would and that – contrary to expectations – productivity is even rising in some cases, is ultimately only due to the "flash in the pan" effect. For most of the companies surveyed, individual and team effort increased, performance levels were kept up through high exertion, although not always productively, and time and effort were invested in the quality of work rather than renewal or customer focus.

↑ Greater effort does not always equate to greater success. Individual commitment improves success levels, tension within teams reduces success levels (% in agreement, values adjusted).

KEY FINDINGS OF THE STUDY

1. **Effort (task load):** Team stress has increased more than individual stress (79% vs. 64%): Additional effort among team members is the result of investing more energy in technology and coordination.
2. **Innovative capacity:** People's ability to innovate rises the moment individual effort rises. Coordination costs eat into any advantage gained. Innovation goes down.
3. **Management impact:** The better the perception of management, the lower scores were given by respondents for the burden caused by the pandemic. Innovation improves, but not due to good leadership.
4. **Stress and performance:** At most companies, individual and team effort rose (51%) and time and energy were mainly invested in unproductive coordination. Only 13% of respondents enjoyed sustained success resulting from individual commitment and functioning teams.

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REINVENTED DURING THE CRISIS: THE SPITZENFRAUEN BW CAREERS PORTAL FOR FEMALE LEADERSHIP

STEINBEIS SERIES OF ONLINE SEMINARS ON WOMEN AND CAREERS JUDGED A TOTAL SUCCESS

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The disruptive impact of the coronavirus pandemic was a painful experience for many companies last year. There were exceptions, however. Spitzenfrauen BW, which is financed by the European Social Fund (ESF), shows that a crisis can also be a chance if you're willing to seize the opportunity. In 2020, a team at the Steinbeis Innovation Center for Business Development at Pforzheim University reinvented the career portal managed by the center by staging a series of webinars on women and careers. The "virtual wise-up break" became an opportunity to get more digital, younger, and more successful.

Exchanging views, networking, ideas, inspiration – the main focus of the Spitzenfrauen BW community has always been to promote women's careers at companies in Baden-Wuerttemberg, and its numerous face-to-face events were always seen as very special occasions. The idea was to meet up regularly with women from Baden-Wuerttemberg who have already climbed or are currently quickly climbing the career ladder in order to offer professional training and get to know innovative companies from all parts of the state. Of course that all came to an abrupt end in the spring of 2020 with the outbreak of the coronavirus pandemic in Germany and socializing restrictions. So would the virus also mean the end of the project? For Steinbeis entrepreneurs Professor Dr. Elke Theobald and Professor Dr. Barbara Burkhardt-Reich, that was entirely out of the question. They both always felt passionate about the advancement of women career, even before they joined forces and set up the Spitzenfrauen BW project together in 2010. All they needed to do

during the coronavirus pandemic was offer something equivalent.

PROMOTING WOMEN'S INTERESTS GOES 100% ONLINE

It was fortunate that the foundations of a digital system were already in place in the form of the Spitzenfrauen-bw.de female careers portal. The website not only provides details of around 120 leading women in the state of Baden-Wuerttemberg, all positive role models, it is also home to an online community of roughly 1,500 mainly female members. The idea that arose during the pandemic was to hold regular virtual meetings to provide women with particularly important support during the crisis. They should also be given food for thought, hear professional input, and learn the tools of the trade of career planning. Would all this be possible in a purely virtual setting? "Well, as we know now, after almost one and a half years: yes! It is possible and promoting women's interests can also be done 100% online," say the project managers, Prof. Dr. Barbara Burkhardt-Reich and Prof. Dr. Elke Theobald, with conviction.

"WISE-UP BREAKS" EVERY WEDNESDAY

The Spitzenfrauen BW project team scored a bull's-eye with its free webinar series on women and careers. The new format was already a success during the first lockdown. When it premiered, it was followed by around 100 women. Since then, there has been a wise-up break every Wednesday at noon, each lasting a refreshing three-quarters of an hour. The sessions are kept brief to take the needs of the target group and the purely virtual setting into account; working online requires even greater focus on the essentials. In terms of the topics covered, the project team tries to offer plenty of variety. The topics range from advice, such as how to market yourself, to current trends such as online networking via LinkedIn, and even developments of a societal nature. For example, the 2020 finale was dedicated to "generation Greta." It is important that the participants take something away from each webinar – be it concrete tips, techniques and recommended strategies for their careers, new food for thought, ideas and inspiration, or simply plenty of positive energy.

CONTINUING THE SUCCESS STORY

Over the course of the past year the weekly number of participants has leveled off at around 70 – including highly experienced career women, up-and-coming managers, and a variety of self-employed women. Not everyone can find time to integrate the webinar into their daily work routine, so to cover off all bases the seminars are also recorded.

