camplus

DAS HOCHSCHULMAGAZIN

Hochschule Reutlingen
Reutlingen University

YOUR JOURNEY STARTS HERE

Innovation

Diversity

Continuing education

Digitization

Teaching

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Editorial

Dear readers,

"Get in and come with us" – this is our invitation to you. Come and discover our university. Take this opportunity to get to know the many different paths which lead into the future. We train tomorrow's graduates by creating a powerful transfer between business, society and academia. Reutlingen University has strong networks in the region and internationally. Our practice-oriented teaching and research make us an important partner and source of innovation in the region. Companies and research institutions are in lively contact with us. At the same time, we live by our international perspective. Students from 100 countries come together on our campus and carry their knowledge and their experience back out into the world. As an international university, we enrich the diversity of the region and train skilled leaders for the future.

This magazine introduces you to exciting topics and personalities from Reutlingen University and showcases unique study projects from our Schools of Applied Chemistry, the ESB Business School, Informatics, Engineering and Textiles & Design.

The road to the future starts at Reutlingen University campus. As a collective location of teaching and learning, our campus opens up manifold education and development opportunities.

So hop in, and let's hit the road!

Yours sincerely,

Professor Dr. Hendrik Brumme
President, Reutlingen University

Here you can find the german edition of camplus.

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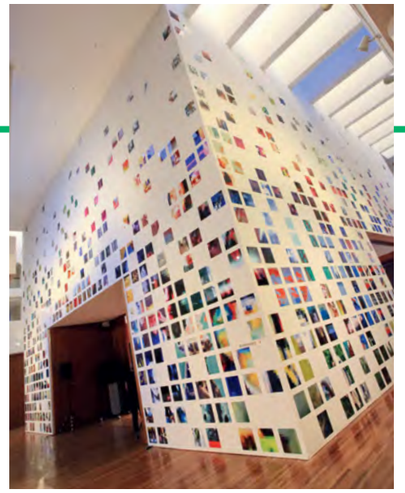
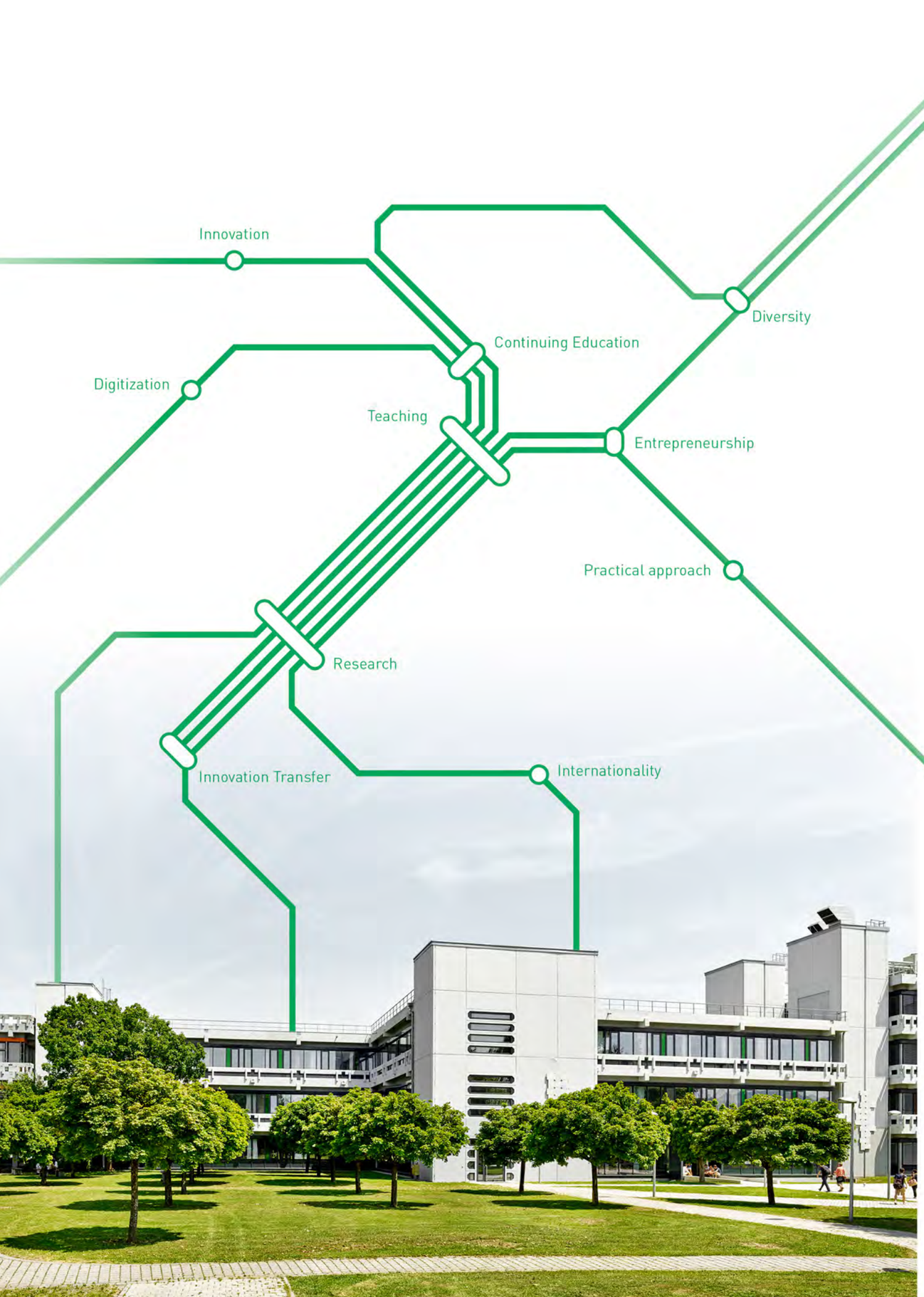




Reutlingen University //

About us

5,400 students at five Schools: Reutlingen University is one of the biggest universities of Applied Sciences in Baden-Württemberg. At our five Schools – Applied Chemistry, the ESB Business School, Informatics, Engineering and Textiles & Design – we take a practical and interdisciplinary approach to training the leaders of tomorrow. The quality of studies has an outstanding reputation worldwide and attracts students from 100 countries to Reutlingen.

Our graduates are highly sought in business and industry. Whether they are local small and medium-sized enterprises or major international companies – many enterprises are in close contact with Reutlingen University, its professors and its staff. That is a plus for everyone. Students benefit because they can make optimal preparations for launching successful careers by participating in real industrial projects, internships and theses. Companies are delighted to get employees with such outstanding education.

Teaching and applied research are closely interwoven at Reutlingen. The University has set up teaching and research centres – alliances between technical universities, partners from the world of business, and academic universities – which only exist in this form in Reutlingen. Lifelong learning is the heart of the Reutlingen Professional Education, the Knowledge Foundation. It enables academic and personal development for those already in a profession by providing part-time study programmes.

Reutlingen University is consistently placed among the top-ranking institutions of its kind. We are proud of that and every day, all members of our university are working to extend this success and to further advance Reutlingen University.

Your journey to the future starts at Reutlingen University

Education is critically important to all areas of business and society. Reutlingen University can be conceptualised as a map of connected, intersecting or parallel institutions.

Teaching

The concept of project-oriented learning is raising the bar when it comes to teaching. For example, Professor Dr.-Ing. Eckhard Hennig received a regional teaching award from the Baden-Württemberg Ministry of Science, Research and the Arts in 2019 for a learning project that makes technology and engineering careers accessible to children (see page 63). And it's not just teachers who benefit from new teaching and learning formats, but students as well (see page 30). Students develop a thorough understanding of theory, but this is accompanied by practical projects right from the beginning. Indeed, practical education is what sets universities of applied sciences apart from others. In 2019, we celebrated the 50th anniversary of this kind of university, which has become more in demand than ever before.

Research

As a university that stresses the importance of good research, we have ranked among the three most research-oriented universities for applied sciences in Baden-Württemberg for a number of years. Research at the University is conducted with a special emphasis on collaboration and an interdisciplinary approach. The unique teaching and research centres (TRCs) offer both teaching and research for projects, whether at universities or businesses. The objective of research centres (RCs), which bring together expertise from a number of different fields, is also to promote interdisciplinary research. For instance, three professors in the new "Smart Biomaterials" research centre are conducting research in the fields of materials science and biomedical applications (see page 70).

Continuing education

As an institution of continuing education at Reutlingen University, the Knowledge Foundation offers numerous courses for working professionals, including bachelor's programmes, open and company-specific master's courses, as well as seminars and certifications for experienced professionals and management (see page 96).

Highlighting entrepreneurship

Our graduates often go on to apply their expertise either in established companies or in their own start-up ventures. Indeed, our courses already do their best to promote a spirit of entrepreneurship. Our Center for Entrepreneurship provides support to students as they develop their business ideas and establish start-up ventures (see page 80).

Innovation transfer

The University's dedication to applied teaching and research is evident from its numerous collaborations with industry. Our approach to collaboration takes a number of forms, including practical semesters during a course of study, dissertations completed at an industry organisation, commissioned research projects and business consultation.

One of the more innovative collaborative projects we have undertaken is the newly inaugurated "werk150" learning and research environment. In the Logistics Learning Factory, businesses can try out the development and training opportunities themselves (see page 68).

By 2022, there should also be a centre dedicated to the textiles and clothing industry by the name of "Texoversum", which will offer a state-of-the-art platform for students, researchers, designers, founders and business people (see page 56).

Diversity

The University has taken decisive action to strengthen its inclusivity and create an environment for students and staff that is fair and sensitive to people of all backgrounds. We believe that having a diversity of perspectives is a guarantor of progress and innovative thinking. In order to achieve the vision of a university where people with different ambitions, experiences and qualities can work together successfully, the University is taking part in re-auditing for a key diversity certification (see page 16).

Digitalisation

The digital revolution is having an ongoing impact on our teaching, research and administrative operations. With this in mind, the University has been consistent in pushing forward digital solutions. Not only do these solutions make working at the University easier, more agile and more transparent – they also allow us to focus resources on digital teaching and research. For example, events such as the annual conference of the German Society of Computer and Robot-Assisted Surgery (CURAC) show how digital transformation is impacting the scientific community (see page 66).

International outlook

International cooperation plays a key part in the University's success. And it's not just the exchange of students – it's the 20 per cent of students on campus who are international and our relationships with around 200 partner universities around the world that cement the University's international credentials. With the completion of the German Rectors' Conference re-audit process on internationalisation of universities (see page 74) and accreditation of the ESB Business School by the AACSB (see page 44), we achieved a great deal of success in 2019 for our international outlook.

The international textile symposium held in autumn 2019, which made public the University's unique collection of textiles, drew the attention of experts around the world (see page 58).

The President's Office of Reutlingen University (from left): Alexander Leisner, Prof. Dr Petra Kluger, Prof. Dr-Ing. Gerhard Gruhler, Prof. Dr Hendrik Brumme, Prof. Harald Dallmann

Leadership excellence at the University President's Office

The University's leadership team is where its core areas of teaching, research and administration are managed. The President's Office has a wide-ranging remit that encompasses all university priorities. Let's meet the people behind the team and learn about what they are responsible for.

TINA SCHMIDT

Professor Dr Hendrik Brumme
President

Hendrik Brumme has led the University since 2012 and since 2018 has been serving his second term in office. He is responsible for representing the University externally and for areas including international outlook, equal opportunities, fundraising, scholarships, marketing, communications, infrastructure development, health and safety, and data protection. With a leadership style that focuses on openness, fairness and transparency, his ambition is to give everyone on campus the space and freedom necessary for a fair shot at success. He knows all too well that good research cannot be ordered from the top down, and that nine out of ten inventions come about randomly. This idea of independence is also what guides the University's teaching activities. The focus of Professor Brumme and the President's Office more broadly is on giving University graduates the knowledge to shape their futures as they go out into the world. This plan is also supported by efforts to promote a culture of knowledge sharing. Helping small and medium-sized businesses find solutions specific to their challenges is one of the many areas where the University can apply its broad range of expertise.

