TRANSFER

THE STEINBEIS MAGAZINE **03|20**

THE CARTE DU JOUR OF THE FUTURE: WHEN ALGORITHMS DECIDE WHAT GOES ON THE MENU

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DEAR READERS,

For more than 30 years, Steinbeis TRANSFER Magazine has played a special role in fulfilling the Steinbeis Foundation's reason for being of imparting knowledge: It shares it. Steinbeis Enterprises write magazine articles to illustrate the areas in which Steinbeis shares knowledge and works on technology projects. This also showcases the areas in which Steinbeis experts are involved in developing future technology. In 2020, TRANSFER magazine accompanied a Technologie*Begreifen ("Grasp Technology") project involving the Steinbeis Network. Its name: #techourfuture. The aim of the project was to offer different stakeholders in Baden-Wuerttemberg (and beyond) information and to stage different kinds of events aimed at making it easy to obtain in-depth and objective information on emerging technology. It was and still is an experiment, and the idea is to explore how willing society is to think about and grapple with the concepts of future technology.

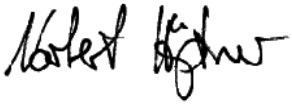
The themes of the three events staged for the project also provided the focal topics for the 2020 editions of Steinbeis TRANSFER magazine. There has been a continual growth in interest in the project – and its results – since the first #techourfuture events, which have dealt with the future of autonomous flying, the future of healthcare, and now a third topic: the future of nutrition. This current issue of our magazine focuses on the latter topic and examines the food and beverages of the future.

The Steinbeis Network and the work carried out by its experts are a reflection of the entrepreneurial emphasis in Baden-Wuerttemberg: There are only a few startups in the field of nutrition, but lots more expertise in the fields of autonomous travel and "Operation 4.0 – data enabling in healthcare." It is clear, however, that social factors play an intrinsic role in entrepreneurial technology transfer. It can therefore be worthwhile drawing attention to the topics that currently motivate people.

In this current issue of TRANSFER Magazine, we expand on these topics by providing insights offered by #techourfuture experts working both inside and outside of the Steinbeis network. Assessments carried out by the Ferdinand Steinbeis Institute within the scope of the Technologie*Begreifen #techourfuture project also offer insights into society's willingness and approach to embracing emerging technology, also shedding light on the issues that arise for members of the general public.

We hope you find this current issue of our magazine an interesting read!

With regards,



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Marlene Gottwald and Norbert Höptner have been working together for several years on the Ferdinand Steinbeis Institute's Technology*Begreifen #techourfuture project. Funded by the Baden-Wuerttemberg Ministry of Economic Affairs, Labor, and Housing, the initiative revolves around the issue of how members of the general public feel about emerging technology. The experts are working on the development of a "platform for trust" aimed at providing neutral and comprehensive information on future technologies. Marlene Gottwald and Norbert Höptner's hope is that this will allay the perception among some members of society that they are losing control, and that it will allow citizens to consciously help shape the future.

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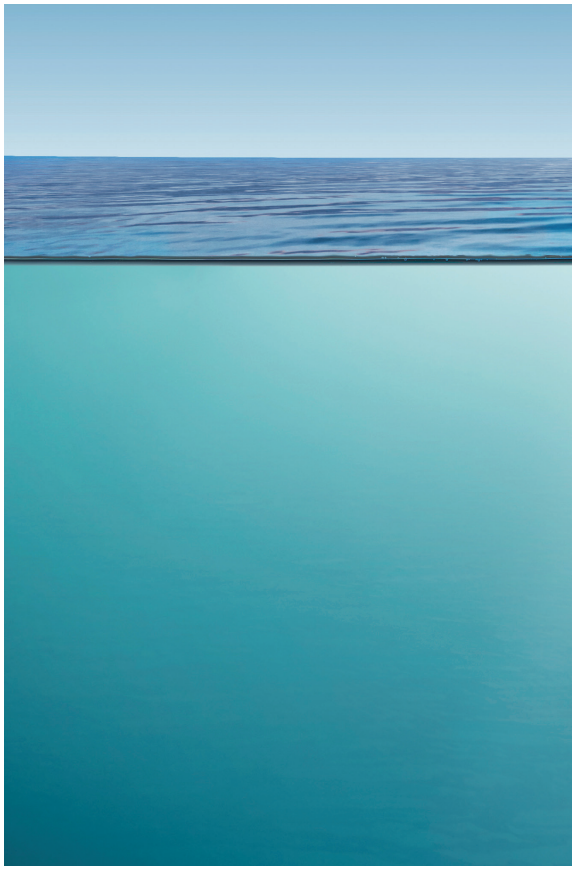
THE CARTE DU JOUR OF THE FUTURE: WHEN ALGORITHMS DECIDE WHAT GOES ON THE MENU

Compared to previous generations, we expect the **FOOD** we eat to do a lot more these days. Whereas in the past, food was primarily about ensuring we were satiated, today we expect much more – food should be **HEALTHY, AFFORDABLE, AVAILABLE** in sufficient supply to everyone, and of course **TASTY**. Aspects such as **EFFICIENCY AND SUSTAINABILITY** are also becoming increasingly important for foods and beverages. Combined with the ever-growing population of the world, these expectations call for new **SOLUTIONS** in the food and beverages industry, concepts that can only be offered with the help of **DISRUPTIVE INNOVATION** and **NEW TECHNOLOGY** such as digital solutions. On the following pages, experts provide a sneak preview of what the menu of the future might look like and examine some of the technological and material **TOOLS** that might be used, also showcasing actual projects that illustrate what is already possible today.

THE PACKAGING OF THE FUTURE – DON'T THROW IT IN THE TRASH CAN: EAT IT!

STEINBEIS EXPERTS LAUNCH ZIM NETWORK PROJECT LOOKING INTO EDIBLE FOOD COATINGS



Modern foods and beverages would be inconceivable without packaging. Although packaging protects contents and improves shelf life, once it has been used it has to be disposed, which places a major burden on the environment. If one also considers global population growth and the way this is fueling even stronger demand for food, not to mention the mountains of food that actually go to waste, we clearly need environmentally friendly packaging alternatives that will also help extend the durability of food. One potential solution might be edible packaging. This is where the ZIM network project launched by Steinbeis 2i comes in. Its aim is to develop the optimal formulation for edible films and coatings. Steinbeis expert Hartmut Welck explains why edible packaging offers particular potential in this area and talks about the challenges that need to be overcome in delivering the project.

Every year, vast amounts of food are simply thrown away in Germany. According to the Thünen Institute, around 12.7 million tons of food end up in the trash can every year, with a store value of over €22 billion. The majority of this waste – 55% or 7 million tons – originates from private households [1]. Vegetables (26%) and fruit (18%) account for the largest share of avoidable food waste in private households, followed by bakery products (15%) and leftovers (12%) [2]. Recent studies show that halving food waste originating from stores and consumers by 2030 (in line with the German government's target) would reduce greenhouse gas emissions related to food consumption in Germany by 9.5% compared to 2015 [1]. Given this situation, it is important to think about ways to increase the shelf life of food and thus reduce the amount of food that goes to waste. One way to do this would be to use new forms of packaging. But there is another factor that highlights the need to find new packaging alternatives: growing environmental awareness among consumers. Customers are increasingly likely to reject plastic packaging, for example when buying fruit or vegetables.

EDIBLE PACKAGING – INNOVATIVE, ENVIRONMENTALLY FRIENDLY, AND EFFICIENT

Packaging plays an important role in extending the shelf life of food, for example by slowing down ripening processes and preserving the quality of products. To identify new packaging concepts – especially if this means replacing packaging made from fossil fuels – and to ensure they offer the right properties, alternatives will need to be developed. Aside from bio-based and biodegradable packaging, one particularly innovative new approach is to offer products in edible packaging. Covering food with edible "functional coatings" makes it possible to stem the amount of oxygen that comes into contact with food on the inside and slow down moisture loss on the outside. This reduces cell respiration, slows down the ripening process, and thus allows products to be kept fresh for longer.

This effect can also save packaging produced from fossil fuels. There are a variety of natural raw and residual materials to choose from, offering different levels of product protection. These include:

- Chitosan made from shellfish/ crustaceans
- Alginates from algae
- Vegetable fats (lipids and glycerolipids)
- Vegetable carbohydrates, e.g. in the form of fructose
- Animal proteins from sources such as milk ingredients (casein, whey)

In addition to offering biological and functional protection, using natural materials in coatings also makes it possible to offer antimicrobial protection properties. For example, certain lemon constituents can be used (such as flavonoids), ginger (such as cineole), garlic, pepper, chili (such as allicin), but also plant extracts, such as grape seeds. This method is becoming increasingly important, especially given the growing awareness among the general public when it comes to hygiene issues.

To also reduce the amount of packaging needed during transportation, mechanical properties can be added to food coatings to protect products from damage in the delivery chain (e.g. by using natural waxes or resins).

STEINBEIS EXPERTS ZOOM IN ON EDIBLE COATINGS

Interest in such concepts among German food retailers is evidenced by initial examples of edible coatings, such as a product used on avocados by the US company Apeel Science. There are currently no EU or German firms offering such solutions. To do something about this and offer a German alternative for edible packaging – in this case as a coating on fruit and vegetables, along with corresponding functional benefits – Steinbeis 2i is currently setting up a ZIM network project. The aim is to develop the optimal formulation, which meet legal requirements when it comes to food approvals, and technical requirements when it comes to technical processes and cost-effectiveness. The project stakeholders also want to raise awareness and improve the image of food products with the coating. Consumers should be educated and feel informed about the innovation in order to develop greater acceptance and change their habits. The idea is to help reduce the amount of food that's wasted and cut the amount of fossil fuel plastic used.

References

[1] Thünen Institut, Lebensmittelverschwendung befeuert Klimawandel, press release, Oct 2, 2019

[2] DLR, 2020, Lebensmittelverschwendung in Deutschland

"CUSTOMERS SHOULD NOT NOTICE ANY DIFFERENCES IN ORGANOLEPTIC OR VISUAL TERMS"

AN INTERVIEW WITH HARTMUT WELCK, SENIOR PROJECT MANAGER AT STEINBEIS 2I

Hello Mr. Welck. The idea of edible packaging is nothing new. For example, in 2003 the Italian coffee company Lavazza developed a Cookie Cup for its espresso. But until now, this type of packaging has not been widely used. What do you think the reason is for this, and how will the project initiated by Steinbeis 2i help you gain acceptance for the idea?

Food waste is a major issue at the moment. Every year, some 13 million tons of food are thrown away in Germany alone. That's an average of roughly 85 kilograms of food per person. But much of the food that's thrown away could still be used, since often it's only discarded because it's passed its best-before date or something doesn't look right about it. Discarded food also has a negative impact when it comes to CO_2 emissions.

This is where our edible coating comes in. The first thing we want to do is to develop a zero-taste coating for fresh fruit that only consists of natural ingredients approved under food legislation. Customers shouldn't notice any differences in organoleptic or visual terms.

What opportunities, but also risks, does edible packaging offer?

Edible coatings offer major benefits when it comes to extended shelf life, but also in terms of reducing packaging materials, for example in storage and during transportation. The problems tend to be more about consumer education, although in that area we do have some good arguments for using edible coatings. We want to use a life cycle analysis to show how much CO_2 can be saved.

Where do you think you'll face the biggest challenges when it comes to implementation?

Aside from the goal of reducing food waste, which the German government has also committed itself to, one of the trends that are emerging at the moment is climate-friendly nutrition – as far as possible with no or very little packaging. This isn't comparable to what happened in 2003, when Lavazza presented its Cookie Cup concept. According to a survey by Statista in 2017, given the opportunity, 87% of Germans would gladly shop without packaging.

The biggest challenge is developing the right formulations and ensuring any edible packaging that's added remains exactly homogeneous, despite different surface conditions. Similarly, the existing coating processes – such as spraying, rolling, and dipping techniques – will need to be adapted to the selected media or undergo further development. As a result, projects in this area always entail a certain amount of time and effort when it comes to testing and development.

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"THE PRIORITY HAS TO BE SET ON FOOD SAFETY"

AN INTERVIEW WITH PROFESSOR DR. CHRISTINE WITTMANN, STEINBEIS ENTREPRENEUR AT THE STEINBEIS TRANSFER CENTER FOR BIOPROCESS ANALYSIS IN FOOD PRODUCTION

Bio-foods, pasta made from insect flour, algae beer – before new types of foods even make it into the supermarkets, they are thoroughly characterized by food analysts. The methods that scientists use for this purpose, current and future nutritional trends in this area, and upcoming tasks in food analysis of the future – were discussed in a TRANSFER magazine interview with Professor Dr. Christine Wittmann, Steinbeis Entrepreneur at the Steinbeis Transfer Center for Bioprocess Analysis in Food and Production, and expert in rapid biochemical testing systems and biosensors.

Hello Professor Wittmann. The food of the future should be sustainable, healthy, and available to as many people as possible. This may lead to new and unconventional foods such as algae bread, insect burgers, and steaks produced by 3D printers. How will these developments change the task of food analysis?

There have been various product developments in the food and beverages industry in recent years – examples include the brewing of algae beer or producing pasta from insect flour. At the same time, as you mentioned, 3D printing has also made its way into food manufacturing, however, so far to a major extent in the confectionery sector. Moreover, with the advent of the first personal 3D printers several consumers already established their own individual layout in wine gums. In terms of the raw materials used for food production, a number of trends are on the horizon. Vegan and vegetarian foods are becoming increasingly popular. For instance, vegan and vegetarian sausages are meanwhile quite well established. For purely vegetarian or vegan diets, it is of particular importance to consider vitamin contents, because raw materials based on vegetable ingredients often lack sufficient vitamin B12 levels. In addition, a balanced nutrition should also take an adequate supply with essential trace elements into account. In this regard, sometimes algae, like the Spirulina alga, can make an important contribution to a sustainable and healthy diet because they contain macro and micro nutrients, as well as other ingredients such as phycocyanin, which allows, furthermore, for the coloration of foodstuffs in a bright blue. It is worth mentioning insects in this context. They do not only contain reasonable protein amounts, but, moreover, exhibit fatty acid profiles of interest for

IN TERMS OF THE RAW MATERIALS USED IN FOOD PRODUCTION, A NUMBER OF TRENDS ARE ON THE HORIZON

a healthy diet. To get a deeper insight concerning their nutritional value, food analysis using either classic or modern methods offers the basis to characterize insect ingredients in more detail.

In my opinion, and, hence, for the food and beverages` manufacturers, the top priority is food safety. This holds true irrespective of additional aspects that may be related, for instance, to new nutritional sources. The prerequisites are defined by food legislation with a series of laws with a key issue in allowing food producers to bring only foods to the market that are safe for consumption. To guarantee food safety, a reliable food analysis is crucial to protect the consumers.

Coming back to algae, for example, they have to be tested for the presence of cyanotoxins, which can be dangerous above certain levels. If we consider products made from insects, such as insect burgers, aspects such as the source, how the insects are kept, but also how they were killed, are all regulated by laws. If a completely new raw material is used to produce food (including beverages), manufacturers have to prove in the form of various test results that the products are safe, i. e. that they are free from any toxic compounds and that they do not contain potential allergens. Again, that is one of the tasks for food analysts. Another area where food analysis plays a key role focusses on the increasing awareness of health issues.

For example, the food and beverages` industry is asked to reduce the sugar and fat content of many of their products. For this purpose, a lot of research is necessary, where food analysis is also of key concern. The trend toward organic products (i. e. taking ecological issues into account) also requires food testing – another task that needs the support of food analysis.

As a food analyst, you invest a lot of time looking at sensors and rapid sensing methods that are currently required, and in some cases the highly decentralized character of food production has to be considered. I am referring to ecological farming of course. Based on the knowledge you are experiencing in science, can you see an emerging trend for this area in the future? Are we more likely to have decentralized, regional producers, or is the trend moving toward fewer factories, but big ones?

There is no easy answer to this question. However, the coronavirus pandemic has resulted in even tighter levels of scrutiny, particularly in the meat processing industry. In parallel, there is an intense discussion about introducing an additional animal welfare label in Germany – "Aktion Tierwohl". Again, this has prompted consumers to consider whether in addition to paying higher prices for foods of animal origin, further improvements should be made with a clear focus on the conditions under which animals are kept for food production, or whether certain methods such as castrating male piglets or culling male chicks should be regulated more clearly by legislation. Work still needs to be investigated to minimize the potential risks for consumers of meat, in general. It is easy to forget that in addition to the current threat posed by African Swine Fever, there are also endemic viruses like the hepatitis E virus, which will really need eradicating from pig farming, especially if we want to do more to reduce the risk of zoonoses. With regard to using genetically modified crops, there are already numerous rapid tests to allow for organic farmers that there is no cross contamination if their arable land is adjacent to conventional farming areas. A particularly effective method for obtaining quick results is to use so-called lateral flow assays based on certain antibodies. That is also the case when feed additives such as soybean extraction flour are purchased from organic farmers and products need organic food labels.

Coming back to your question regarding producers, you have to remember that the conditions vary across the different federal states of Germany. For example in Mecklenburg-West Pomerania, there are extensive farming areas. And then there are also areas under nature conservation. I think the trend there is more likely to go toward larger factories. The current situation under the coronavirus pandemic is that an increasing number of people are calling for more regional production. Another important factor is the rising demand for organic products. In my opinion, two opposing developments may become possible in agriculture of the future. On the one hand, there is a tendency toward Agriculture 4.0 (Smart Farming) involving lots of high-tech solutions, and on the other, there is a clear trend for improved or-

ganic farming based on sustainable principles. These developments correspond to two different price segments. But more and more consumers want to know where products actually come from and under which conditions animals are grown. Moreover, there is the issue of profitability, which is extremely important for farmers. In addition, it is difficult to foresee public policy in this area. Hence, an entirely conclusive answer to this question is difficult, but it will be fascinating to see where the journey will take us to.

Some of these new challenges also require new tools, in other words new analytical procedures and evaluation methods. What are the current trends in this area, and which ones will determine the future of food analysis from your point of view?

For quite a long time now, we have been working on the development of antibody- and DNA-based testing systems, and these can be used in a number of different formats. For example, they can be used in biosensors, for lateral flow assays based on test strips that can be read within minutes, and they can be applied to various microtiter plate formats to handle numerous samples in parallel. In collaboration with Biometec company from Greifswald we developed a variety of specific monoclonal antibodies, some of which can be used to test for the presence of RR soy, Bt corn, molds, and various allergens, and these antibodies are now available as basic materials for various testing methods. Also, instrumental methods of analysis are gaining importance, such as MALDI-TOF mass spectrometry, which allows you to identify microorganisms, molds, animal species, and fish species without having to go to great lengths to prepare samples. Aside from NIR methods, which have been common for quickly ascertaining the main ingredients of foods and drinks – such as proteins, fats, or carbohydrates – increasing use is now being made of Raman spectroscopy using handheld devices.

What impact will personalized nutrition have on your work? Will there be something like a "sensor for everyone" one day?

It would be good if we could have something comparable to the strategy of individually prescribed drugs, in the nutritional area, so you could receive recommendations tailored to a specific "healthy" diet, in a way that would also work prophylactically against physical and mental illnesses. For example, recommendations could be based on individual human microbiomes or people's genetic predispositions. But there is still a great part of research needed in this area, not just in terms of individual genomes, but also regarding the human metabolome and especially the microbiome and its influence on long-term health. Also, the question remains who will pay the costs for such kind of individual testing and recommendations.

Even today, one question faced in food analysis is whether certain foods (including beverages) are originals, or whether there is food fraud ongoing. Will this become even more of a problem in the future? And if so, what requirements will result with respect to the analytical methods?

From my perspective, food safety is the more important factor, but the authenticity of food is and will remain extremely important. The priority has to be to ensure that food is safe, which was something that became abundantly clear with the horse meat scandal. First, they had to be sure that the meat actually came from horses that had not been treated with veterinary medicine, because if there had been drug residues, that could have caused a health problem for consumers that had eaten the lasagna.

Another important area where you need to be sure that food is not being tampered with is restaurants and catering. For example, it is found more frequently in the past that people are being misled with seafood. It is not easy to tell if a fillet of sole really is a fillet of the right fish or whether it was taken from a much cheaper flatfish. There are some really useful techniques for working out which fish is on the plate, based on selective antibodies, using DNA methods or MALDI-TOF mass spectrometry.

