

# Mindshift

Impulses for change – TUM Campus Heilbronn

## Diversity

Interculturality at  
TUM Campus Heilbronn

Page 24



### Vision

Daniel Gottschald speaks  
about the competence region

Page 4

### Reinforcement

Scientific output is on the rise  
at TUM Campus Heilbronn

Page 13

### Responsibility

The ethical dimensions of  
modern computer science

Page 20

# Contents

Issue Nr. 4

## 4 **Vision**

VR in teaching and the development of the Heilbronn-Franconia region as an engine for medium-sized businesses

## 8 **From research**

New and old professors drive scientific output at TUM Campus Heilbronn

## 16 **TUM in the region**

From the summit meeting of world market leaders, new career profiles, diversity initiatives, and more

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## 24 **Cover story**

Spring Awakening at TUM Campus Heilbronn: Interview on interculturality and integration in action

## 27 **The transparent university**

Campus Tips: From students for students

## 28 **Continuing education**

Courses at the cutting edge of research in the context of a growing educational location

## 31 **Short notes**

More about the Heilbronn Campus and our initiatives

## 33 **Interview**

Prof. David Wuttke on the potential and current applications of digital twins

## 35 **Imprint**





# Dear Readers,

This fourth issue of Mindshift comes at a time when life is finally returning to TUM Campus Heilbronn after two years of pandemic-related restrictions. Of course, one cannot speak of normality in light of the war in Ukraine. And yet, many students as well as the new additions to our professorial staff are experiencing the diversity on site for the very first time. That is why we are dedicating our cover story to the intercultural aspirations of this campus culture.

This is also fitting for other reasons. Because what we want to create here at TUM Campus Heilbronn is an intercultural as well as interdisciplinary and practice-oriented exchange. The digital transformation

has revealed how lifelong learning and adopting new perspectives through the experiences of others provide precisely those igniting sparks that generate creativity – and ultimately innovation. We must embrace this mindset if we in Germany want to be seen as drivers – rather than followers – of digitalization.

At the same time, our students and teachers are the face of TU Munich in Heilbronn-Franconia – and beyond. After all, interculturality is also lived here on an academic level. There are already collaborations with universities of excellence such as HEC Paris, Oxford University and, more recently, the Hebrew

University in Jerusalem. In addition to student and didactic exchange formats and joint research projects, we organize webinars in which interested members of the public can also participate. We are already in talks with other universities of excellence. For us, all of this is living interculturality, which we want to bring to the region.

A lot of new things are also happening in the area of research. From the possibilities of new technologies in teaching – such as virtual and augmented reality – to innovative ways of using data, the influence of corruption on economic relations, and ethical considerations in computer science, the new Mindshift issue takes you on a journey into the heart of our TUM Campus Heilbronn.

I hope you enjoy reading it!

**Prof. Helmut Krcmar**

Founding dean and representative of the president  
for TUM Campus Heilbronn

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**We not only train our students  
to be leaders with tech expertise,  
but also turn them into  
ambassadors for the region.**

# On the way to becoming a competence region

**Daniel Gottschald, managing director of TUM Campus Heilbronn gGmbH, talks about his vision of a “competence region” that is being created in harmony between research, teaching and business**



Daniel Gottschald, who has been managing director of TUM Campus Heilbronn gGmbH since 2021, answers the question of why the Technical University of Munich has also become a Heilbronn university by expressing his admiration for the Heilbronn-Franconia region: here, over many years, an independent culture of world market leaders, hidden champions and historic family-owned companies has established itself that is unparalleled in this country. “The location is unique in a way. Because eve-

rything that makes German SMEs strong is visible here – enormous stability across the board, as well as plenty of tradition and credibility.”

## **A university that talks about itself and listens**

TU Munich has recognized this potential and is working with the Dieter Schwarz Foundation day by day to increase its presence and impact in the region. But there is still

much to do. What Gottschald is particularly concerned about in Heilbronn is establishing a symbiotic relationship between the university and business, like the one he knows from Munich, for example. “When I approach a company there with a transfer initiative, there are already well-established mechanisms of cooperation. In Heilbronn, he says, the TU Munich needs to talk about itself a lot more, but above all it needs to listen to company representatives and promote joint initiatives. This is also good for us,” says Gottschald.

### **Small and medium-sized enterprises: a hallmark of the region**

Gottschald sees a great opportunity in highlighting SMEs as a trademark of the region in the future – with the help of TU Munich and its new campus in Heilbronn, which can tie in perfectly here. “Silicon Valley is known for its technology orientation, Israel for its start-ups, and we in Heilbronn-Franconia need to be known for our family businesses.” It is also a matter of focusing on the special competencies of these medium-sized players, such as their pronounced resilience. After all, the ability to stay afloat in crises is conceivably relevant, especially against today’s socio-political backdrop as well as the aftermath of the coronavirus pandemic.

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### **We in Heilbronn must be known as a region of competence for small and medium-sized German enterprises.**

After all, it is important to remain highly innovative and at the same time not to follow every trend. The region’s family businesses have found a good balance between a down-to-earth character and innovative ability, Gottschald believes. With the “Alliance for Transformation” and numerous creative networking opportunities, such as

those offered by the Economic Development Agency or the Employment Agency, the region is also demonstrating its ability to cooperate, he adds. “And for that reason alone, Heilbronn as an educational location offers the perfect breeding ground for aspiring academics who themselves have ambitions of one day holding management positions.”

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### **Anyone who wants to learn how to perfectly combine innovation and resilience will find plenty of inspiration here in the region.**

#### **Digitalization as a networking engine**

In order to add more color to the “competence region” stamp in the future, TUM is increasingly relying on networking formats – such as TUM Talk and TUM Connect – that promote exchange between Heilbronn-Franconia’s scientific and economic players. But networking can also take place in entirely different ways, says Gottschald. One example? “Beer brewers from Ireland, who are enjoying great success with digital marketing strategies, will soon be brought together with winegrowers from the Heilbronn area. Both sides will benefit from this in an uncomplicated way,” he says, adding, “This is also made possible by digitalization, which incidentally plays a central role in research and teaching at TUM Campus Heilbronn.”

With regard to this, Daniel Gottschald has even more ideas – for example, a kind of meeting place on campus where people can get in touch virtually with other students and entrepreneurs in exciting places like Silicon Valley. In this way, he says, the “metaverse” connects with the physical world. “After all, we want to have an impact in the region and in society,” Gottschald affirms. “To do that, we have to create connections. And then something new automatically emerges.” ●



# Virtual reality: The teaching format of the future?

**The pandemic has also called for new ways of teaching. David Wuttke, Assistant Professor of Supply Chain Management, has done pioneering work, conducting two lectures in a VR environment for a semester and publishing the results in a white paper. In this Mindshift interview, he talks about it with Chiara Marske, Bachelor student at TUM Campus Heilbronn**

The year is 2021: seminars take place on the moon, while students and lecturers physically interact with each other without leaving their desks. What sounds like a mixture of daydream and science fiction is in fact reality – albeit a virtual one. Because today, in the midst of the triumph of digitalization, we can expand the boundaries of teaching with the help of technology.

**Prof. Wuttke, the coronavirus pandemic has cast a new light on your research into the use of VR in university teaching. But in fact, there were already efforts before. How did that come about?**

**Prof. Wuttke:** Since VR teaching offers completely different possibilities, I had already been working on the topic before the first COVID-19 reports. With the help of apps, I wanted to test how to simulate real-life situations – for example, decisions in the company or tours of production halls. What are the inventory levels like? Where are there unnecessarily long distances? Where are things poorly arranged? Where are machines at a standstill? I can practice the ability to optimize processes wonderfully in this way, without having to leave my desk. Of course, this came in handy during the pandemic – but even beyond that, the areas of application are diverse and highly exciting.