The five faculties of the University provide the ideal environment. Its commitment to international collaboration is reflected in its high level of diversity on campus. Professor Brumme sees the ongoing promotion of collaborative learning and cooperation on campus as a key priority. By taking an active role in the Baden-Württemberg board of universities of applied sciences (HAW-BW), he is proactive in tackling issues addressed both within and across various institutions. He also believes it's important to work closely with the city of Reutlingen itself, as shown by regular dialogue and collaborative projects. The President is confident that universities of applied sciences are the ideal institution for shaping the world of tomorrow. As a result of increasing digitalisation, the University will have transformed completely in ten years' time. For one thing, the dissemination of knowledge in and of itself will wane in importance, while innovation platforms will take a more central role.

Professor Brumme is working to secure the future of the University – after all, it has plenty of ideas to offer and is not afraid to face the challenges ahead. As regards the core areas of teaching, research and administration, the University leadership team is best placed to build on its success and help shape the future.

Professor Harald Dallmann
Vice-President, Teaching

As Vice-President, Harald Dallmann has been responsible for studies, teaching, continuing education and quality since 2007. His remit encompasses a range of topics, including the principles of teaching, new forms of teaching and learning, digital transformation in teaching, and induction programmes for freshers. Other factors that determine the quality of studying and teaching include organisational evaluations, accreditations and rankings. Key successes in previous years include the founding of the Reutlingen Didactics Institute (RDI), which offers advice and development opportunities for those teaching or learning at the University. The technical infrastructure required for new forms of learning has been realised by the founding and ongoing development of the RELAX platform. A great deal of success has already been achieved in the University's involvement in programmes and initiatives, as shown by the holistically structured FESt-BW funded projects, for example (see page 26).

Due to the abundance of tasks and objectives, the key challenge for teaching is adapting it to ongoing developments. This primarily concerns digital transformation in teaching, preparation of students for their studies, and development of teaching methods. Professor Dallmann regards the University as an educational institution that has a responsibility to promote the digital revolution in teaching, while also giving students the digital skills they need. According to this philosophy, the key issue is not how best to disseminate knowledge, but rather what young people need to prosper in a digital world. To make teaching fit for the future, suitable teaching methods must be identified and efforts should be made to determine the best time in a student's trajectory in which to apply them. Numerous teaching projects indicate the kind of dedication being shown by people addressing these issues. What Professor Dallmann finds important here, however, is the personal interaction between colleagues in these areas.

Alexander Leisner
Chancellor

Alexander Leisner has been in the office of University Chancellor since July 2019 and is thus responsible for the University's administration with departments dedicated to human resources, students and academia, budgeting and finance, technology and safety, as well as the University service centre. Being at the top level of University administration and bearing responsibility in the President's Office for structural development involves a number of different issues, including designing an optimal working environment for staff, taking leadership and awarding recognition, development of individuals, and further promoting the compatibility of career and family ambitions. On campus, structural development is being promoted with major renovation projects, including the new facilities to house the Faculty of Applied Chemistry. A wide range of measures are necessary to build and maintain a vibrant campus. The new builds, including the Texoversum, are a visual representation of the approach to innovation transfer on campus. Also on the agenda is the university funding agreement and the associated medium-term funding. There are also additional sources of funding to pursue, and there is plenty of value to be found in collaborations with other universities and partners. Due to the growing workload in administration, solutions including an improved digital workflow, as well as efficient processes between the university departments involved, are of paramount importance. The University also bears responsibility in terms of sustainability. In addition to promoting research and teaching excellence, this means looking closer at the day-to-day running of the university, including its consumption of paper and energy, transportation issues, and management of green spaces on campus. In terms of corporate governance, the University is expected by the public and political institutions to achieve new and innovative outcomes while adhering to the law. Alongside conventional risk-management approaches, compliance management systems and embedded organisational values, this requires the support of policymakers as well.

The range of issues to be tackled here is immense, but it shows that a university chancellor in today's climate needs to be able not only to lead, but also to work closely with colleagues to develop the university. And this is exactly what gives Alexander Leisner the motivation to succeed at this job.

You can learn more about research in the University President's Office in the interview on the following pages.

Continuing the success of applied research

Passing the baton in the President's Office

Professor Dr-Ing. Gerhard Gruhler
Former Vice-President, Research

Professor Gruhler is a seasoned researcher, robot expert and someone who isn't afraid to speak his mind. Now, after a career spanning 30 years, he has decided to retire.

You have been part of University leadership since 2008. As a professor at the Faculty of Engineering, how did you become Vice-President of Research?
Gerhard Gruhler: My admission to research at Reutlingen was relatively sudden, actually. It began in 1992, when I was working as a partner on a joint project funded by the EU, which is when I got the chance to recruit my first three scientific colleagues. A number of other projects followed, after which the President's Office recommended me to the University Senate for the newly created position of Vice-President for Research. At the Faculty of Engineering, I was working in the field of mechatronics as an expert in robotic systems. After all, I came from the world of industry, giving me a relatively good grounding, so I was able to draw on a lot of my own research experience for the role of Vice-President.

How has research at the University changed over the years?
Gruhler: Since 2009, the volume of research projects has grown by 800 per cent. Today, the various professors work alongside around 110 scientific research colleagues, which is a huge challenge for infrastructure because they don't always progress at the same rate. The founding of the Reutlingen Research Institute (RRI) in 2008 was an important first step, because it consolidated research activities under a central body of coordination and services for all researchers at the University. It was after this point that a number of teaching and research centres were established. Seeing the University work its way from the bottom third of Baden-Württemberg's 21 research universities to the top three was really thrilling.

Have you achieved everything you wanted to?
Gruhler: Of course not; there's still plenty of things to be done. For example, there's still a lack of understanding about the crucial balance between good teaching and research. And around ten years ago, my colleagues and I were speculating about whether professors with significant research profiles at universities of applied sciences would be able to independently award doctorates before we retire. Sadly, this has not turned out to be the case.

What makes Reutlingen a great place to do research?
Gruhler: The emphasis here is on doing research that is relevant to specific applications, and this is incredibly important to professors, members of staff and the University more broadly. These kinds of research generate real impact and help us solve real-world problems.

What areas of research are particularly important today?
Gruhler: The answer to that illustrates quite nicely how research is organised at the University. We have six teaching and research centres, each of which teaches and does research on one particular field. These are power electronics for energy transformation, digital business computing, interactive materials, distributed energy systems and energy efficiency, process analysis and technology, and Industry 4.0. We also have the Smart Biomaterials research centre, as well as five smaller research groups and individual researchers who are highly specialised in their respective fields.

"SEEING THE UNIVERSITY WORK ITS WAY FROM THE BOTTOM THIRD OF BADEN-WÜRTTEMBERG'S 21 RESEARCH UNIVERSITIES TO THE TOP THREE WAS REALLY THRILLING."

What are your personal highlights of 30 years spent at Reutlingen University?
Gruhler: I was always happy when delivering lectures. It was especially rewarding when it felt like the students were taking on board everything I was saying. I also enjoyed working in the lab with young people, but I relished every major piece of commissioned research or grant approval we received, as well as hearing colleagues today say that Reutlingen is a really great place to do research, and the opening of our first teaching and research centre and every one that followed. I was also surrounded by an incredible team at the RRI with an exceptional director, and the teamwork in the President's Office was amazing – they're great people and we worked together like a well-oiled machine! I also had the privilege over many years of developing and coordinating overseas collaboration in the Faculty of Engineering, which has given me many lasting friendships around the world. There were also many students who I was delighted to see had returned all grown up and inspired after a semester abroad.

Will you find it difficult to say goodbye?
Gruhler: Of course, I'm sad to leave, but there are many good reasons why the transition will be easy. For example, I know that my area of teaching and my laboratory in the Faculty of Engineering will be in great hands with my successor, and I'm looking forward to the energy and ideas Petra Kluger will bring to the table as Vice-President of Research. I'm also looking forward to assuming a role as advisor to the President's Office so that I can use my experience going forward. So the plan isn't just to do nothing.

Which qualities does a director of research at the University need to possess?
Gruhler: Two things. First of all, you'll need to be able to look at the bigger picture, which means constantly having your ear to the ground in order to seize new opportunities. You might say you have a sixth sense for such things. Secondly, you'll need to be comfortable at the granular level, and have a certain degree of tenacity. You should be a supporter and problem-solver for research staff, and make sure that those who want to do research are given opportunities to do so.

Thank you very much for talking to us.

Professor Dr Petra Kluger
Vice-President of Research, 2020

The incoming Vice-President Petra Kluger is bringing energy and new ideas to the role. As an active researcher who is no stranger to thinking outside the box, she wants to harness the synergy between research and teaching, and make research more accessible to society.

"FROM THE GROUND UP, MY RESEARCH HAS ALWAYS BEEN INTERDISCIPLINARY IN NATURE, SO I ALWAYS THINK BEYOND THE FRONTIERS OF MY SPECIALIST FIELD."

Your brief within the President's Office will focus on research. How are you going to pick up where Gerhard Gruhler left off?
Petra Kluger: What has been very helpful in the past few months is the insight I've had into the various responsibilities of the Vice-President of Research and into the administrative processes relating to research at the RRI. So I would like to say a big thank you to Gerhard for all the great work he's done! The main job now is to maintain the University's excellent position in regional league tables for research. To do this, strategies for enhancing our research capabilities will have to be developed in conjunction with each of the various faculties. I also think it's important to promote cooperation and exchange between researchers at the University. As Vice-President, I want to play a supporting role while getting major interdisciplinary projects off the ground.

As a biologist, you teach and research at the Faculty of Applied Chemistry. What can we expect in terms of research under your tenure?
Kluger: We will be working with human and animal cells and using them to build three-dimensional tissue models. As regards biomedical applications, for example, such artificial tissue models would be used in lieu of animal testing in order to test toxic substances. These models would be developed either manually or using a 3D printing process.

What makes working as a university professor an attractive career?
Kluger: I love working alongside young people and helping them develop their skills. And in terms of research, I'm given the space to explore some really exciting ideas. This means I can use findings from my research in my teaching and get students excited about science.

Which personal qualities do you apply in your role as Vice-President of Research?
Kluger: As an active researcher myself, I'm able to understand research staff and what they need. At the President's Office and the RRI, I apply my administrative and problem-solving abilities. From the ground up, my research has always been interdisciplinary in nature, so I always think beyond the frontiers of my specialist field. I also use my experience in teaching to explain complex ideas in simple ways. My aim is to make people aware of these concepts – they should understand what they're all about.

You are one of the most research-oriented professors and were the first female professor of a university of applied sciences in Baden-Württemberg to officially receive 'association' from the University of Hohenheim in March 2019. How important are these collaborations?
Kluger: All researchers have a wide network in their field, and for me it's biomedical science. We should be making these networks as interdisciplinary as possible, so collaborations such as these rules of association can be helpful in achieving this. The best ideas normally arise from interdisciplinary work with other researchers. Our University already has a number of key collaborative research relationships and is very good at sharing its findings with the broader economy and society. Our colleagues, for example, are given recognition and appreciation on expert panels by virtue of the publications they have submitted. In the future we will work to ensure the broader public has a better insight into research at the University and how knowledge is shared.

What are your objectives?
Kluger: I want all faculties within the University to work together to achieve our common goals. There should also be a tighter network between teaching and research, since we know they are mutually beneficial to one another. Another objective is to get young people inspired to get into research, and to raise awareness of it in society. New digital solutions, for example, could make our research more tangible and more easily accessible. There's also the matter of enhancing our international outlook in terms of research projects, which we can achieve by focusing more on collaborations across Europe.