Many participants are now regulars, so they often spend their Wednesday lunch breaks with Spitzenfrauen BW. The positive uptake has been a huge success for the project team, especially given the number of new women who have become aware of the portal because of the online format. For example, much more use is now being made of the mentoring program. Many women used their time in the pandemic to reassess personal priorities and a number of them sought professional advice from the project mentors.

Twenty-four webinars were conducted last year. Although the project was the product of necessity, the success story will now be continued in 2021 with a series of speakers and an interesting variety of current topics.

The Spitzenfrauen BW project is financed by the Baden-Wuerttemberg Ministry of Economic Affairs, Labor, and Housing through funds from the European Social Fund and the state of Baden-Wuerttemberg.

Further information:
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AGILE TEAMS: A KEY SUCCESS FACTOR FOR DIGITAL TRANSFORMATION IN VALUE CREATION NETWORKS

THE FERDINAND STEINBEIS INSTITUTE PROVIDES SUPPORT FOR CROSS-COMPANY AND CROSS-INDUSTRY COLLABORATION

Digital transformation can be a major challenge for the manual trades and industrial enterprises. Not only do they have to question familiar ways of thinking, they also have to adapt to continuously changing markets and shifting demands, especially when it comes to work planning and strategic management. The Mittelstand, the broad swathe of small and medium-sized companies in Germany which spans a vast number of traditional manual trades, is having to deal with an increasing number of customers asking for holistic solutions – not least as a consequence of digitalization and new service trends in other sectors of industry. But how should companies respond to their demands, especially given that this would impact the entire value chain and no longer just the company? The Ferdinand Steinbeis Institute recently joined forces with a number of partners as part of a project called Agile Teams to demonstrate how to get cross-company and cross-industry collaboration to work effectively.

Digital natives are particularly likely to want smart solutions in business these days – i.e. digitally enhanced systems. Thinking just in terms of industries, segments, or trades is increasingly outdated. Digitalization may be more and more likely to involve a certain degree of specialization, not just for SMEs but also for the manual and skilled trades, but for the majority of customers that is a secondary consideration. For customers, it's paramount to offer benefits, simplicity, and service.

In most cases, customer benefits can only really be offered or improved by working together on solutions, especially when it comes to complex products and services. Soft skills such as communication, consulting, and coordination skills are becoming increasingly important. To provide smart services, a foundation of data is required, even if customers don't currently know that they will need such services one day.

THE INCREASING IMPORTANCE OF NETWORKS AND COLLABORATION

As a result, it will also become more and more important for SMEs and the manual trades to work together in new kinds of heterogeneous "value creation networks" and fixed collaboration partnerships. It is becoming apparent that the focus of such value creation networks will not be restricted to the sectors companies currently operate in. They will also include IT firms, startups in the manual industries and other areas, but also tech startups and other kinds of SMEs. In addition to service provision, there is clearly major potential to form partnerships in areas such as product and service development, purchasing, marketing, and staff training.

As a result, an increasing number of new inter-company and cross-industry value creation networks will form in the medium to long term, and it will be particularly important for small and medium-sized enterprises to become involved in these networks. Although "compartmentalized thinking" is not restricted to the manual trades, it does impair collaboration, especially among non-manual trades and other industries and sectors. A profound cultural change is needed in the skilled trades and Mittelstand. For companies shaped by tradition, this entails major effort and a judicious approach to change and transformation management. The transition from traditional value creation to new types of

network-based processes will affect companies in a number of ways, but particularly in terms of organization, company culture, and technology. Until now, there have been no validated methods for moderating interaction between stakeholders from different corporate or specialist "cultures," or firms that operate in different languages or have different access to methods or tools.

AGILE PROJECT TEAMS – A NEW MODERATION METHOD

To address this issue, the Ferdinand Steinbeis Institute joined forces with a team of specialists from bwcon, Steinbeis 2i, and the Baden-Wuerttemberg Crafts Council (BWHT) to develop such a moderation concept and put it through its paces like testing a prototype. The goal of the pilot project, which is funded by the Baden-Wuerttemberg Ministry of Economics and goes by the name of Agile Teams – Success Factors for Inter-Company and Cross-Industry Cooperation in Digital Transformation, is to create specific and significant value for companies within a very short period of time.

To start with, agile teams comprise at least three members of a value creation network or collaboration project. In addition, each team is supported by at least one duo of facilitators (or moderators). This also makes it possible to offer teams additional moderation techniques. Finally, each agile team includes at least one intermediary. His or her role is to add perspective, input the experience of a business stakeholder from the state, and forge links with the specific support and funding packages that are available in each area, also by building bridges to other stakeholders in the state. In total, that makes at least six people working in an agile team. The project consortium initially supported three such agile teams and accompanied them through three different phases of the funded project.