### Now that you have the first test phase behind you, what aspects are particularly crucial for a successful VR course?

**Wuttke:** First of all, it is important to have different virtual rooms with which you can map the needs of a physical course well: you need a lecture room for lectures, but also rooms where you can hold group discussions, for example. For the latter, the spatial audio feature, which I first thought was a nice gimmick, was invaluable – because it allowed us to actually talk in small groups without disturbing others in the same room.

**Chiara Marske (TUM student):** The effect was very close to actual reality: anyone standing in close proximity to their avatar was easily audible. On the other hand, people who were in another corner of the virtual room almost faded out. This was ideal for group work and conversations.

**Wuttke:** Of course, good preparation is also crucial – both technically and organizationally. VR headsets have to be shipped or distributed and programs have to be written. You also need to factor in technical problems, system updates and possible discomfort for those involved, especially at the beginning. Some report feeling dizzy when entering virtual reality. In such cases, however, one can switch to a desktop alternative.



TUM student Chiara Marske finds her way around her virtual learning environment.

### In what ways has VR teaching even exceeded your expectations?

**Marske:** What was amazing was that, in retrospect, I was able to remember the course content better than I usually do – this was quite different from the case of lectures via digital conferencing tools. The virtual environment definitely helped to cement what was said in my memory. Another advantage: thanks to the headset, I was less distracted during the courses – for example, by my smartphone – and was able to follow better overall.

**Wuttke:** I had the same experience. For example, I still remember exactly how we talked about supply chains at the seminar on the moon. The exoticism of virtual spaces certainly played a part in that. In general, however, virtual reality primarily creates visual links for what is being said. And since visual support often enhances learning, retention was also higher in this setting. Also, in a VR environment, there is more of a sense of presence than in a virtual call, where most people turn off their cameras and are only present as a name on the screen at first.

**Marske:** That's right! Just being able to physically raise your hand and see who also wants to ask a question at the same time has brought the sense of community back into the course. This creates a togetherness that is not possible via conference tools. People can approach each other, seek conversations, and even banter.

### Asked the other way around, where is there still room for improvement?

**Marske:** The biggest problem in VR teaching to date has been the lack of a way to take notes, since at the moment you can't see the keyboard or your own hand. However, solutions are currently being developed for this. In addition, we have to schedule the regular software updates even better so that we lose less precious time in the process. After all, you don't usually switch on your headset until shortly before the start of the course.

### Can the use of virtual reality formats become established in teaching?

**Wuttke:** Looking ahead, VR teaching probably makes the most sense in a hybrid setting: formats that thrive on interaction fit wonderfully into the virtual space. Classical lectures, on the other hand, benefit less from it. At the same time, we should always keep in mind: technology alone does not solve problems. And since VR and AR are still so new, we still have to figure out how to use them properly so that our students benefit from them in the best possible way. ●

# Step by step into the digital future

**Digitalization is fundamentally transforming the way companies work. The Center for Digital Transformation at TUM Campus Heilbronn is conducting research on this shift. Three short films provide an insight into the exciting research focus areas**



Two years of the COVID-19 pandemic have made one thing abundantly clear to us: for companies, digitalization is both a challenge and an opportunity. On the one hand, traditional jobs and lines of business are suddenly on the sidelines, companies have to adapt their corporate cultures as quickly as possible, and innovation cycles are becoming shorter and shorter. At the same time, the digital transformation simplifies and automates work processes in an inimitable way and facilitates completely new business models. How can companies overcome these challenges and make the best possible use of the opportunities?

This is the question we are researching at TUM Campus Heilbronn – to be more precise: the Center for Digital Trans-

formation. The focus is on three topics that could not be more relevant: digital platforms, the influence of digital technologies on companies, and data-based decision-making. Taken together, they form the basis for successful transformation processes. The Center has dedicated a short film to each of these three forward-looking research areas. Below is a brief summary as well as redirects to the respective videos via QR codes.

## **The influence of digital technologies on companies**

What influence do digital technologies have on companies? Researchers led by Prof. Gudrun Kiesmüller, Prof. David Wuttke and Prof. Sebastian Müller are working on improving processes, business models, and business ecosystems by combining various digital technologies to ensure a company's competitiveness. Research is also being conducted into the use of virtual reality and augmented reality in industry and the impact of digitalization on financial markets.

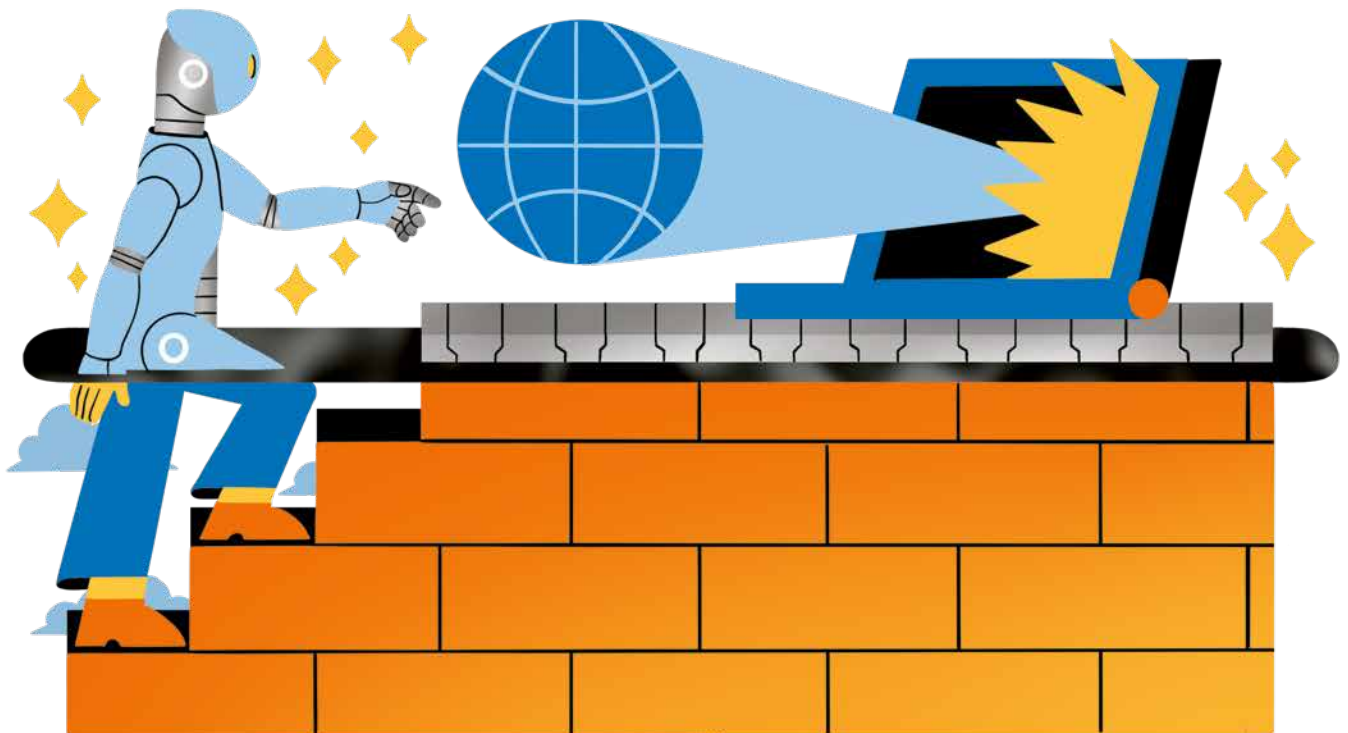
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### **Learn more**

about the research of  
Prof. Gudrun Kiesmüller,  
Prof. David Wuttke and  
Prof. Sebastian Müller







### Digital platforms

How can companies benefit from digital platforms? Researchers led by Prof. Jens Förderer and Prof. Helmut Krömer are investigating digital business models that take into account other determinants besides competition. They are developing methods and incentive systems that help a platform gain acceptance among users, providers and consumers. They are also focusing on the necessary steps to successfully establish platforms in the market.