What are your ambitions for research at the University?
Kluger: My hope is that research grows further and extends more over international frontiers over the coming years, and it would be an enrichment to the University in terms of diversity as well. I also want to fully harness the potential at the University for interdisciplinary projects. Here, there are still plenty of opportunities for having meaningful exchanges across disciplinary boundaries.

Thank you very much for talking to us.

INTERVIEWS BY TINA SCHMIDT

Championing diversity: Generating value through equal opportunities

Reutlingen aims to foster an environment for students and staff that is fair and sensitive to people of all backgrounds. This vision is institutionally embedded through the re-auditing for the "Vielfalt gestalten" ("Shaping Diversity") certification. This involves agreeing on the action to be taken in order to enhance equality of opportunity at the University.

Yalcin Cetinkaya and Mircea-Alexandru Ghizila, both media and communications informatics students, designed this logo to celebrate Diversity Day 2016, the topic of which was "Internationality and Community". The message behind it, "We are diverse", is that numerous individuals come together in the community of the University with their own unique abilities and ambitions.

'Diversity' is a term which is growing in importance both in the business world and in university culture. It acknowledges first and foremost that educational and career opportunities depend not solely on individual talent, but also on other factors, including cultural and social background, religion and worldview, age, skin colour, gender and sexuality, as well as any physical or mental disabilities. All of these factors may have an impact on whether people thrive in an academic context.

To a certain extent, barriers still exist in universities across Germany. This may involve physical barriers, such as buildings that have not been made accessible to those living with disabilities. These barriers can be minimised with suitable equipment and by building accessible structures. Having a bilingual campus also helps to allow different groups of people to take part in the academic experience. On the other hand, there are intangible barriers that we maintain in our attitudes as well. These manifest themselves not only in discriminatory behaviour, but also in support for structures which make it more difficult for certain groups of people to access academic and career opportunities. This can include a lack of transparency in application processes and communications, biased teaching and assessment, or even lecture and session times that are difficult for those with families.

Reutlingen University aims to achieve an environment that is free of discrimination of any kind, and one that gives individuals from all backgrounds the space to grow and thrive. We believe that having a diversity of perspectives is a key guarantor of progress and innovative thinking.

"WITH ITS STRONG INTERNATIONAL OUTLOOK, REUTLINGEN UNIVERSITY HAS BEEN COMMITTED TO DIVERSITY FROM THE VERY BEGINNING. OUR AIM IS TO PROMOTE A MULTIFACETED VISION OF DIVERSITY WHICH CHAMPIONS INNOVATION AND BENEFITS EVERYONE."

Prof. Dr Hendrik Brumme, President

In order to achieve the vision of a university where people with different ambitions, experiences and qualities can work together successfully, Reutlingen University is taking part in re-auditing for the "Vielfalt gestalten" ("Shaping Diversity") certification. The certification is awarded by the 'Stifterverband' – a joint initiative set up by businesses and foundations devoted to consulting and networking with institutions in the fields of education, science and innovation.

The aim of the audit is to optimise educational and career conditions so that everyone has the same opportunities. This would ensure students and staff achieve the academic and career successes that their talents truly merit. Diversity and an inclusive environment are therefore considered key factors that create a high-quality student experience.

During the first audit conducted in 2015 for the diversity certification, the University had already committed to strategies and measures that would ensure the right conditions for a diverse body of students. The raft of measures introduced in the current audit involves additional strategies relating to diverse recruitment processes. When it comes to recruiting for top-tier academic positions, this includes transparency in hiring practices and specifically interviewing candidates from under-represented groups.

There is already some good infrastructure in place at the university to offer advice to diverse groups of people as well as personnel on hand to improve these services. This includes the Reutlingen International Office, equality team, diversity unit, family service centre, central student advisory service, representatives for students and staff living with disabilities, as well as points of contact dedicated to dealing with cases of discrimination, sexual harassment and bullying.

The University's annual Diversity Day shows that diversity is an area where there are a lot of ideas being exchanged. This is a project of the Diversity Charter, a corporate initiative promoting diversity and inclusivity. The University signed the Charter back in 2014, and since then has organised regular events foregrounding this inclusive vision. For example, in 2019 the University hosted a 'diversity café', in which numerous staff and students took part.

DR LOUISA SÖLLNER

Learning never stops

Personnel development supports people at the University in the lifelong learning process

Lifelong learning is an area of strategic importance at Reutlingen University. For this reason, the University has a personnel development plan that is introducing new ideas intended to improve working conditions for staff. This article explores the personnel development concept, including its three key elements: continuing education, human resources programmes and health management.

CHRISTOPH GROHSMANN

Changes in society also entail shifting requirements for individuals, and it highlights the need for lifelong learning. The personnel development programme, the Human Resources department and the Chancellor of Reutlingen University are united in their support for this idea and are promoting the lifelong learning process of all members of staff from initial recruitment to the end of their employment relationship. "The most important resource in a university is the potential of its staff, who make up the core of what we do. We must do what we can to remain an attractive employer, while making improvements to everything we offer. This includes improving working conditions, management and recognition, as well as personal development opportunities for individuals and achieving a balance between work and family," says Chancellor Alexander Leisner.

The personnel development programme promotes the process of lifelong learning and thus helps us achieve the objectives of the University's 2017–2021 structural and development plan. Professor Dr Petra Kneip, the President's Office representative for personnel development, highlights the excellent level of cooperation at the University: "A good personnel development programme is only possible if you have a good team around you that is focused on working together." This cooperation includes the President's Office, the Human Resources department, the employee committee, the Reutlingen Didactics Institute, the Reutlingen International Office, the Center for Entrepreneurship and other institutions. Personnel development has three overarching elements: continuing education, human resources programmes and health management.

Continuing education
Reutlingen University offers its employees an extensive range of continuing education opportunities. For example, seminars are available on the topics of healthcare, intercultural competencies and digital skills. The University's learning portal also offers tutorials and courses such as "Design Thinking" and "LEGO Serious Play" in a bid to establish new methods of teaching and learning. Staff also have the opportunity to refresh and sharpen their English skills in seminars. Alongside the seminars offered within the university, there are some offered in association with the Tübingen-Hohenheim university alliance. This allows participants to network with and learn from people outside of their own university. Petra Kneip is particularly passionate about this issue. "As a university, we have a special commitment to offer our staff continued learning opportunities. However, the ultimate responsibility lies with those learning."

Health management
Promoting good workplace health is also an important part of the personnel development concept. This includes a wide range of courses, an ergonomic workplace environment, participation in an urban cycling scheme and much more. In a range of different courses, employees are given incentives for a healthier working day. Each individual is then responsible for implementing these into their daily lifestyles. "Health management is one way in which Reutlingen University invests in its staff," adds Gisela Hamal, who works in personnel development.

Human resources programmes
In addition to continuing education programmes, personnel development also involves integrating various human resources programmes into the university's day-to-day operations. Reutlingen University rewards exceptional performance and dedication with a special prize system. The awards ceremony, held once a year, is intended as a symbol of recognition to provide incentives for staff at the University.

Employees receive recognition not only for their outstanding performance, but also for their ideas. An system introduced in 2019 provides a way for people to submit suggestions for how processes can be improved. All members of staff can put forward their ideas in an online portal, which also allows them to comment on and rate other ideas.

In addition, an appraisal interview is held once a year. This one-to-one meeting is held between a member of senior staff and the employee in question. The meeting is intended for reflection on the employee's performance, and not as an instrument for assessing members of staff or discussing performance targets. The meeting also provides the opportunity to discuss the need for continuing education.

Our people

PROF. DR DENNIS SCHLEGEL

Role:
Professor of Business Informatics at the School of Informatics at Reutlingen University

At the University since:
March 2019

Previous role:
Business consulting at KPMG, latterly as a senior manager (with statutory authority). Here I completed a number of projects spanning finance and IT in a number of industries.

My current projects ...
focus on developing courses in my specialist areas of consulting and business administration. I also work in international relations to increase the international outlook of our business informatics course.

What I like about Reutlingen University:
The open and professional collaboration between colleagues, as well as the motivated students, who ultimately are the basis for the University's excellent reputation.

My goals are ...
to prepare exciting and useful lectures for students and tailor them as well as I can to their future career ambitions. In the medium term, I also want to get more involved in application-oriented research.

PROF. DR JAN OLIVER SCHWARZ

Role:
Professor of Strategic Management and Leadership at the ESB Business School at Reutlingen University.

At the University since:
September 2019

Previous role:
Professor of General Management at the Faculty of Design at the Fresenius University of Applied Sciences in Munich. Before that, I was a consultant for Decision Strategies International, a boutique strategy consulting firm in the field of long-term strategic thinking, and at the Strategy department of Allianz SE in Munich.

My current projects ...
involve trying to understand how strategic processes can be made more participative so that members of staff are included earlier on and to make sure people are on board with a new strategy. I am also working on an empirical study that analyses how to deal with design-thinking projects in the future.

What I like about Reutlingen University:
The outstanding motivation of the students and the dedication of employees and colleagues, but also the way research and practical application are combined.

My goals are ...
to inspire students in my lectures to tackle the current and future challenges faced by businesses and to debate proposals for combatting these issues. I also want to include input from the business world in my lectures and provide an impetus for additional research projects.

PROF. DR-ING. TINO ZILLGER

Role:
Professor for Smart Textiles Electronics – Functional and Interactive Textiles at the School of Textiles and Design at Reutlingen University

At the University since:
April 2019

Previous role:
Head of the printed-photovoltaics and energy-storage research unit at the Institute for Print and Media Technology at the Chemnitz University of Technology. Here I focused primarily on teaching international students and completing national and international research projects.

My current projects ...
focus on the integration of flexible electrical components in textiles applications. This involves combining flexible printed electronics technologies with textiles processes and materials. Possible applications include life sciences, medicine and industrial contexts.

What I like about Reutlingen University:
The willingness of students and colleagues at the University to engage creatively with new topics in teaching and research and to get involved in their development.

My goals are ...
to establish well-founded and exciting lectures covering the basics, and to improve interdisciplinary courses with a strong focus on applications and research. In this vein, I am currently working on setting up a laboratory for electronic textiles in order to prepare students for their future careers.

PROF. DR ANTJE BRÜSCH

Role:
Professor for Project Budgeting and Controlling at the Faculty of Engineering at Reutlingen University in the International Project Engineering study programme

At the University since:
October 2019

Previous role:
After graduating from Reutlingen University in 2003, I began a career in the automotive industry. My most recent position in this field was at Bosch, with my first role in Diesel Systems and subsequently Powertrain Solutions as a Controlling Manager for the growth and innovations business unit. Alongside my professional work, I earned my doctorate studying the interaction of parts of performance management systems with the role of the controller.

My current projects ...
primarily deal with establishing outstanding interactive teaching in my specialist fields for the upcoming semesters. I'm also working on additional publications related to my doctoral thesis.

What I like about Reutlingen University:
Mainly the University's teaching staff and international outlook, along with all the great memories I have from my own studies. I also like the extraordinarily motivated body of students, as well as how responsive the University is from a communications and administrative standpoint.

My goals are ...
to offer students application-oriented and interactive lectures while dispelling their reservations about business administration (i.e. from "boring rote learning" to "everyone needs BA") and enhancing their critical faculties from a systems point of view. I also intend to establish myself in the Management Accounting and Control research community.

Our rankings

Top positions for Reutlingen University in national and international league tables, success in international accreditations and audits, as well as valuable memberships.