To work up tangible value as quickly as possible, a separate workshop concept was developed for the agile teams. This concept involved running three workshops based on three phases of the Design Thinking model (using the Double Diamond, including a problem space, concept space, and solution space). The sequence of workshops, including lead-up, intermediate steps, and follow-up, was designed to last around six months and was structured by content according to a "sensitizing concept," which made it possible to provide orientation and develop the agile team within the topic. For example, for the topic of corporate culture, a "culture model of four quadrants" was developed.

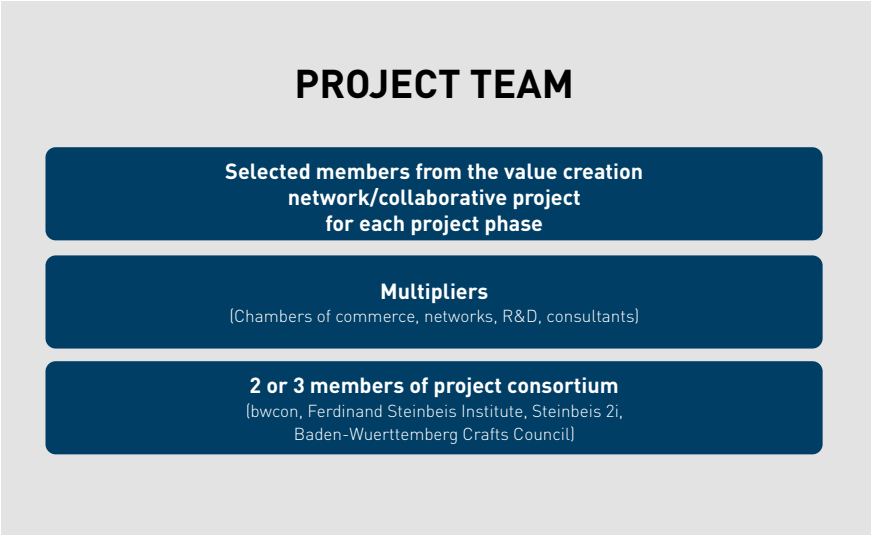
CARPENTER HEROES

One of the teams that was facilitated was called Carpenter Heroes. The Mario Esch Joinery in Murrhardt is a specialist manufacturer of high-quality domestic furniture and something of a pioneer in the Stuttgart region when it comes to digital technology. In 2017, the firm invested in an almost seamless digital system for all internal processes. It now uses a measurement system provided by Flexijet which makes it possible to take all kinds of measurements in customers' houses at the touch of a button. All furniture is designed and illustrated in a 3D CAD system provided by a company called RSO. The joinery uses a Dynestic7535 CNC machine operated by a Nextec 4.0 master computer, allowing it to manufacture furniture with minimal waste based on so-called nesting programs – even spanning multiple jobs. Once the furniture parts are all cut to size, they are automatically labeled with a barcode.

The joinery not only supplies private households with furniture, it also offers contract manufacturing services to other joineries in the area. Although the firm is already progressive and extremely

Building an "agile team"

successful, its owner Mario Esch is always on the lookout for new opportunities to systematically keep his business model moving forward. During one TREND workshop, he came up with the idea of developing a platform for coordinating his contract manufacturing operations, so they could be extended to include end customers. If more partners from other fields of carpentry could be added, his vision would be to offer customers everything they associate with the discipline of carpentry through a single platform. Another idea is to offer a kind of online personal shopping service along the lines of Outfittery, the clothing company. Customers could be shown various images of furnishing options and select the ones they like. An AI program would then get to know customers' tastes and help them make buying decisions. This would save the amount of time carpenters have to invest advising customers.



RESULTS OF THE PILOT PROJECT

The three facilitated agile teams impressively demonstrated that the concept works on a number of fronts. The selected facilitation concept was successfully applied to all three teams, drawing on the analogy to Design Thinking and the three-pronged problem space, concept space, and solution space method. All teams visibly made good progress, also in tangible terms, developing a number of useful ideas, achieving key milestones, or developing design thinking "artifacts."

All of the teams were asked to kick off proceedings with a Four-Quadrant Culture Model in order to highlight the role played by corporate culture in heterogeneous partnership networks. This model was developed and tested as part of the project and has proven to be especially useful in dealing with the practical aspects of processes. As well as identifying existing strengths and challenges, the participants were sensitized to such issues, the impact they may have on setting up and expanding networks, and in particular, the different ways such issues manifest themselves.

It was particularly noticeable how the moderated teams pulled together over the course of the project. The firms that were supported said that they found a number of aspects at the workshops extremely useful and expedient. These included being sensitized to key challenges, giving specific consideration to personal friction and potential conflict, learning about strategies together, applying the tools and concepts together, designing workshop artifacts together, questioning supposed givens, and having professional moderation for discussions between team members.