#### Learn more

about the research of  
Prof. Jens Förderer and  
Prof. Helmut Krömer



### Data-driven decision making

How can companies and organizations make decisions based on actual data rather than intuition? Prof. Gudrun Kiesmüller and Prof. Jingui Xie and their collaborators are applying big data analytics, machine learning, and optimization to support decision making in healthcare, finance, marketing, and supply chain management. They are also refining methods for specific applications and developing new algorithms and methods that can deal with the uncertainty usually present in data.

#### Learn more

about the research of  
Prof. Gudrun Kiesmüller  
and Prof. Jingui Xie



With our internationally recognized expertise in digital platforms, data-driven decision making, and our research on the impact of digital technologies on businesses, we aim to continue making an important contribution to digital transformation. We will succeed in this by supporting the economic forces of our region in internal process optimization. Close collaboration with academic and corporate partners is a crucial building block. ●

Are you interested in more information about the Center for Digital Transformation and/or a collaboration with us? Feel free to contact us.

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Prof. Wuttke's AR study shows: augmented reality helps in rehearsing process flows.

# Augmented reality and the bigger picture

**Companies are increasingly turning to AR for new production workflows. What impact does the technology have on worker productivity and learning? The results of Prof. David Wuttke's recent study highlight a dilemma**

Let's say you're driving a car through a strange city. Thanks to GPS, no problem. The routes are automatically adapted to the current traffic situation, and you get to your destination as quickly as possible. But what do you think: would you remember the route you took afterwards? Probably not. Would you perhaps have paid more attention to your surroundings if you had used a map instead of the GPS?

The answer to this question is provided by the so-called levels-of-processing approach. This model of memory psychology says that the more we are forced to actively deal with a new fact, the deeper we process it mentally – and the better we are able to remember the information.

Let's now consider a manufacturing employee in the start-up phase of a new production line. For a long time, the employee's road atlas was his manual – informative and well-written, but also unwieldy and consequently time-consuming. Many companies are therefore turning to augmented reality (AR) to boost productivity. Thanks to the implementation of AR devices in the work process, workers' hands are free to internalize motor tasks more quickly

with the help of step-by-step instructions. AR thus acts here as the manufacturing worker's GPS.

At a time when product life cycles are getting shorter, the process of learning new skills should also be as time-efficient as possible. After all, ramping up production quickly and efficiently can be a key competitive advantage. The use of AR promises to do just that. But companies face a productivity dilemma: do they prioritize a fast ramp-up through standardization? Or should traditional learning be used to foster the potential for improvement and innovation over the long term?

This question is at the core of the recent study "Seeing the Bigger Picture? Ramping Up Production With the Use of Augmented Reality" by Prof. David Wuttke, Assistant Professor of Supply Chain Management at TUM Campus Heilbronn. To study the impact of AR devices on productivity in production processes, Wuttke and an international research team conducted a field experiment at a German manufacturing company in which the team compared augmented reality instructions with traditional instructions on paper.

## Experiment

Fifty company employees participated in a series of tasks. Half of the participants were instructed using AR glasses (treatment group), while the other half received paper instructions (control group). All subjects completed both a difficult and an easy task. The difficult task required several manufacturing steps, while the easy one only required sorting manufacturing parts into containers.

Subsequently, all participants were asked to repeat both tasks in the same order. This time, however, they did so without assistance. In order to examine the learning curve effects and possible suggestions for improvement in more detail, a follow-up experiment was conducted with another 50 employees from the same company. They repeated the difficult task four times without guidance. The participants were also asked to make suggestions for improvement, which were then evaluated by experts.

## Results

The results of the experiment pose an interesting dilemma: the treatment group with AR took 43.8 percent less time to complete a new task than the control group.



## The productivity dilemma seems to be alive and well in the age of Industry 4.0.

Prof. David Wuttke – Assistant Professor for Supply Chain Management at TUM Campus Heilbronn

However, when both groups repeated the task without instructions, the employees who had previously used AR headsets took 23 percent more time. The differences between the two groups were smaller for easier tasks, but also significant. Interestingly, subjects in the control group improved their performance significantly from round to round without instructions – in contrast to the treatment group. In addition, the control group provided better suggestions for process improvement.

Overall, Prof. Wuttke's results speak for the use of AR devices, especially when they are used to achieve short-term productivity increases in more complex manufacturing tasks. For simpler tasks, on the other hand, the positive effect of AR devices is less pronounced. However, the study shows that this immediate productivity gain is accompanied by a loss of innovation potential.

To summarize: Industries with high cycle rates could benefit the most from augmented reality. In industries where there is a positive correlation between processes and employee innovation over the long term, the use of AR could actually lead to lower performance by the companies. In such cases, a hybrid model may be advisable, where one part of the workforce uses AR while the other part follows written instructions. How this can succeed and how technical solutions can be used is the subject of current research.

Finally, to stay in the initial picture: the interaction of map and GPS is especially useful when you are staying in an unfamiliar place for a longer period of time. Thanks to the map, you get to know your surroundings, and with the help of GPS, you quickly reach your destination. ●



# New forces, new research

**At TUM Campus Heilbronn, the faculty is growing –  
and so is the scientific output**

How does the vaccine approval process affect COVID-19 vaccination intentions? And: what can augmented reality do for marketing? The new additions to our teaching staff are driving research on these and other exciting topics at TUM Campus Heilbronn.

## **The dilemma of (emergency) approval procedures for COVID-19 vaccines.**

When the first pandemic wave in the spring of 2020 flooded the world with COVID-19 and the associated health, economic and social dislocation, failed therapeutic attempts with existing drugs quickly made it clear that we needed potent vaccines – and we needed them as quickly as possible. No sooner said than done – thanks to science: Appropriate vaccines were developed by various manufacturers in record time.

However, it is usually the case that new vaccines must first undergo a lengthy approval process that takes several years before they can be used. Of course, we didn't have that much time. And so accelerated approval procedures or less thorough emergency approval procedures were used around the world to get vaccines to market quickly and safely. Just as quickly, it became clear that by no means all people were ready to put their trust in the vaccines. According to current figures from the German Federal Ministry of Health, the proportion of the total German population with basic immunization – i.e., those who have received at least one dose of vaccine against COVID-19 – is around 76 percent (as of May 6, 2022). If one subtracts from the remaining 24 percent those few who cannot be vaccinated due to health predispositions, there is still a significant remainder who refuse vaccination protection despite being offered it.

Philipp Lergetporer, Professor of Economics at TUM Campus Heilbronn since September 2021, together with Daniela Glätzle-Rützler and Thomas Rittmannsberger (University of Innsbruck) and Silvia Angerer (Private University UMIT TIROL), took this circumstance as an opportunity to conduct a study examining trust in vaccines depending on their approval processes. About 2,000 German adults were asked about a hypothetical mRNA vaccine in a representative sample – randomly divided into four experimental groups. Depending on their assignments, they received either the scenario of an emergency approval, which took either 5 or 20 days, or an accelerated but in-depth procedure, which took 20 or 150 days.



Philipp Lergetporer

Subsequently, the subjects were asked whether they would allow themselves to be immunized with this vaccine, whether they trusted the vaccine and whether they would pay for it. The results were clear: trust was significantly higher with the in-depth procedure compared with the emergency approval (by 13 and 12 percentage points, respectively). This group was also willing to pay eight to nine euros more for the vaccine. In contrast, a longer review period in each case had only a minor impact. “In a pandemic, regulatory authorities face the trade-off of approving vaccines as quickly as possible on the one hand, and building confidence with the most thorough testing possible on the other,” says author Philipp Lergetporer. “Our study, ‘How Does the Vaccine Approval Procedure Affect COVID-19 Vaccination Intentions?’ can contribute as a basis for these difficult decisions.”