As already mentioned, what would be really exciting would be to find a way to use food and beverages to combat certain health deficiencies or illnesses. Everybody knows about yogurts that deliver bacteria to the digestive system and are supposed to have a positive influence on the microbiome. Of course the other question is whether they actually work, because everyone has his or her own microbiome. And it is still not clear whether the bacteria are actually alive when they reach the intestine. But the concept is very interesting in itself because there is scientific evidence that nutrition might play an important role under certain medical conditions. The problem when it comes to actually doing something is that every solution is extremely specific; it has to be adjusted to the individual, which requires a lot of research and of course that is, at least at present, extremely cost-intensive.

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#TECHOURFUTURE: THE FUTURE OF NUTRITION – LOOKING BEYOND THE HORIZON

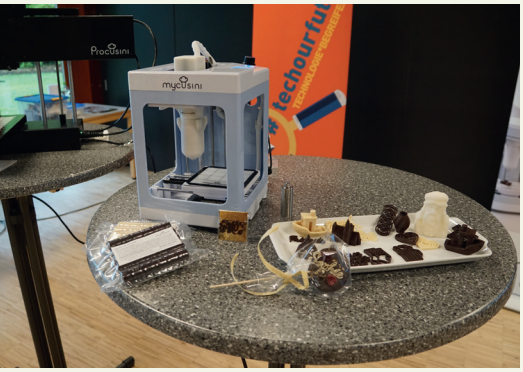
NEW TECHNOLOGICAL OPTIONS IN NUTRITION

From 15 October to 5 November 2020, the final three events took place in the Technologie*Begreifen (Grasp Technology) series. The third focal topic for the #techourfuture talks, which were staged virtually at the Steinbeis House for Management and Technology (SHMT) in Stuttgart, was The Future of Nutrition – Looking Beyond the Horizon. During these events, leading experts from science and industry presented a variety of potential uses for technology in the field of nutrition. All three events were broadcast live on the Ferdinand Steinbeis Institute YouTube channel. The lively discussion addressed not only questions of taste, but also the opportunities and risks for society.

What influence does technology have on our diet? What role do CRISPR genetic scissors play in plant breeding? Will we soon be printing out our lunch on 3D printers? Will meat be produced artificially one day, and what impacts would that have? Answers to these and other questions were provided by experts from the Ferdinand Steinbeis Institute as part of the #techourfuture series, an initiative funded by the Baden-Wuerttemberg Ministry of Economic Affairs, Labor, and Housing.

THE CARTE DU JOUR OF THE FUTURE: FOOD FROM THE 3D PRINTER

The first event focused on the question of whether 3D-printed food is just a gimmick for amateur cooks or whether using additive manufacturing processes in the field of nutrition has a real benefit for society. According to a quick survey conducted at the beginning of the event, the vast majority of participants believed the technology would be of benefit to society. Dr. Helga Gruber, manager of research and development at Print2Taste, provided an account of how the 3D Food Printer works and explained that food from 3D printers can, for example, make it possible to offer appealing, individually prepared food to people who have problems with chewing and swallowing. Teresa Dufter, head of R&D for foods and applications and a colleague of Gruber, gave a live demonstration of food being 3D-printed onto a plate. The small number of people who were actually able to attend the event



on site were also able to discover for themselves how it tasted. As well as some tidbits of chocolate, there were also lunchtime samples of broccoli, carrot, and German meatloaf. Around 50 people tuned in to the event and there was particularly strong interest in the shelf-life of the 3D-printed food and whether it would be possible to print more than one ingredient at a time. Gruber explained that in addition to reducing production time, work is also underway to equip the printer with multiple nozzles to make it possible to print foods simultaneously with different ingredients. Neither of the experts thought it likely that 3D printers would one day replace chefs in professional kitchens. In its current format based on the latest technology, the Food Printer does however already offer a number of entirely new ways to process food. For example, it offers confectioners an alternative for producing chocolate, and 3D printing is already resulting in different options for coming up with novel shapes and special flavors.

THE FUTURE OF PLANT BREEDING – FROM MENDEL TO GENOME EDITING

After discussing the changes brought about by new technologies in the food processing industry, Part 2 of the series focused on the beginning of the agricultural production chain. Professor Dr. Thomas Miedaner, director of the rye division at the State Plant Breeding Institute at the University of Hohenheim, took the audience on a journey to the future of plant breeding. Miedaner explained that given global population growth, climate change, and the global spread of pathogens, plant breeding will continue to be indispensable in the future. Drawing on a number of enlightening examples from the field of rye and corn cultivation, he also explained how new approaches such as DNA marker technology, genetic engineering, and genome editing actually work. Overall, as well as accelerating the lengthy process of cultivating plants – which can take six to ten years – they can also make procedures more efficient. The difference between the various methods is that selections can be either made based on entire genomes, or individual genes from nature can be introduced to crops, or genome editing can be used to specifically modify individual genes – for example in order to reprogram genes responsible for disease resistance so they are no longer "susceptible" but become "resistant." The topics covered during the round of discussion included the efficiency of different procedures, impacts on the genetic diversity of plant life, biodiversity itself, and its role in climate change. A Mentimeter survey was conducted at the start and end of the event to gauge the general mood regarding different methods, and it was found that the majority of participants still consider classic plant breeding a permissible intervention into nature. Roughly 50 percent of those surveyed also regard the newer methods, such as genome editing, as a permissible intervention into nature. Miedaner also confirmed that reservations regarding new technologies are now diminishing.

CLEAN MEAT – MEAT FROM THE LAB

The third and last part of the #techourfuture series on The Future of Nutrition looked at the influence emerging technologies can have on meat production. In 2013, the Dutch researcher Professor Mark Post presented the first hamburger cultivated in a laboratory. The price tag at the time was roughly 250,000 euros. So in technical terms, it is actually possible to grow meat in a Petri dish. But how exactly is so-called clean meat produced? What does it take to make clean meat? And does meat cultivated in the lab taste any-

FROM A PROJECT POINT OF VIEW, IT'S NOW TIME TO REVIEW THE DIFFERENT FORMATS THAT HAVE BEEN TRIED OUT OVER THE PAST TWO YEARS AND COMPARE THEM IN MORE DETAIL

thing like conventional meat? As the event started, almost half of the audience assumed the taste would be similar. Professor Dr. Petra Kluger, Vice President of Research and professor of tissue engineering and biofabrication at Reutlingen University, who since 2019 has been conducting research with a team of scientists into the cultivation of animal tissue, explained the various steps involved in producing meat in the laboratory. During her presentation, she also addressed current challenges and the potential advantages to society offered by meat from the Petri dish, especially when it comes to factory farming and climate change. The questions posed by the audience during the YouTube live chat session included aspects relating to healthy nutrition, market-readiness, the price, the use of animal stem cells, and cooking habits. Although obvious reservations were expressed during the discussion regarding the use of animal growth serum, the majority of participants saw the value of laboratory meat as a climate-friendly alternative to factory farming.

TECHNOLOGIE*BEGREIFEN – INFORM, DISCUSS, UNDERSTAND

The pilot project, which has been funded by the Baden-Wuerttemberg Ministry of Economic Affairs, Labor, and Housing, is thus drawing to a close (see also the editorial on page 3). From a project point of view, it's now time to review the different formats that have been tried out over the past two years and compare them in more detail. Not only will this be necessary to do justice to the original goals of the #techourfuture Technologie*Begreifen initiative, the idea is to develop a format that will allow stakeholders to find out more about emerging technologies – objectively and in a "forum of trust." At the same time, people should be allowed to question the use of technology, discuss issues from different standpoints, and offer their own views of future scenarios. After the all-day face-to-face event on the future of autonomous flying (November 2019) and the virtual events on the future of our health (June/July 2020), it was originally planned to organize the third block of topics as a hybrid event and allow the audience to choose to take part on site or participate online. This worked out for parts 1 and 2, but part 3 was only possible as a virtual event due to the current lockdown situation. The number of participants has risen with each passing event. The #techourfuture event on The Future of Nutrition attracted the largest audience so far. The next step will be to assess the reasons for the overall trend and to try to understand how this is influenced by the topic and format chosen for each event. One initial conclusion can already be made, however: The format will continue to take the topic chosen for the event into account, as well as the target group and the prevailing situation in Germany as a whole.

Missed an event? All events in the #techourfuture series on The Future of Nutrition are available on the Ferdinand Steinbeis Institute YouTube channel and can be viewed by going to: bit.ly/3pdgwNN.

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"ANYTHING THAT WILL SPEED UP PLANT BREEDING IS A GOOD OPTION"

AN INTERVIEW WITH PROFESSOR DR. THOMAS MIEDANER, HEAD OF THE RYE GROUP AT THE STATE PLANT BREEDING INSTITUTE OF THE UNIVERSITY OF HOHENHEIM

Gene technology – are you for or against it? The ability of this question to divide people into two camps is something Professor Dr. Thomas Miedaner, head of the rye group at the State Plant Breeding Institute of the University of Hohenheim, is all too familiar with. Why this is so, whether and how this polarization can be counteracted, and which risks and opportunities emerging technologies offer when it comes to plant breeding, were questions TRANSFER magazine asked him, as another expert in the #techourfuture series of events.

Hello Professor Miedaner. Plants have been a part of the staple diet of humans for thousands of years, and they will remain indispensable in the future. But the growing global population, climate change, and the trend toward sustainable and healthy nutrition pose a challenge to plant breeding. What kinds of new technology can people use to address these challenges?

Plant breeding is a very time-consuming process. We assume it will take eight to ten years to develop and breed a new plant variety. As a result, we're not in a position to react quickly to developments when it comes to plant breeding. This is also why anything that will speed it up is a good option. For example, this includes hybrid breeding, which was actually developed more than 100 years ago, but also new technology, such as marker technologies, which are the main focus of my work, but also genetic engineering and genome editing.

These technologies can help significantly accelerate plant breeding, which of course would be beneficial if you think about the issues you just mentioned. In terms of actual time savings, this depends on what kinds of traits you're dealing with. If it's a simply inherited resistance to diseases, that doesn't take so long to develop, but if it's a complex trait like drought tolerance, you can bank on it taking decades. One of the biggest problems is that many of the plant traits we work on are complex, so they're inherited through a whole host of genes. Also, with genetic engineering and genome editing, initially you can only modify or add individual genes. The issue this raises is whether regulator genes can be found that will really change complex gene networks leading to the final traits, such as those required for grain yield or complex disease resistances. At the moment, that's certainly not the case. As things stand now, we're not able to use this approach to breed perfect varieties, neither using genetic engineering nor with genome editing.

One of the big problems with plant breeding is the global spread of the aforementioned pathogens. What can be done about this?

As I just mentioned, there are some disease resistances that are only inherited through a single gene. These are relatively easy to work with, although often the effects are not durable. As a result, pathogens are often able to adapt relatively quickly to the new resistance because pathogens also keep changing. So if I'm dealing with a really simply, inherited disease resistance, it can either work for ten years or it could become ineffective again after three years. If

you're working with so-called quantitative resistance, there can be five, ten, or twenty genes inherited simultaneously and each one makes its own small contribution.

These resistances are more durable, but of course this entails a lot more time and effort. This is where we want to improve processes by using DNA marker technology, as this allows us to select for several genes simultaneously.

DNA marker technology, gene technology, genome editing – these are all technologies that can be used to accelerate plant breeding and make it more efficient. What opportunities do they offer, but also what are the risks?

All three techniques have to be dealt with separately because they're based on different principles. For example, DNA markers are purely diagnostic procedures. We look for favorable variants in the genome of a plant, such as disease resistance or early ripening plants. To do this, we scan the genome and use relatively complex calculation methods to determine which regions of the genome are responsible for a certain trait. We can then pick the most favorable variants and use DNA markers to select these variants in the lab already at the seedling stage. The main advantage of this is that no changes are made to the plants itself. Instead, we breed them by classical methods and the only addition we make to the process is that we also run a DNA diagnosis. That's why I see no risk in this area.

With gene technology, we have a completely different situation because entire genes are introduced to plants from foreign organisms. This is usually done with bacterial genes, because they're easier organized and a lot easier to find in their small genomes.

This allows new traits to be created that were not previously available in certain plants, such as resistance to herbicides or special insects. One thing I'd like to point out in this respect is that genetically modified plants have been grown worldwide on vast acreages of land for 25 years now. To date, none of the anticipated or dreaded risks, such as a collapse of ecosystems, have been identified. That said, it's only the well positioned, multinational corporations that can afford genetic engineering because of the high costs involved and the very complex approval procedures.

Unlike genetic engineering, genome editing is an approach that can also be used in technical terms by medium-sized companies with the support of scientists. It's already fairly common practice in Germany for science to work together closely with plant breeding. With genome editing, no foreign genes are introduced. Instead, genes already present in the plants are modified by exchanging individual base pairs, the building blocks of DNA, and that's what makes this process so special. There's a nice example for the results from Israel, where scientists have succeeded in creating resistance to three different plant viruses by modifying a single gene. Now if you ask about risks, of course there are risks that something might go wrong – there always are.

For example, one thing that could happen is that you don't just alter the gene you wanted to change but other genes in the genome with similar motifs as well, even though you didn't actually want to influence them. But all plants – whether modified or bred conventionally – have to be tested in the greenhouse first, and then in the field, and naturally that's where such defects become noticeable. At the end, there must always be a field test. I don't see any other risks in this approach.

There's a lot of talk at the moment about the CRISPR/Cas method. Could you explain in as simple terms as possible how this works?

In principle, you're dealing with a tiny section of an RNA sequence that ensures the gene you want to modify is targeted specifically. That's the big difference to conventional genetic engineering, because that introduces genes into the plant but you can't influence exactly where they are integrated in the genome. And then there are Cas enzymes, which cause a double-strand break such that DNA is separated at the exact spot you targeted via the RNA sequence. This results in a split and the cell has two ways to repair this. Either it slaps other base pairs into the break, which usually causes the gene to stop functioning, or you offer the plant a repair sequence. And that's exactly what the CRISPR/Cas method involves. Either you switch genes off, so you render them inoperable, or you

PLANT BREEDING IS A VERY TIME-CONSUMING PROCESS

alter them by changing individual base pairs. The latter method does require further research, however, before it can be offered by every laboratory.

There's a lot of skepticism about genetic engineering. What reservations do you encounter in your work, and how do you deal with them?

Of course, as a scientist you'd immediately like to say that education and explanation are tremendously important; we have to show people what a new technology or a new process is all about. But on the other hand, that's precisely what's been happening for more than 20 years. There are clearly two fronts in ideological terms and they've become entrenched. I suspect there are a lot of people who don't really think much about this topic. But then there are also activists who fundamentally oppose it, and you can't win them over with factual reasoning.

If we take the issue of genome editing as an example, the biggest bone of contention is how to classify genome editing. The European Court of Justice has ruled that it's the same as genetic engineering so it should be regulated exactly the same way.

This means that genome editing will not be carried out commercially in Europe because there are strict requirements that products must be labeled as genetically modified. They've adopted a different approach in other countries. In the USA, for example, results are checked by the government and if an alteration doesn't include foreign DNA, but only the DNA found in the plant, and the characteristics that are produced also exist naturally in a plant, that doesn't constitute genetic engineering – so it can be applied without restriction, cultivated, and even marketed. Those are the two different views on the matter at the moment.

#techourfuture expert Thomas Miedaner in conversation with moderator Marlene Gottwald

In your opinion, what can scientists do to reach out to the general public and ease inhibitions when it comes to new technology?

Naturally, for the younger generation it's important to share all information with them. But if you're talking about the people who have already formed an opinion on certain technologies, and it's negative, I believe the tricky issue is then whether we can still reach out to them at all, or whether they actually want to be reached out to.

But I would say I find it misleading if all kinds of products are labeled GM-free, because with the exception of small regions of Spain, there are no genetically modified plants being grown at all in Europe. You'll neither find them in the fields nor in the market, so you can't actually have any products at all from genetically modified crops. But if some products are labeled GM-free, it implies there are certain products out there that have been genetically modified.

That makes the whole topic more complicated. And then there's one issue we really struggle to comprehend as people who work with plants: Lots of modern medicines are produced with the help of bacteria that have been genetically modified. Even vitamins and many of the additives you find in food are produced with genetically modified bacteria. Nobody seems to be interested in that bit, but with plants it always turns into a huge debate.

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"CLEAN" MEAT FROM THE LAB

RESEARCHERS AT REUTLINGEN UNIVERSITY KEEP A CLOSE EYE ON ANIMAL WELFARE AND ENVIRONMENTAL PROTECTION

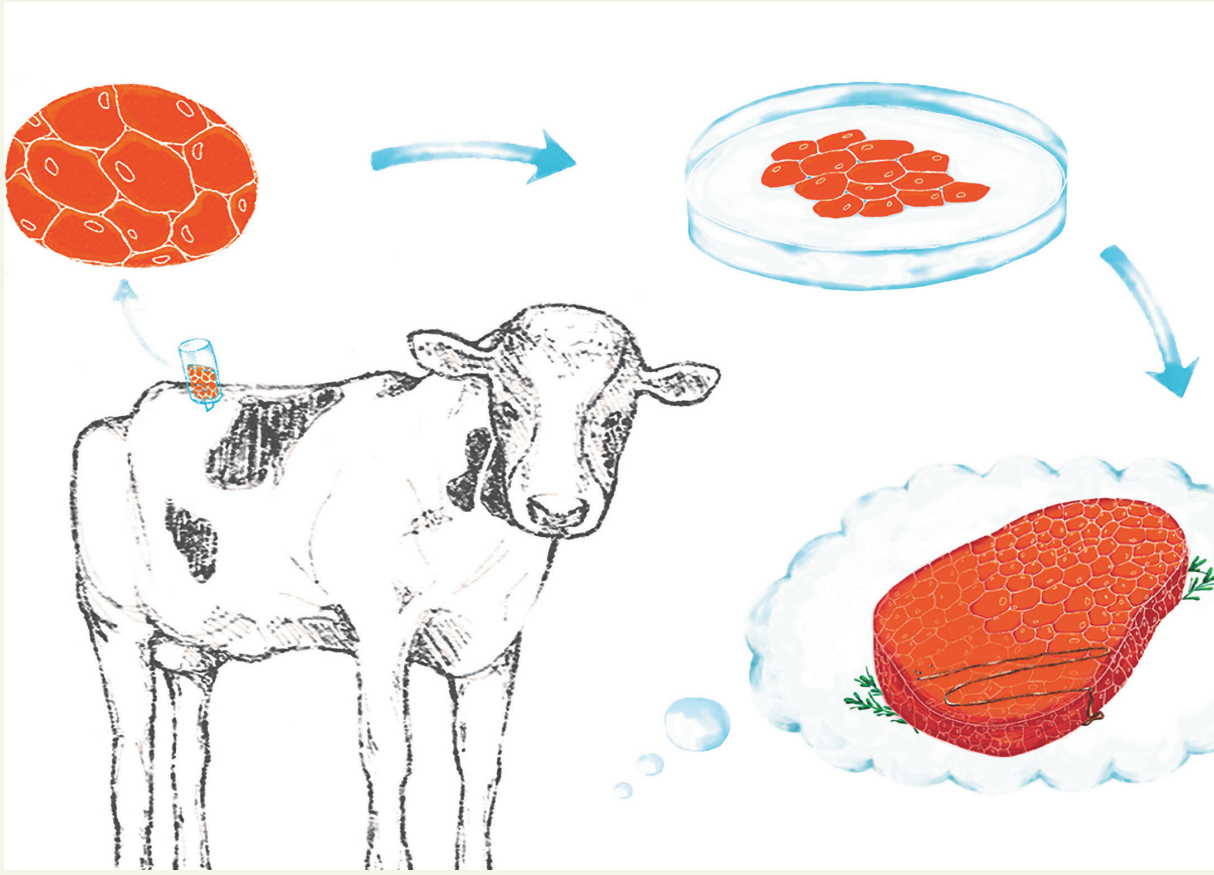
Enjoying the taste of meat without killing animals – a research challenge that is more topical than ever. Shocking images from factory farming, scandals in the meat industry, and the dramatic impacts of meat production on the climate require solutions that are not just sustainable, but will also stand the test of time. Prof. Dr. Petra Kluger, Vice President of Research at Reutlingen University, has taken up this challenge and is working in the laboratory to cultivate artificial meat from isolated animal cells. Her research focuses on two key questions: How to succeed with mass production, and what healthy meat might be like if it is produced artificially. Kluger recently reported on her findings to date as an expert at the #techourfuture series of events on The Future of Nutrition.