It also proved valuable to have an intermediary at the workshops. The facilitators made it possible to include important ideas, methods, or tools in the work of the teams in ways that matched the target groups. In addition, they also offered support that could be useful to the workshop participants after completion of their projects.

The facilitation model was also found to be particularly powerful. Team members were organized into duos from different organizations taking part in the consortium. This allowed them to triangulate their moderation experience, merge findings pragmatically into new concepts, and leverage synergies. Switching to virtual workshops due to Covid-19 restrictions also proved successful and was only felt to have had a limited impact on envisaged project goals. It was particularly useful that new online facilitation methods could be developed as part of the process, with instruments and methods to match, and these may also play an important role in digital methods in the future when supporting partnership networks. The project team has compiled a catalog of measures based on the lessons learned during the pilot project, as well as a list of tools and concepts that were developed, and these should be useful for follow-on projects in other areas, including beyond corporate culture.

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www.steinbeis.de/su/1212
https://steinbeis-fsti.de/agile-projektteams

"WORKING IN AN AGILE TEAM IS A VERY PARTICULAR FORM OF COLLABORATION"

AN INTERVIEW WITH CARPENTER MARIO ESCH

Hello Mr. Esch. How important are digital platform solutions for the manual trades in general, but also particularly for carpentry?

Business has been shifting online for years now. Information and services are also increasingly being bought online. This trend has already fundamentally changed a whole variety of industries. The travel industry, but also books and retail in general are experiencing a phase of restructuring. And the trend is also gradually creeping into the manual trades. Digital solutions enable large manufacturers and industry to offer individualized goods and services directly in the customer space. We're also seeing this trend in areas affecting carpentry. The marketing budgets of the big players, and the aura created by individual brands, are disproportionately large compared to individual craftsmen. Having horizontal – but also vertical – platforms for the manual trades, or having partnerships in place, can ensure that manual workers remain visible to customers.

Are the manual trades in Baden-Wuerttemberg prepared for this change? What competences do companies need in order to cope with the changes that are happening?

I think there's no catch-all answer to that question. On the one hand, there are the companies that set the agenda and acquire or buy in skills. On the other hand, even though companies are aware of what's happening, according to a 2020 survey by Bitkom and ZDH, only 19% believe their business model will change as a result of digital transformation. Skilled workers in manufacturing areas have had computer-controlled machines and software for some time now. But just because you have a CNC machine or a CAD program doesn't mean you've gone digital. In my opinion, we need a better definition of digitalization. This is where there's an urgent need for support from politicians and associations, but also from the scientific community.

How important is corporate culture as a success factor for collaboration through platforms?

For me, defining a common corporate culture – one that can be adhered to by all partners – is fundamental when setting up successful partnerships and platforms. Without proper "ground rules," it's not possible to work together in the long term.

Was working on the Agile Teams project productive for you? And would the concept also be suitable for other businesses or platforms?

Working in an interdisciplinary team was a wonderful experience. It was particularly valuable for our project to have different trades involved. It broadens your outlook and it's a better way to represent different interests. There are always situations when things don't meet your expectations or needs. That's when the team keeps you going and you work out a solution together. The agile team approach is definitely applicable to and useful for other medium-sized and large companies, not just on its own, but also as part of manual trade partnerships and platforms.

One last question then: How important are professional facilitators to the process?

Working in an agile team is a very particular form of collaboration. It was extremely helpful to receive support from a professional and have moderation. We were introduced to a number of tools, and receiving help from the facilitators made it quick and safe to use them. If we'd had to learn how to do that ourselves, it would have been much more time-consuming and a lot less precise. We also received professional and constructive help seeing things from the outside in, and combining this with evaluations and summaries. Without facilitators, the project could well have come unstuck at one point or another. I would definitely recommend having facilitators.

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SUPPORT DURING THE CRISIS: AN APPLICATION SYSTEM FOR COVID-19 AID

STEINBEIS TEAM DEVELOPS DIGITAL SYSTEM FOR PROVIDING EMERGENCY SUPPORT IN BAVARIA

Germany is responding to the economic crisis triggered by the coronavirus pandemic with huge programs aimed at offering emergency support and bridging loans to companies, institutions, and the self-employed. In practical terms, the programs – which are aimed at certain sectors and occupational groups – are being implemented on a decentralized basis within each of the federal states, which have set up new processes and systems. Obviously, it's a challenging time. With thousands of cases having to be processed within a very short period of time, IT systems had to be made available quickly to provide support for the administration. The Steinbeis Transfer Center for Business Development, which is based at Pforzheim University, has been providing support with the IT project for the State of Bavaria.