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### **Under the microscope: is augmented reality becoming a game-changer in marketing?**

Today, hardly anyone doubts that surgeons can learn to operate more skillfully and quickly with the help of video games. Professors of medicine already recommend this rather unacademic measure during university studies. After all, the motor skills required for gaming are not dissimilar to those required for surgery. For future cohorts, however, the prescribed console sport should soon be a thing



Martin Meißner

of the past – because people now know even better how to help themselves. Augmented reality – AR for short – which combines physical reality with any fictional reality, already has the potential to simulate motor training sessions in unprecedented form. It’s not just young doctors who benefit from this. Mechanics who want to rehearse complex repairs or constructions for emergencies can also already make use of AR applications. And the field can be expanded at will – from programs for the logistics industry to completely new teaching units in the education sector.

AR is now also being used by brands. IKEA, for example, offers an app that allows virtual, true-to-scale images of furniture to be placed anywhere in the home using a smartphone camera. This measure can rightly be classified as a metaphorical stone that kills two birds at once – because the Swedish giant is not only technically ahead of the competition, but the app also eliminates uncertainties and creates completely new purchasing arguments. Sentences like “I don’t know if we have room for that” are likely to be heard less often from tech-savvy shoppers in the future.



However, Prof. Martin Meißner, who has been responsible for the Digital Marketing department at TUM Campus Heilbronn since January 2022, has conducted a study to determine whether the use of AR can actually add real value to the promotion of content or products. Based on the affect-as-information theory, the research team conducted two online experiments to empirically determine the differences in the intensity of affective reactions, such as enthusiasm, between AR and non-AR content. Participants' willingness to perform the desired purchase action as a result of the reception was also compared.

In the end, the team was able to determine that the degree of positive affective reactions to augmented reality in marketing depends on various factors – for example, on how high-quality the technology is and how meaningfully it is implemented in the respective content. Prior AR experiences also play a role. And so, in the end, the certainty remains: exciting technology alone does not turn people into fans and consumers into customers. Nevertheless, novel developments such as augmented reality hold unprecedented possibilities for marketers. And since we can justifiably speak here of children's shoes that are slowly but surely becoming too narrow, it is hard to foresee what the future of AR marketing has in store.

### Alliances with an aftertaste: How corruption affects companies and business relationships

Imagine that the technology giant Apple was planning a new production line in Venezuela and announced that it would move production of the new iPhone there in the fu-



Chengguang Li

ture. According to the company, it had already reached an agreement with the local project developers and the relevant authorities and was only waiting for the go-ahead to start construction. Next, let's assume you held Apple shares of significant value and thus had an understandable interest in the market development and long-term valuation of the Palo Alto giant.



How would you feel after such an announcement? Would you be concerned about your investments? And how would others react – from fans of the brand to the stock market? According to the index of the non-governmental organization Transparency International, there is hardly a country that suffers more from corruption than Colombia's neighbor on the northern coast of South America. This fact weighs heavily. After all, in addition to the disregard for other important values of a globally active B2C corporation, it counteracts associations such as reliability and security, which are fundamentally indispensable for trade relations.

Prof. Chengguang Li, who has headed the Department of Strategic Management at TUM Campus Heilbronn since January 2022, asked himself similar questions – and answered them in a study published in February 2022. The aim was to prove the influence of corruption on market reactions among international strategic alliances. Li's thesis: in the case of an announcement of an international strategic alliance, the level of corruption in the alliance partner's country influences the market reaction to the detriment of the cooperating company (Apple in our example), as corruption creates uncertainty about the partner company's behavior. Moreover, if anti-corruption laws apply in the home country of the company in question, this effect is amplified. However, if the company already has experience in the corrupt country, the effect decreases.

Prof. Li was able to confirm these theses in the course of his empirical surveys. Based on an analysis of more than 1,000 international strategic alliances involving companies from 30 countries, the significance of corruption as an important element of the institutional environment becomes clear – with notable losses in value creation opportunities and increased risks. So it turns out that it's not just on a moral level that companies lose credibility when the finger points in the direction of corruption. It is usually not worth it economically either. ●

# The astronaut has had his day

**What do I want to be when I grow up? For many young people today, the answer is content creator. Prof. Jens Förderer explained to students at the SciDay in Heilbronn what this new job description is all about**

In October 2021, a news story stirred up the streaming community. Hackers had exploited a data leak at the live streaming provider Twitch and published the earnings of the world's most successful Twitch streamers. The top 20 also includes a German: Marcel Eris aka MontanaBlack. From August 2019 to October 2021, the 34-year-old had received around \$2.4 million from Twitch.

The new job profile of content creator is becoming increasingly attractive among young people. A survey by the toy manufacturer Lego proves: kids these days would rather become YouTubers (29%) than, say, teachers (26%) or astronauts (11%). But it's not just the chance to earn a lot of money that makes the profession so interesting for Gen Z. It's also the prospect of flexible hours, high reach and fun at work.

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**Be aware: most content creators come up empty-handed.**

Prof. Jens Förderer – Professor  
for Innovation & Digitalization at  
TUM Campus Heilbronn

## **Many real-world examples, little research**

But how does one become a successful content creator in the first place? Prof. Jens Förderer, Professor of Innovation & Digitalization at TUM Campus Heilbronn, has devoted himself to this question. On the occasion of the Science Center experimenta's latest SciDay series, he gave a lecture to students from Heilbronn. Prof. Förderer emphasized,

“Numerous blog posts and books provide excellent practical tips, but lack an economics perspective.”

Nevertheless, he gave his young audience some important insights from his research. Probably the most important: “Be aware: most content creators are coming up empty. Content platforms follow a so-called superstar economy, comparable to the profession of a footballer or actor. Only a small percentage make the breakthrough.” But those who nevertheless aspire to become content creators have to consider crucial factors to increase their own chances of success, Prof. Förderer continues.

## **The path to brand success**

First, he says, choosing the right platform is crucial. For this, it is necessary to answer several questions in advance, such as: Which platform has the greatest potential? Is it a local or global platform? And is the platform already generating revenue?

Once these questions have been answered and a platform has been selected, the next step is to strategically determine the content. Twitch, Instagram and other big companies earn their money with advertising and thus need content that others are willing to pay for. “The content to be promoted must therefore be family-friendly, generate attention, and appeal to a specific target group,” explains Prof. Förderer. It's also helpful to conduct a competitive analysis, he says, since a content creator's chances of success depend primarily on rivalry among producers.

His final advice to students: “Find a niche for your content where there is little similar or identical content and the effort to produce similar content is high. Also, be persistent, experiment, and set trends.” ●



Coaching on the career ladder: female TUM students are supported as part of the WoMent mentoring program.



# WoMent means empowerment

**In the WoMent cross-mentoring program, female TUM students benefit from the knowledge of experienced managers, a wide range of workshops, and unique networking opportunities**

From Socrates and Plato to Steve Jobs and Mark Zuckerberg – what do these epoch-making names have in common? They all form so-called mentoring tandems. And: they are all men. Even if you generously expand the search criteria, such tandems are few and far between among women.

The relationship between mentor and mentee, teacher and apprentice, characterizes countless outstanding achievements in human history. Here, it is worth taking a look at

history. In the Homeric epic, Odysseus entrusts the responsibility for his household and the education of his son Telemachos to his close friend Mentor before he himself goes off to the Trojan War. This example from mythology was revisited in the Age of Enlightenment. Until the 20th century, Mentor was considered the prototype of the “fatherly friend” who prepares his male protégé for life. The gender bias of this format is certainly long outdated. However, the concept itself is more relevant than ever – also here at TUM Campus Heilbronn.