Studying & teaching

Top bracket

CHE Ranking 2019:
Mechanical Engineering, Faculty of Engineering

CHE Ranking 2018:
Computer Science, School of Informatics

CHE Ranking 2017:
Business Administration, ESB Business School
Business Administration and Engineering, Faculty of Engineering
Business Informatics, School of Informatics

Top rating

Trendence student survey
Graduates Barometer 2019:
ESB Business School, all courses

Start-ups

Top ratings

U-Multirank 2019:
New start-ups by graduates

Stifterverband 'start-up radar' 2018

International accreditation

AACSB accredited

ESB Business School
Top five per cent of all business schools worldwide

Practical application

Top bracket

CHE Ranking 2019:
Mechanical Engineering, Faculty of Engineering

CHE Ranking 2018:
Computer Science, School of Informatics

CHE Ranking 2017:
Business Administration, ESB Business School

Business Administration and Engineering, Faculty of Engineering and ESB Business School

Business Informatics, School of Informatics

Top-25 performer

U-Multirank 2019: Reutlingen University among 25 top performers worldwide for practical application

First place

Universum Image Award Employability 2014:
ESB Business School

International outlook

Top bracket

CHE Ranking 2017:

Business Administration, ESB Business School

Business Administration and Engineering, Faculty of Engineering and ESB Business School

Business Informatics, School of Informatics

Top ratings

U-Multirank 2019:
International student mobility, entire university

Trendence student survey 2019
International outlook of courses:
ESB Business School, all courses

Audits

International and diverse

German Rectors' Conference
re-audit 2015–2019:
"Internationalisation of Universities"

Diversity Audit 2016:
"Shaping Diversity"
Entire university

Other top rankings

Wirtschaftswoche 2019 league table

First place: Business Administration, ESB Business School

Second place: Business Informatics, School of Informatics

Fifth place: Business Administration and Engineering, ESB Business School

Four stars

BIX 2015: University library

Memberships

Excellent research credentials and social responsibility

Member of the EUA
(European University Association)

PRME
(Principles for Responsible Management Education)

'Families at University' initiative
Member of the best-practice club

Regional engagement // Knowledge sharing

U-Multirank:

Knowledge transfer:
First place worldwide in 2017, 2018 and 2019

Regional engagement:
Top flight for entire university in 2017, 2018 and 2019

Research

Reutlingen has ranked among the top 3 of the 21 most research-oriented universities for applied sciences in Baden-Württemberg for a number of years.

camplus //

teaches & researches

Theory and practice are not opposites at Reutlingen University – they are closely integrated. Many of our professors and teaching staff come from well-known enterprises – often from management positions. They know what is truly important in their sectors, and have good connections there. That in turn is a benefit for our students, who find out about the latest developments in business and technology – and make contact with potential future employers. In small semester groups and exciting projects, they learn at an early stage what they will need for their professions.

Interdisciplinary work is a big issue at all five Schools. Our professors demand that students expand their horizons. To ensure high standards in research and teaching, we conduct quality assurance measures such as regular evaluations of classes.

Research plays an important role at Reutlingen University. At our six teaching and research centres, we work with business and academic universities to get Master's students fit for future issues by actively involving them in research. There are also options available for cooperative doctoral studies. The Reutlingen Research Institute is the umbrella organisation for these teaching and learning centres; it pools all the activities in research, development and technology transfer. The RRI is the competent contact partner for industry, business, and for other research institutes and universities.

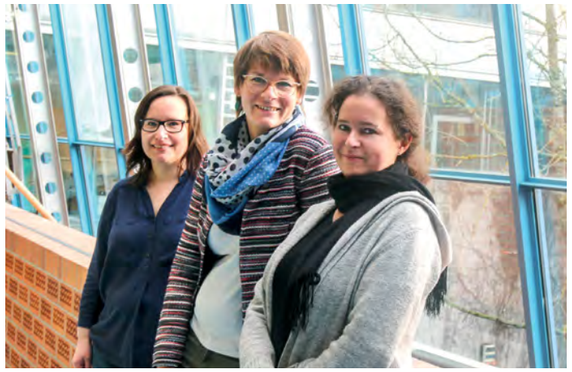
Comprehensive support

The FESt-BW projects

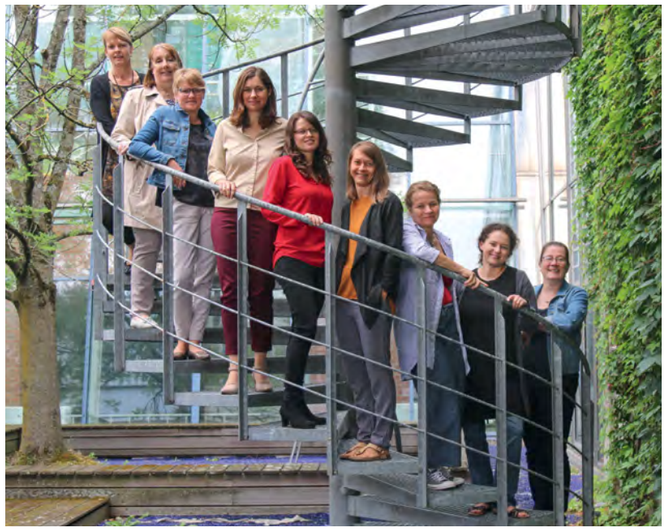
With the 100-million-euro "Fund for Successful Study in Baden-Württemberg" (FESt-BW), the regional Ministry of Science, Research and Art has been funding universities in the state of Baden-Württemberg from 2016 to 2020. The aim of the programme is to improve student outcomes and reduce the numbers of people dropping out of their studies. Since it has been in place, five projects have been funded at Reutlingen University with a total of 1.9 million euros, offering tailored support to ensure equal opportunities for all in academia.

Aptitude and choice – the "discover your studies!" project

The 'discover your studies!' project is scheduled before students enrol. It is designed to help prospective students learn about their courses. What's included in a course at an applied-sciences university? What's behind the name of the course? Is studying at university suitable for me? All these are questions the project is intended to address. Prospective students are given the tools to better understand their own capabilities and the contents of the programme they wish to enrol in. For interdisciplinary courses in particular, it's difficult to determine what's behind the name of the course, and often certain buzzwords give rise to expectations that might not match up with reality. The project proposal cites Alice from Lewis Carroll's *Alice's Adventures in Wonderland*: "Would you tell me, please, which way I ought to go from here?" asked Alice. And the Cheshire Cat replied: "That depends a good deal on where you want to get to." It's this uncertainty that arises when people have to decide on a course of study and then a career further down the line. This means that we have to provide information that is as clear as possible while providing more information and advice overall. This is where the central student advisory service can play a key role. For example, it can work out a suitable orientation programme for prospective students and invite school pupils to come and see university life for themselves. In addition to the university open day and the many other programmes we offer to keep people informed, the aims of the project are designed to increase and improve the information available.



(Left to right) Anik Asshoff, Anna-Julia Toll (Project Management), Myriel Anselm



The FESt-BW projects team

"staRT your studies!"

So you've found the right course for you and you're ready to get started? At this stage, the staRT project offers new students a few things that can help them get their studies off to the right start. The services offered in the project have been constantly evolving since 2016. For example, during what are known as the 'staRT weeks', now you can take preparatory courses in maths, physics and chemistry, which is taken up by more than half of the University's freshers. The workshops on 'Starting at university' and 'Tips and tricks for learning' are just two examples of the many services offered in the staRT weeks alongside the main subjects. Yet our support services don't stop there – they continue throughout your course with advice on various topics and open workshops for all students in maths, physics, chemistry and writing, giving students rapid support and useful feedback. There's a point of contact available for almost everything, whether centrally via the project or within the respective University faculty via teachers and staff. Our surveys show that there is a great deal of satisfaction with these services, and that they teach students a lot and help them better overcome their initial challenges on campus. A major factor in successful university education is establishing a good social network right from the beginning: Have I found a nice group of fellow students? Do I feel comfortable on campus? Is the environment right for me? Am I enjoying the course? All these are factors that motivate students and determine their happiness, which is why they are promoted in the staRT project right from the outset.

BETTINA WEHINGER-ROTH

(Left to right) Anabela Mendes Passos, Dr Fabian Lang, Irene Merdian (Project Management)

Teaching and learning labs – "inveRT your studies!"

The focus of the "inveRT your studies!" project is to find new and inventive ways of structuring lectures and seminars. Lectures that have so far been held in more conventional settings have been organised using the 'inverted classroom' method. This method – a form of 'blended learning' – involves a combination of online and in-classroom teaching. Students learn on an online multimedia learning environment called 'RELAX'. And during in-classroom periods, students reflect and expand on what they have learned together in various shared activities.

Between 2019 and 2020, a number of different subjects have taken on this opportunity across the various faculties. In the first year of the project, General Business Administration with Prof. Bath, Computer Science with Prof. Schöller/Prof. Burgert, Mathematics 2 with Prof. Priwitzer/Prof. Höfert and Textile Chemistry with Prof. Textor have successfully adopted the inverted classroom method. By combining media-supported teaching with dedicated classroom time, a teaching and learning culture is encouraged which promotes independent learning in online self-study and the development of skills across a number of disciplines. Moreover, the adoption of media-supported teaching and learning methods ensures a platform for continuously improving the University's overall digital learning prospectus.

The project is managed and coordinated by the Reutlingen Didactics Institute (RDI), which reports directly to the Vice-President for Teaching. Page 30 onwards takes a closer look at the project and the experiences of those teaching.

IRENE MERDIAN

Arriving and succeeding at university: "smaRT – study STEM at Reutlingen University"

The project entitled "smaRT – study STEM at Reutlingen University" is intended to improve the success of students at university and to help full-time international students applying for a degree programme at Reutlingen University. Because these students are more likely to drop out of university than their German counterparts, with the drop-out rate particularly high in STEM subjects, the smaRT project focuses on selected STEM faculties and degree programmes at the University.

The objective of the online survey carried out in 2019, as well as the first measures taken to address the issue, was to learn more about the experiences of these students at Reutlingen University. "What we found is that the main challenges for international students are rooted not only in language barriers and academic and professional integration, but also in their interactions with German students," say the two project coordinators. "These are areas where we must take action and ultimately make a difference."

The smaRT project team, with project coordinators Karin Bukenberger (second from right) and Claudia Frank (third from right), as well as staff and student assistants

Because an outstanding international outlook is so important to the University, and in light of the tuition fees for international students from outside Europe since 2017 in Baden-Württemberg, the smaRT project provides the opportunity for the University to remain attractive to these students while improving conditions for them. This not only benefits the international students themselves, but also the teachers and members of staff in the various faculties and in university administration who interact with these students.

Under the direction of the Reutlingen International Office (RIO), the project offers professional guidance, language support and personalised advice, as well as the "Students4Students" buddy programme and other extracurricular activities and networking opportunities so that international students can integrate both socially and academically into their new environment.

KARIN BUKENBERGER

Start-up culture at university – "Spinnovation" and "Spinnovationplus"

This project has been launched to improve support for start-ups being established alongside degree programmes. The proposal for collaboration with Hochschule der Medien Stuttgart and Aalen University entitled 'Spinnovationplus' continues the successful 'Spinnovation' project.

The Spinnovation project is bringing about a change in mindset towards entrepreneurship and innovation at the three universities by reconfiguring course curricula and offering new programmes. It's aimed at all students who approach the topic of starting a business during the first half of their study programmes. It gives them plenty of positive experiences and helps them develop a positive mindset which awakens their entrepreneurial spirit. The focus, however, is on raising awareness among the students and giving them the right training.

The Spinnovation team of the three universities in March 2018 at an event for the 'Start-up Stories' project, with Theresia Bauer – the regional Minister of Science, Research and the Arts

The joint Spinnovation project is being continued until the end of 2020 alongside Spinnovationplus. Its objective is to improve the quality and breadth of support for students starting up their own ventures by means of three sub-projects: networking opportunities, personalised validation and social entrepreneurship. Moreover, a lot of work is being done to promote the formation of interdisciplinary project teams. At Reutlingen, the focus is on social entrepreneurship and 'intrapreneurship'.