It all began when Petra Kluger was running lectures on "tissue engineering" – the practice of cultivating tissues. This inevitably led to the topic of meat from the lab. In fact there was such strong interest in the topic, not only among students but also at her opening talk at the International Conference on Cultured Meat in Maastricht in 2018, that the graduate of biology decided to start researching the topic herself. Before beginning to cultivating meat in the lab in 2019, she had already been involved in cultivating human tissue for biomedical purposes at Reutlingen University. Meanwhile, the research group under Petra Kluger, which comprises doctoral candidates, scientists, and students, is working on a number of research projects.

To obtain the stem cells they need to cultivate meat in the lab, the researchers only require a small piece of pork or beef, so no animals are slaughtered specifically for research purposes. The meat is digested using enzymes before being passed through sieves to separate the smaller stem cells from larger constituents. The lab in Reutlingen takes the cells that have been isolated in this way and breeds them at 37 degrees Celsius in an incubator. The cells are then fed into a 3D printer, where they are constructed into an edible piece of meat – complete with muscle and fat tissue that can basically be formed into any shape.

Kluger is passionate about the potential offered by her research: "Compared to conventional meat production, meat from the lab is much less resource-intensive in terms of water and farming land, and it produces fewer greenhouse gases. "As a result, it offers a sustainable alternative to meat supplied along the lines that have been common until now. This kind of 'clean meat' – the term now used in English – is also good for animal welfare, and it poses fewer of the health risks associated with conventional meat production, particularly those caused by using antibiotics in factory farming."

The Reutlingen-based research group is currently working on preparing the 3D printer meat for commercialization. One of the key issues of mass production is costs. In May 2020, Reutlingen University and the University of Hohenheim launched a joint project with funding from the Avina Foundation aimed at developing solutions for scaling up production methods to industrial volumes. "We're looking into ways to advance production on an industrial scale. To do this, we're optimizing manufacturing



Currently, artificial meat is still based on actual pieces of pork or beef

processes to ensure we have enough cells for large production volumes," explains Kluger.

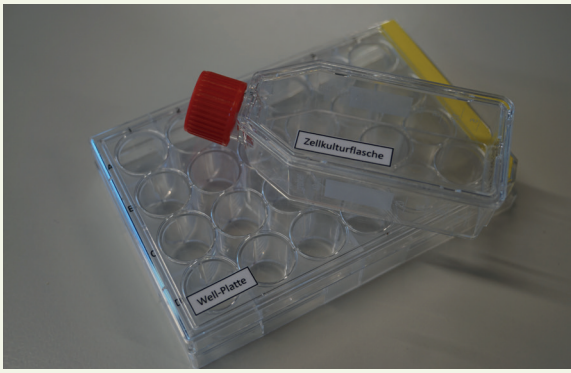
Another approach being looked at is how to produce healthy meat in the laboratory. The idea is to supplement artificial meat with nutrients such as folic acid for pregnant women, vitamins, or nutrients to help promote muscle gain. The research team from Reutlingen is looking into ways to combine lab meat with food supplements to offer healthy alternatives to meat and thus address consumer skepticism. The reason for this is that there is still low acceptance among the general public for "designer meat."

It will probably not be possible to exactly replicate animal meat by using lab meat in the near future, but Kluger does not consider this an absolute necessity. Instead, the researchers from Reutlingen can imagine their work leading to completely new products as an alternative to conventional meat. Bottom line, Kluger believes it will not be possible to stem the tide moving toward meat alternatives due to social changes and the need to protect the climate, human health, and animals – as well as the need to secure food supplies for the Earth's population in the long term.

YOU ONLY NEED A SMALL PIECE OF PORK OR BEEF, SO NO ANIMALS ARE SLAUGHTERED SPECIFICALLY FOR RESEARCH PURPOSES.

"ULTIMATELY, IT'S THE CONSUMER WHO DECIDES"

AN INTERVIEW WITH PROFESSOR DR. PETRA KLUGER, VICE PRESIDENT OF RESEARCH AT THE UNIVERSITY OF REUTLINGEN



Hello Professor Kluger. You're working on the production of artificial meat. What advantages does artificial meat offer compared to meat from conventional production?

With conventional production, large areas of land, high volumes of water, and a lot of energy are used even before animals are ready for slaughter. This also produces high volumes of greenhouse gases that cause damage to the environment. All of this can be significantly reduced by producing meat in the laboratory. And as more and more people now live on this planet, it simply won't be possible to feed everyone with meat produced through conventional methods. The alternative, which we'd like to play a part in setting up, is highly interesting if you want to protect the environment and at the same time provide humankind with protein-rich food.

How well do you think meat from a 3D printer would be accepted among the population, and what reservations do people have?

People have a large number of reservations, although this has decreased significantly in recent years. For example five years ago, people thought you were crazy if you started talking about artificial meat. In the meantime, there's been a shift in society. This can also be seen in vegetarian products, which are now also much more widely accepted than they were just a handful of years ago. When you mention artificial meat, some people ask what the benefits are or why it makes sense, because you could just become a vegetarian instead. Of course that would actually be the most climate-friendly option, but although we know from the figures that the proportion of vegetarians is gradually rising, it's still a relatively low number. Other skeptics claim that our product is not real meat, but something artificial instead, so they also ask what the benefit is supposed to be. Our answer to both groups is that no-one's forcing you to eat it. It's simply another alternative source of nutrition.

There are lots of reports at the moment on how livestock is kept and the slaughtering conditions of animals. These are not because people think cows should be grazing in lush, green meadows; they're more to do with fattening farms where they use antibiotics, or with animal diseases that keep coming back again. Because the cells we use for 3D printing are currently sourced from small slaughterhouses, we're investing a lot of time in looking into slaughtering methods. If I'm honest, the more you look into this topic the more you do start to wonder. One of the advantages we have when we're cultivating meat in the lab is that the process takes place in a sterile environment, so ideally we don't need to use antibiotics. Also, in the lab you don't have diseases like swine fever, which is going around again at the moment. But ultimately, it's the con-

sumer who decides and there'll be enough people who will continue to eat conventional meat. Maybe the trend will go toward more organic meat with this consumer group, because lower quantities of meat will be needed.

But one thing that should be noted at this point is that when it comes to producing meat in the lab, there are still lots and lots of ways to make improvements. The idea is that later down the line we'll be able to take the cells we require from a cow so we can generate a kind of cell line. This is an area lots of my colleagues are working on, not just in the work I'm carrying out with my research team. We don't yet have any such cell lines, so we're using slaughterhouse waste that's not used by butchers. Another starting point is to look at the medium the cells grow in. At the moment, it still contains lots of animal ingredients, so we're trying to change that. This is necessary so we're not dependent on conventional meat production again, but also to find cost-effective ways to go into mass production.

It's not uncommon to encounter public resistance to new technology and industrial processes. What can be done about this, and how important do you think it is to keep the general public well informed?

It's extremely important to keep people well informed. In fact this is one of the most fundamental aspects, because it's one thing to develop a technology, but it's acceptance among the population that determines whether a technology is put to use, or how it's used. I think it's crucial that new technology is thoroughly investigated in scientific terms, and that the results are published in such a way that the underlying science is understandable to the general public.

There's actually not a lot going on in Germany at the moment when it comes to lab meat, but for example in the US, the Netherlands and Israel, there are already lots of firms and startups talking about launching such products in the near future. But if consumers don't know enough about this topic, it won't take long for fears to arise and even rejection. This is why it's hugely important to ensure the research is kept transparent. I also think it's important that there's public funding for research in this area. We need a lot more know-how and a lot more facts, which will then also be made available to the general public – so consumers. And we need to explain the facts to consumers and discuss these with them so they can decide for themselves: Is this something I want, or not?

You're currently working on transferring artificial meat from the lab into mass production. What do you think the biggest challenge will be with this?

I've already mentioned the first challenge, which is about having the required big volumes of cells. Another important issue is where the cells come from. Taking cells from the slaughterhouse is not really appropriate in the long run, but we will have a cell line. We'll then allow the cells to float around in a nutrient solution. That said, this approach is still incredibly expensive because of the volume of animal ingredients you need, and it's not really sustainable. The idea with mass production is that we want to be able to produce tons of meat, so we'll need to find another option, one that works and is still relatively inexpensive. The methods used to cultivate meat are also important, because at the moment we're still growing it in Petri dishes, i.e. plastic. These are then thrown away and this also wouldn't be sustainable in mass production. The idea we're looking into is to move to bioreactors, i.e. suspension culture, so cells no longer adhere to each other but float in a solution that can be as big as you want. In scientific terms, it will be extremely exciting to see if we can get this process to work with our cells, which actually do need something to adhere to instead of floating around in a solution.

If mass production does prove successful, do you think "clean" meat will completely replace conventional meat in the future, or will it just be an alternative?

I think that's also just a question of time. Some consumers are sure to try the meat. As I said, we're already seeing this happen with vegetarian products. Also, only a few years ago, hardly anyone would've imagined that you could buy insect snacks at a discount store. So changes are already happening right now, and that's why I'm convinced there'll be people who will try artificial meat immediately. But the number of users will only increase gradually and rise in line with the number of products available. Conventional meat production is sure to continue for many decades to come. But if it's possible to eat products that are not just similar to meat but taste just as good, and if you don't have to kill animals to enjoy them, I can imagine there will be a shift in society.

Not only that, but it's not as if we want to replicate meat like for like; we also want to offer additional benefits and other nutritional alternatives – for example meat with folic acid for pregnant women or meat-algae products.

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"ALL TECHNOLOGY HAS TO CONVINCE PEOPLE BY ITS APPLICATION OPTIONS AND BENEFITS"

AN INTERVIEW WITH DR. HELGA GRUBER, RESEARCH AND DEVELOPMENT MANAGER AT PRINT2TASTE

Have you ever stood in front of the cakes and candies in a store and wished that your own attempts to decorate cakes were even half as successful as the products on display? Well now there's help on hand for would-be confectioners – thanks to 3D food printing. Dr. Helga Gruber, research and development manager at Print2Taste, who also took part in the third #techourfuture event on The Future of Nutrition as an expert participant, talked to TRANSFER magazine about how this technique was developed, where it is already in use, and what the future holds for 3D food printing. She strongly believes that a foundation of communication and information on new technology will be crucial for gaining public acceptance.

Hello Dr. Gruber. Food at the touch of a button. Lots of people dream of this happening one day, and you're making their dream come true. How did you and your partners come up with the idea of a 3D food printer?

Our startup team comprises food technologists with extensive knowledge and practical experience in the properties and processing of a whole variety of foods. When the first 3D printers started entering the plastics industry, we were immediately inspired to use the same technology to model food. As pioneers in this area, we developed the world's first 3D food printer – Procusini – and honed it until it was ready to be commercialized. The fact that we were able to implement it so quickly is mainly down to our in-depth understanding of the composition of food, which is the key to success with 3D food printing.

Where are your 3D food printers currently being used, and in which other areas do you envisage them being used in the future?

Our 3D food printers are already being used commercially by food and catering experts, bakeries, and candy stores – but also in private households. Chefs working in professional kitchens use the Procusini to add the finishing touches to their creations with individualized, edible 3D objects, and bakeries use it to decorate cakes. Amateur cooks at home use the mycusini chocolate printer to produce small creative treats from 3D chocolate. We will make increasing use of the possibilities offered by 3D food printing in the future, especially to personalize food in terms of composition, shape, and texture. Depending on requirements, it will be possible to produce small snacks at home,

No limits to creativity: cake decorations produced by the 3D chocolate printer

and restaurants and catering companies will even be able to produce entire meals using 3D food printing.

Just like almost all new technology, some people are skeptical when it comes to 3D food printing, if not suspicious. How do you deal with their concerns?

Of course for many, it's completely new territory and it's difficult to imagine what 3D food printing actually means. That's totally normal, especially given the way we all relate differently as individuals to food; we all have certain habits and preferences.

For us, the important message is that this new technology uses foodstuffs that are no different in terms of composition to the sort of products you find in grocery stores. We're happy to offer people live demonstrations of how individual foods are created with the Procusini or mycusini and are formed into different shapes. When this process is experienced directly by the people, skepticism quickly turns into enthusiasm.

How important do you think it is to offer people information on future technologies for them to become accepted by society? And what's the best way to ensure society absorbs this information?

For society to embrace new technology, it's tremendously important to show how things work in functional terms – really early during development – and to show the opportunities they offer and the impact they have. All technology has to convince people by its application options and benefits.

Technologies often go through different phases when they enter the market. So with the mycusini 3D chocolate printer, it's already become the new standard for lots of amateur confectioners, since the shapes it offers go beyond the current realms of manual dexterity and silicone molds.

Here's another example: According to some studies in care homes, personalized food allows you to significantly improve the nutrition offered to people with chewing and swallowing difficulties. When you know that, there's already broad acceptance of the future prospects offered by 3D food printing, especially in terms of improving care and the quality of life for people in this group.

To share such information with the general public – in a way that's easy to understand – it's important to find a format that opens the door to direct dialog. Of course it's also important to use the right social media channels to reach out to as many people as possible.

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CAN SALESPEOPLE PUSH AWAY CUSTOMERS?

RUNNING SALES PROFESSIONALLY IS THE BEST WAY TO SHOW CUSTOMERS HOW MUCH YOU VALUE THEM, ARGUES STEINBEISER WINFRIED KÜPPERS

Sales-driven companies drive away customers – baloney, some would say, since sales departments attract customers. Precisely, say others, pointing to examples of sales departments completely fouling up positive-looking projects. The truth probably lies somewhere between these two extremes, argues Steinbeis entrepreneur Winfried Küppers, an expert in selling: There are overpriced market criers and others who bring salvation. In our latest Steinbeis Swipe! Küppers explains his views on the matter.

I can still remember exactly what I was doing when I first heard a manager utter the provocative opinion that sales drive away customers. I was a young sales analyst and an ardent believer in selling. I knew my theory, I'd practiced it, and I was on the road on behalf of a highly professional organization. I knew without doubt that this simply wasn't true. Today, twenty years later, I often utter this provocative statement myself when talking to customers or discussing sales departments. Their reactions vary widely in terms of actual content, but they always have one thing in common: They're emotional!

HOW DID THE SALES FUNCTION GET SUCH A BAD REPUTATION?

Whereas in the U.S. people are proud to work as salespeople, in this country hardly any will admit to being a member of the field sales fraternity. This is partly to do with German history. In the 1950s and 60s, people didn't sell products, they "distributed" them.

Demand was strong and everyone wanted a modern household. Companies produced in plenty, but even when the market was saturated, sellers still kept trying to push their products onto the market. This ruined the reputation of salesmen for decades. Then came a countermovement, the complete humility of salesmen submitting to customers. Both extremes represent a type of salesperson that is not in tune with customers.

Even today, sales departments can drive away customers. Over the past 20 years, I have accompanied many "sales reps" to customer appointments. Professional and successful salespeople – but also other ones. One I remember particularly well, an account manager for mechanical engineering clients. He was so "uninterested" in his region, he didn't even notice that one of his customers had cut monthly orders by 90% – four months beforehand. When the customer was asked why, he said the supplier didn't really care about him – others were more active, so he switched suppliers.

With one of my own clients, we managed to reduce the number of people in field sales from 120 to around 80 just by introducing digital solutions. At the same time, sales rose. Why? Only the best salespeople were kept on and because the team was organized more systematically, it quickly found a good way to analyze potential. As a result, some customers that had plateaued in terms of order volumes for years, suddenly doubled them.

Salespeople push away customers. Sadly, it's true. But having no sales function also pushes away customers! Customers want salespeople. Customers want to be looked after and even wooed. Customers expect someone to come along and make it easier to decide what to buy, someone who wins them over and inspires them. So if a firm has no proper sales, it's seen as unprofessional or arrogant, or it looks like it's not interested in customers.

THE SOLUTION? BE PROFESSIONAL.

If you look closely, you realize that half the time the problem is not sales per se, but being unprofessional – or just bumbling along. Good salespeople who learn their profession from scratch are always an asset. Unfortunately, however, we sometimes look for the wrong things in salespeople. If we're looking for an engineer, accountant, or architect, we always focus on "real professionals," but when it comes to sales, we work with people from outside the field – who often had zero to do with selling during their

training or studies. For some, it's enough to know the product to become an account manager. That's not enough!

Every company needs sales. Sales looks after our customers, takes them seriously, and knows right away what they need. Above all, however, we need salespeople who regularly win over new customers, helping to grow the company and compensating for other customers who fall off the radar.

Top salespeople focus on successful outcomes and business expansion. They hit targets and provide valuable feedback. The more clearly you define selling concepts and the more detailed you make selling, the quicker you achieve business targets. The task of running sales is the responsibility of management. This involves creating concepts and defining strategic objectives. Good salespeople provide you with a steering mechanism for developing the business in the coming years.

A trend has emerged in the last two or three years: More and more buyers are being trained in negotiation skills. Currently as many as one-third of sales courses offered by leading instructors are attended by buyers. So if customers are increasingly training their purchasing professionals to put pressure on our salespeople during negotiations, we can't afford not to have the best salespeople on our side.

Professional sales will be even more important in the future, because a number of changes will mean that it won't be enough to do "business as usual." I'd like to highlight two such changes. The first is that not being able to travel, a situation that will continue for many months due to the coronavirus pandemic, has accustomed buyers to video conferencing, and they value the advantages of video calls. However, many salespeople prefer to visit customers in person and this has limitations, which they can still justify at the moment due to the pandemic. Bridging physical separation and compensating for it by using alternative sales methods will be a key task for people in sales in the future. In addition, digitalization is leading to changes in processes and procedures, for both field sales management and customers. Field sales staff are like a link in a chain, so they have to serve both parties and ensure everything works. Digital technology is also leading to completely new business models, which can't be sold in the same way they used to be. The future bandwidth of the company sales function will determine whether we will emerge as the winners or losers after this sea change.

ONE MISUNDERSTANDING NEEDS CLARIFYING RIGHT NOW

When managers say they don't want a sales function, they usually mean salespeople who insist on imposing things on customers. It's right to not want that. That's why it's important to have clear sales concepts. Sometimes a salesperson is just someone whose job is to tell customers about different ways to work together. If they do this skillfully and respectfully, it can open many doors. Think about this one: Do all your potential customers know your offering and its benefits?

Good salespeople also determine actual needs and the range of prices customers are willing to pay. I know from many conversations with purchasing managers how far off the mark some companies are in estimating customers' price flexibility. And how detailed is our understanding of our potential customers? With the right understanding and knowledge, salespeople don't drive away customers – on the contrary. Existing customers feel listened to, projects and orders can be identified quickly, and new customers can be acquired.

Few topics are the subject of so much argument within a company as sales. Why? Because no other topics are of such existential importance to a company as keeping hold of existing clients, generating new orders, growing organically, safeguarding jobs – and many more. And where there's hope in plenty, there's either great joy or bitter disappointment. The job of influencing this equation lies with management. If you feel that your salespeople are driving away customers, make a change and clean up their act. Yes, running a professional sales department is an investment – but it's one that pays off in the long run.

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THE ULTIMATE CHALLENGE OF PROJECT MANAGEMENT

AN INTERVIEW WITH STEINBEIS ENTREPRENEUR DR. KAREN DITTMANN AND PARSQUBE CEO MEHRSCHAD ZAERI ON THE TOPIC OF HYBRID PROJECT DESIGN

Constructing a hospital, introducing new software at a company, re-organizing a company division – very different tasks, but they all have one thing in common: They are projects. In the past, there was a tendency to tackle such tasks by resorting to classic, plan-based project management. These days, people increasingly turn to agile project management. The underlying motivations for using agile methods are the increasing pace at which projects now happen and the intention of dealing better with complexity. Despite this, many firms struggle to cope with the challenges of making their projects more agile, or they don't actually need full-blown agile management to the extent they are given to understand. This is where there are benefits in using hybrid project management, which merges classic approaches with agile methods. Dr. Karen Dittmann, Steinbeis Entrepreneur at the Steinbeis Transfer Center for IT Project Management (ITPM), and Mehrschad Zaeri, CEO at parsQube, who together have implemented a variety of projects over the years, recently launched their HybridBlog on YouTube to talk about the dos and don'ts of project management, underlying philosophies, and examples of best practice. TRANSFER Magazine has been following the blog and recently interviewed the two experts on project management.