The Steinbeis Center had already developed and managed the application system for a Bavarian innovation voucher program since 2009. As a result, there was already a digital backbone in place, which could be built upon to launch an application system for the current bridging and emergency support program. In technological terms, the solution is based on a system called the Management Monitor, a proprietary Data Warehouse and Business Intelligence software developed by the Steinbeis Enterprise with exactly the functionalities required to address the current challenge.

After an extremely curtailed development cycle, the project team was ready to go live with the first application system in July 2020, as part of a rapid prototyping process for financial help for venues such as theater houses and movie theaters. In the months that followed, applications were set up for event organizers and sole traders, and a scholarship program was launched for young professionals.

The core function of the application system is to drive the entire digital process underlying the emergency support program – starting with eligible recipients submitting applications online, to application processing at corresponding centers and authorities, and disbursements through the state bank.

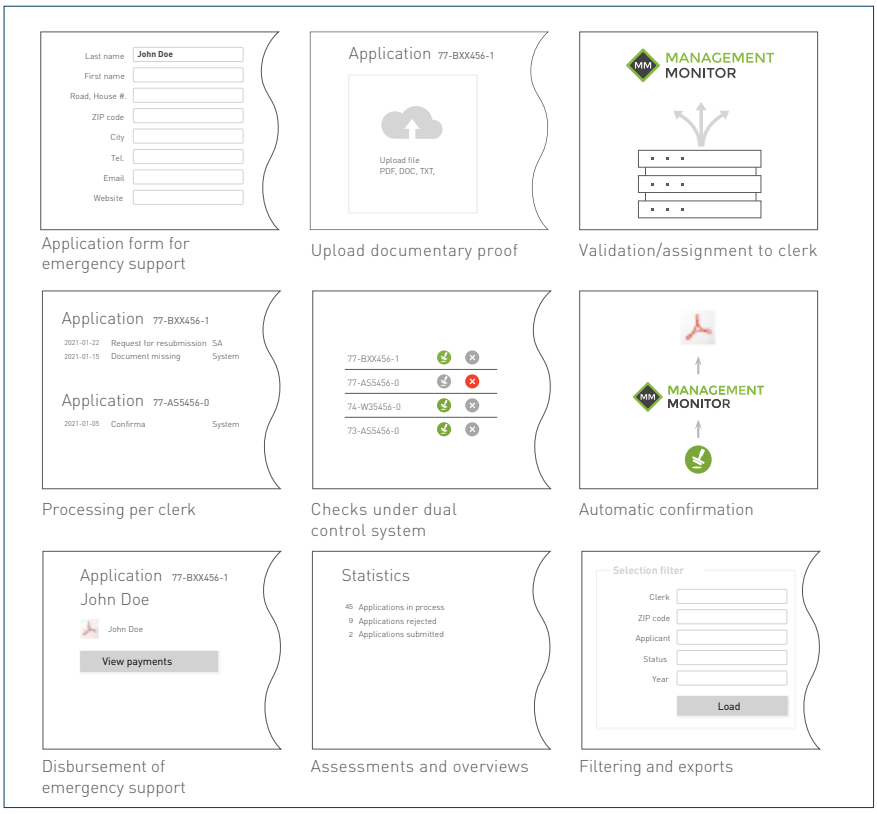
THE APPLICATION PROCEDURES IN DETAIL

Applicants apply for the support they require by entering their personal information on a form provided through a web portal. The website sets up a company and personal account so that applications can be processed on a continual basis. The applicant's tax return preparer, whose certificate must also be uploaded to the portal, then confirms that the information is correct.

Applications are then validated and plausibility checks are conducted by the software before assigning cases to clerks according to each region and zip code area within Germany. Administration clerks are provided with a task list detailing all open applications that are now ready to be verified. They can automatically ask applicants questions through the system or request further documentation. All communication between applicants and administrators in charge of their cases is documented in the system, and processing statuses can be tracked at any time by authorized users. The system checks all applications received for multiple submissions to avoid any such problems arising in the first place.

After initial checks, application are forwarded to a second reviewer based on a dual-control principle. Applications then go through a multi-stage decision-making procedure before it is finally decided whether they will be accepted or rejected. Decisions are recorded in the system by a clerk, automatically triggering the next stage of the process in which confirmations are set up by the system and issued to each applicant by email. To ensure payments are transferred, data files are created and sent to the state bank for remittance. Possible reclamations can also be set up within the system and issued along the same lines.

At any time, administrators are in a position to obtain clear information on the status of application processing and approvals. Applications can be filtered according to the stage they have reached within workflows with follow-up files to



The process steps in the Bavarian application system for bridging and emergency support program.

provide an optimal overview. The system offers a variety of filtering options and export functions to allow administrators to work flexibly and carry out their everyday tasks as efficiently as possible.