This start-up culture project is managed and coordinated by the Center for Entrepreneurship.

THOMAS REHMET

Reutlingen Didactics Institute

The Reutlingen Didactics Institute wants to encourage teachers and students and help them reflect critically on their teaching and learning practices so that they can turn them into more of a dialogue-based process, allowing for non-conventional, independent and sustainable thinking, teaching and learning.

PROFESSOR DR-ING. MANFRED ESTLER, IRENE MERDIAN, DR FABIAN LANG, ANABELA MENDES PASSOS

Inverted classroom – re-imagining the lecture
Personalisation of teaching among an increasingly diverse student body calls for the design of a teaching and learning culture that places students at the centre of their individual learning processes and encourages them to take personal responsibility for their learning at an early stage, in line with the principle of lifelong learning.

As part of the "inveRT your studies!" project, sponsored by the Baden-Württemberg Ministry of Science, Research and the Arts, teachers are working to optimise their courses with the help of the Reutlingen Didactics Institute (RDI). In the inverted classroom approach, content is no longer taught at the university, but rather is studied by students irrespective of location and time – all independently and at their own pace using online materials available in various media formats. The content is carefully curated in the University's RELAX online learning management system (based on Moodle), including online activities, knowledge tests and quizzes. The valuable classroom-based sessions can then be used for interactively reflecting on, expanding and applying students' knowledge as a group. Working on problems, case studies or exam questions as a group serves to test and strengthen their knowledge in practical and methodical ways. When it comes to implementation, teachers in the various degree programmes can set individual priorities.

It's a very good system. I had a lot of fun and the group was very attentive. The knowledge test also turned out to be a great experience. Taking part in and discussing the case study was fascinating, and the people there were so engrossed that you could have heard a pin drop!

Prof. Johanna Bath, General Business Administration, ESB Business School

Choosing the right materials and planning effective learning activities for different levels of ability is a huge challenge for teachers. However, it's worth the effort when you see the failure rate drop by half.

Prof. Dr-Ing. Oliver Burgert, Computer Science 1, School of Informatics

During the first semester, there was initially a lot of scepticism among students about this teaching format. However, after they received feedback on their work and had the chance to discuss it with classmates and teachers, the advantages of this method became clear throughout the semester.

Prof. Dr-Ing. Marcus Schöller, Computer Science 1, School of Informatics

The concept makes it possible to address complex topics more clearly in the classroom-based sessions and to concentrate on them and work on them in greater depth.

Prof. Dr rer. nat. Christian Höfert, Mathematics, Faculty of Engineering

It worked out very well and it was no problem for the students to prepare for the lecture from the beginning. And the fact that students can learn the material at their own pace makes a lot of sense.

Prof. Dr rer. nat. Barbara Priwitzer, Mathematics II, Faculty of Engineering

By asking students to prepare for the in-classroom lecture so that they can use it to apply and ultimately broaden their knowledge, we can get a better idea on which concepts were understood or not.

Prof. Dr Torsten Textor, Textile Chemistry, School of Textiles and Design

Onboarding for new appointments
Newly appointed professors are given all the right support by the RDI to perfect their university teaching. In an initial interview, the RDI informs newly appointed staff about existing university teaching measures and works with them to identify any specific needs and the next steps to be taken. To get started, new appointments attend condensed seminars on teaching principles, such as how to formulate learning objectives, as well as workshops offered by the Office for University Didactics (GHD) and the cross-university 'Neckar Connection' initiative. To help new appointments in their new environment, a number of services can be provided, such as specific pedagogical advice and support, classroom sit-ins and coaching.

For me, the services offered to new staff is a key source of support for teaching. Because I can choose from a number of different programmes and seminars, I can set my own focus areas. The social aspect to these programmes allows me to get to know my colleagues and employees at the university better.
In the initial interview, I gained some insight into the services that were offered and together with the RDI we discussed what I personally needed. This was a lot of help when it came to creating a teaching portfolio, which has been a major goal of mine for the first three years. I also think the lecture evaluations are really important because they're the only way I can receive feedback from students in order to improve my teaching. You can only change something for the better if you are able to discuss it openly. Receiving support when dealing with evaluation results is important too, especially when causes and relationships are included in the analysis based on the experience of the RDI.
While this onboarding process fosters a sense of mutual trust and a strong connection to the University and its staff, it also gives you confidence in your teaching and provides a shared basis in terms of teaching practices.

Prof. Dr rer. nat. Christian Kücherer, School of Informatics

On the hunt for design trends using just a smartphone

Professor Brigitte Steffen was awarded the 2019 teaching prize at Reutlingen University. The idea? To use social media app WhatsApp to research design trends. But that was just the start. Steffen has a number of other digital projects in the works.

At the end of April, the city of Milan becomes a buzzing metropolis. Around 400,000 industry figures and design enthusiasts flock to the Italian city every year to take part in the Design Week and catch up on the latest trends in design, architecture and interior furnishing. Right in the thick of it is our own Professor Brigitte Steffen, head of textile, material and surface design, alongside her students. There are so many people exhibiting at the event all over the city that it would be impossible for one person to see it all in the two days of the student excursion. Or is it? Three years ago, Brigitte Steffen came up with a great idea for how her students could be in multiple places at the same time. This involves small teams taking on separate categories and routes, and posting their impressions and trends along with photos and videos in a shared WhatsApp group. A typical conversation might look like this: "So we're at Mooi right now and they have a lot made from batik materials. Have you seen anything like this?" – "Yes! We were just in Prada, and they have an entire collection there."

Brigitte Steffen was awarded the 2019 teaching prize at Reutlingen University for her idea of using WhatsApp to research design trends. But perhaps it was also for her sheer tenacity, because the WhatsApp groups were not running so smoothly initially. "I was very much the active one, and at the beginning I didn't get a lot of input from students." Steffen figured out the reason for this at a debrief when the first group returned from Milan in 2017. Students enjoy using WhatsApp a lot, but only really for personal use. Clearly, use of the messaging app for sharing ideas with colleagues or classmates as well is a step too far for some.

So even 'digital natives' have yet to learn how to use digital tools correctly. On this subject, Steffen is planning to organise some useful classes, starting in early 2020 with a block seminar on recording videos with a smartphone. Students will also learn about which of the trends discussed in the closed WhatsApp group would be suitable for publishing – specifically on Instagram. Because not all of the things students see in Milan will actually be new, and nor will they necessarily be part of a trend.

When it comes to trends, Brigitte Steffen knows her stuff. As a designer, she has worked with a number of clients, including in homewares, and later in textiles for a number of big labels including Chanel and Joop. "I was also one of the first in the industry to engage with digitalisation." As early as the 1980s, she was introducing computers into her then-employer's design process. She had never aspired to teach at a university, and when receiving an offer for a professorship at Reutlingen for the first time, she was initially reluctant to accept. However, after her experience as a visiting lecturer, she became hooked and ultimately accepted the role of professor. That was in 1989. Since then, projects that involve a computer or, more recently, a smartphone have become a common fixture of the now 60-year-old lecturer's repertoire. "The moment I find out that I'm no longer at the cutting edge is the moment I'll stop."

Right now, there's no sign of her losing touch. Indeed, the students themselves can learn a great deal from their professor when it comes to digital technologies. And Steffen's mind is brimming with ideas for other digital projects. So this WhatsApp project is just the beginning – one part of a broader strategy for introducing the digital revolution to the analogue world of textiles, materials and designs. In the 2020 summer semester, the trends identified by the students will be distilled into a trend booklet, which will also be funded with money from the teaching prize. The booklet will, of course, be available in digital format.

The course is also exploring new possibilities in terms of how student projects are presented. So far, graduates have shown their work in an elaborate event attended mainly by friends and family. To ensure projects remain on display permanently going forward, 2020's physical presentation took place for the first time on a smaller scale on the University campus on 13th February, which was accompanied by a more elaborate digital presentation. Entitled "7 Schritte – 7 Wege" (7 steps – 7 paths), graduates worked alongside an agency to develop an interactive website. It shows the various projects and people involved, their different trajectories through university, along with their different interests and focus areas. The website is also due to host the trend booklet at some point during the summer semester. In particular, the website is intended to appeal to industry professionals and partners of the University – people who seldom have time to travel to a physical event.

"... IF WE USE THE PORTAL TO SUCCEED IN GETTING THIRD-PARTY FUNDING FROM COMPANIES AND PROVIDING THESE COMPANIES ADDITIONAL VALUE, THEN THAT'S A WIN-WIN-WIN SITUATION!"

As if that wasn't enough, Brigitte Steffen wants to combine these elements into a portal which links together networks and achieves two things: students benefitting because they receive exposure to a wide public, including potential employers, and the University becoming more attractive to the best students. "And if we use the portal to succeed in getting third-party funding from companies and providing these companies additional value," adds Steffen, "then that's a win-win-win situation!"

BERND MÜLLER

Professor Steffen's classes involve discussion of the various ways of presenting students' projects digitally – here using the example of a trainer.

Professor Dr-Ing. Volker Jehle receives the 2019 research prize. The wet-laid non-woven fabric machine at Reutlingen University is the only one of its kind at a university in all of Germany.

A passionate non-woven fabrics researcher

Professor Dr-Ing. Volker Jehle was awarded the 2019 research prize at Reutlingen University. His specialist field? Non-woven fabrics that can be used in countless everyday applications. Jehle has introduced a unique infrastructure for researching and developing non-woven fabrics.

Whether in the filter of an extractor hood, in the wound dressing part of a sticking plaster, as insulating material in cars, or for the super-absorbent material in babies' nappies – non-woven fabrics have been an important resource for mankind for several millennia, especially since they also include felt and handmade paper. So a lay person might think there was nothing left to research. "Quite the opposite," says Volker Jehle, professor of fibre, yarn and non-woven fabric technologies at Reutlingen University. As he explains, non-woven fabrics are today's high-tech products that keep surprising us with ever more remarkable properties and are far from exhausted. Whether it's fabrics for gas turbine blades that can withstand temperatures in excess of 1000 degrees Celsius or brake discs coated with ceramic fibres – Jehle is familiar with a wide range of applications. And he knows them not from mere hearsay, but because he has been a frontline researcher on the subject. For this reason, the University awarded him with the 2019 research prize.

Jehle has risen to become a W3-rank professor, also known as a research professor. "A lecturing professor can do research if they want, whereas I have to," says the 49-year-old with a wink. Although considering how much he loves what he does, it would be hard to say he was being forced! Textiles and non-woven fabrics have appealed to him ever since he earned his doctorate. Having spent ten years in the industry, he has been building the non-woven technology research field at Reutlingen since 2013, as prior to then it did not exist at the School. While this brings into the University a field which is rich in tradition and holds plenty of promise for the future, it also fills a gap in terms of teaching. Indeed, knowledge about non-wovens is essential for all students who want to begin a career that involves textiles in some way or other.

There are many different types of non-woven fabric, made using a range of manufacturing methods. However, they all have one thing in common: they don't need any knitting or weaving. Jehle is specialised in wet-laid non-woven fabrics, in which the fibre flocks are dissolved in water and pumped into a strainer – a process similar to making paper, only much more delicate and with a high degree of reproducibility. A range of fibre materials are available for this purpose, including ceramic, metals and plant fibres – these last two have lots of potential for a circular economy. Alongside his colleague Nancy-Jane Biller, Jehle works on non-wovens that can be made into decorative composite panels for use in furniture. The raw material is fibres, such as those from the cultivation of hops, which are left over from fermentation in biogas plants and cannot be used as fertiliser on fields. Jehle is breaking down barriers in the industry with a revolutionary idea – turning waste into new furniture that can be easily recycled or disposed of afterwards. "Companies are showing a lot of interest in it."