Hello Dr. Dittmann, hello Mr. Zaeri. It's been a while since your YouTube blog went live. How did you come up with the idea of launching a blog on hybrid project design?

Mehrschad Zaeri:
One thing we've learned after such a long time working in project management is that it's extremely important to master classic methods, but at the same time, given the increasing number of challenges and growing levels of project complexity, you can't do without agile methods. We're familiar with both worlds of project management – classic and agile – and want to build a bridge to bring together the best of both worlds and exploit synergies.

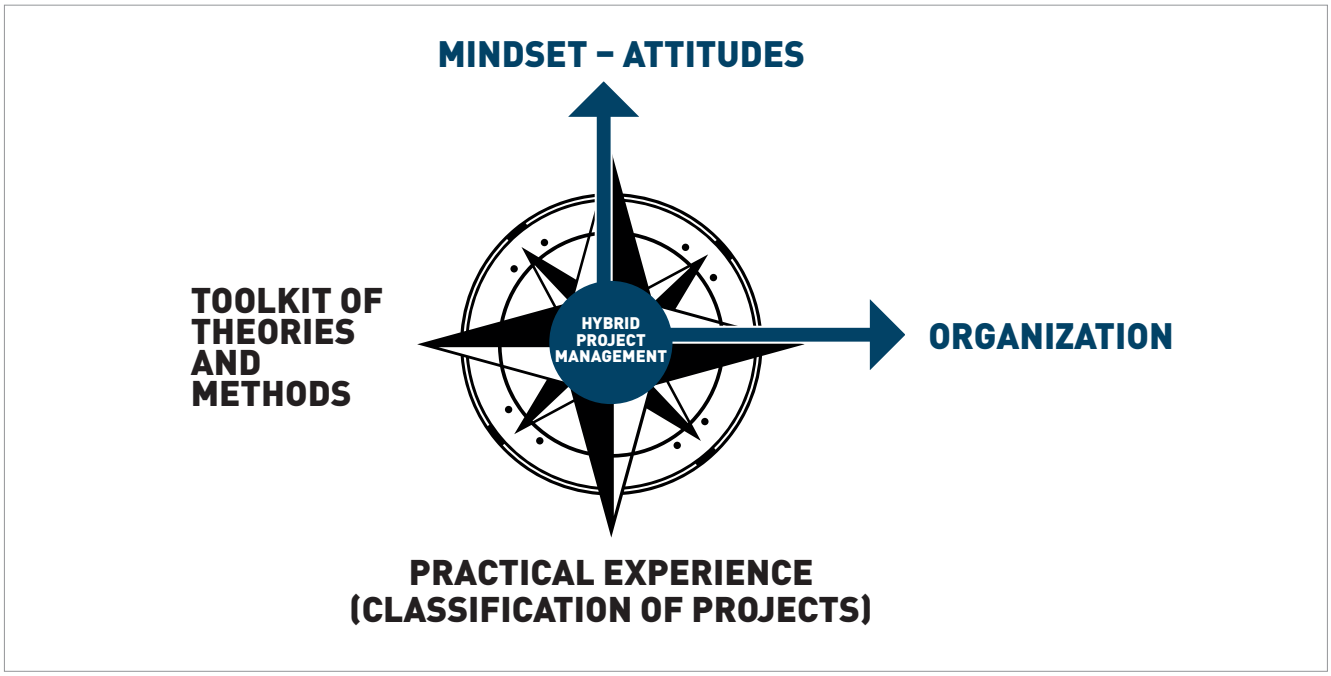
Karen Dittmann:
For me, it's also important to offer the experience I've gathered while working in different sectors of industry. As an Entrepreneur at the Steinbeis Transfer Center for IT Project Management, I've been exposed to all the ins and outs of the IT market, mechanical engineering and machine construction, the agricultural sector, but also pharmaceutical research – and they all have different cultures, approaches, and requirements. This abundance of differences allows you to develop a broad outlook, and that encourages you to think in hybrid terms.

You base your customer consulting on a rather unique compass. Could you tell us about it?

Zaeri:
Our compass is a powerful tool that we use with companies to tackle the shift toward hybrid procedural models. Our method involves making distinctions between the different points of the compass. To the north you have attitudes, or the mindset. What's the attitude like at the company, and what do you need to take into account for the change project? To the east, we have the organization itself. Which areas of the organization are projects taking place in? What tasks have already been delegated? What processes and standards need to be taken into account? To the south, there is existing front-line experience with projects at the company. How much know-how does it already have in this area? And then finally to the west, there's a toolkit of theories and methods, that are already so well rehearsed that it's no major effort to tap into them.

Dittmann:
One thing you might want to ask is what

To find out more about hybrid project design, watch the (German) HybridBlog run by the Steinbeis Transfer Center for IT Project Management by searching for HybridBlog on YouTube.



all this has to do with hybrid project design. An important thing we've learned through our consultancy work at the Steinbeis Transfer Center for IT Project Management is that introducing hybrid methods should always be based on a holistic approach. It's not enough to send everyone on courses and then expect them to use hybrid methods in their work, which is the western point of our compass analogy. If the company culture still hasn't got a construct for "failure" or "fail fast" – the northern point on the compass – it'll be difficult to adopt agile principles. And if the organization – the east – swears by hierarchical project management, it'll have problems adapting to the agile principle of "servant leaders." Last but not least, you have to think about the south – practical experience – because if you've had no previous experience working with projects, the organization will have to introduce fundamental rule sets and strategies for project work.

Zaeri:
In general it can be said that the hybrid approach is difficult if you've had little exposure to project work, because it represents the most challenging aspects of all three approaches – agile, classic, and hybrid.

Dittmann:
Exactly, and lots of people underestimate this aspect. This is because with hybrid approaches not only do you have to understand classic project management and be in a position to apply it without thinking, you also need knowledge of the whole spectrum of agile frameworks, including changing mindsets.

That sounds challenging. Is this the sort of knowledge you can expect a project manager to have?

Dittmann:
Not really, no. And this brings us to an important point. When we use project design, we're not just talking about small or medium-sized projects ticking over in the background within organizations. Our main intention is to use it for big, challenging, and complex initiatives. Or for designing procedural models for a specific organization. To do this, you need experts in project management, with the right knowledge and skills.

Zaeri:
Hybrid project design is the ultimate challenge of project management.

Dittmann:
That's exactly how I see it. But it's also the most fun!

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SUCCESSFUL DIGITALIZATION – HOW TO IMPROVE PRODUCTIVITY AND QUALITY

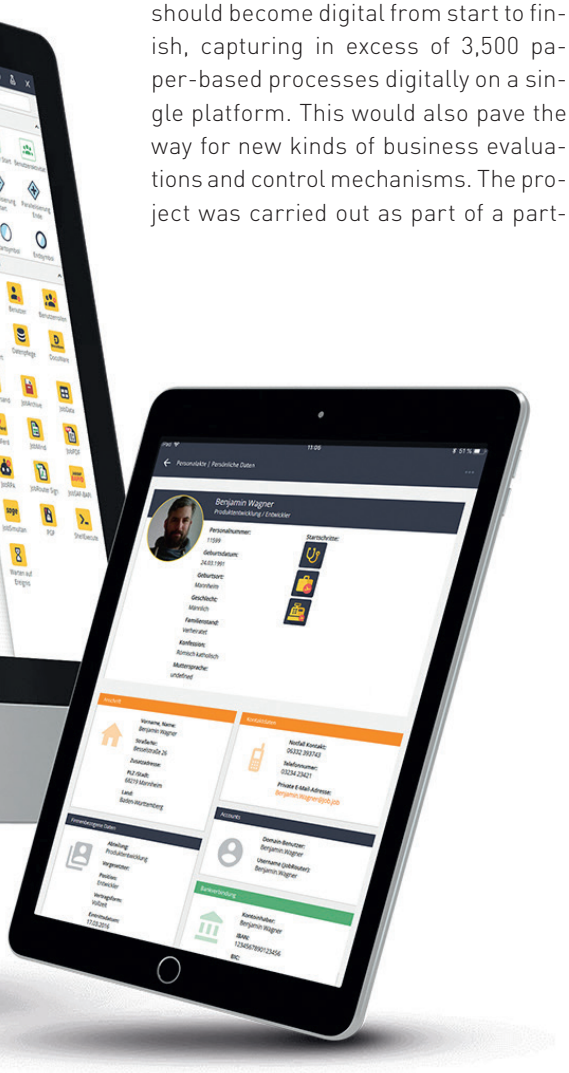
STEINBEIS STUDENT DEVELOPS A CONCEPT FOR DIGITALIZING CONTRACTUAL PROCEDURES AND INVOICING

Companies have little choice these days when it comes to processes – they need to be as digital as possible if they want to remain competitive. There are a number of reasons for this. The first is that employees, customers, and suppliers expect a smooth user experience with the software that underlies processes, so it's important to map entire processes and not jump between different systems or media – at every stage of the value chain, across the company. But systems also have to ensure that documentation requirements are adhered to and must respect issues such as legal and internal compliance, such that everything remains transparent and understandable at any given time. Then there is the need to improve productivity, without increasing the burden on staff. Overall, this is a complex challenge, but it's not insurmountable, as Jonas Pospischil has shown with a degree project conducted for his studies toward a Master of Business Engineering at Steinbeis University.

Everybody is talking about digital transformation these days. But is there a systematic and structured way to deal with the digitalization and automation of processes? Which processes are best suited to initiating digital transformation? And what expectations do people have when it comes to using tools to digitalize processes? These were the challenges faced by Jonas Pospischil when he embarked on his degree project. He had a number of areas he wanted to tack-

EVERYBODY IS TALKING ABOUT DIGITAL TRANSFORMATION THESE DAYS. BUT IS THERE A SYSTEMATIC AND STRUCTURED WAY TO DEAL WITH THE DIGITALIZATION AND AUTOMATION OF PROCESSES?

le. His goal was to digitalize the processes used by a supplier of floor coverings for large shipping vessels – from assigning tasks to crews to providing feedback on finished work, the automatic delivery and invoicing of services, and client approvals. The entire process should become digital from start to finish, capturing in excess of 3,500 paper-based processes digitally on a single platform. This would also pave the way for new kinds of business evaluations and control mechanisms. The project was carried out as part of a partnership between Steinbeis University, JobRouter, and the sponsor of the project, Smart Solutions for Industry.



The Smart Solutions for Industry AG is a joint equity holding of the Filderstadt-based SCMT Steinbeis Center of Management and Technology GmbH and the Esslingen-based Steinbeis Interagierende Systeme GmbH.

AUTOMATING PROCESSES WITH THE HELP OF A DIGITALIZATION PLATFORM

A digitalization platform is a type of software that pulls together different kinds of technology. Its key role is to make software straightforward and understandable for users. Why? Because that saves time when systems enter operation, thus raising user acceptance. Optimally, systems should be based on "low-code" principles. What this means is that the development environment used for the software results in processes that model information visually or show graphs. That way, there is little need to use traditional, text-based programming methods. This significantly reduces the time invested in developing and deploying business applications. By offering users a browser-based graphical interface, even process designers with little knowledge of programming are able to model processes and apps. Providing software applications in web-based formats or native apps for mobile end devices makes it easier for users to carry out tasks at any time, wherever they are. In a nutshell, the priority should always be to ensure users have quick access and that they find it easy to use the software; there's little benefit in introducing software if it can't be used by everyone, for all intended tasks.

The starting point for Pospischil's project was an extremely long-winded evaluation process used to plan tasks assigned to each crew per day. The system also involved incoming information on work carried out and special services, but it was being weighed down by paper. After this part of the process, information had to be transferred to spreadsheets using Microsoft Office, resulting in frequent errors that were difficult to review. Documents were being printed out to approve time sheets. And then there were more than 1,000 invoices per year, which were first printed and then scanned in before being sent to customers or forwarded to in-house accounting. Overall, the process involved more than 3,500 individual document-based processes, which had to jump between three different systems. "In terms of numbers, the challenge was to save several thousand sheets of paper, cut processing times from weeks to hours, and avoid hopping between three different systems," summarizes Pospischil. His goal was to make it possible to run the entire process on a single digital platform and avoid gaps between different systems caused by printing out documents. It should also become possible to conduct evaluations every day, rather than once every six weeks,

to improve the quality of information, and to archive information safely for review purposes.

To understand the current situation, Pospischil organized workshops and face-to-face interviews. This allowed him to structure requirements and develop a rough concept for the target process. To ensure processes could be developed based on agile methods, he avoided drafting a detailed concept. Instead, he moved quickly on to process implementation, using agile methods to include ongoing feedback from key users and regular customer reviews. This was made possible by the low-code process digitalization platform, which also enabled the target process to be implemented quickly and effectively within the software. Within a short time, it became possible to come up with operable prototypes for users to try out, evaluate, and give immediate feedback on. This feedback flowed directly into further development work.

DIGITALIZING PROCESSES

Digital transformation requires a solid understanding of how business processes are digitalized. Business processes comprise a series of interrelated tasks ending in the provision of a service or product. "But that doesn't mean digitalizing processes entails mapping analog processes. It's about developing new and optimized processes spanning every area of the company – so you transform them by using the power of digital technology," emphasizes Pospischil. There is significant benefit in digitalizing and automating processes beyond the boundaries of individual departments and linking different types of software. As a result, digitalization always entails changes in existing processes and gaining a new understanding of different roles and responsibilities.

The frequency with which new processes are now being introduced to business – or existing processes have to be modified – has accelerated in recent years. Often, business processes have to be realigned or adapted within weeks, sometimes for project-related reasons. If processes are too rigid, people stop thinking about them. Agile processes are a sign that the world itself is now becoming increasingly agile; responsibility is being handed back to the user. Enforcing rigid rules, or even stopping processes because they don't fulfill the right conditions, makes little sense in modern business. This may be asking a lot of the people who develop processes and implement process standards. But it's not the process that defines the way forward, but the people who are responsible for processes – so they should also be involved in the thinking.

DIGITALIZING DOCUMENTS AND INFORMATION

The aim is to reduce the amount of paper used in the office to an absolute minimum, not only to cut processing time, but also to ensure key stakeholders have access to the right, latest information at the right time and in the right place. Digital decision-making processes need reliable data and information based on this data.

A data management system (DMS) makes it possible to set up different documents in central databases so that the information they contain can be extracted and processed. The focus lies in digitalizing data and information – not creating digital copies of paper documents. This makes it possible to manage access to required documents based on current circumstances, or to extract information depending on how far certain processes have progressed. Such databases also store supplementary information on each document for quick and easy searches.

This document archive can then be simply connected to other systems. The

WHAT SHOULD COMPANIES LOOK OUT FOR WHEN DIGITALIZING PROCESSES?

1. Use an integrated platform for business processes
2. The project plan should include a "big picture" of individual application scenarios
3. Ensure using the system is as straightforward as possible
4. Apply low-code methods to reduce the complexity of software modifications and extensions
5. The project should address aspects such as process digitalization, document digitalization, and issues such as robotic process automation and digital signatures
6. Software must be capable of expanding simply according to the number of users, processes, documents, data records etc.
7. Make good use of interfaces with other company systems

underlying software also automatically detects which documents are needed and extracts relevant parameters from documents. As well as saving time for what would otherwise be a protracted archiving process, this also offers the potential to fully automate processes. Staff at the company work together on data and information in parallel. This information is then inserted and processed electronically in other digital documents, such as contracts. It is even possible to use digital processes to add legally valid electronic signatures to documents.

It would not be possible to use this digital information for further processes without a system for storing, administering, and processing data digitally. Stored correctly, roles can also be distributed and managed in completely different ways. Reducing the amount of information held in analog formats on paper – by systematically converting it into data – thus lays a foundation for digital transformation.

LOOKING BACK ON THE PROJECT

Jonas Pospischil was a student at Steinbeis in parallel to his work for Smart Solutions. He succeeded in digitalizing the processes used by the supplier of floor coverings for large shipping vessels. In addition to reducing the number of times information jumped between systems – it now only skips once – he completely eliminated the need to manually transfer information several times between Excel spreadsheets. Furthermore, by integrating contract information into the system, he has prevented bookings being incorrectly entered for already completed or non-existent assignments.

After discussing and capturing the required process, Pospischil worked in partnership with JobRouter on transferring this process to its digitalization platform. It was extremely important when planning the individual elements and steps of processes to involve the people who would use the software in the development project. After all, they would be dealing with the software for everyday tasks. At the end of defined sprints, users and managers were kept informed of progress to allow them to give feedback that could be worked into the next sprint phase.

Once the development phase was completed, it was time to test all relevant requirements of the prototype process. A further small project team was formed for this in order to introduce the new processes to a front-line operational setting in parallel to the old processes, which were still in place. This took up a great deal of resources in the short term, but it was extremely important for the success of the project. This step also made it possible to make minor adjustments or changes under real conditions, not only so that final touches could be made to the process but also so that users could be given effective training.

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TURNING THE SPOTLIGHT ON SUSTAINABILITY

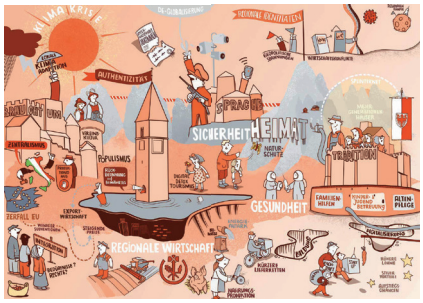
SIBE EXPERTS HELP DEVELOP FUTURE SCENARIOS FOR SOUTH TYROL

What will it be like in the northern Italian region of Trentino-Alto Adige in 2030 – especially given recent experience with the Covid-19 pandemic? Will there be a return to traditional values, customs, and family structures, will the region open up more to the outside world, and will there be a greater emphasis on social welfare and ecologically sustainable production methods and lifestyles? Or will the region focus instead on individualization and accelerated social development, resulting in a continuing and unchecked rise in resource consumption? To answer these and other questions, researchers from Eurac Research and the School of International Business and Entrepreneurship (SIBE, the business school belonging to the Graduate School at the faculty of Leadership and Management at Steinbeis University) conducted a future study of South Tyrol, with a particular focus on sustainability.

To understand how markets, industry sectors, and society in general will develop over time, for years companies have banked on so-called strategic vision. Increasingly, future scenarios are also used in urban planning and regional development. This was also the case with the prognostic study conducted on South Tyrol.

SOUTH TYROL – ONE FUTURE, FOUR POTENTIAL OUTCOMES

To sketch potential scenarios, in addition to considering global factors, the researchers examined society, healthcare, business, the environment, politics, and technology. This resulted in four scenarios representing future portraits from a retrospective angle, as if the people of South Tyrol are looking back in 2030.

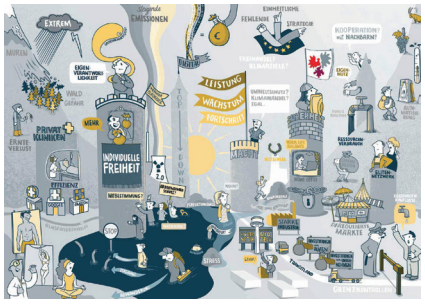


Scenario I:
A world of regional consciousness – strength lies in tradition

- Heightened competition between nations and geopolitical blocs
- Uncertainty and polarization among the population
- Distancing from "the outside" as more turn toward analog ways of life

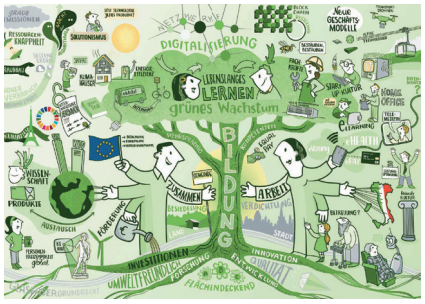
Scenario II:
A world of neo-cosmopolitanism – think global, act local

- A radical re-think and shift toward socially fair and environmentally sustainable production methods and lifestyles
- Profound, structural change resulting in reorientation in many areas of society based on a tendency toward neutral growth



Scenario III:
A world of individual freedom – I am the architect of my own happiness

- Increased confidence in market mechanisms and competition as the most important principles of social order
- Achievement, personal responsibility, individualization, acceleration in society, a blossoming of entrepreneurial and pioneering spirit, but at the same time the rising consumption of resources and even



Scenario IV:
A world of green innovation – there's a (technological) solution for everything

- Intensification of international collaboration and global exchange of information, goods, and services
- Networking within the global village

The researchers looked particularly closely into whether, and to what degree, the Sustainable Development Goals of the United Nations could be realized under each scenario. As a next step, the team plans to solicit more opinions and gain input from stakeholders in Italy.