## Mentoring, continuing education and networking

Since 2020, our female students have had the opportunity to participate in the cross-mentoring program WoMent. In this cross-institutional cooperation project, mentees are accompanied by mentors from business or academia for several semesters during their studies as well as during research and practical experience, and are supported in all key decisions. Regular mentoring meetings form the basis for a goal-oriented and individual exchange between the tandem.

In addition to transparent and unvarnished insights into the everyday working life of an executive, the individual support program opens up access to regional and supra-regional company networks. The program is flanked by a variety of workshops on topics such as goal setting, communication, leadership, negotiation, and design thinking.

Prof. Dr. Michael Stich, TUM Professor of Accounting, emphasizes that WoMent is aimed in a special way at outstanding female students who are already determinedly and enthusiastically pursuing goals – from setting up their own companies to traditional entry into academic careers. All these steps require courage and individual support and feedback from experienced colleagues. In this respect, the program offers a unique opportunity, especially for the prospective international female graduates of TUM in whose home countries “female leadership” is still completely a shadow phenomenon.

### #womeninquires: WoMent breaks down gender roles with interview series

Even highly qualified female graduates are confronted with traditional gender roles and often do not experience the necessary support to take the high risk of realizing their own ideas. WoMent promotes a socio-critical and self-critical examination of the personal and professional goals of female scholarship holders through a variety of offerings. Reflecting on different perspectives together provides the tools to effectively meet a wide range of challenges.

One example of this is the current interview series #Frauf-ragtnach, which was launched by WoMent and the network Führungsfrauen Raum Heilbronn. Based on the book by entrepreneur and author Fränzi Kühne Was Männer nie gefragt werden – Ich frage trotzdem mal (What Men Are

Never Asked – I'll Ask Anyway), the team led by WoMent project manager Katharina Rust conducted interviews with leading personalities in the Heilbronn-Franconia region – including Harry Mergel, Lord Mayor of the City of Heilbronn, and Reinhold Geilsdörfer, Managing Director of the Dieter Schwarz Foundation.

Questions such as “Has your visual appearance influenced your career?” or “What about career and family?” initially put both sides in an unfamiliar situation, but ultimately encouraged a change of perspective.

## Creating change together

What does the WoMent team wish for the future? “That pigeonholing will soon no longer be an issue and that we can talk openly about diversity,” Katharina Rust recently told the 'Heilbronner Stimme. “Because gender equality is not a women’s issue, even if it is often declared to be so.” Prof. Dr. Michael Stich agrees, and adds: “Attracting outstanding talent from all across society is no longer an ‘annoying evil,’ but also represents an existential issue for all companies. WoMent purposefully promotes the courage of ambitious female graduates to seize their opportunities.”

This is a cause that TUM Campus Heilbronn has supported since its inception. The profound societal transformation toward sustainable business in the digital age requires a joint effort. Neither in the short nor in the long term can our society do without the perspective and impetus of young female leaders. What is true for WoMent is also true for TUM Campus Heilbronn: only together can we achieve sustainable change. ●

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**WoMent changes the way we look at our society and companies. The courage to undertake one’s own projects is at the forefront.**

**Prof. Michael Stich** – Professorship for Accounting at TUM Campus Heilbronn

# From burden to opportunity

**At the summit meeting of world market leaders in Schwäbisch Hall, everything revolved around the future of German SMEs. Prof. Helmut Krcmar made it clear that the digital transformation cannot be mastered with a patent remedy**



Prof. Helmut Krcmar shares insights and inspiration for digital transformation.

We are in the year 2022 A.D. : Throughout Germany, SMEs are struggling with competitiveness and a shortage of skilled workers. In the whole of Germany? No! In the Heilbronn-Franconia region, indomitable hidden champions are successfully resisting.

We admit: we really like the Asterix allusion. But for this scenario to become reality, a special “magic potion” is needed to give medium-sized companies superpowers – better known as digital transformation.

The recipe for this was available at the summit of global market leaders in Schwäbisch Hall. Prof. Helmut Krcmar, Founding Dean and President's Representative for TUM Campus Heilbronn, provided an important ingredient. The question of his lecture: How do we succeed in getting entrepreneurs to perceive digital transformation as an opportunity, and not as a burden?

## **Patent remedy? No way!**

For Prof. Krcmar, one thing is certain: we need a shared vision. And an understanding that there is not just one truth. There are many possible answers to the core questions of digital transformation, which each company must find for itself through trial and error. “Digital transformation

is an incremental, organizational process in which people, technology and organization must be continuously changed and adapted depending on the situation at hand,” Krcmar emphasizes.

A digitally savvy workforce is another essential component of successful digital transformation, Krcmar said. His appeal to entrepreneurs:

## 1

**Actively strive for digital transformation and help shape it within a culture of openness.**

## 2

**Empower your employees to participate in the process by removing their fear of being replaced by digital technologies.**

## 3

**Provide appropriate training and continuing education.**

And the essential essence of the “magic potion”:  
Turn the burden into an opportunity! ●



# Ethics for nerds

**Big data, AI and IoT: digital technologies are penetrating almost all areas of daily life these days. This makes it all the more important to prepare our students for the ethical dimensions of their future work**



What is big data allowed to do? If we look at China, this ethical and moral question takes on a whole new dimension. For several years, the government under President Xi Jinping has been building a comprehensive and, to the Western world, dystopian surveillance tool – the so-called Social Credit System (SCS). Through the collection of huge amounts of data, China's citizens are increasingly becoming transparent people. Those who follow the regime's rules receive a high score and can draw extensive benefits from the system. Those who step out of line must reckon with momentous consequences.

This example is one of many that underscores the challenges states, companies, and institutions face in a world of AI, self-driving cars, and humanoid robotics. Technologies are neither good nor evil. What matters is the intention of the human who uses them. It is therefore a matter of responsibility as to how far one can go and what is ethically justifiable. In short: Technological progress yes, but at what price?

### **Seminar for the first time as a cross-faculty event**

This topic is at the core of our new interface format "Ethics for Nerds," which was developed by the TUM Faculty of Computer Science and offered together with the TUM School of Management for the first time in the summer semester of 2022 at TUM Campus Heilbronn.

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**In light of the changing world situation, it is imperative for computer scientists to address the topic of ethics.**

**Prof. Carsten Trinitis** – Chair of Computer Architecture and Operating Systems at TUM Campus Heilbronn

By dovetailing the fields of computer science and ethics, the two TUM schools underscore their interdisciplinary and future-oriented character. In the cross-faculty event, our students, together with the two lecturers Prof. Carsten

Trinitis and Prof. Michael Stich, shed light on various socio-political areas on which computer science has a particularly strong influence.

How should the influence of social media on politics and society be classified? How justifiable is it to work on information technology for modern weapons systems? What is happening "thanks to computer science" in the international financial markets? It is questions like these that are discussed in open forums, with one goal: to make our students aware of the ethical dimensions of their future work.

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**Our times require us to think outside the box.**

**Prof. Michael Stich** – Professorship for Accounting at TUM Campus Heilbronn

### **Responsible technology as the key to success**

Modern information technology has long since ceased to be an exclusively technical and mathematical science. In order to actively shape digitalization and social development, prospective developers and IT specialists must also keep the ethical consequences of their actions in mind. In other words, they must take responsibility.

Dealing responsibly with technologies is also essential for the economic success and future viability of a company. Consumers today place much higher demands on the ethical behavior of companies, for example with regard to data protection and sustainability. The attractiveness of a (potential) employer is also increasingly determined by ethical orientation.