The same goes for many of the projects being worked on by the team. Jehle raises hundreds of thousands of euros each year for his research, making him the second most successful professor at the University in terms of raising third-party funding. The Steinbeis Transfer Centre for Innovative Non-woven Technology in Bad Urach, which Jehle founded in 2017 and of which he acts as director, provides a lot of assistance. It acts as a bridge to industry and markets the research results of the working group at the University. The professor also works closely with other research institutes. For example, with the German Aerospace Center in Stuttgart, he is developing a carbon-ceramic coating for brake discs which is designed to be much cheaper and would involve far fewer manufacturing processes.

So what non-woven material is right at the top of Volker Jehle's to-do list? This is a question that he already knows the answer to: "I ride a motorbike, and my dream is to invent a material for bike clothes that don't make you sweat when you're stuck in traffic on a sunny day." He might just be on to something there. "My students have said they want to develop a non-woven fabric with me that actively cools your body."

BERND MÜLLER

Cellulose fibres and flower seeds are worked into a fleece in a wet-laid non-woven fabric machine.

AC
Angewandte Chemie

Good reasons to study one of our programmes:

- Interdisciplinary, practically and internationally oriented study programmes
- Interesting research projects
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- Personal supervision by professors and lab engineers
- Good career prospects
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Students

443

Occupational fields

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Study programmes

Bachelor:

- Applied Chemistry
- Biomedical Sciences

Master:

- Biomedical Sciences
- Interdisciplinary Product Development
- Polymer & Process Analytical Chemistry
- Environmental Protection

Over the borders: research and learning in a network

For 30 years, Reutlingen University has been working with three other institutions in Baden-Württemberg to train students in the Environmental Master's Degree programme. The collaborative programme with Hohenheim University brings with it the option of doing a doctorate at Reutlingen University, where Professor Petra Kluger supervises doctoral candidates. A further path to a doctorate leads via the cooperative doctorate run by Reutlingen University and the University of Tübingen. This integration of different research groups in the field of biomaterials research is entering its fourth year. The School of Applied Chemistry also has long-term partnerships abroad. In 2019, the collaboration with Nanjing Tech University led to a summer school for Chinese students.

Soil or water experiments are conducted in the environmental analysis laboratory.

Protecting the environment for 30 years

In the winter semester of 2019/2020, the University celebrated 30 years of its Master's in Environmental Protection programme. The collaboration between the universities of applied sciences in Reutlingen, Nürtingen, Esslingen and Stuttgart began in 1989 as a postgraduate programme which ten years later became a full master's programme that always responded to the ongoing changes in the environment. Since then, the programme has produced over 1,000 graduates.

In December, the University celebrated the programme's anniversary. Participants used the event to take stock of how environmental protection has changed as a discipline. In 1970, environmentalist ideas were already arriving at European shores with the first ever 'Earth Day' from the US, which had a particular impact in Germany. The German press reported a "poisoned environment" (vergiftete Umwelt) at the time, as well as environmental disasters worldwide caused by industrial pollution and emissions. Even the Club of Rome was for the first time pointing out the finite nature of resources. The environmental movement was born, and it began to influence lawmakers. Since then, extensive national and international regulations have been put in place and environmentalists have been able to chalk up some real successes: air pollution in population centres has been reduced dramatically, the water quality in rivers and lakes has been improved significantly, and thanks to the worldwide ban on CFCs, the atmosphere's ozone layer is returning to how it was in its pre-industrial state.

At the beginning of this movement, 'end-of-pipe' technologies were used to filter out pollutants very effectively in a relatively simple way. This was followed by environmental protection being integrated into the means of production, whereby entire production processes were upgraded to ensure low pollutant emissions and low environmental impact. Almost every time, it has been clear-cut cause-and-effect relationships that have led to the right corrective technologies being developed and applied.

Despite all these successes, young people in particular are now insisting on solutions to unsolved environmental problems, which are mainly related to the size of the population and the world's increasing mechanisation, and which are far more complex than anything that has been dealt with in the past.

One of these complex environmental problems is, of course, climate change, which has been observed by the Intergovernmental Panel on Climate Change (IPCC) since 1988. The Panel collates and evaluates scientific evidence and global research into the causes and effects of climate change, as well as its risks and the potential strategies for adapting to or mitigating it. It thus represents the opinion of the global scientific community, namely that only rapid and significant reduction in greenhouse gas emissions – especially CO_2 – can prevent a dangerously high increase in global temperatures.

Another environmental concern is the decline in biodiversity. Our responsibility is to examine the scientific research and condense it into something policymakers can understand. The latest Global Assessment Report has confirmed that the biosphere on which the entire human race depends is changing in ways that have never been witnessed before. Meanwhile, biodiversity is declining faster than ever before observed in human history.

The Master's in Environmental Protection at Reutlingen University is intended to equip graduates with the skills to develop reliable and sustainable solutions for the future and to help them tackle these challenges throughout their careers.

Subjects such as water pollution control, methods of wastewater treatment, prevention of air pollution and sustainable environmental development are the focus of this applied course of study. In the University's own well-equipped laboratories, and in subject-specific excursions and seminars, students learn applied principles relating to environmental protection and its various social, technical and eco-biological aspects.

PROFESSOR DR WOLFGANG HONNEN

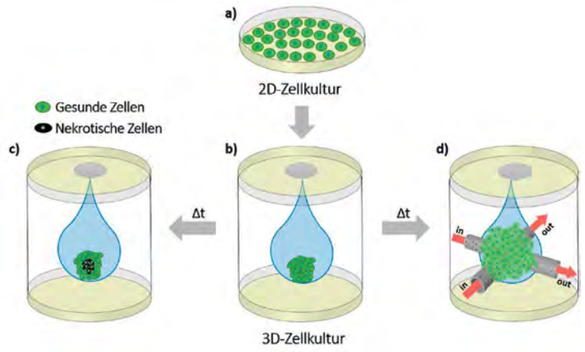
The next round of research

As an amalgamation of different research groups, the Reutlingen/Tübingen collaborative doctoral programme is working on the subject of biomaterials, and is developing materials with special properties for use in medical and cell-culture technologies. The research project by Miriam Scholz, one of the eleven doctoral students, will be funded by the Vector Foundation.

Miriam's doctoral thesis on cancer research focuses on the investigation of a new, potential biomolecule for the treatment of brain tumours. With this technology, there is no need for the use of animal models.

In her current project, she is developing a biocompatible duct system for the supply of spherical cell aggregates. Using computer simulations and a high-precision technique based on two-photon lithography, Miriam is developing a delicate duct system which is then subjected to pressure and populated with tumour cells. This duct system is used to supply nutrients to the tumour cells, including its internal structure, so that the core does not die. With this comprehensive supply of nutrients, it is ultimately hoped that such artificial tumours would then be able to reach a size that has never before been possible. This results in an in-vitro cell model being created which accurately mimics the conditions in a living host – all without the need for animal testing. For her unconventional research project, Miriam is being funded by the Vector Foundation for the fourth year of her doctoral programme.

MAREN HALDENWANG



From 2D to 3D: Tumour cells grow into a spherical cell culture system (a, b) in a droplet of nutrient solution. When it reaches a certain size, cells in the centre of the spheroid begin to die due to a lack of nutrients (c). With an artificial duct system, this effect can be counteracted, allowing the growth of larger tumours (d).

Students and young scientists from China feel at home at the University.

Collaboration with tradition

For many years, there has been fruitful partnership between the state of Baden-Württemberg and the eastern Chinese province of Jiangsu. Reutlingen University also benefits from this, creating opportunities for exchange in the field of biotechnology in a dedicated Sino-German workshop and a summer school.

The annual event is used to facilitate scientific collaboration between Chinese scientists and German researchers on the latest issues in biotechnology. More specifically, the project aims to develop new strategies for advancing the field of biotechnology in both countries.

Since 2019, the Faculty of Applied Chemistry has hosted a school for students and junior scientists from China, organised by Professor Dr Rumen Krastev. The school involves lectures, tutorials and practical experiments on the subject of new materials and surface modifications used to control biotechnology processes.

Kein Tang, a PhD student in biochemistry, found the two-week summer school incredibly enjoyable: "We learned about a number of different techniques for identifying chemical substances on a qualitative and quantitative basis. It will help me a lot with my studies back in China."

For Zhao Ming as well, the summer school included a lot of new and interesting experiences: "I like Germany a lot. That said, the food is a little different from what I'm used to." She goes on: "Studying at Reutlingen University is really great. The buildings are much smaller and less confusing than ours in China."

Reutlingen will continue to work closely with Nanjing Tech University so that the summer school with Chinese students at the Faculty of Applied Chemistry will become a tradition.

MAREN HALDENWANG

DNA sequences that contribute to the onset of type-II diabetes can be analysed using the model derived from the bio-ink.

Collaboration resulting in rights to award doctorates

In Baden-Württemberg, a new form of collaboration is allowing universities of applied sciences to work closely with traditional institutions. Professor Dr Petra Kluger from Reutlingen University is the first to benefit state-wide from association with the University of Hohenheim and, as an associated professor, is qualified to supervise doctoral candidates.

As a new form of collaboration, this association is intended to last at least ten years. Petra Kluger now has the right to award doctorates for this period of time. This collaborative relationship is beneficial not just to Reutlingen University but also to the University of Hohenheim. Formally speaking, doctoral supervision is integrated into the traditional university, but colleagues that are 'associated' in this way are exempt from certain obligations, like committee work or other administrative duties.

Franziska Albrecht has benefitted enormously from this association as the first doctoral candidate at Reutlingen University. The goal of the collaborative 'T2D-Gene-3D' project in conjunction with Professor Dr Melina Claussnitzer from the University of Hohenheim is to investigate the epigenome of type-II diabetes using 3D human fat-tissue models developed in the lab in order to identify new approaches for potential treatments. At Reutlingen University, the focus of research is on developing the physiological 3D-printed test model in order to replicate the natural environment of the cells as accurately as possible.

For her doctoral studies, Franziska Albrecht is first developing what is called a 'bio-ink', which is made from plant-based molecules and bodily substances, in order to print a fat-tissue model in 3D. The requirements for the bio-ink are stringent. As well as adhering to the standards that are usually applied in tissue engineering, such as biocompatibility (i.e. the compatibility of a material with human tissue), the bio-ink must also be soft enough so that the fat cells can form and remain in place. At the same time, it has to be stable enough so that the printed model keeps its shape for a number of weeks. The models Albrecht is developing in her doctoral programme will then be analysed and evaluated epigenetically, which involves searching for sequences of DNA that contribute to the development of type-II diabetes through epigenetic changes. Once identified, the plan is to modify the suspect DNA sequences using a method based on CRISPR/Cas9 in order to open new avenues for developing drugs to treat type-II diabetes.

MAREN HALDENWANG

ESB BUSINESS SCHOOL

Good reasons to study one of our programmes:

- Outstanding, innovative teaching with an international orientation
- Focused, application-oriented research
- International partnerships with business, institutions of higher education, research
- Consistent practical training in all areas, by teaching staff, partnerships with companies, projects
- One of Germany's biggest alumni networks
- High degree of extra-curricular involvement by students
- Responsible and values-conscious behaviour

Students **2.142**

Share of international students **~30 %**

Occupational fields

Business and organisations in international contexts:

business consulting, consulting, marketing, controlling, finance, personnel management, strategy, industrial facilities planning and construction, logistics, production, flow of materials, materials administration, accounting, machine and systems design, quality management and assurance, technical sales and distribution/purchasing

Study programmes

Bachelor:

- International Business
- International Management Double Degree
- International Operations and Logistics Management
- Production Management

Master:

- European Management Studies
- Digital Industrial Management and Engineering
- International Accounting, Controlling and Taxation
- International Business Development
- International Management (MSc/MBA full-time, part-time)
- Operations Management

Networking in the Champions League of business schools

Since July 2019, the ESB Business School has been accredited by AACSB International (Association to Advance Collegiate Schools of Business). This puts the School in the league of just five per cent of all business schools worldwide that have received this accolade.