For further information, go to
https://www.steinbeis-sibe.de/fvc_news/vier-zukunftsszenarien-fuer-suedtirol-2030.

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THE 2021 STEINBEIS ENGINEERING DAY: SMART CONNECTED PRODUCTS

WHEN ARTIFICIAL INTELLIGENCE MEETS THE INTERNET OF THINGS

The internet of things (IoT) and artificial intelligence (AI) are important drivers of innovation. They open up new opportunities for innovative business models and new value cration. IoT products and devices are already used not only by companies but also by consumers. The combination of AI and IoT technologycreates AIoT products capable of learning from experience and making decisions without human input. How can small and medium-sized businesses (SMEs) exploit this trend and develop their own AIoT products? This will be the main topic of the sixth Steinbeis Engineering Day, scheduled to take place on May 5, 2021 at the Steinbeis House for Management and Technology.

Merging sensors with actuators and internet technology allows to link up machines with devices and even buildings – or summarized in a single word: things. The internet of things already encompasses more interconnected things than people. According to forecasts, by 2025 there will be more than 55 billion IoT-ready products. An IoT-ready product is equipped with its own sensors. This enables it to take in its immediate surroundings or check its own status and pass this information on to others via the internet. Depending on the kind of actuators they are fitted with, products can then be controlled from a distance – or "remotely." The networking between IoT-ready products is based on the capturing, evaluation, and exchange of data. The collection of data resembles thereby the human sensory organs, the exchange is similar to our interhuman communication and the evaluation increasingly resembles the functions of the human brain IoT products are not necessarily capable of learning, due to the type of data analysis methods that have been used until now. But there are now new techniques based on artificial intelligence that are capable of simulating human learning.

Combining the IoT and AI is spawning new products capable of delivering genuine competitive advantage, but they require detailed expertise that is not always accessible to SMEs, or not to the extent they require it. At the next Steinbeis Engineering Day, the Ferdinand Steinbeis Institute will demonstrate how SMEs can make existing and new products more AIoT-compatible. By looking at specific examples, participants will gain insights into the potential and benefits offered by AIoT products. AIoT experts will also explain the issues that need to be considered when developing AIoT products and appropriate business models. Participants at the event will also be shown the benefit SMEs gain by setting up networks across different sectors of industry and developing AIoT products collaboratively.

→ More information: **www.steinbeis-engineering-tag.de.**

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FROM THE END OF THE PAPER MESS: THE E-PRESCRIPTION AS A GAME CHANGER

TEAM OF STEINBEIS EXPERTS ASSESSES THE OPPORTUNITIES AND THREATS OF E-PRESCRIPTIONS

According to a study into digital healthcare conducted by the German industry association BITKOM, half of all Germans feel the healthcare industry needs to "go digital," especially if mounting healthcare costs are to be kept under control. The survey respondents are open to digital applications in healthcare services and almost 60% would use electronic prescriptions. The study also found that 65% of Germans see significant potential in using electronic patient records. In international terms, the German healthcare industry still has a lot of catching up to do, however. Experts at the Ravensburg-based Steinbeis Transfer Center for Technology – Organization – Human Resources (TOP) and their partner, PSO, want to do something about this. Together, they have developed and evaluated a prototype e-prescription app.

The Covid-19 pandemic has significantly accelerated change in the public health service, brought about by digital solutions. This is also leading to a growing number of novel e-health innovations. In August 2019, a draft "Bill for More Security in Medicine Provision" (GSAV) raised the curtain on electronic patient records and e-prescriptions in Germany. The aim is to allow data to be exchanged more quickly and securely between all stakeholders. For this to work, e-health apps will be needed to allow patients to manage their data and prescriptions themselves. Introducing e-prescriptions will be a game changer.

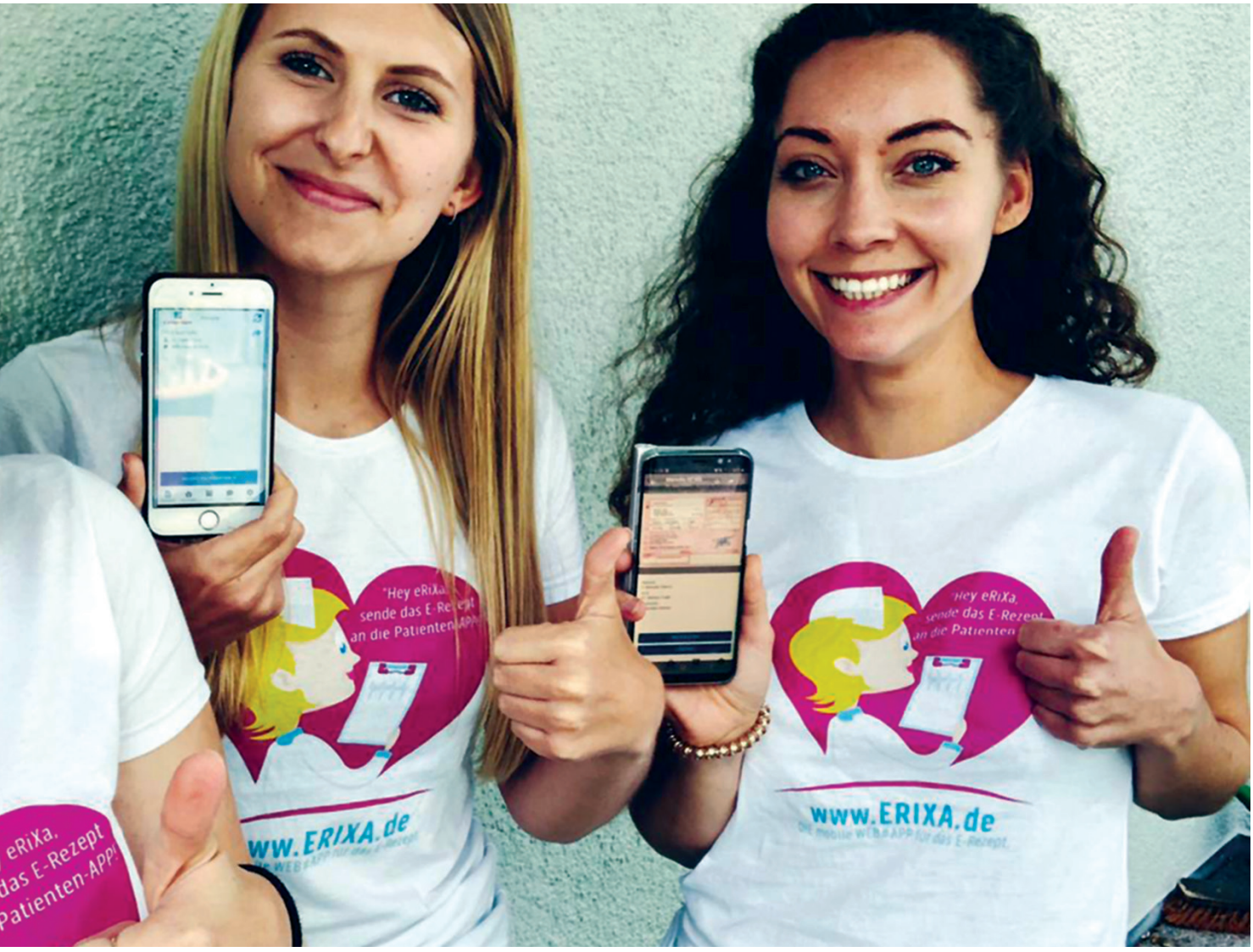
As part of a value/benefit analysis, PSO, a startup from Ravensburg, invited experts at the TOP Steinbeis Transfer Center to test eRiXa, its first e-prescription app, and compare it to other e-prescription apps on the market. To gain an overview of the health app market, the Steinbeis experts drafted a matrix of suppliers. Providers identified as market leaders were then included in the value/benefit analysis and put through rigorous testing by students at HTWG Konstanz (Constance University of Applied Sciences).

ZOOMING IN ON CUSTOMER BENEFITS – NOT EVERY USER IS A HEAVY USER

The project team identified three typical user groups for the e-prescription app and determined their needs and wishes for such an app. To add definition to the user groups, app users were profiled by age and typical medical conditions they have. This evaluation resulted in three different target groups: a young group of 18-to-30-year-olds, who are rarely sick, a mid-range group of 31-to-60-year-olds with chronic ailments, and the elderly target group of 61-to-99(+)-year-olds, who are more frequently sick. The target groups have similar underlying expectations for the app, but they do differ when it comes to more specific requirements. It was noticeable that the older the users are (and thus the more often they are sick), the more add-ons they expected the app to offer.

ANALYZING VALUE AND BENEFITS USING THE GERMAN SCHOOL GRADING SYSTEM

The project team conducted a value/benefit analysis for the three defined user groups and tested the app accord-



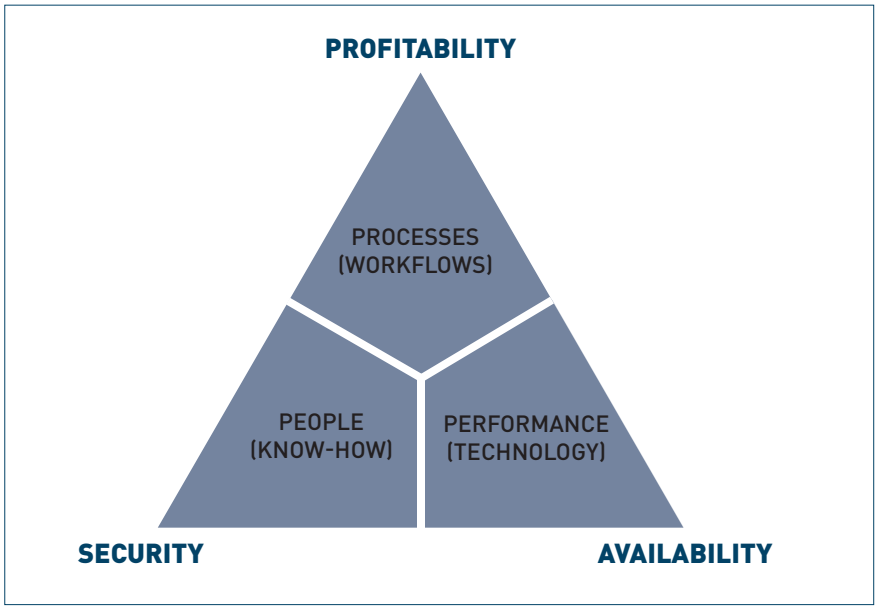
↑ Master students at HTWG Konstanz have tested „eRiXa". (© PSO GmbH)

ing to four key criteria: the technology, usability, app features, and providers. Based on these factors, tests evaluated a variety of performance attributes such as app installation times or the number of steps needed to register for the app. Each assessed criterion was weighted in percentage terms according to importance. The project team used German school grades to score the apps.

E-PRESCRIPTIONS WILL BE INTRODUCED (AT THE LATEST) BY JANUARY 1, 2022, AT WHICH POINT THEY WILL BECOME COMPULSORY.

PROJECT RESULT: USE THE OPPORTUNITY BUT KEEP AN EYE ON RISKS

E-prescriptions will be introduced (at the latest) by January 1, 2022, at which point they will become compulsory. In the meantime, there will be plenty of opportunities to prepare for the innovation by conducting pilot projects in the overall healthcare market. The Covid-19 pandemic has had an important influence on people's perceptions of telemedicine as a major opportunity to offer contact-free patient care. Being able to issue e-prescriptions will be



The PRiMA© model (© PSO GmbH)

key to the success of offering treatment through telemedicine. It may spell extra work for doctors' practices during the transition phase, but in the long term the new system will also offer time-saving benefits. This is because digital processes save time by freeing up physicians to look after patients.

It remains to be seen if this new approach to treating patients will ultimately become standard practice after the coronavirus pandemic. Online pharmacists are hoping that telemedicine and e-prescriptions will raise their share of the market for prescription medicines by up to 10%. Discussion flared up again recently about prohibiting mail order companies from selling prescription drugs in Germany, to protect pharmacists in the community. This is because there are already similar bans in most other European countries. It is important for local pharmacists to concentrate on offering personal advice and finding new fields of business, such as home deliveries. Focusing solely on selling and distributing drugs will not be sustainable for them in the future, because mail order pharmacists outperform others in terms of efficiency and can compensate for the time advantages of local pharmacists by offering same-day deliveries.

E-prescriptions would offer stakeholders in the healthcare sector a host of opportunities if they start using available apps and tools to prepare their patients for the future. The TOP Steinbeis Transfer Center offers a platform to help with this in the form of the joint eRiXa and e-prescription app project. For example, physicians, pharmacists, care homes, hospitals, and patients from all parts of Germany can make use of the testbed. The e-prescription app from Ravensburg builds a bridge between different stakeholders in the public health service and patients.

More on the eRiXa project and the e-prescription app:
www.erixa.de

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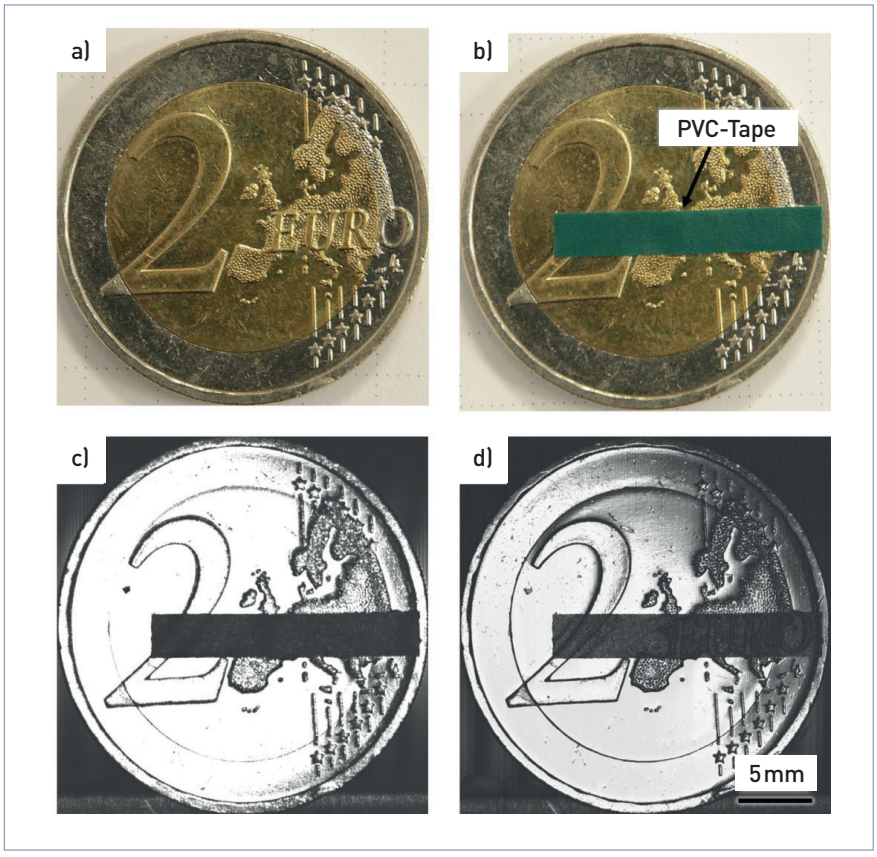
SMALL STRUCTURES IN FOCUS

A RESEARCH TEAM FROM MANNHEIM DEVELOPS MEASUREMENT TECHNOLOGY FOR ASSESSING STRUCTURAL AND MATERIAL DIFFERENCES ON SURFACES

Whether a surface is roughly soiled is recognizable at a glance. However, this is much more difficult in the case of small and invisible soiling. What's the best way to ascertain if a surface really is as clean as it's supposed to be? Such soiling is caused by oil and fat layers, detergents or plastic abrasion. Measuring surfaces is a major interest in forensics as well. Currently, the Center of Mass Spectrometry and Optical Spectroscopy (CeMOS) is investigating this issue at Mannheim University of applied science. This is in collaboration with Steinbeis Transfer Center for Smart Manufacturing Solutions and SME partners in industry.



The Steinbeis experts conducted an experiment by covering up sections of a two-euro coin with PVC tape (a, b) and taking measurements.

The project is focused on developing a measurement system for structure measurement. Based on this, the design of a device for the qualitative control of surface structures has been realized. The result is a laser-based scanner that enables a rapid spectral measurement of surfaces.

CeMOS, the largest institute for university of applied sciences in Baden-Württemberg, has been developing solutions for medical technology, image processing, metrology-based material development. Above all, optical device technology is a key component of the institute. The team at the Steinbeis Transfer Center supported the fundamental development of CeMOS for pre-series prototyping. This is commercially available at the Steinbeis Transfer Center "Intelligent Industrial Solutions".

But how does the surface scanner work? "The developed measurement method is characterized by a mid-infrared laser beam deflected by a complex optical system above the sample. The sample partially absorbs laser light in a different way, depending on its absorbance properties. An infrared (IR) detector acquires the confocal reflected measurement signal." explains Professor Dr. Matthias Rädle, director of CeMOS and a Steinbeis Entrepreneur at the Steinbeis Transfer Center. The signal is strongly depending on the sample and its absorption properties. Infrared light is particularly well suited for material discrimination: it is not visible to the human eye and does not damage the sample during the entire scanning process.

By using different specific laser wavelengths, molecular differentiation is enabled.

NON-CONTACT MEASUREMENT OF HUMAN FINGERPRINTS

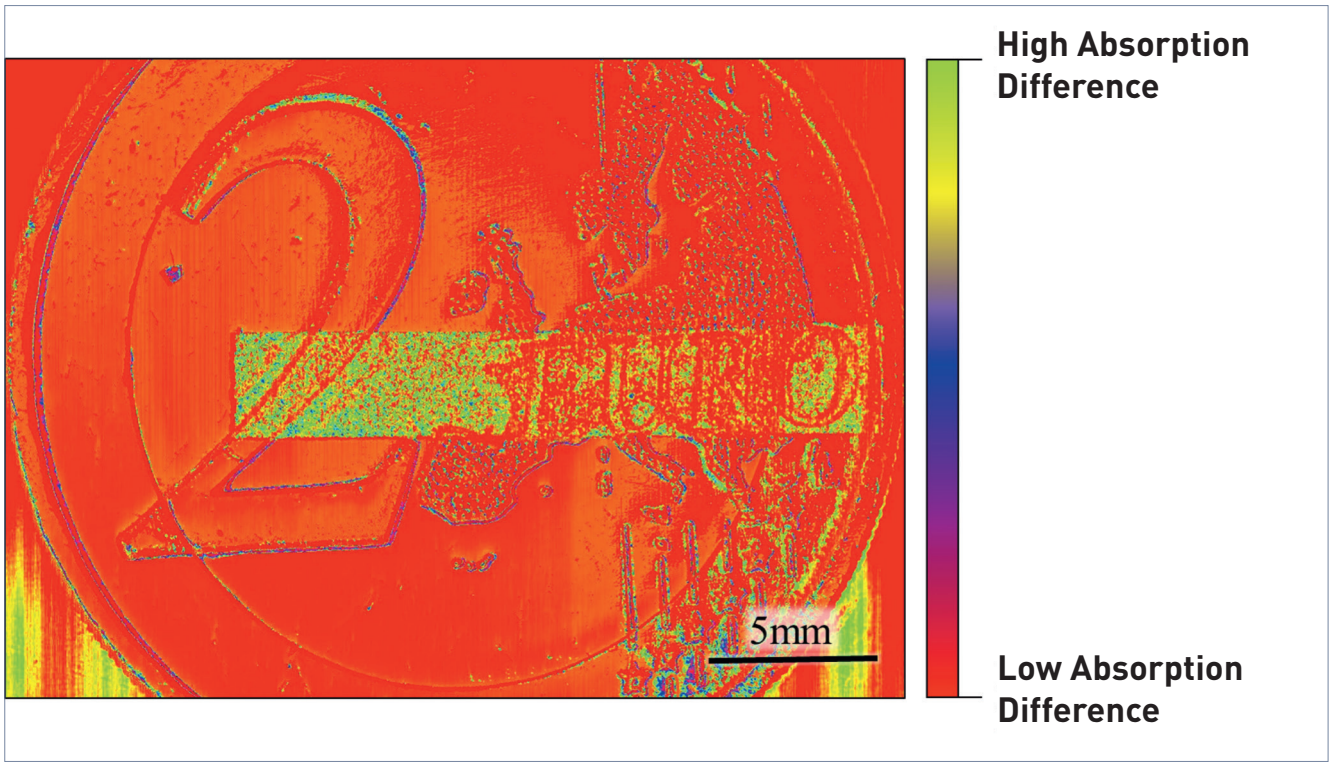
The scanner's properties enable to detect traces of fat. In criminology, this is of major importance and significantly supports dactyloscopy. This refers to the evaluation of human fingerprints, which are individual, unique, unchangeable and accordingly classifiable for each human being. Dactyloscopy is a scientifically and judicially recognized method of identifying persons. Fingerprints are created by secreted body fat or fat taken up from the environment. Individual lines in the fingerprint, known as papillary lines, leave a unique lipid structure on touched surfaces. "The technology we have developed has the great advantage that fingerprints on different surfaces can be measured and recorded in a contactless way without preparation. Conventional methods of recording, such as powdering using the adhesion method, on the other hand, lead to direct irreversible damage to the fingerprint," explains Tim Kümmel, Msc. one of the inventors of the system at CeMOS.