The Heilbronn-Franconia economic region is home to numerous global players, world market leaders and hidden champions who have recognized the urgency of this change. They are increasingly looking for managers who combine both worlds and are supporting them on their way to more responsible action. With the interface format "Ethics for Nerds," the two faculties at TUM Campus Heilbronn are creating a good basis for this. ●



# How to reach for the stars

**The secret of Apple, Facebook and other big tech companies? Prof. Jens Förderer, who researches the topic of digital platforms at TUM Campus Heilbronn, revealed it during an online lecture on May 10, 2022**

Big tech companies like Apple and Facebook are creating a market capitalization that no one would have thought possible before the triumph of digitalization. But it's not just the obvious giants that are scoring points. Less omnipresent service providers such as Airbnb and Uber, whose apps shine with perfect user experience designs, are also showing remarkable growth trends. What makes these companies so successful? Prof. Jens Förderer has an answer.

In short, the secret lies in the operation of digital platforms and the associated transformation of classic value creation models. By mediating transactions between consumers and producers with the help of their own platform infrastructure, there are practically no more limits to growth for companies of this type. The motto is: no matter where, no matter how big – server capacities can be easily expanded or ramped up as needed.

## **When fairy tales dazzle: Only ten percent of all platforms survive**

The conclusion to be drawn from such fairy-tale success stories? Platforms are an attractive business model, especially for startups, for realizing their own ideas with comparatively little investment, occupying niches and establishing themselves permanently among the giants. But Prof. Förderer urges caution: "These dazzling examples can be deceptive and hide the reality. In fact, around 90 percent of all companies fail to introduce a digital plat-

form. Only a few are able to establish themselves on the market and become as successful as those we know."

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**About 90 percent fail when launching a platform. If you want to be the exception, you need luck and the right strategy.**

Prof. Jens Förderer – Professorship for Innovation & Digitalization

## **Strategy and tactics bring the dream closer**

To ensure that ambitious founders and those dreaming of the next platform hype still have the best possible chances in the competitive market, Förderer wanted to achieve one thing above all with his online event "How does a platform start-up succeed?": to communicate strategies for setting up and achieving long-term success. So in addition to the basic workings and concepts, a key focus was on the challenges that need to be overcome, as well as proven strategies and tactics. "Who knows," said Förderer in the aftermath. "Maybe the next Steve Jobs was among us that day." ●

# Research and technology as an HR compass

**Human Resources 2.0: In search of new strategies in HR management, TUM researchers and HR managers from the DACH region are coming together as part of the TUM HR Community**

Taking the lessons and new opportunities that arose from the pandemic and marrying them with the tried and true in HR management: the participants in the TUM HR Community want to find out how this works and how other unsolved HR puzzles can be cracked through regular discourse. The control center: our TUM Campus Heilbronn.

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**The format hits exactly the right spot, connects practice with research and opens up completely new perspectives.**

**Birgit Oßendorf-Will** – Director HR  
at Ströer Group

“I always look forward to the exciting presentations and the interactive exchange with HR luminaries and researchers,” says Birgit Oßendorf-Will, Director HR at Ströer Group, for example. “The format hits exactly the right spot, combines practice with research and thus opens up new perspectives.” Oßendorf-Will is a regular participant when the community gathers at the invitation of Claudia Paul-Helten. As Director Networking at TUM Campus Heilbronn, Paul-Helten organizes the meetings of the virtual dialogue format across all TUM locations as well as in cooperation with the Institute for LifeLong Learning.

As part of the preparation process, she selects topics that are tailored to the needs of the participants: “We present studies whose results are not available in this form any-

where else. TUM scientists contribute evidence-based results of their work and discuss them with representatives from DACH companies in a wide range of industries and sizes.” These networking events take place six to seven times a year. What emerges from them, however, goes far beyond the event framework. Often there are interesting collaborations between science and business, which in turn lead to new findings.

The topics of the upcoming networking events include trends in artificial intelligence and their impact on HR, as well as the aspect of sustainability. Professor Alexander Hübner will discuss these with the participants – he holds the Chair for Supply and Value Chain Management at TUM Campus Straubing. Helmut Krcmar, founding dean of the Heilbronn Campus, is also a regular participant and contributes scientific input to the topics of the meetings. ●

For more information, including on possible participation in the TUM HR Community, please contact Claudia Paul-Helten, Director Networking TUM Campus Heilbronn gGmbH, at [Claudia.paul-helten@tumheilbronn-ggmbh.de](mailto:Claudia.paul-helten@tumheilbronn-ggmbh.de).

# A campus culture blossoms through diversity

**Adelheid Schäfer-Terino and Anne Kreuz, patrons of culture on campus, talk about interculturality, active integration and the feeling of being at the start of something significant for Heilbronn and the region**



With the 2022 summer semester, more than just spring arrived in Heilbronn. Ever since the first nationwide lockdown left the corridors and lecture halls empty, people at the new TUM campus had been counting the days until the arrival of the voices that sound in so many languages here. For a large number of students, it was the starting signal of a new phase in their lives. They had never seen the campus, the library, the seminar rooms, or their fellow students with their own eyes.

Now, however, TUM Campus Heilbronn is finally blossoming with the unparalleled diversity for which it has been known beyond the region. Around 80 percent of the students come from far away – from countries such as Bangladesh, Mexico, Nigeria, India, and Iran. Many of them find themselves in a completely new situation in Heilbronn, which may not always be easy – from cultural peculiarities to dealing with the authorities to finding a place to live, many things work differently here than in their home coun-

tries. So it's no wonder that Adelheid Schäfer-Terino, Anne Kreuz and their colleagues at the Student Service Point, who are on hand to answer all questions about student life, have their hands full. In this Mindshift interview, they talked to us about cultural bridges, a sense of responsibility and interpersonal relationships.

**At TUM Campus Heilbronn, special attention is paid to promoting integration and interculturality. Why is that so important?**

**Schäfer-Terino:** The explanation is relatively simple. We have no choice but to focus on diversity. We have young people studying here who come from nearly 50 different countries and from all continents of the world. Helping them to find their way in their new environment and to get organized is not only an essential task for us, but also a matter of the heart.

**Kreuz:** That's exactly how it is. In fact, we don't really have to promote diversity anymore, because it's lived out





on campus every day anyway. Every one of our initiatives and decisions is influenced by it. This is already clear on Welcome Day: people talk in English by default, and the many different accents show how diverse our campus culture actually is.

**Schäfer-Terino:** Our German students also benefit significantly from this. Because they, like everyone else, have to find their place on campus, live the cultural exchange from day one, and thus create the necessary conditions to be able to shine in the best possible way in an international working environment later on.

**To what extent does the diversity on campus also benefit companies that hire TUM graduates in Heilbronn?**

**Kreuz:** The advantage I just mentioned for our students also applies to future employers: those who graduate with us sometimes have up to four years of experience in dealing with people from other cultural backgrounds,

often speak at least three languages – their own native language as well as English and German – and also have an education at one of the most renowned universities in the world to show for it.

**Schäfer-Terino:** TUM only selects the best applicants anyway. That's why a degree from our institution is in itself a seal of quality. I myself am always impressed by the intelligence, perceptiveness, willingness to learn, and intrinsic motivation of our protégés.

**How do you help students organize this new phase of their lives on campus?**

**Schäfer-Terino:** We often become active before they leave their home countries – for example, we help them find housing. We provide information on dormitories, shared apartments, or private providers, advise on dealings with the authorities, and also plan in the background together with institutional players to overcome constant challenges such as the housing shortage in Heilbronn.

We also connect new and experienced students in our buddy program, making them aware of the responsibility they have as ambassadors of TUM. Recently, for example, we were able to provide a recently arrived Ukrainian guest student with a buddy from her home country to help her settle in.