The application systems provided by the Steinbeis experts have helped ensure applications in Bavaria are processed quickly in recent months. Despite the heavy workload placed on administration clerks, there was still a clear overview and the clear lines of communication meant that every applicant has been able to see the processing status of his or her application – a win-win solution for all parties.

Further information is available online by going to **www.management-monitor.de**

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A WINDOW OF OPPORTUNITY IN WOOD RESTORATION

STEINBEIS EXPERT VOLKER BUCHER JOINS FORCES WITH TIMBER MANUFACTURING SPECIALIST HOLZMANUFAKTUR ROTTWEIL TO DEVELOP INNOVATIVE METHODS FOR CLEANING, ABRADING, AND COATING SURFACES

Sometimes all it takes is a smidgen of fortune to bring innovative partners together. That's how it was for Volker Bucher, professor at Furtwangen University and Steinbeis Entrepreneur at the Steinbeis Transfer Center for Surface and Coating Technology. He was walking around the Minster of the Holy Cross in Rottweil when he stumbled across Fabian Schorer, an expert in restoration work. As a specialist in restoring listed artefacts, Schorer was carefully cleaning frescos on the ceiling of the 800-year-old minster with a laser beam and stripping down wooden elements on the pews. This aroused Bucher's interest … perhaps this laser cleaning technique or a similar process could be used to restore old wooden window frames. The two are now working together on a joint project with Rottweil Wood Manufacturing (Holzmanufaktur Rottweil). Their research and experiments are being funded through an innovation voucher awarded by the State of Baden-Wuerttemberg

In Germany, preserving windows on protected buildings is a cultural obligation enshrined in law. Aside from factors relating to architecture, building culture, and architectural heritage, it is an established institution offering immense potential in terms of environmental protection, sustainability, and resource efficiency. But preserving wood or metal fittings in old and listed buildings is only possible if you have access to effective means and solutions in terms of handicraft knowledge and restoration skills. In 2015, Rottweil Wood Manufacturing (Holzmanufaktur Rottweil) and holzmanufaktur SWISS from Hunzenschwil in Switzerland embarked on a series of research projects looking at the preservation and functional enhancement of old windows.

Working alongside Steinbeis expert Volker Bucher, the team at Rottweil Wood Manufacturing set about optimizing the methods of laser cleaning and CO_2 snow-jet cleaning. The aim of the project partners is to find a way to selectively remove paint and other coatings from listed wooden parts, metal components, and other metal fittings. In doing so, the process should not affect – and especially not damage – underlying elements.

SEARCHING FOR ALTERNATIVES TO LYE REMOVAL AND SANDING

The team working on the project is using powerful experimental devices with an emphasis on high-energy light in the UV and IR wavelength ranges, opening the door to a whole spectrum of applications and answering a variety of requirements. It is also looking for effective alternatives to standard methods used to date in this area, such as chemical lye removal and mechanical grinding. These methods are not only hazardous to health, but also cause high levels of emissions and result in material losses; they may also affect underlying materials.

For the first step, Bucher conducted a feasibility study with the experts at Rottweil Wood Manufacturing. As the client, Rottweil Wood Manufacturing defined requirements and assessed these with Bucher in terms of practical feasibility.

» **IN GERMANY, PRESERVING WINDOWS ON PROTECTED BUILDINGS IS A CULTURAL OBLIGATION ENSHRINED IN LAW.**


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This was followed by a literature search, before selecting any methods that should be used and objects that could serve as a point of reference.

THE CO_2 SNOW-JET PROCESS

Research into commercial aspects affecting the CO_2 snow-jet process highlighted the potential and the marketability of the method under investigation. Even highly sensitive surfaces of cultural importance can be cleaned with this process. Cleaning involves several steps. First, light surface patina is removed from areas of soiling using pulse transmission. Temperature differences between the CO_2 snow jet and the surface being treated, as well as the thermoelectric voltage that this creates, take the process into the next stage of cleaning: The upper layer of the surface, which is subject to mechanical stress, is loosened by the pressure of the jet. During the cleaning process, the CO_2 snow jet changes state from solid to gas.

USING LASERS TO CLEAN MATERIALS WITH LIGHT

Another key area being looked at under the project in Rottweil is laser-based cleaning with light. There are already a number of reliable laser methods that can be used to clean, paint-strip, or pretreat wood and metal surfaces. Based on these approaches, Rottweil Wood Manufacture asked restoration experts already experienced in laser-based ablation to draft a work schedule for Steinbeis expert Bucher to complete for the project.

ATMOSPHERIC PRESSURE PLASMA PROCESSES

The project team aims to conduct further testing and a series of trials in order to find ways to increase the weather resistance of indigenous types of wood. Many functional fittings on monuments – such as windows, doors, and all kinds of wooden parts – are subjected to aging, especially in outdoor areas exposed to the elements. As a result, they are not guaranteed to enjoy lasting protection and this makes them more difficult to care for, maintain, and work on.