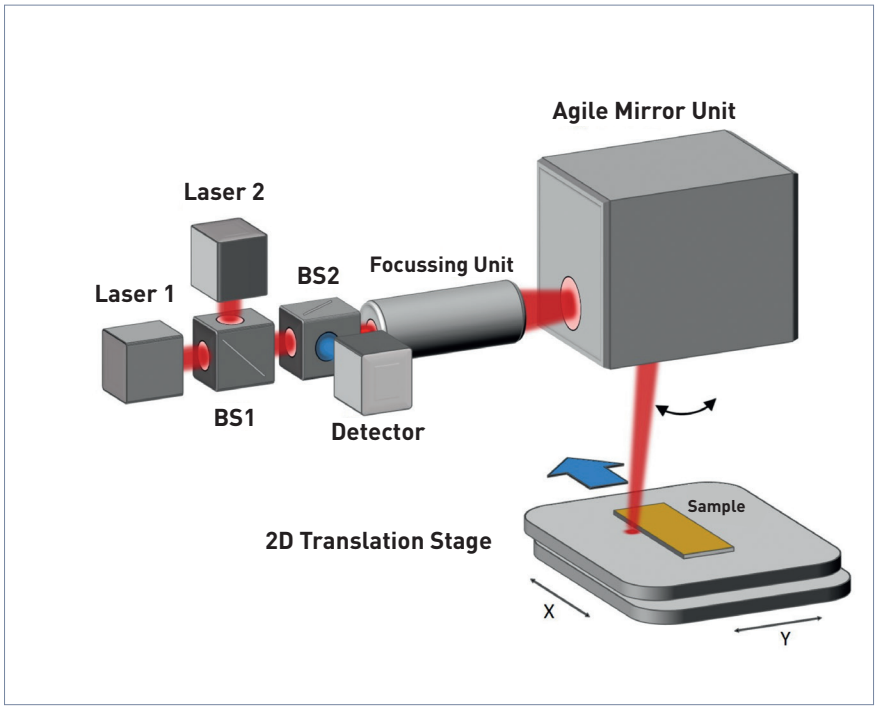
Contactless imaging has the profit that further examinations of the unchanged samples or renewed scans are possible afterwards. In addition, the fingerprint must be digitized and compared to a database with already taken fingerprints after using the adhesion method. The developed scanner, on the other hand, reduces fingerprint acquisition times in police laboratories significantly and allows direct comparison of the digital image with the database. Furthermore, the scanner is capable of providing a three-dimensional assessment of finger fat in sample measurement. This would allow the use of new features to uniquely identify a fingerprint.

CONTACTLESS MEASUREMENT OF SURFACES FOR QUALITY CONTROL

However, the developed scanning technology is not only used in dactyloscopy, but also in surface quality control. Quality control is an important component in all areas of manufacturing, as it serves to verify if a product meets certain requirements. The control depends strongly on the product that needs to be validated. For verification, non-contact methods are preferred, which do not make any changes to the product. A change would mean that the product is no longer usable for control procedures or further processing.

After scanning, an image processing module significantly enhances results such that structures and lettering on the coin can be made out.





The recently developed scanner system for capturing spectral measurements of surfaces

The scanner developed by the project team is not only capable of detecting structural differences. It also distinguishes molecular differences. This enables, for example, the detection of thin oil films on reflective substrates. The ability to achieve very high resolutions in a short scan time was the focus of the development. A high scan resolution of a few microns makes the detection and digitalization of smallest structures on a surface possible.

The scanner has a penetration depth of up to 150 µm when measuring and also records the height profile of the specimen. The information obtained from a scan can therefore not only be converted into a two-dimensional image, but also enable spatial assessment of the scanned surface. This reaches the point where the scanner can be used to look through thin plastics such as PVC tape (polyvinyl chloride). To visualize this, the team masked a two-euro coin with PVC tape in such a way that the euro lettering was hidden, and then measured the coin. In the scan results the covert part is already faintly visible. A subsequent image processing provides a better impression. It processes the scanned image data for the eye, that the euro lettering, as well as the drawn structures on the coin are clearly visible. This examination is also possible for circuit boards. For this purpose, parts of the circuit board are masked off with PVC tape. This experiment illustrates that the developed scanning technique can capture and visualize the board structure and even conductor tracks inside the board.

Further areas of application and possibilities for optimally using the scanner are being added daily and will continue to be researched in the future. In addition, the optimization of the ready-for-sale series model is planned.

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THE GREEN DEAL AND "FROM FARM TO FORK": EU STRATEGIES FOR IMPROVING THE FOOD SYSTEM AND BIOLOGICAL DIVERSITY

TEAM AT STEINBEIS-EUROPA-ZENTRUM PROVIDES SUPPORT WITH SUBMITTING APPLICATIONS TO THE EU

By launching its Green Deal strategy, the EU is pursuing its goal of becoming carbon-neutral by 2050. The Green Deal is considered the most ambitious environmental legislation proposal submitted by the EU Commission since the end of 2019. The concept includes an EU biodiversity strategy aimed at "bringing nature back into our lives" and an official "From Farm to Fork" strategy for a fair, healthy, and environmentally friendly food system. The aim is to smooth the path for a transition to a sustainable European supply chain in the food and drinks industry. Steinbeis-Europa-Zentrum is offering advice and support for stakeholders submitting EU applications and project proposals for the Green Deal concept.

According to Frans Timmermans, Executive Vice President of the EU and European Commissioner for Climate Action, the biodiversity strategy and the From Farm to Fork strategy are central to the EU Green Deal initiative and stand for a new approach that will allow nature, food production, and biological diversity to go hand in hand. The focus lies in healthy eating and the well-being of humans and animals – and at least in competitiveness and the stability of the EU. This is a major opportunity for research projects, innovations, new products, and improved manufacturing processes.

The aim of the From Farm to Fork strategy is to make European food supplies more sustainable on a number of fronts and reduce their impact on countries in other regions. For the first time, the strategy includes a comprehensive food policy proposing measures and goals for each stage of the food value chain. The idea is to make European food systems more sustainable. Every EU member is obliged to implement these guidelines on a national level and thus promote fulfilment of the shared EU goals. This should help European food become the international standard bearer when it comes to sustainability. The strategy dovetails with the sustainable development goals of the United Nations, and the aim is to improve global standards through collaboration and trading policies.

To coincide with the From Farm to Fork strategy, the EU commission has published details of its biodiversity strategy. Its aim is to strengthen society's resilience to threats such as climate change, forest fires, food shortages, and outbreaks of disease. This includes protecting wildlife and combating the illegal animal trade. By 2030, biodiversity in Europe should be well on its way to recovery. According to Brussels, the strategies work hand in hand as core elements of the European Green Deal and bring nature, farmers, companies, and consumers together so they can all cooperate in safeguarding future competitiveness and sustainability.

SUSTAINABILITY WITHIN THE FOOD SYSTEM AND BIODIVERSITY

The two strategies tackle a variety of specific topics and objectives as part of the Green Deal. For example, by 2030 the EU wants to halve the use and risk of chemical pesticides.

The excessive level of nutrients making their way back into the environment is a major factor in air, soil, and water pollution. It endangers biological biodiversity and contributes to climate change. The European Commission is therefore taking measures to cut nutrient losses by at least 50%, slow the decline in soil fertility, and reduce the use of fertilizers by at least 20% by 2030.

The use of antibiotics in humans and animals is leading to antimicrobial resistance, resulting in roughly 33,000 deaths in the EU each year. As a result, the commission wants to reduce the use of antibiotics in livestock farming and aquaculture by 50% by 2030.

It also wants more extensive development of organic methods as an environmentally friendly approach to farming. The European Commission is supporting an expansion in organic methods with the aim of seeing a quarter of all agricultural land being used for organic farming by 2030.

According to estimates, in 2017 more than 950,000 deaths – equal to roughly 20% of all fatalities – were the result of an unhealthy diet. A healthy diet based on vegetables not only lowers the risk of life-threatening diseases, it also re-

GREEN DEAL FUNDING

The EU has called for proposals in the following areas as part of the Green Deal. The submission deadline for funding applications is January 26, 2021:

1. Increasing climate ambition: cross-sectoral challenges
2. Clean, affordable and secure energy
3. Industry for a clean and circular economy
4. Energy and resource efficient buildings
5. Sustainable and smart mobility
6. Farm to Fork
7. Biodiversity and ecosystem services
8. Zero-pollution, toxic-free environment
9. Strengthening our knowledge in support of the European Green Deal
10. Empowering citizens for the transition towards a climate-neutral, sustainable Europe

duces the environmental impact of our food system. The waste food per capita produced by both the retail trade and consumers should also be reduced by 2030.

OPPORTUNITIES FOR BUSINESS ENTERPRISES AND RESEARCH INSTITUTIONS

By themselves, ambitious targets are not enough. They also need to be underpinned by specific support measures. Accordingly, in September the European Commission issued its first call for proposals under the Green Deal. Overall, approximately one billion euros of funding are up for grabs. The experts at the Steinbeis-Europa-Zentrum and Steinbeis 2i are providing companies and research institutions with support in the form of information, advice, and help with submitting applications. It is also helping to set up a consortium for projects and providing support with searches for suitable, professional, international partners.

Going by the motto EU KONFORM (a German acronym for "conceiving, formulating, and managing projects"), the European experts at the two enterprises have pulled together a package of services for companies and research institutions. The idea is to provide stakeholders with support in identifying suitable funding programs in all fields of technology and to offer advice on EU funding programs for research, development, innovation, and testing. The Steinbeis experts can provide support at all stages of a project, from developing original ideas to actual implementation. They can also help with contractual arrangements with the European Commission.

FUNDING AVAILABLE UNDER THE FROM FARM TO FORK STRATEGY

Funding for the following areas can be applied for as part of the From Farm to Fork strategy:

- **Subtopic A:** Achieving climate neutral farms by reducing GHG emissions and by increasing farm-based carbon sequestration and storage.
- **Subtopic B:** Achieving climate neutral food businesses by mitigating climate change, reducing energy use and increasing energy efficiency in the processing, distribution, conservation and preparation of food.
- **Subtopic C:** Reducing the dependence on hazardous pesticides; the losses of nutrients from fertilizers, towards zero pollution of water, soil and air and ultimately fertilizer use.
- **Subtopic D:** Reducing dependence on the use of antimicrobials in animal production and aquaculture.
- **Subtopic E:** Reducing food losses and waste at every stage of the food chain including consumption, while also avoiding unsustainable packaging.
- **Subtopic F:** Shifting to sustainable healthy diets, sourced from land, inland waters and sea, and accessible to all EU citizens, including the most deprived and vulnerable groups.

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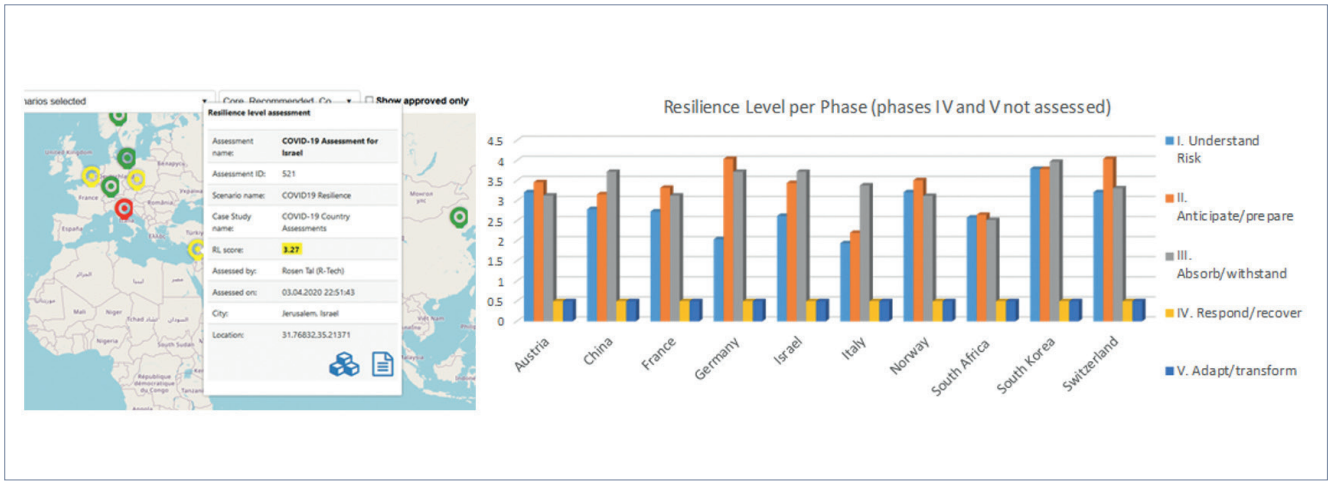
THE CRISIS IS OVER, OR MAYBE NOT...

THE STEINBEIS ADVANCED RISK TECHNOLOGIES GROUP HAS DEVELOPED A CLOUD PLATFORM THAT MAKES IT POSSIBLE TO MANAGE IN A CRISIS AND PROVIDES OPTIMAL SUPPORT



Current situation in different countries

Covid-19 has probably been the most global pandemic there has ever been – by a long way, and not just in geographical terms. Apart from the medical aspects, the economic impacts are and will be severe, especially in sections of the global population that are already suffering. The current situation is unique because it would appear to have triggered one of the first truly global threats. But was this threat really unexpected? Most members of the general public would probably say that it was – something experts would certainly deny. For more than two decades, organizations such as the World Economic Forum, the OECD, and the WHO have been warning about the threat posed by new pandemics, expressly highlighting how they can lead to sudden outbreaks and rapid person-to-person transmission – people would have no or only very little immunity, there would be no vaccines, and there would be insufficient or no supplies of antiviral drugs. Steinbeis Advanced Risk Technologies Group (R-Tech) has developed a cloud-based platform providing a portfolio of solutions for crisis situations.

The anticipated impacts of the current pandemic are disturbing. According to the United Nations, the number of people living in extreme poverty with an income of less than two euros a day is expected to rise to over 100 million. The number of people lacking basic shelter and clean water could hit half a billion this year, virtually wiping out a whole decade of progress. Besides, economic recovery is expected to very different for those economies that coped well with the crisis compared to those that did not.

Is there any way to prepare for an event like the current pandemic and mitigate its consequences? As early as 2006, the Global Risk Report published by the World Economic Forum warned that if we fail to contain a virus capable of causing a pandemic – and person-to-person transmission of the virus become commonplace – "the vulnerabilities of our interconnected global systems would intensify the human and economic impact." It added that the global spread would be facilitated by global travel patterns and insufficient warning mechanisms: "Short-term economic impacts would include severe impairment of travel, tourism, and other service industries, as well as manufacturing and retail supply chains. [...] Deep shifts in social, economic, and political relations are possible."

Fast forward to the year 2020, and the Covid-19 pandemic is not only damaging global healthcare infrastructures, it is also undermining social, economic, and political relationships worldwide. It is not possible to predict when it will be over, but for the experts at the Steinbeis Advanced Risk Technologies Group, some of the most important lessons are already quite clear and they must be incorporated into future approaches to solve such problems:

1. GLOBAL:
Covid-19 will not be the last crisis of its kind. Further global upsets will follow, triggered by pandemics or other emerging risks such as extreme weather, global unrest, or cybercrime. All interest groups and society as a whole must be involved in searching for solutions and different ways to implement them.

2. RESILIENCE:
Covid-19 appears to highlight the fact that societies must deal proactively with such risks and become "resilience-oriented." According to the ISO definition, resilience is "the ability to absorb and adapt in a changing environment.

3. BEYOND "FIRST RESPONSE":
Coping with a crisis must be handled in such a way that all factors are assessed before, during, and after the catastrophic event. Current efforts often revolve around the "first response" (the immediate actions, reaction at the, e.g., catastrophic event). At the beginning of the coronavirus pandemic, most attention turned to providing beds in intensive care, six months later, people tended to talk more about the economy.

AN INTELLIGENT CLOUD PLATFORM OFFERING POTENTIAL SOLUTIONS BASED ON INDICATORS

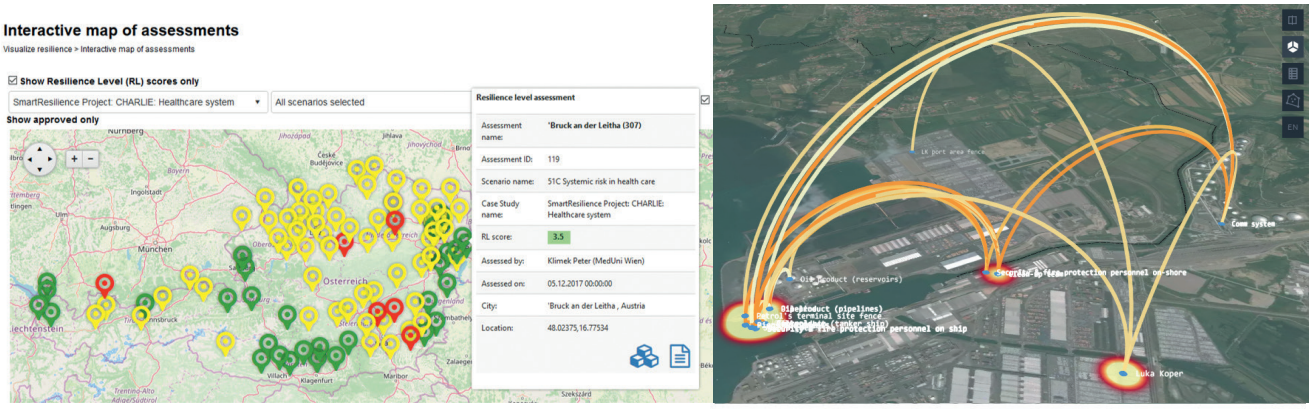
In a series of EU projects, the Steinbeis Advanced Risk Technologies Group (R-Tech) joined forces with the European Risk & Resilience Institute (EU-VRi) to develop a portfolio of solutions that meets the three above-named requirements. Work is still ongoing to refine these solutions. "The portfolio is based on a smart cloud platform on the web that will allow governments, local authorities, first responders, and stakeholders involved in disaster management to find a common basis for exchanging information and making decisions together," explains Steinbeis Entrepreneur Prof. Dr.-Ing. Aleksandar Jovanovic. Risks and resilience are dealt with along integrated lines within a framework spanning all stages of the crisis cycle:

STAGE I:
UNDERSTAND RISKS
This phase happens before the adverse event occurs. It involves identifying and monitoring emerging risks as early as possible and drawing attention to them.

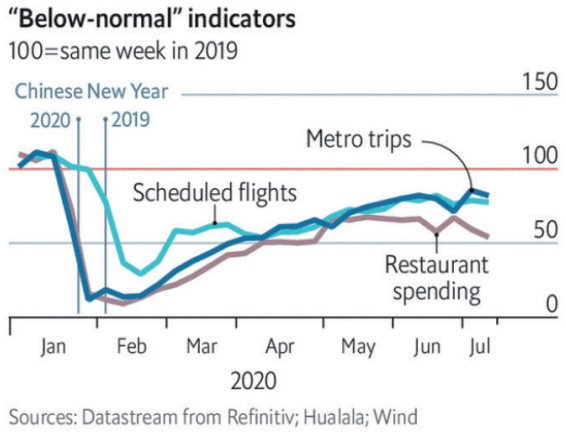
STAGE II:
ANTICIPATE / PREPARE
This phase also happens before an undesirable event takes effect. It involves planning and developing proactive adaptation strategies.