**Kreuz:** In addition, with the Service Point we have created a central point of contact for questions and assistance regarding life in Heilbronn and on campus. Whether it's organizing vaccination appointments, assistance with translating certificates, or arranging language courses, we are there for our campus family – even when you're just looking for encouragement and need someone to say it's all going to work out! All in all, this can be subsumed under the heading of “living a welcoming culture.”

### What other initiatives are there? And what can we expect in the future?

**Kreuz:** As part of our Fireside Chats, which take place every two weeks, all students on campus already have the opportunity to get together informally outside of the university setting, to exchange ideas and to address important topics. This offering has been very well received so far and will be expanded in the future. A campaign called “Campus Start” is planned for the coming winter semes-

ter. We will fill the first month of the semester with information events, as well as lots of leisure and other activities on campus and in the region. Our future “Ask Me Anything” format, in which we bring regional entrepreneurs together with our students, also pays off.

**Schäfer-Terino:** I'm also very excited about our “Intercultural Jumpstart,” which we plan to offer as part of the Campus Start program. As I mentioned at the beginning, many people here in Heilbronn find themselves in a situation for which they are not prepared. They are desperate to assimilate and at the same time worry about losing their own cultural identities. At this point, we would like to build a few bridges, convey values, and promote understanding for one another so that coexistence on campus and beyond can be as harmonious as possible.

### What is your personal motivation – or to put it another way: why do you enjoy your job so much?

**Schäfer-Terino:** Our graduates will help shape and mold the future at some point. That's what they are trained for and that's what they are capable of. It is therefore a real concern of ours that they become responsible and sensitive managers who think sustainably, act with appreciation, and make their decisions with an eye on the big picture. Supporting them on this path inspires us. ●



Adelheid Schäfer-Terino (left) and Anne Kreuz

# Campus tips: from students for students



The summer semester of 2022 finally breathed new life into TUM in Heilbronn. Our students took this as an opportunity to share their favorite places and highlights on campus with us

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**There's a lot happening on campus and in the city right now. I often have to smile when I notice something that has changed for the better.**

Marc Hornstein – Bachelor of Management and Technology student (class of 2020)



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**Fireside Chat is probably my favorite format on campus. This is where you really get to know each other – and in a completely informal atmosphere. If you haven't been yet, you should catch up quickly!**

Vanshika Sharma – student in Management and Technology (class of 2020)

”

**Whoever came up with the idea for the Service Point is brilliant. Everyday problems are solved here immediately, and you can fully concentrate on your studies.**

Dias Altay – Bachelor Information Engineering student (class of 2021)





# All you can learn

**Well digestible, added value guaranteed: the recent Lunch Academy in Heilbronn was all about digital transformation. How can companies make the best possible use of the potential offered by new technologies? Dr. Christoph Geier had the answers**

Postprandial somnolence – that’s the technical term for the drop in performance that often occurs after the lunch break. What can help? Experts say: sufficient sleep at night, no lavish portions for lunch, and sensibly used breaks. The latter is guaranteed by the Lunch Academy – a cooperation between the TUM Campus Heilbronn, the German Association of Small and Medium-Sized Businesses (BVMW) and the Heilbronn Competence Network.

Dr. Christoph Geier, Director Digital Transformation at TUM Campus Heilbronn, was a guest at the 143rd edition of the hybrid and practice-oriented continuing education format. Under the title “Decathlon with an (Un)certain Outcome,” he gave the numerous participants exciting insights into how various elements of technology-driven corporate change interact and can be used specifically for continuous change.

Following the typical program flow, Dr. Geier presented obstacles and appropriate solutions as well as the skills

needed when implementing transformation initiatives. Concrete examples from different industries served as illustrations and provided opportunities for joint discussion and exchange.

## **From burden to opportunity**

The BVMW’s annual kick-off event in the evening in Waldenburg showed that the topic of digital transformation is not just suitable as light lunch fare. There, everything revolved around the entrepreneurial challenges that digital transformation brings with it. Prof. Helmut Krcmar, Founding Dean and President’s Representative for the TUM Campus Heilbronn, was invited, and his keynote speech made it clear to the participating entrepreneurs that digital transformation should not be seen as a burden, but as an opportunity.

A detailed summary of his remarks on this topic at the Summit of World Market Leaders can be found on p. 19 of this issue. ●

# Into the green landscape

**Together with the DVFA, the TUM Campus Heilbronn has developed a continuing education program that provides information on the special features, opportunities and risks of sustainable investments**

In the wake of the war in Ukraine, all of Europe is crying out for security of supply and independence from Russian energy imports. Suddenly, shares in oil companies are in greater demand than they have been for a long time. Is this the swan song to the long success story of “green” investments?

No, say experts. In the short term, there is a high demand for fossil fuels. In the long term, however, the crisis has created an additional impetus to switch to renewable energies as quickly as possible. And above all, there are still political measures such as the European Green Deal to create a climate-neutral Europe by 2050. So sustainable investments have lost none of their importance – on the contrary.

The importance for investors to correctly assess the implementation of corporate sustainability is conveyed by the twice-yearly program “Sustainable Investing,” developed by Prof. Gunther Friedl and Prof. Christina E. Banner. Following its successful premiere at the TUM Campus Heil-

bronn in the spring of 2022, the fall program will be held at the conference center of the German Association for Financial Analysis and Asset Management (DVFA) in Frankfurt.

There, in two blocks, participants will learn not only the scientific background, but also practice-oriented methods for the evaluation and analysis of investments. Investment strategies tailored to sustainability are part of the program, as are instructions on how to prepare sustainability reports, tips on how to manage the risks involved, and advice for clients on the sustainability characteristics of their investments. ●

**For more information,**  
please scan the  
QR code.



# Healthy leadership

**Managers are not only responsible for the economic success of their companies, but also for the mental health of their employees**

Social isolation, homeschooling of children, existential fears: more than two years of the pandemic have taken a heavy toll on the psyches of many people. The DAK Psych Report 2021 states: “Never before have there been so many days lost from work due to mental illness as in the first coronavirus year of 2020. It was a major challenge for those affected, but also for colleagues, teams and employers.”

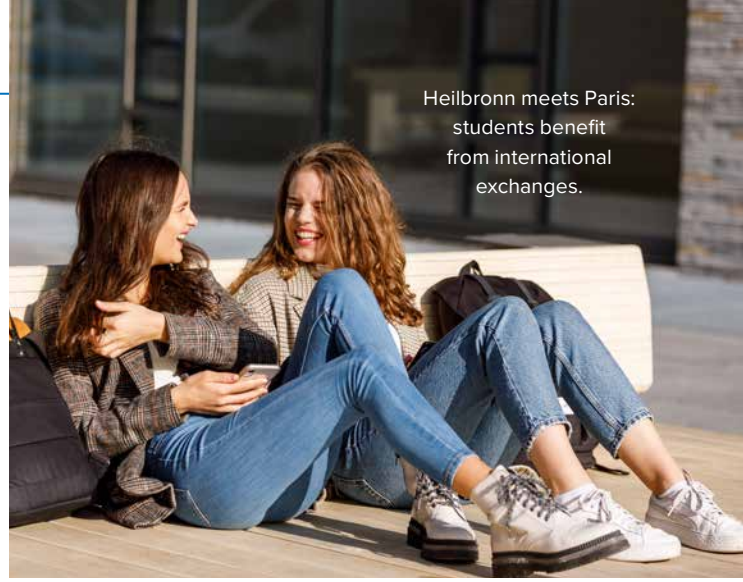
That’s why the TUM Institute for LifeLong Learning has developed the continuing education program “Gesund(es) Führen” (Healthy Leadership), which will take place online and on-site at TUM Campus Heilbronn between September 2022 and January 2023. The goal of the hybrid continuing education program is to raise awareness among

mid-level managers for the topic of mental health in a changing working world. In addition to conducting appropriate employee interviews, participants will be empowered to establish health-promoting work structures in their organizations and teams. The topic of mental health will thus be removed from taboo, and avoidable illnesses are to be prevented. ●

**For more information**  
on the training program,  
please scan the QR code.



Heilbronn meets Paris:  
students benefit  
from international  
exchanges.