The team is currently using a process involving atmospheric pressure plasma to conduct a series of tests aimed at improving the adhesion of coatings on wood from different sources, as well as wood with aging surfaces. This is expected to result in improved adhesion, deeper penetration, and more even distribution on surfaces. As provided for in the work schedule, lab testing is currently being carried out, as well as field testing involving outdoor weathering.

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MEDIATION – QUARTER I EDITION, 2021

→ WWW.STEINBEIS.DE/SU/941

CONSULTING – WHEN YOU CAN'T GET AHEAD ON YOUR OWN

GERNOT BARTH (ed.)

Legal consulting, couple counseling, business consulting – when you're stuck, you can always try to tackle problems by yourself. But often, a better way to solve issues is to turn to a consultant, advisor, or counselor for help. Consultants or counselors act as a kind of mentor, standing at your side and enabling you to overcome difficulties by providing the right input. This skill is of immense importance for mediators, who are often called in by people seeking help with situations of conflict. This latest issue of Mediation focuses on consulting, taking an in-depth look at dovetailing insights into industry with the role of neutral mediators, and how important it is to be able to listen carefully to succeed in consulting. As always, a number of fascinating insights are also offered over and beyond this focal topic. For example, in an interview with the editor, Prof. Dr. Gernot Barth, negotiation expert Prof. Dr. Christian Duve explains what he considers the foundation of successful negotiation. Answers are also offered to the questions of why the role of a manager is sometimes not so far removed from that of an Instagram influencer, and how companies can succeed in promoting innovative thinking.

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THE 7 SKILLS OF THE BEST

→ WWW.STEINBEIS.DE/SU/2159

THE CAPABILITIES YOU NEED TO MAKE IT TO THE TOP

WINFRIED KÜPPERS

In politics or business, if you've stopped climbing the career ladder although you're doing everything to get to the top, it's probably neither coincidence nor bad luck. It's also not because you're playing for the wrong team or you're simply not up to it. All you're missing is an understanding of the things that matter most. As a consultant to politicians and managers, Winfried Küppers spends a lot of time with people who have made it to the top. He has analyzed what makes them successful. In doing so, he has uncovered seven skills – the skills of the best. In his book, Küppers reveals what these skills are and how to acquire them.

This publication is also available as an e-book and audio book.

FUNDAMENTALS OF BUSINESS ADMINISTRATION

HEINZ REHKUGLER, MARCO WÖLFLE (eds.)

→ WWW.STEINBEIS.DE/SU/1868

This book of fundamentals provides an overview of the core topics covered by the business administration courses forming the Bachelor of Arts in Management degree at VWA Business School, a faculty of Steinbeis University, as well as the business administration program at VWA Freiburg. To keep the overall book a sensible length, articles and sections are concise and intended to provide a fundamental understanding of business management theory, methods, and instruments. As a result, the articles offer ideal supplementary reading for individual courses, although they are also an excellent read for students on other business administration courses.

2020 | Paperback
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PROCESS COMPLEXITY

DEVELOPMENT OF A METHOD FOR OPERATIONALIZING AND CONTROLLING PROCESS COMPLEXITY

SAMUEL KUNZE

→ WWW.STEINBEIS.DE/SU/403

For many companies, managing the growing level of complexity is one of the biggest challenges of the 21st century. Yet many methods for dealing with increasing complexity have been around for years. This research develops a methodology of process complexity that will enable organizations to identify highly complex processes and keep complexity under control.

The method makes it possible to systematically implement projects aimed at measuring and managing process complexity. This starts with selecting an area of interest to the company. First, relevant factors have to be determined with an influence on process complexity in the area under investigation. By working closely with relevant departments, factors with an influence on process complexity are measured and assessed in terms of multiplicity, diversity, and variability. The causes of increased complexity are then identified. The method concludes with a definition of required measures and responsibilities for managing process complexity.

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ARE CAREER VALUES CHANGING FOR EMPLOYEES?

AN EMPIRICAL ANALYSIS IN GERMANY

FRANZISKA LEOKADIA FRIEDRICH

→ WWW.STEINBEIS.DE/SU/1249

In a modern, knowledge-driven world of employment, a company's most important assets are its people. Employees play a decisive role in determining whether companies are able to deal successfully with the economic and social challenges they face or whether they will fail to do so in the future. As business goes through digital transformation, hand in hand with increasingly short innovation cycles and demographic changes, this is having a significant impact on the working world of today and tomorrow. Companies need to find effective methods of HR development, not only to help employees in a world of continual flux, but also to safeguard competitiveness. Traditional career paths characterized by authoritative bosses, hierarchies, and extrinsic rewards are losing ground to alternative models, such as careers without borders, shaped by a progressive approach to self-determination and strong intrinsic staff motivation. In a society undergoing fundamental change, employees feel increasingly obligated to define their own career paths. This book analyzes the changing career values of employees in Germany, bringing together the expertise of people working on the front line of business with a variety of insights from academics.