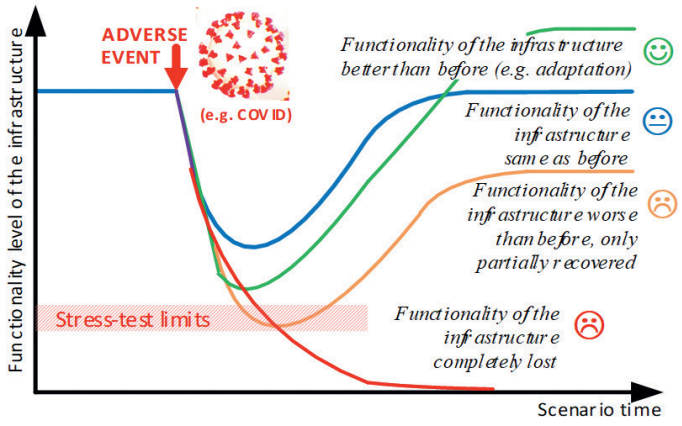
STAGE III:
ABSORB / WITHSTAND
This phase starts during the initial stages of the adverse event and includes an assessment of vulnerabilities and potential domino/knock-on effects.

STAGE IV:
RESPOND / RECOVER
This phase concentrates on keeping the unwanted situation under control as quickly as possible. It also includes the recovery period and post-event recovery.



Evaluating and mapping resilience (left: 122 hospitals in Austria) as well as scenarios and interdependencies (right: dockland in Slovenia)





The modeling tools allow past crises to be analyzed (left: recovery in China after the coronavirus outbreak. © The Economist 2020) and what-if scenarios to be evaluated for the future

STAGE V: ADAPT / TRANSFORM

This phase includes infrastructure improvements and has an important influence on whether infrastructures are more resilient and sustainable after the event.

Risk assessment is based on more than 5,000 indicators stored in the system database. This system provides individual tools that allow different kinds of risk and resilience evaluations to be conducted, such as an assessment of resilience under certain scenarios, resilience monitoring beyond the period of operation, resilience comparisons (benchmarking) within different types of infrastructures, and similar assessments. Interactive graphs and diagrams help users to understand the evaluations, which are often highly complex, and run through a wide spectrum of what-if scenarios – looking backward or forward. The system also offers modules to support decision-making and perform stress-tests. Together, they help identify the best possible solutions to complex situations.

The portfolio of solutions offered by the Steinbeis Advanced Risk Technologies Group has been used to conduct a series of comprehensive disaster assessments, for example, one involving 122 hospitals in Austria. It is also being used for complex scenarios such as disaster events in smart cities, ports, water and energy supply, and other critical infrastructures.

Every new case leads to hitherto unknown challenges and with this, new solutions, although it is important to ensure that any technological innovations can actually be used in practice.

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A DECISIVE FACTOR: TRUST

THE DIGITAL TRUST FORUM FOSTERS TRUST IN DIGITAL SOLUTIONS USED WITH PHYSICAL ASSETS

With a growing number of smart and connected products now entering into the world of digital technology, issues relating to the information that is gathered and how it is used are becoming more and more important. In particular, many are enthusiastic about rapid advancements in artificial intelligence (AI) and the internet of things (IoT), but there are also those with misgivings. To engender broad (user) acceptance and trust among all stakeholders, security and data protection must be guaranteed. The Digital Trust Forum (DTF) brings together key interest groups and is helping end users to develop a greater sense of (digital) trust toward AI and IoT solutions. The platform is being hosted by the Ferdinand Steinbeis Institute as a neutral and non-profit facilitator.

The foundation stone for the Digital Trust Forum was laid in May 2019 when it was set up with the support of eleven organizations. Since then, its task has been to pursue the vision of fostering trust in digital solutions. To achieve this, the DTF functions as a global, open, and independent initiative, bringing together manufacturers, OEMs, IT/OT providers, and related organizations. Its goal is to enable end users to develop a high degree of trust in AI- and IoT-based solutions, because without sufficient confidence in this field, it will not be possible to continue appealing to new customers and users. Consequently, not only should this proactive role result in trust guidelines being clearly defined with the support of key stakeholders, but their guidelines should also be transparent and comprehensible. Given the rapid pace of progress in the fields of artificial intelligence and the internet of things, striving for clearly defined responsibilities and governance will provide a basis for greater trust in the interaction between AI and the IoT. These are the issues being looked at intensively by the DTF in business and science context.

PILOT PROJECTS AND STANDARDIZATION PROGRAMS WITH THE DTF

Aside from defining trust guidelines and reference architectures, the DTF is also launching pilot projects and standardization programs. One example of a DTF project initiative is the Trusted OTA Update Challenge. Technology based on OTA methods (OTA = over-the-air) facilitates contactless software and firmware updates for vehicles, machinery, and devices used in industry. It opens the door to myriad

ASIDE FROM DEFINING "TRUST GUIDELINES" AND REFERENCE ARCHITECTURES, THE DTF IS ALSO LAUNCHING PILOT PROJECTS AND STANDARDIZATION PROGRAMS.

opportunities to offer digital services, but it also introduces new risks.

Another DFT project initiative is focusing on instilling greater trust in private 5G networks, an important issue not just for many telecommunications providers but also for their customers. The project initiatives are coordinated and organized by various committees and working groups under the auspices of the Digital Trust Forum. The role of the DTF is to operate as an independent and self-governing organization, and it is being hosted by the Ferdinand Steinbeis Institute acting as a neutral intermediary. Strategy and steering committees provide strategic and operational direction, and emerging trends with a bearing on standardization, open source technology, and alliances are captured and tracked by different representatives from companies working in the ecosystem of actual business practice. Their observations are supplemented by contributions from a Trusted Manufacturing Work Group (WG), a Trusted Products WG, a Trusted Cloud and AIoT WG, and a Digital Trust Infrastructure WG.

The Digital Trust Forum itself maintains active contact to the European Union (EU) and is listed on the EU Transparency Register as a non-profit organization. EU commissioner Mariya Gabriel regularly attends DTF forum meetings as a guest. At one meeting, she stressed that digital trust is an essential and valuable attribute of democratic societies, to which the DTF is making an important contribution.

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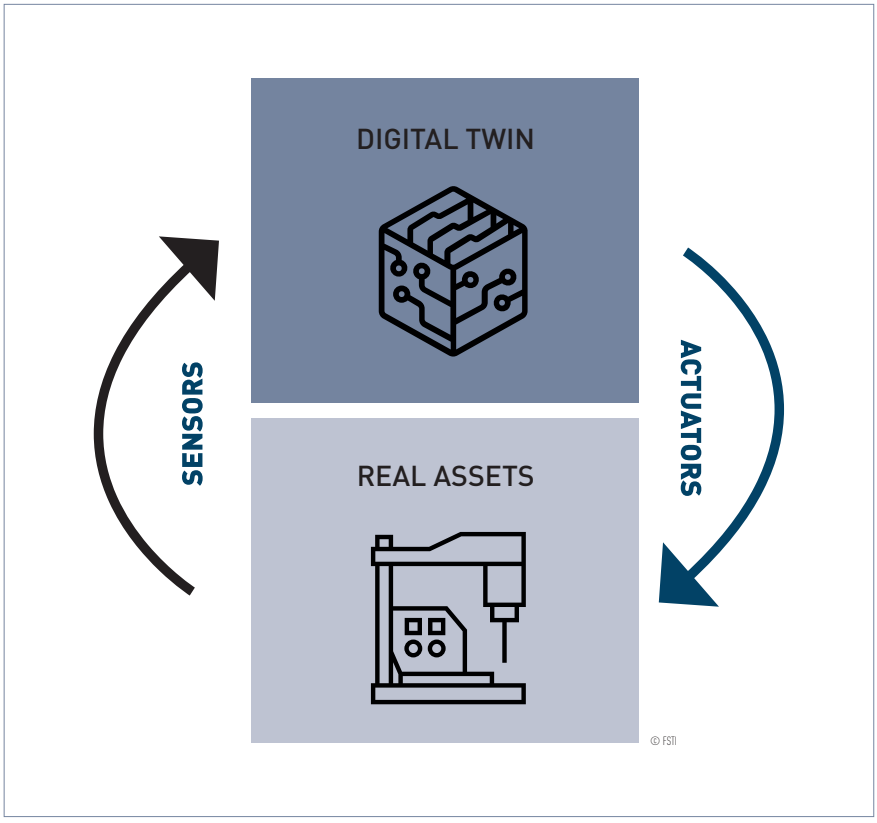
DATA COOPERATIVES: AN OPPORTUNITY FOR AI IN GERMAN SMEs

THE FERDINAND STEINBEIS INSTITUTE DESIGNS A COOPERATIVE CONCEPT FOR THE DIGITAL SPACE

Digital solutions can be used to create replicas of real objects in a digital setting – for example in production – by creating a digital twin of a processing unit. Data used with digital twins are not the same as classic master or planning data. They are mainly used to represent real objects, also called assets, and capture dependencies between different types of measurements in the form of digital models. In the case of a processing machine, relevant information on the condition of an asset would be something like feed rates or tool temperature. The condition of digital twins can be assessed by allowing them to be influenced by functions and services; changes in their condition are conveyed back to the real object. The success of new value creation scenarios offered by digital twins hinges on firms' ability to use those digital twins to manage complex processes and other workflows in the real world. Succeeding in this area is a major challenge for German business, which is dominated by small and medium-sized enterprises – the Mittelstand. How can SMEs benefit from the trend toward digital solutions and the new options to add value – without becoming dependent on large, international platforms? Experts at the Ferdinand Steinbeis Institute (FSTI) are conducting research in the context of data cooperatives.



↑ digital twin

Business in Germany is shaped strongly by proprietary, stand-alone solutions. Most focus on optimizing in-house products and processes. German companies possess extensive know-how within disciplines, but this tends to be highly specific and is used to continually enhance their own products and processes. Internal information is seen as a basis for optimizing technology or creating AI applications, such as predictive maintenance solutions. All too often, firms neglect the opportunity they have to connect digital twins with context-sensitive control mechanisms.

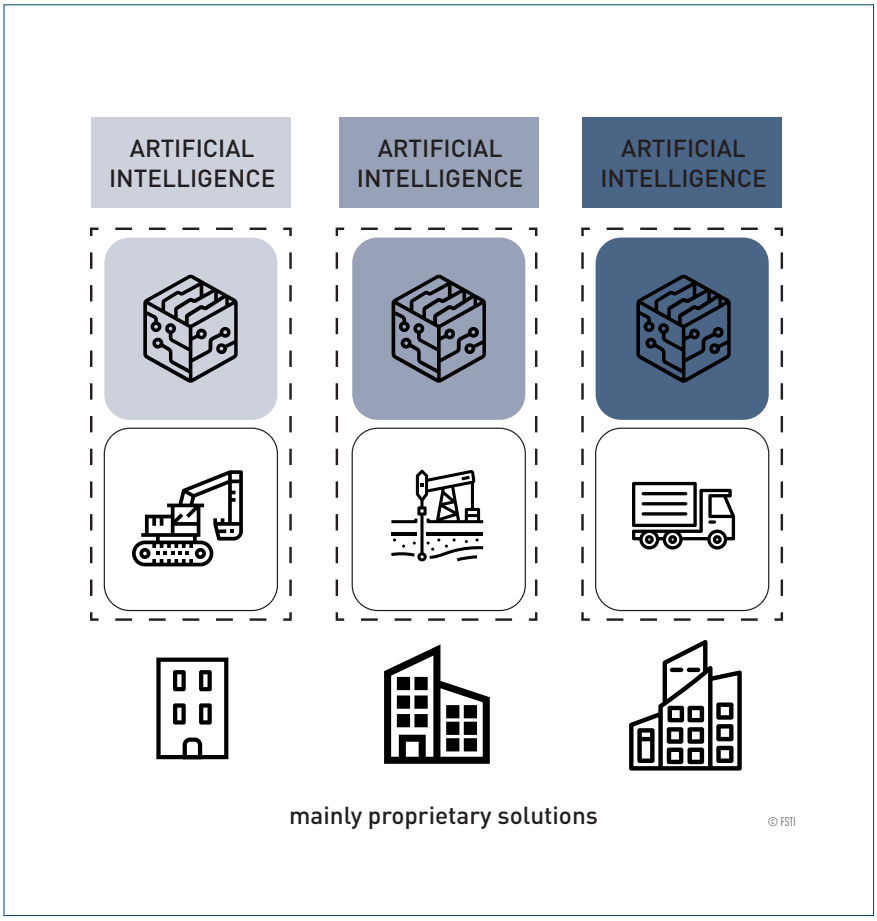
THE INTERNATIONAL MARKET IS DOMINATED BY COMMERCIAL PLATFORMS AND STATE-RUN DATA TRUSTEES

The trend is different when it comes to international markets. Currently, there

are a variety of digital platforms offered in the market for the industrial internet of things (IIoT). Their aim is to capture the value added by entire sectors of industry and in doing so, make it easier to plan, manage, and control. This can be clearly observed in areas such as the Far East, where companies are setting up large-scale platforms that make it possible to coordinate entire value chains such as the construction industry and agriculture. Their approach is based on the assumption that there is particular potential to add value by merging and controlling large volumes of connected, digital twins on platforms. These would make it possible to apply artificial intelligence methods and use disproportionately large and homogeneous volumes of information to uncover potential to make improvements.

A different approach, which is particularly common in Europe, is to see the state or multi-state institutions as the guardians of such data. This thinking is particularly interesting when it comes to economic policy, because business interests are removed on a platform level, thus counteracting the tendency for individual providers to strive for sovereignty by establishing a monopoly. At the same time, this approach raises the trustworthiness of platform solutions and dispels reservations.

Numerous instances of data-driven solutions show that neither approach has to be adopted exclusively. For example, if highly personal information is being processed, maybe even medical data, people would probably have more confidence in data trustees offered by the state than in a company looking after their data with the aim of making money. In other contexts, such as when product data needs to be merged in order to carry out further assessments or do benchmarking, having a company running the platform is probably the right alternative. It is therefore the type of data that is being processed, or the aim and context of the required solution, that determines which approach to take. One thing both options have in common is that platform providers don't normally have the business capabilities it takes within a specific area to exploit any potential to add value (especially by connecting digital twins), so they would also not be in a position to manage the process of value creation. Such business capabilities are mainly in the hand of the companies connected through the platform.

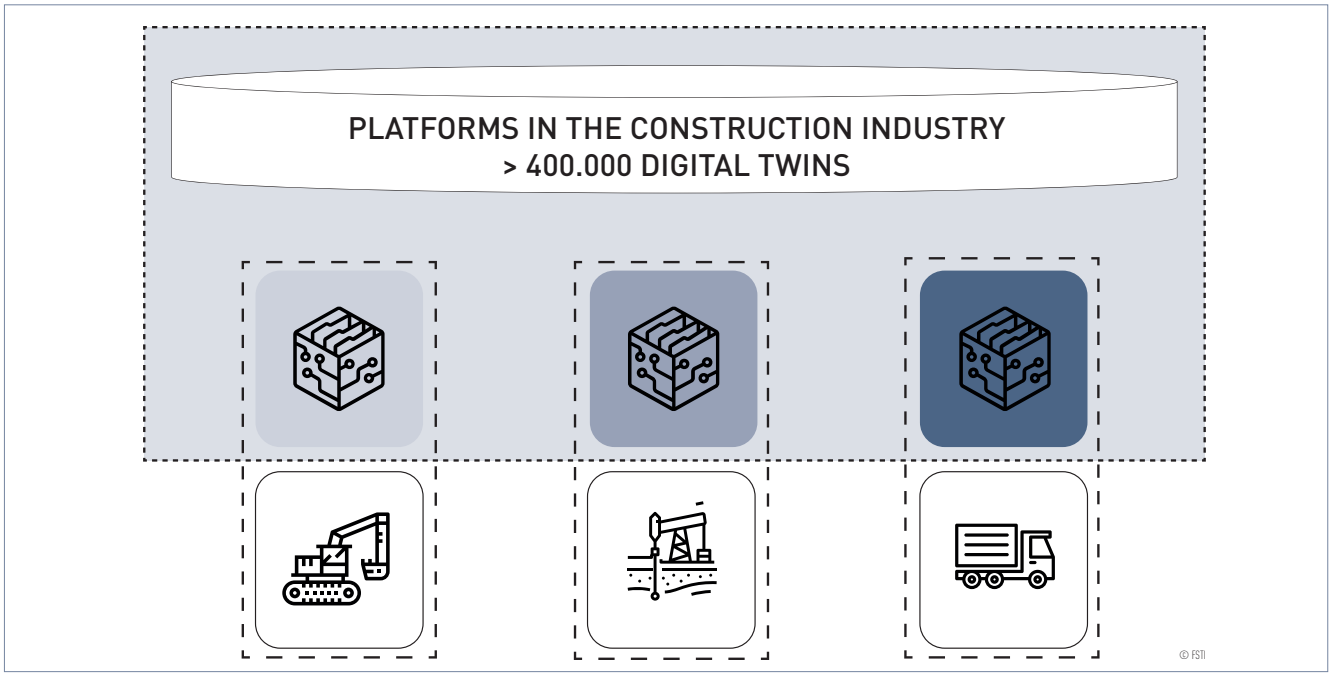


situation in german companies

AN ALTERNATIVE SOLUTION: THE MICRO TESTBED OFFERED BY THE FSTI

The Ferdinand Steinbeis Institute has succeeded in showing that there may be a third approach, as part of its so-called Micro Testbeds, which were originally developed through funding from the Baden-Wuerttemberg Ministry of Economic Affairs. The Micro Testbeds developed by the FSTI bring together larger and smaller companies under the umbrella of cooperative ecosystems. They offer networks through the internet based on open standards, and these can be used to identify and exploit new value creation scenarios focusing on partnership models across different sectors of industry.

It is known from experience that combining the capabilities of different companies across different sectors of industry and exchanging information on digital twins makes it possible for the companies involved to enjoy additional process advantages in ways that were



Platforms in the construction industry featuring multiple digital twins

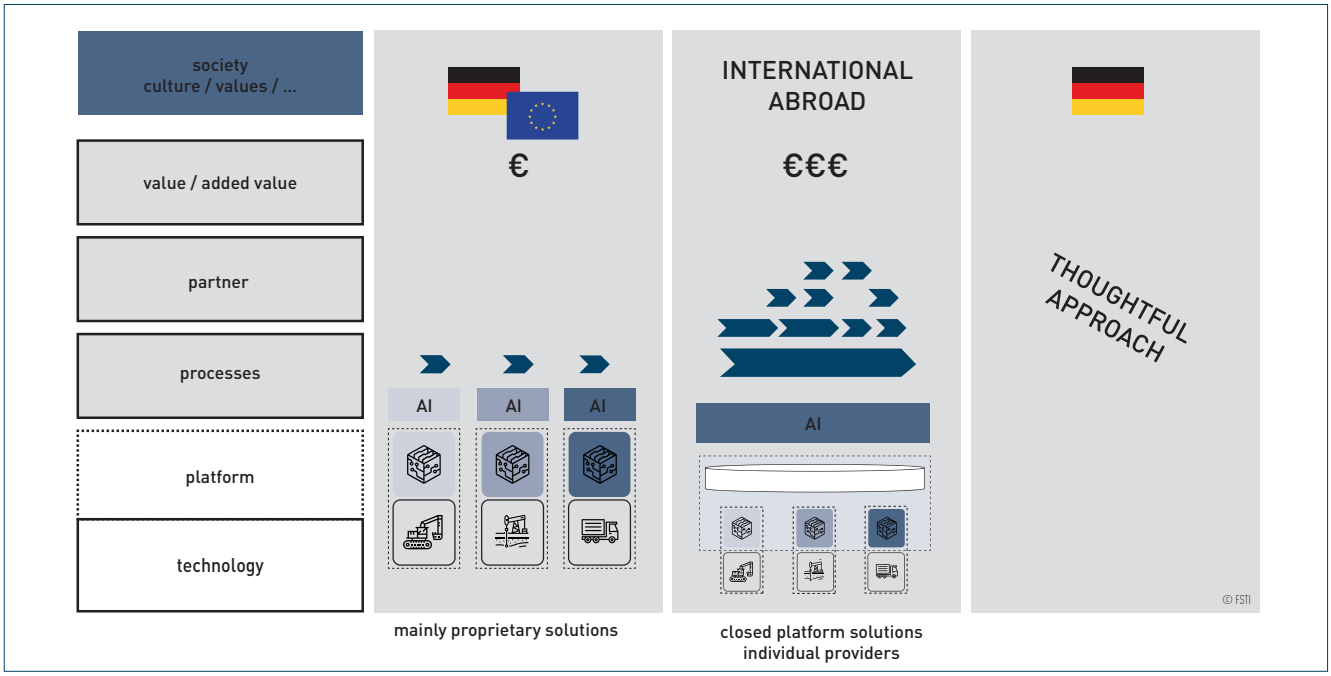
not previously possible. Time and again, using digital twins on a cooperative basis has enabled companies to identify multiple value creation scenarios and, based on these, come up with business models for the overall ecosystem. But to do this, they need what the FSTI calls a Forum of Trust between different partners to make data available to all partners.