A five-year qualifying round – what happens in this time?
The former Dean, Professor Dr Andreas Taschner, supervised the accreditation process together with the accreditation team during his tenure. What does this qualification stage involve? "AACSB focuses on the strategy adopted by a business school. To achieve AACSB accreditation, an institution needs to be confident in its values and know what sets them apart from the competition, and it has to apply this mindset to all its processes. The AACSB also has its own quality criteria, for example in terms of organisation, teaching, research or human resources," says Taschner.

Work began in 2013 with the application for admission to the accreditation process. In order to do this, there were a number of initial requirements the School had to meet. This was followed by a comprehensive process of organisational development. "Over the past few years, we have established a range of new processes and incentive schemes, new committees, new research focus areas, and put lots of resources in place for our key strategic priorities," adds Taschner. An AACSB mentor supervised the development of the ESB Business School during the entire process. On two occasions each year, he was at ESB for several days and provided useful feedback and expertise. Both the mentor and the School themselves reported on progress to the AACSB each year. After three reports the time had come – a green light for the final visit of the peer review team. During their visit in May 2019, the ESB Business School convinced the team that it met the AACSB's high standards. "It quickly became clear to the AACSB that we are serious about our international outlook and practical relevance," says Taschner, "We also had very good basis for most of the general quality standards."

Networking in the 'Hall of Fame': the ESB attends the AACSB Conference
No sooner had the ESB achieved 'Champions League' status among business schools than they suddenly realised the acute opportunity to network with other members of the AACSB community. At the 2019 EMEA conference of the AACSB in Krakow, partners from all over Europe, Africa and the Middle East met to discuss current topics under the motto "Business Schools as Enablers of Global Prosperity". On the agenda: How can business schools positively influence and promote innovation and entrepreneurship? What does responsible management training look like? How do business schools assert themselves in change processes? And how can they take advantage of technological progress?

The second AACSB conference: presentation of certificates at the AACSB in Krakow. Left to right: Stephen Schneider, Quality Assurance, AACSB Accreditation, Professor Dr Andreas Taschner and Tim Mescon, Executive Vice President and Chief Officer, EMEA, at AACSB International

The ESB has been awarded the AACSB mark of quality
AACSB International – the Association to Advance Collegiate Schools of Business (AACSB) is one of the most important accreditation organisations for business studies. AACSB accreditation is an accolade held by only five per cent of all business schools worldwide. The accreditation confirms that the ESB meets the highest quality standards in education and research.

Professor Dr Taschner talks about the accreditation process

In the AACSB community, there are numerous opportunities to learn from our peers. The AACSB offers a variety of networking opportunities, seminars and conferences. "In the future, we will receive suggestions and best practices from the best institutions worldwide," adds Taschner, who was personally present at the conference as one of his final official duties as Dean of the ESB.

No time for resting on our laurels
Professor Dr Christoph Binder, Dean at the ESB Business School since October 2019, looks at the opportunities and challenges for the coming years arising from AACSB accreditation. He trusts the core brand of the ESB: "the well-functioning 'DNA' of the ESB should be maintained, but at the same time we want to make sure we are always on the ball as an academic institution, an employer and a partner to businesses and our counterpart universities around the world. On top of that, we want to make sure we're continually improving ourselves."

In addition to AACSB accreditation, the ESB Business School has an ongoing commitment to ensuring quality processes and procedures thanks to its system accreditation and the associated routine internal audits of its degree programmes. For example, the quality-assurance concept known as 'assurance of learning' in all degree programmes ensures that students are taught the right skills and that core strategic elements of the School are firmly anchored in the relevant curricula.

Over the coming years, the School will also focus on developing our academic research and publication profile, maintaining our 'faculty qualifications' and pursuing the ESB's strategy in areas such as digital transformation and sustainability.

AACSB will also look into offering new opportunities in terms of collaboration and partnerships. "We have received a lot of positive feedback from the AACSB community around the world for how we work with our corporate partners," says Binder. The other business schools were impressed by the ESB's thriving alumni network, the career fairs on campus and its collaboration with partners in the business world. Our links to businesses pursue a range of objectives, including working with graduates to develop their skill profiles. "With the AACSB, we now have the opportunity to be selective in getting more university partners on board from specific countries and locales and to ensure the quality of the partner programme," says the new Dean regarding his perspective on the coming years.

With that in mind, we're ready to take on the next challenge!

JESSICA STEPANEK

Changing hands: Professor Dr Binder becomes the new Dean

Fully connected with the VR headset

Virtual reality with limited resources: A team of seven students under the direction of Professor Dr-Ing. Dominik Lucke took up the challenge last summer semester – showing incredible creativity, perseverance and teamwork.

An assignment issued to a group of students as part of the MSc in Operations Management at the beginning of the 2019 summer semester involved development and production of a VR headset, specific design and pricing specifications, and media content produced in-house and tailored to the ESB Business School. The 'VR ESB' project team were thrilled to get started. At 'werk150' – the teaching and research environment on campus – a laser cutter, a 3D printer, CAD software and a robot were provided to help the aspiring engineers during production and assembly.

Teamwork is the key to success

The various responsibilities were distributed clearly within the team: Katharina Grimm and Steffen Honigmann were in charge of purchasing and development of the 360° video, Philipp Jauch selected production equipment and developed the video, Daniel Kuhn built the headset and the assembly workstation, Giuliano Ferraro built the assembly workstation and was in charge of robot programming, and Vera Sackmann helped to develop and produce the VR headsets.

Maintaining a good network is a good idea at every stage of project work, and this was clear right from the outset: "One example is the requirement that VR glasses should have an ESB-specific design. The design team considers how these specifications can be integrated into the headset, the production planning team devises a potential production pipeline, and the purchasing team ensures that the materials are within the price range – that is, four euros per headset," explains Honigmann. The importance of ongoing consultation with the client became clear when the group showed their professor the initial design concept after three weeks. Acting as a 'critical customer' of sorts, the initial evaluation was fairly negative. However, this was no major setback for the team: alternative ideas and solutions were quickly at hand. Erring this time on the side of caution, the team conducted a survey to ascertain what was important when it comes to VR headsets. As a result, the headsets were fitted with lenses that are adjustable based on the distance between the eyes, foam rubber padding for wearing comfort and they came in three different designs: 'Interconnected', 'International' and 'Spirit'. The assembly workstation was tooled up, and the robot did the gluing and folding of the cardboard blanks for the body of the headsets. Work was also done to personalise the headsets, with lettering on the front and a QR code on the side that contained a link to the 360° video. The video for the headset began to take shape and it soon enough showed the virtual visitor campus, library and canteen from the perspective of an aspiring engineer.

As the final presentation deadline loomed, it became clear to the students once again that maintaining a good network helped the team to avoid issues. To ensure the lenses were provided on schedule, the design team were contacted in good time so they could be prompted to decide on the right model. Teamwork and nerves of steel were required, particularly when the robot suddenly started to have a life of its own the day before the trade fair premiere.

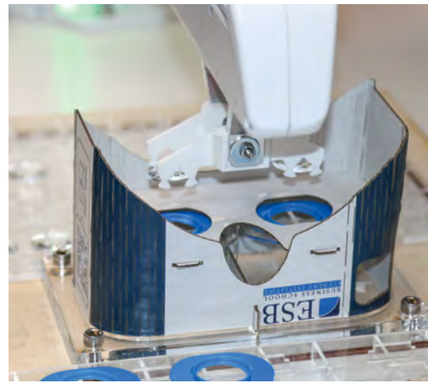
A growing network

All of the team's efforts eventually paid off. The VR ESB project team gained a lot of practical experience, had lots of fun and is rightly proud of the results. The university then used the product as a special give-away at trade fairs and events. This way, visitors to the open day at werk150 were given the opportunity to assemble their own headsets and take them home. Visitors of all ages were fascinated. "Technologies like this headset are more memorable than a pen or a USB stick," says Professor Lucke. The virtual insight into everyday student life in the 360° video is also unique and gives relatives and prospective students an authentic impression of campus life. Meanwhile, students in the next semester have developed another 360° film, which takes the viewer through a virtual tour of werk150. Evidently, one great idea goes a long way. The final takeaway of the VR ESB team painted a very clear picture, namely that it was a project that benefitted everyone – they learned a lot and the university had the chance to enhance its profile.

JESSICA STEPANEK

You can find out more about werk150 on page 68.

> VR is a term that refers to a virtual reality created using special software and hardware. This might be a realistic archaeological visit to historic civilisations or a simulated flight in a spaceship, or a true-to-scale tour through a construction project. The key element is the VR headset, which adjusts the displayed image based on the position and orientation of your head. This creates the impression of being present in virtual reality.



INF
Informatik

Good reasons to study one of our programmes:

- Outstanding reputation among students, business, and partner institutions
- Study programmes in future-oriented areas
- Excellent career prospects
- Option to study for a cooperative doctorate

Students

836

Occupational fields

IT development, IT consulting, management, logistics, programming, advertising and internet agencies, health sector

Study programmes

Bachelor:

- Media and Communications Informatics
- Medical Technical Informatics
- Business Informatics

Master:

- Digital Business Engineering
- Human Centered Computing
- Business Informatics

Many paths to success

The recipe for success at the School of Informatics

What is the School of Informatics like to study at and why does it consistently score well in league tables? The reason is a whole range of services available to students even before the course starts. In the 'INF staRT week', freshers have the opportunity to refresh their maths skills and to get a flavour of the diverse range of topics covered by computer science. The curriculum of the computer science studies programme includes theory with plenty of practical application and encourages students to implement their own ideas and work together in a team from the very beginning. In addition, the School of Informatics offers other initiatives, such as the hackathon, that enable students to acquire further skills and practical experience.

ALFRED SIEWE-REINKE, IRENE MERDIAN

Starting your studies – meeting your new classmates

With the 'staRT your studies!' project, which is funded by the Baden-Württemberg Ministry of Science, Research and the Arts, Reutlingen University offers 'staRT weeks' two weeks before the start of the semester to prepare students for their studies. For example, the School of Informatics offers the 'INF staRT week', giving freshers lots of information about the School and course content.

Here, you can sharpen your maths skills, get an insight into the basic concepts of computer science and start learning programming. Students can also get to know the university campus and the School so they know what to expect on their first day of study. It is especially important that the students get to know each other and benefit from each other's experience. The 'INF staRT week' is ideal for this because it involves students who are further on in the degree programme.

THE STARTING WEEK OF THE COMPUTER SCIENCE PROGRAMME DISPELS A LOT OF DOUBTS PEOPLE MIGHT HAVE, SUCH AS "WILL I GET THE HANG OF THINGS?" OR "WILL I MANAGE TO STUDY COMPUTER SCIENCE EVEN THOUGH I HAVE NO PREVIOUS KNOWLEDGE?" IT ALSO MEANS YOU CAN GET TO KNOW YOUR CLASSMATES BEFORE THE COURSE STARTS IN EARNEST.

Sandra Wickner is in the fourth year of her Medical Informatics course at Reutlingen.

Our approach: Teaching and learning methods at the School of Informatics

The School closely links theory and practice in all courses of study. A good computer-science degree not only includes the acquisition of sound knowledge, but also the 21st-century skills required for the job market, such as teamwork and communication. This combined approach is the central tenet of the way we teach at the School of Informatics.

Bachelor of Medical Informatics
Right at the beginning of their studies, students work independently on a topic from the *Medical Informatics* and *Standard and Processes* modules. Here work will be done in small groups. It pays off if you have already got to know your classmates in the staRT week or the freshers weekend. There is a writing workshop available as well as an introduction to scientific working methods.