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SOCIAL SKILLS CRITICAL TO SUCCESS IN COMMUNITIES OF PRACTICE

→ WWW.STEINBEIS.DE/SU/1437

KIRSTEN SCHMIDT-ALTMANN

The competitive situation of companies has undergone fundamental shifts in recent years. This can be attributed to globalization, changing values in the world of work and society in general, and the many innovations made possible by information and communication technology. Knowledge is therefore a key resource of the future. Business success is thus dictated by companies' ability to leverage the potential of their employees' know-how.

This is where communities of practice are important. By using computer-based knowledge platforms, things that are already known by some can be exchanged with others and exploited to generate new knowledge. Looking closely at communication within communities of practice reveals that non-verbal communication no longer takes place when people communicate with one another via computers in text.

In order, nevertheless, to realize goals and plans in situations requiring social interaction, individual stakeholders require the right social skills. This is the starting point of Kirsten Schmidt-Altmann's dissertation, which is just as much of interest to scientists as it is to people involved in corporate life in areas overlapping with theory.

2020 | E-Book (PDF)
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AN EVALUATION UNDER REAL CONDITIONS OF THERMOCHEMICAL DEPOLYMERIZATION TECHNOLOGIES (DECOMPOSITION PROCESSES) FOR RECYCLING PLASTIC WASTE

→ WWW.STEINBEIS.DE/SU/857

MATHIAS SEITZ, VALENTIN CEPUS, MARKUS KLÄTTE, DIRK THAMM, MARTIN POHL

Methods of pyrolysis and depolymerization involving waste plastics have been known for many years and are repeatedly brought up as the link between incineration and mechanical recycling. There have been a number of technical, political, and economic reasons in the past for not putting these technologies to use in industry.

The topic has gained new relevance in recent years, not only due to global warming caused by fossil materials, but also due to marine pollution caused by plastics and the prevalence of microplastics in almost every corner of the planet. There is an urgent need to re-evaluate all possible ways to recycle plastics.

This study examines the legal framework, theoretical possibilities from a technological standpoint, the economic and ecological sense of certain options, and – by way of example – the current status of pyrolysis and depolymerization technologies. In addition to assessing the current situation, two small technical plants are examined, as well as a potential recycling scenario in a post-fossil world.

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€19.90 [Germany]

THE DIGITAL TRANSFORMATION OF CORPORATE MANAGEMENT

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THE CHALLENGES AND POTENTIAL OF BI, BIG DATA, AI, AND THE CLOUD – STUDY RESULTS, 2020

ANDREAS SEUFERT, CECILE VON KÜNSSBERG

Data are often regarded as the key success factor in driving competition in the 21st century. Despite this, both the magnitude and the pace of change are still vastly underestimated. Yet any changes that need to be made are fundamental in nature. Not only are business processes being digitalized but so are products and entire business models.

Given this competitive environment, which is characterized not only by disruptive changes in business models but also by increasingly dynamic and rapid change, the ability to innovate is crucial.

The aim of this study was therefore to understand the views of companies regarding the current status of digital transformation. Particular emphasis was placed on opinions regarding information as a strategic resource. In particular, specific designs were examined with respect to data use and how analytical methods are applied to innovations.

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SUCCESSFULLY SHAPING THE DIGITAL TRANSFORMATION OF BUSINESS MANAGEMENT – THE CHALLENGES AND POTENTIAL OF BUSINESS INTELLIGENCE, AI, AND ADVANCED ANALYTICS

ANDREAS SEUFERT (ed.)

Digitalization is not a fundamentally new phenomenon, but for far too long it has mainly been seen as a topic for startups in Silicon Valley. In many cases, people only began to reconsider their ideas when the first impacts of disruption could no longer be overlooked, even in core industries.

Nevertheless, both the magnitude and the pace of change are still vastly underestimated. Any changes that need to be made are fundamental in nature; not only are business processes becoming digitalized but so are products and business models.

Digital transformation is therefore no accident. It reflects the far-reaching upheaval of entire industries and companies and will thus also radically change management practice and financial accounting.

The Digital Finance & Management Accounting Conference, which took place for the first time on Oct. 29, 2020, aims to provide a platform for exchanging views and discussing new issues. The Expert Talk on Nov. 12, 2020 delved deeper into the topics, using a "deep-dive" session to discuss issues raised at the conference. The two publications of proceedings summarize the presentation slides of the speakers at the conference and the expert talk.

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Provide benefit!
Strategies for a sustainable economy and society

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