# TUM & HEC Summer School 2022

**How are digital innovations changing the way companies operate? A corporation that links different countries promises answers to this question**

From politics to business to education: Franco-German cooperation is considered the engine of European integration. With its now established cooperation, the TUM School of Management is adding another connecting chapter to the relationship between the two countries.

From July 4 to 15, the Summer School program “Entrepreneurship and Digital Innovation” will take place. The two-week program was developed in cooperation with the TUM Institute for LifeLong Learning and HEC Paris – one of the world’s most renowned business schools. The program is aimed at Bachelor students, young professionals, and university graduates. The goal is to immerse participants in two essential dimensions of digital innovation: start-up entrepreneurship and digital transformation.

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**The fact that there are so many startups around the world today is because we have new tools and opportunities to collaborate and use them to create new things.**

Jean-Rémi Gratadour – Academic Director  
Summer School HEC

The first week is the responsibility of HEC Paris. Here, participants learn the basics of digital entrepreneurship – including skills, methods and tools to turn an idea into a start-up project. The dynamic learning approach is in line with the educational theory of learning through practice. In class, students work with inspiring examples from field reports and in team workshops.

In the second week, TUM leaders at the Heilbronn Campus supplement the course offerings with cases and examples of digital transformation and technological innovation in industries such as healthcare and retail. Working in groups, participants look for solutions to current digital transformation challenges outlined by entrepreneurs in advance.

At TUM Campus Heilbronn, people are already looking forward to the summer of 2022 with excitement, because the partnership-based course offering marries three core ambitions that are firmly anchored in the DNA of our university of excellence: paving the way for tomorrow’s leaders, international exchange, and the opportunity to learn from the best in the field. ●

**For more information**  
on the TUM & HEC Summer School,  
please scan the QR code.





# Data Science Challenge: Turning a lot into more!

**Managers are increasingly expected to back up their decisions with insights from data. To prepare for the challenge, students took on the tasks of the Data Science Challenge at the Heilbronn Campus**

What to do with all the data that falls at the feet of busy companies as a side effect of digitalization? Master's in Management students at TUM Campus Heilbronn should now have a clearer idea. As part of the Data Science Challenge, initiated and organized by Prof. Jens Förderer and PhD student Tobias Kircher from the Center for Digital Transformation, a total of 14 teams competed for the crown in data analysis on January 13, 2022.

In addition to detailed strategic insights, various proposals for the personalization of prizes and vouchers were presented as well as discussed. There was also a prize for the winning team – along with the discovery of exciting avenues that can be opened up through the targeted evaluation of data.



The crown for data analysis: Prof. Förderer presented the award as part of his challenge.



# Making sense of data

**Prof. Sebastian Müller explained how researchers and analysts can draw conclusions from masses of data and sort mountains of information with the help of AI-based tools during a workshop at the Heilbronn Campus**

Data is the oil of digitalization. Whoever first coined this mantra, it seems he or she was right – and in a double sense. Because while data is what makes digitalization really work, it is also its most valuable product. Once you have access to it, it can be used to optimize almost all areas of the value chain – from product development to marketing. At least in theory.

First of all, you have to deal with an almost unmanageable flood of information, the efficient evaluation of which takes people to the limits of their capabilities. But not so machines: with the help of new text analysis tools and Natural Language Processing (NLP), qualitative masses of data can be evaluated and even contextualized in a fraction of the time. Sebastian Müller, Professor of Finance at TUM Campus Heilbronn, presented how this works at a workshop in November 2021.

Senior researchers and doctoral students from the departments of Management, IT, and Finance accepted the invitation to the TUM Campus Heilbronn for this purpose. In addition to the latest developments in AI-supported text and data analysis, the participants also discussed the opportunities, limitations, and ethical issues of the technology.

Prof. Müller had calculated that the topic would open doors in the science sector, but also in the regional economy. “We are dealing with a young campus here, where we explicitly address the influence of digital transformation – as well as the management of family businesses. The topics of text and data analysis are closely linked to digitalization. That’s why I think regular NLP workshops at the Heilbronn Campus are not only feasible, but almost indispensable.” ●



# More real than reality

**How digital twins are ushering in a new age for analysts and process optimizers**

The detailed visualization of a component or machine on a computer is called a digital twin. Such a virtual simulation feeds on an immeasurable amount of data and enables real-time analysis and prognostics. David Wuttke, Professor of Supply Chain Management at TUM Campus Heilbronn, reveals the potential of this technology in an interview with Mindshift.

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**Machines or algorithms that can process and visualize large amounts of data make the world easier for us.**

**Professor Wuttke, what opportunities do digital twins open up in defect management?**

First of all, we have to consider the different types of errors that occur in production processes. Firstly, there are technical errors, such as the failure of components, followed by process errors, which, for example, lead to the repeated production of rejects. And finally, we also have to factor in human errors, such as those that occur when data is entered or are caused by incorrect decisions.



Prof. David Wuttke

Many of these can be identified and eliminated by using digital twins. The reason: machines or algorithms that can process and visualize large amounts of data make the world easier for us. This is because they give us the opportunity to see the big picture. In practice, this happens, for example, in the context of predictive maintenance using big data and advanced analytics. In addition, algorithms can take a lot of the computing work off our hands.

**What advantages do artificial intelligence and algorithmically guided measurements offer over the five human senses?**

If you look at sensing, there are some advantages associated with AI and big data. For example, you can put sensors in places in machines where humans can't feel or see. They take measurements around the clock and also record all relevant data in real time during operation – regardless of the general conditions. The question remains: how do I evaluate such data? Here again, there are different approaches depending on the situation. Of course, I can use artificial intelligence for analysis and evaluation. Or I can use AI to create a visual model of the physical reality – i.e., a digital twin. In this case, managers or employees can analyze specific areas, virtually dive inside the machine, and draw conclusions.



**To what extent do digital twins, for example, support decision-making reliability?**

A major advantage of digital twins is that they function regardless of location and are typically located decentrally on a server or in a cloud. This means that managers can virtually involve technical experts who developed the machine in their decisions and seek advice without the need for the contact person to be on site. Or they can involve specialists from another plant, ask for a quick shoulder check, and make decisions together on tricky issues. In the past, it was more common to use special machines in Germany, but the manufacturer came from Japan, for example. In such cases, experts had to travel to the site first. Today, this can be done almost in real time.

**How can I trust that a digital twin has been reliably calculated?**

In supply management, we have learned over the last 20 years that trust must play an important role. Long-term

collaboration in particular has the advantage of building mutual trust and knowing the people behind the developments and processes. In addition, contracts help to establish that only a certain degree of precision allows corresponding conclusions to be drawn and that a machine must therefore deliver correspondingly precise data. Of course, there is never absolute certainty, because people make mistakes – regardless of the basis of trust – and not all machine algorithms are open. But these risks can be mitigated.

If there are doubts about the reliability of a machine or the calculation of a digital twin, a machine supplier can, for example, make it available for short-term use and charge a monthly fee. In this way, the supplier takes on some of the risk in the event of a malfunction, creating additional trust on the part of the customer. In the end, the digital twin of a machine or component not only provides intensive control, but it also ensures better maintenance and opens up new business models. ●

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**In the end, a digital twin not only grants control – it also ensures better maintenance and opens up new business models.**

**Professor David Wuttke** – Professor for Supply Chain Management at TUM Campus Heilbronn

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