DATA COOPERATIVES

Based on the Micro Testbed concept, the experts at the Ferdinand Steinbeis Institute are conducting follow-on research in collaborative and cooperative ecosystems, focusing on new approaches to participation. Key criteria revolve around safeguarding free access to data while at the same time ensuring stakeholders maintain their ownership and sovereignty over information. To achieve this, a consortium has been formed between the Ferdinand Steinbeis Institute, the Baden-Wuerttemberg Cooperative Association (BWGV), and the Institute for Information Systems 1 and the Institute for Management Accounting and Control at the University of Stuttgart. The aim of the consortium is to design and evaluate the concept of data-cooperative . The initiative is being funded until the end of 2021 by the Baden-Wuerttemberg Ministry for Economic Affairs.

The aim of the data cooperative is to find common ways to use digital twins to create new, beneficial scenarios for all involved companies, and to offer network advantages and economies of scale. During the first phase of the project, interviews are being conducted with numerous cooperative representatives and

THE AIM OF THE DATA COOPERATIVE IS TO FIND COMMON WAYS TO USE DIGITAL TWINS TO CREATE NEW, BENEFICIAL SCENARIOS FOR ALL INVOLVED COMPANIES, AND TO OFFER NETWORK ADVANTAGES AND ECONOMIES OF SCALE.



Data cooperatives as a cooperative approach

IIoT experts. The results of these interviews will lay a foundation for designing data cooperatives. In the second phase of the project, this concept will be put through its paces in practice by setting up and accompanying three experimental data cooperatives, which will then progress to the next stage.

The legal structure of the cooperative offers advantages on a number of fronts. Cooperatives have for a long time been an established method for implementing initiatives within networks and pursuing shared goals collectively and collaboratively. In addition, the principle of sharing an identity ensures that the interests of members are placed center stage – a principle that sets these cooperatives apart from other forms of partnership. All of these advantages are a good basis for creating a Forum of Trust, providing a space for partners involved in the cooperative to decide for themselves what to do and collaborate as equals – in keeping with the saying attributed to the pioneer Friedrich Wilhelm Raiffeisen: "What is not possible for the individual can be achieved by the many."

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MENTAL FITNESS – A STRENGTH OF LEADERSHIP

STEINBEISER DR. MICHAEL ULLMANN WORKS WITH MANAGERS AND LEADING SPORTSPEOPLE ON MENTAL STRENGTHS

Attempts to improve mental fitness often fail because people don't have a starting point in terms of tangible numbers or values: If you don't know how you score in terms of mental fitness, you can't know which areas to work on. The pioneers in this area are professional sportspeople, many of whom work with mental coaches, psychologists, and experts in teamwork. Dr. Michael Ullmann, freelance project manager at the Steinbeis Consulting Center for Sales Analytics, has been applying his experience in working with professional sportspeople to managers at companies.

↑ Dr. Michael Ullmann (left) with Luca Gläser after winning the German Ice Hockey Championship in 2019.

Mental fitness is crucial in top-level sport and often makes the difference between winning and losing. The same applies to companies. The mental fitness of the workforce is a decisive factor for business performance. This is something Steinbeis entrepreneur Winfried Küppers will certify to. As an advisor to company directors and politicians he knows what it's like behind the scenes at companies. "At the moment with the Covid-19 pandemic, and later, I believe there are two issues that dictate the success of companies. The first is helping employees to recognize their own mental state and introduce the right measures; the other is ensuring managers are in a position to foster the right mental attitude within their teams." This is because people have changed after their experiences in recent months and this is having a direct impact on their companies.

Adjusting to the new reality is also a psychological challenge. But companies can do something to help their employees deal with these challenges. This will also make them more effective. At the moment, such issues are still mainly the domain of psychologists and mental coaches, who work intensively on clients' condition on an individual basis. But there are also an increasing number of software programs, apps, and algorithms taking on this responsibility, and this trend is expected to continue in the coming years.

THE SCIENTIFIC BASIS

How do you actually ascertain your level of mental fitness, and what are your strengths and weaknesses? The way to do this is to use diagnostics based on an assessment of subconscious and involuntary processes in the brain. One example of this is the color association method based on the scientific theory of Swiss psychologist Max Lüscher and Carl Jung. The underlying thinking this technique is based on is that colors are involuntarily associated with certain experiences, and this results in an association process on an unconscious level. This connection is used for diagnostic purposes.

Until now, it has not been possible to use simple digital evaluation methods to assess such tests, because people tend to think too consciously when faced with difficult tasks, so the colors they select are based on subconscious motivations but a conscious choice. Psychologists recognize this right away, but until now computers did not. In the meantime, however, there are highly complex algorithms capable of assessing such tests on an extremely high level and this relieves mental coaches of tedious evaluation work. These digital tests are used widely in professional sport because they are able to quickly determine who is in a strong mental state and burning to win on the day of a competition – and who isn't.

LEARNING FROM PROFESSIONAL SPORT

Michael Ullmann has conducted scores of diagnostic assessments in his role as mental coach of the German ice

hockey champions and the German national ice hockey team, providing many detailed insights that subsequently led to significant improvements in players' condition, often surprisingly quickly. His techniques work in a variety of areas, from optimizing the onboarding process (integration into the team) to improving the mental stability of younger players making the transition from the junior squad to the professional squad, solving issues inhibiting performance, improving mental recovery, overcoming mental barriers, and raising motivation and the drive to perform at times when players are under extreme pressure.

Ullmann has been conducting an increasing number of tests in recent years in his capacity as a freelance Steinbeis project manager, especially with teams of managers and people working in sales. Summarizing his experience until now, he comes to a clear conclusion: improvements are sometimes even greater than in professional sport. At one IT company, he quickly ascertained that just being able to go through the assessment was already valued by staff. For many, it was the first time their actual mental well-being and previously unknown strengths and weaknesses had been understood. Managers saw unimagined opportunities open to them. Teamwork improved within weeks, management communication was perceived by all parties as much more constructive and conducive to achieving goals, and efficiency improved.

At one mechanical engineering firm, the Steinbeis expert succeeded in significantly improving the atmosphere at the company by applying his employee satisfaction techniques. Staff started talking about the things that really mattered to them. This pulled the people together as a team at a time when they were working from home and able to spend much less time together, meaning that individuals had to rely on their own resourcefulness.

Ullmann currently uses an algorithm to run an initial evaluation of the test. A mental coach then talks to assessment participants about their results, although it's possible in the next five to ten years that artificial intelligence will take care of this part of the process.

"There's no such thing as the ideal manager or the ideal way to manage, so there's no such thing as the ideal profile. Every manager has to manage in a way that plays to their strengths. So there's no such thing as an ideal scenario, even if it can be shown that some patterns are more favorable than others," believes Ullmann. What's crucial is how people deal with their own personal traits and what they do with them. Color association diagnostics and the profiles they allow you to create provide support in building on and consciously playing to individual strengths, recognizing and changing weaknesses, or at least developing constructive strategies for dealing with them. In the same way that head team coaches can use this assessment technique to educate their trainers and skippers, one of the tasks of company executives is to empower managers to do the same. In doing so, just like professional sportspeople, companies put themselves in a position to perform to the best of their ability.

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SCROLLING IN ON USABILITY AND THE USER EXPERIENCE

SME 4.0 CENTER OF EXCELLENCE FOR USABILITY FORMS PARTNERSHIP WITH BWCON

Physical distancing during the coronavirus pandemic has made the presence of digital technology much more tangible in many areas of life. And one thing already seems certain: There will be no going back to the rigid ways of the past and everyday habits before the pandemic. Digital systems are shaping and changing the context of the working environment. They are also changing many leisure activities. As a result, it's important when designing digital products, systems, and services to focus on users from the very beginning of the development process to ensure systems are easy to use and deliver a positive user experience. Usability and the user experience play an increasingly important role in planning the interaction options offered by new technology. The aim of the SME 4.0 Centre of Excellence for Usability is to support small and medium-sized enterprises in making their products user-friendly so they deliver a positive user experience. The center of excellence is being supported by bwcon, a business enterprise in the Steinbeis Network, running events and workshops to offer training on usability, the user experience, and human-centered digital transformation.

Digital technology is often looked at from a purely technological standpoint. With human-centered digital technology, however, people, their needs, and requirements become the point of focus. One of the aims of human-centered design is to deliver good usability and a positive user experience, two different criteria that are often confused with one another. Usability describes how easy it is to use a product or service, or how practical something is within a certain context for certain user groups. User experience builds on usability to reflect subjective perceptions when people use something, as well as their expectations and thoughts, and these go beyond the product itself, even for areas such as related services.

Research in recent years has shown that people's understanding of user experience needs to be improved because the emotions that come into play when they use technology play a central role in shaping their experiences. For example, the user experience is a momentary, primarily judgmental feeling (positive or negative) while using a product or service. Positive user experiences can be delivered by meeting psychological needs such as a feeling of competence, stimulation, solidarity, autonomy, popularity, security, and meaningfulness. bwcon is working with the SME 4.0 Centre of Excellence for Usability to share know-how on the basic concepts and methods of usability and the user experience (UUX), primarily with small and medium-sized enterprises who they are helping to build networks.

GAINING PRACTICAL EXPERIENCE THROUGH METHODS WORKSHOPS

The center of excellence helps SMEs acquire and apply knowledge and capabilities. The role of bwcon is to host methods workshops to share different approaches to designing applications so they offer good usability and a positive user experience. During the workshops, concepts are also put through their paces in practical terms. The workshops make it possible to cover a broad variety of methods, from classic assessments of usage contexts to experience interviews. A virtual workshop is currently being developed on AI service blueprints. These revolve around a method originally used to depict the processes of service provision, and this method was redeveloped at the center of excellence so it can be used to design and plan AI application concepts.

NETWORKING BUSINESS ENTERPRISES WITH EACH OTHER AND WITH UUX EXPERTS

Helping SMEs build networks is an important part of the work carried out by the center of excellence for usability. As part of an initiative called UUX Change, bwcon has succeeded in bringing together representatives of SMEs, start-ups, and freelancers with UUX experts to allow network members to discuss

usability, the user experience, innovation, and the future of work – all in a laid-back setting over pizza and refreshments. As host of the first usability "test lunch" in Berlin at the beginning of the year, the center of excellence for usability succeeded in bringing a variety of developers and users around the same table. During the informal event, prototypes, websites, and apps were tested for usability and the user experience. The SME 4.0 Centre of Excellence for Usability also takes part in regular annual presentations and workshops at the World Usability Day. This year's event will take place for the first time as a virtual meet-up on November 12, 2020.

AI INSTRUCTORS PROVIDE SUPPORT TO SMES

Since November 2019, the SME 4.0 Centre of Excellence for Usability has also been involved in an AI instructor program organized by the Federal Ministry for Economic Affairs and Energy as part of a drive to promote "digital SMEs" and make Germany a leading business location for AI. The tasks of an AI instructor include raising awareness among small and medium-sized businesses for the use cases of AI, providing support with the introduction of AI applications, and sharing experience and knowledge. Under the program, the SME 4.0 Centre of Excellence for Usability offers a variety of seminars and workshops, covering everything from theory and fundamentals to the development of AI, data management, strategy, and human-AI interaction. The latter topic includes methods used to make good usability and a positive user experience an inherent ingredient of AI applications. It also addresses other approaches for designing speech interaction and human-robot collaboration.

Experience during the last three years since the SME 4.0 Centre of Excellence for Usability was set up shows that collaboration between educational establishments and programs aimed at promoting economic development – of which bwcon is an example – creates the best possible synergies. Methods and theories can be tried out directly at companies, and the feedback they give can be used to continuously adjust to their needs and make improvements. The large business network that bwcon is involved in is an opportunity for companies to forge networks and thus keep expanding on their strengths.

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MEDIATION – QUARTER IV EDITION, 2020

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LOVE

GERNOT BARTH (ED.)

Love is a universal phenomenon that moves people all over the world – young and old, rich and poor, female and male. It drives, inspires (not only in artistic terms), and leads people to flights of fancy, but sometimes it leaves them in despair. Love takes on a special meaning within the context of conflict, on the one hand because love can cause conflicts, and on the other because it also plays an important role in resolving them. How to resolve conflict through participation, compassion, and connection is explained to all kinds of readers in this latest issue of Mediation, which this time focuses on love. It also answers questions such as what one should avoid when lovelorn, how to overcome heartbreak, why parental love and parenting complement each other in a natural way, and what the benefits are of empathetic leadership styles.

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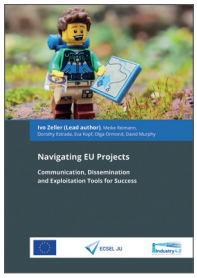
ANALYSIS OF MECHANISMS ASSOCIATED WITH FEEDBACK BENEFITS UNDER CONSTRUCTION SOVEREIGNTY OF FEEDBACK BENEFITS HELD BY THE BUYER

SUSANNE VOSS

With private buying decisions made on behalf of third parties, buyers gain none of the benefits they would be entitled to if they used the purchased products themselves. To compensate for this benefit, there is a "feedback benefit" stemming from feedback communicated by the third party when the benefit is handed on. Founded on seven-stage research on the basis of mixed methods, the author examines the structure of feedback benefit and influencing factors. Her focus lies in "communicative feedback", especially in situations prone to breakdowns in communication. Initial assessment would suggest that such breakdowns jeopardize feedback benefit; however, empirical checks show that they perform a function. Based on these insights gained through her work, the author derives recommendations for marketing practice.



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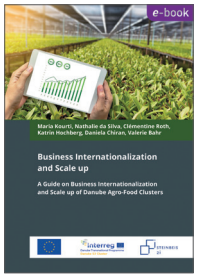
IVO ZELLER, MEIKE REIMANN, DOROTHY ESTRADA, EVA KOPF, OLGA ORMOND, DAVID MURPHY

More than ever before, European research and innovation now takes place in order to strengthen the economy of Europe and drive global development. Lighthouse projects supported by the Industry4.E CSA are spearheading the microelectronics and ICT sectors on the path to a digital industry. But what is the best way to share these high-tech innovations with the general public in such a way that results are put to effective, wide-ranging use and undergo further development? "Navigating EU Projects" answers this question, inspires, motivates, and offers practical ways to use innovations. It also shares success stories from the Industry4.E Lighthouse projects.



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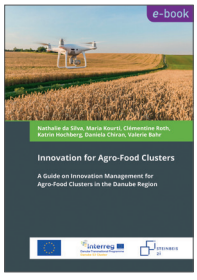
MARIA KOURTI, NATHALIE DA SILVA, CLÉMENTINE ROTH, KATRIN HOCHBERG, DANIELA CHIRAN, VALERIE BAHR

Growth is the result of successful internationalization as well as expanded operations and fields of business. However, organizations also need to be innovative to remain competitive in international markets. At the same time, they have neither the resources nor the time to do everything themselves. Alliances and partnerships with other organizations make it possible to gain access to strategic knowledge and required resources. Business clusters play an outstanding role in this, by supporting members in forming partnerships aimed at facilitating internationalization and scaling up. Open innovation is an ideal approach to knowledge sharing across organizational boundaries, also enabling rapid and successful internationalization and expansion. This handbook provides corresponding tools as well as showing examples of clusters, their members, and all kinds of organizations.



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NATHALIE DA SILVA, MARIA KOURTI, CLÉMENTINE ROTH, KATRIN HOCHBERG, DANIELA CHIRAN, VALERIE BAHR

The agro-food sector is an important economic driver in many areas of Europe, offering significant potential to create more efficient and sustainable products, processes, and business models. To cope with the increasing pressures of global markets, largely fueled by higher production and processing standards, and in order to drive future developments, organizations need to join forces at every stage of the value chain. Innovation and economic growth are often driven by business activities within concentrated regions, which is also why companies can benefit from joining business clusters and becoming actively involved in them. This guide provides agro-food organizations and clusters with useful know-how and helpful tools for enhancing their competences when it comes to innovation management.

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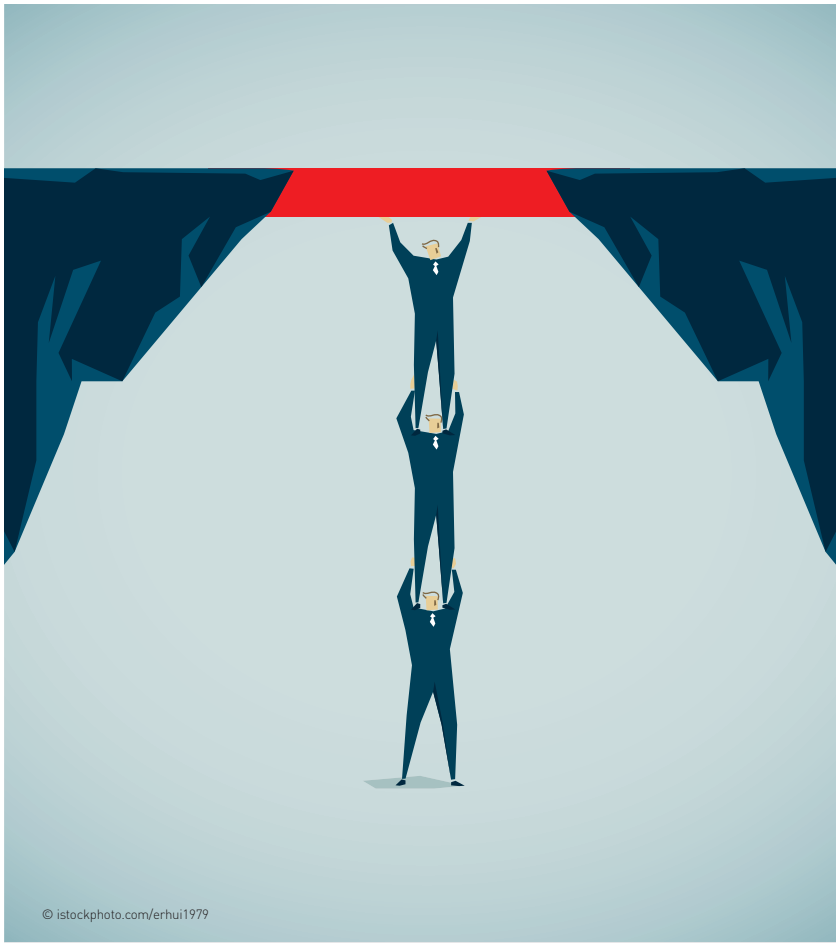
PREVIEW

EDITION 01|2021
Feature topic
Provide benefit!
Our solutions for current challenges
Planned publication date: April 2021

The Steinbeis Network spans more than 6,000 experts, who draw on advanced knowledge and work in interdisciplinary teams to help a variety of clients realize their ambitions. In turn, those clients benefit from customized solutions. Although our experts work on a whole host of different topics and projects, they all have one thing in common: Their focus lies in providing tangible benefit and delivering competitive advantage for their customers and business partners. It is this benefit that will be the focus of TRANSFER Magazine in the coming year – the benefit offered by the Steinbeis Network through its projects within and on behalf of the business community, science, and society as a whole. But how does one define benefit, measure it, or even know when it has been provided? These are just some of the questions we will explore in the three printed editions of TRANSFER Magazine in 2021.



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CONCEPT AND DESIGN
Julia Schumacher

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

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