Bachelor in Media and Communication Informatics
Using cutting-edge web applications like Facebook or Instagram as examples, students in the first and third semesters of the *Software Engineering* programme learn the specifications of a complex software system.

In the course of the semester, students work in small teams on three practical activities in order to gradually develop the specification of a complex software system. This involves, for example, what the web application will do, how the interface can be designed and how the system will interact with the user.

Master's in Business Informatics
The elective subject *Data Science/Statistical Learning* in the master's programme in Business Informatics introduces students to basic concepts of statistical learning that are currently used in research and practice (such as machine learning and predictive analytics). The focus is less on the mathematical details of the methods and more on developing an understanding of data, models and their relationships. Following the concept of problem-oriented learning, students develop skills independently using case studies.

Hackathon – practical "speed learning"

In addition to placements and projects, the School of Informatics is increasingly focusing on hackathons, where students have to put their ideas into practice over one or two days. This form of learning is firmly established in the master's degree course in Digital Business Engineering and is even part of the examinations. In November 2019, the Business Informatics programme organised an international hackathon together with the universities of Vilnius, Tartu and Latvia. "With this idea, we hope to improve international collaboration between universities, because these regions are very innovative in the field of IT," said Professor Armin Roth, who set up the hackathon at Reutlingen. The hackathon in Reutlingen was about developing a solution for displaying digital sensor data to users. After two introduction days with theory and soldering trials on a circuit board, the teams had 24 hours to implement their idea and then present it to a panel of judges in a four-minute presentation. "We generally do this during our studies in projects that extend over one or two semesters. In the hackathon, however, everything is compressed down to 24 hours. You can't think about sleep and you really have to work perfectly together in a team," said Wjatscheslav Baumung, who supervised the workshop in Reutlingen together with Professor Armin Roth. A team of computer scientists and business economists won the prize, which was donated by the software company Aicomp. "Computer scientists often get lost in the detail. When finally presenting to the panel of judges, however, it is important to present the basic idea, and the business-savvy people are often better at this, which is one of the reasons why studying Business Information Technology is so important," says Wjatscheslav. The Reutlingen doctoral student is himself something of a pioneer in the idea of international cooperation, which the hackathon aims to advance further. He is completing a doctorate in Reutlingen in association with the University of Latvia.

Exhausted but thrilled – teams at the award ceremony hosted by Prof. Dr Herbert Glöckle, Reutlingen University.

"What I learned in my degree was in high demand on placement."

"I wanted to experience a clinic from the inside and learn about how the doctors work there so that I could get a better idea of what software to develop so that it is actually used." This is how it all began for Patrick Beyersdorfer when he applied for an internship during his bachelor's degree in Medical Informatics at the start of 2019. As part of the programme, the university hospital for general, abdominal and transplant surgery in Tübingen was chosen. This was based on advice from his professor Dr Oliver Burgert – advice that was to pay off for the young student.

On the one hand, Patrick was able to experience the ideal working day of the surgeons, the kind of stress they are facing on a daily basis, and how much they have to do at any given time. On the other hand, he also got the chance to actively participate in the working group for surgical technology and training. The working group deals with issues relating to intraoperative assistance systems, robotics and the modern training of physicians. "It was great that I was included in the working group and its projects from day one, as my knowledge from four semesters at Reutlingen University was really in demand."

Patrick seized this unexpected opportunity and developed a training system for minimally invasive surgery, in which the operation is monitored with endoscopic cameras. "Since the operation is observed from a monitor, it's easy to lose track of your tactile senses. This means that the instruments can damage tissue without you feeling or seeing it. That was the problem I decided to address."

Patrick got to work developing a prototype that monitors whether the instruments used are actually visible on the observation screen during an operation. If this is not the case, a warning message appears on the monitor and there is an audible warning signal. Further research is needed before the system can become fully operational, because there are still a few issues relating to accuracy during certain phases of surgery – even relatively minor errors would be unthinkable in the medical field.

Patrick is also transforming the training programme for doctors at the university hospital into a digital service during his several-month-long internship. The new e-learning portal enables trainees to learn and practise independently. In addition, they receive immediate feedback as to whether they have solved the problems correctly and can watch explanations or videos on the topic as required.

Professor Dr Andres Kirschniak's team at the university hospital was so pleased with the results of Patrick's work that the Reutlingen student was even allowed to present the results on behalf of the team at two scientific conferences. "For me, the placement was an ideal experience that gave me the assurance that I'm on the right path, and so I'm eager to keep going and see where it could lead," says Patrick, who will continue to work with the Tübingen medical team after his placement.

Patrick Beyersdorfer (right) with Dr Jens Rolinger

The founding team of Rehago (from left to right): Johannes Höfener, Melanie Schweis, Anika Ochsenfahrt, Philipp Zajac

Who dares wins – Rehago's start-up story

With their start-up company Rehago, four young graduates implemented an idea from the field of medical informatics – one which they had already developed during their degree programme. This involved developing a virtual solution for mirror therapy, whereby people that were paralysed on one side of their bodies, such as after a stroke, learn to move their paralysed half again. In this therapy technique, neurologists use a mirror to trick the brain into thinking that it can move the diseased limbs after all. The young entrepreneurs came up with the idea of displaying everything mirror-inverted with specially developed virtual reality headsets. "For the training, for example of a paralysed arm, the patient puts on our headset and then sees in virtual reality how his or her supposedly paralysed arm begins to move. With this trick, the brain learns to move the arm again in reality," explains co-founder Philipp Zajac. The VR headsets developed in this way were so well received by therapists that they decided to establish the new company in 2018.

The team maintains association with the office of Professor Dr Oliver Burgert in the School of Informatics, who teaches the Medical Informatics degree programme. With this support, the start-up was able to submit applications for the EXIST start-up grant and the "Innovative Start-ups for Human-Technology Interaction" funding programme run by the German Federal Ministry of Education and Research, which have since been approved.

The young entrepreneurs are currently working on getting the technology approved as a medical device. Until then, Rehago is not permitted to market the product as a therapy device, but instead as a training device. However, the founders are confident that Rehago will achieve long-term success. They received a start-up grant from the German Federal Ministry of Education and Research for their idea and won the 'Life's a Pitch' prize from Samsung.

TD
Textil & Design

Good reasons to study one of our programmes:

- One of the world's leading textiles training institutions
- Outstanding teaching and supervision by professors
- Practical orientation and direct collaboration with partners in industry
- Unique selection of textiles machinery
- Excellent research and new interdisciplinary orientation
- Option to study for a cooperative doctorate

Students

609

Occupational fields

Production management/planning, product development/management, marketing, sales, logistics, purchasing, advice, controlling, process management, textile design, fashion design, interior design

Study programmes

Bachelor:

- International Fashion Retail
- Transportation Interior Design
- Textile Technology – Textile Management
- Textile Design/Fashion Design

Master:

- Interdisciplinary Product Development
- Textile Chain Research
- Design

Versatile textiles

Since October 2019, a new dean has been managing the School of Textiles and Design together with an equally new team of board members. The new dean and fashion management expert, Professor Dr Jochen Strähle, talks to camplus about his ambitions, vision and challenges.

INTERVIEW: SASKIA GROSS

What objectives do you have for your tenure as Dean and what are your priorities?
Jochen Strähle: On the board, we have set out three objectives. The first is the re-accreditation of all seven degree programmes, with the aim of leveraging improved connectivity and synergy within the School. The second is to ultimately bring the Texoversum project to life and thus create a place where innovation relating to textiles can be cultivated. And our third objective is to make Reutlingen University, including us as a School, once again the first port of call for studying textiles in Germany. For me, the focus should be on people. Our vision is to shape the world of tomorrow through textiles and to only do things here that help people and society. This starts with us as employees and ultimately goes beyond the students into society more broadly. Our students must be able to feel like they can grow as people. Our job is to give them the opportunity to do so, and this will allow us to generate real value for society.

You have held various management positions in the fashion industry. What experiences have you gained from this that you can apply in your current role as Dean?
Strähle: First of all, the legacy of the past can only endure through change. In other words, you have to change things if you want to improve them. Secondly, in every organisation, there are many dormant talents of which we are initially unaware. Helping to uncover this talent and harness it is incredibly powerful. Thirdly, without the people in the School there is nothing but an empty shell, and this also applies to businesses too. That is the most important point to understand.

"OUR VISION IS TO SHAPE THE WORLD OF TOMORROW THROUGH TEXTILES AND TO ONLY DO THINGS HERE THAT HELP PEOPLE AND SOCIETY."

In office since October 2019: Professor Dr Jochen Strähle, Dean of the School of Textiles and Design

The new board at the School of Textiles and Design with the Dean, Prof. Dr Jochen Strähle (left to right): Prof. Dr Klaus Meier, Prof. Dr Jochen Strähle, Prof. Henning Eichinger and Prof. Dr Torsten Textor.

What is your vision for how the School will look in ten years?
Strähle: At the 175th anniversary celebrations in ten years' time, we must be the first port of call for studying textiles in Germany. Our name should appear alongside institutions where innovation for the textile industry is born. That goes for education in general, university education, advanced training, innovation and policy as well. Once we have reached that stage, we will have accomplished our mission.

What challenges do you foresee for the textiles industry and, by extension, the School?
Strähle: The German perspective on the textiles industry has changed. Production no longer takes place here on a large scale, which is why the industry is said to be less relevant to Germany. In global terms, however, it is one of the largest globally connected employers. When you occupy a nonetheless relevant field at a location with this perspective and long-term manageable production, it is definitely a challenge. There are numerous areas in which textiles play a major role. And it must not be confused or equated with clothing alone. Medicine, mobility and architecture in particular are major fields in which textiles will play a leading role in the future. I also believe that, compared to other industries, the textile industry has an image problem – it has to struggle with the broader perception of textiles. The question is how to get young people excited about the fact that textiles are (a) more complex than they appear on the surface and (b) are a field that will be much closer to people's real-world environments going forward than perhaps other sectors will be. Textiles are finding their way into many fields that we will need more and more in the future. Take the medical sector, for example – we have an ageing population so textiles can play a role in providing better care. People are also becoming increasingly mobile and need modern solutions. Lightweight construction is playing an increasingly important role, with textiles the key factor. And let's not forget the clothing industry as well. Many of the excesses of the climate crisis can also be traced back to textiles production – and solutions are urgently needed in this area. These solutions must be found, and that is our social responsibility.

Which skills among students and graduates of the School are particularly important to you?
Strähle: Every Reutlingen textiles graduate has a basic knowledge of technology, design and business administration, regardless of what they studied. This is a unique approach which is anchored into the basic values of the university. Everyone here with us has knowledge and experience of all core areas of the textiles value chain, which is unique. Our graduates possess significant expertise, coupled with the curiosity to discover new things. Although what we do might not always look glamorous, Reutlingen is where the real textiles work is done. In the short term, painting a colourful picture might have some impact, but in the long-run substance always prevails. Having an international outlook is also important for our graduates, although for this we refrain from focusing exclusively on placements abroad – it is a philosophy that guides what we do on campus as well.

"MEDICINE, MOBILITY AND ARCHITECTURE IN PARTICULAR ARE MAJOR FIELDS IN WHICH TEXTILES WILL PLAY A LEADING ROLE IN THE FUTURE."

What was the biggest surprise for you as Dean of the School?
Strähle: In terms of my role, as Dean you have a keen interest in all areas, so you perceive the diversity of your own organisation even more intensely than was the case before.

Thank you very much for talking to us.

Left: Textile fragment from Peru (likely 8th century)
Below: Angels – unusual symbolism for the Japanese Empire period – on an 18th-century pattern

History woven into 900 fabric patterns

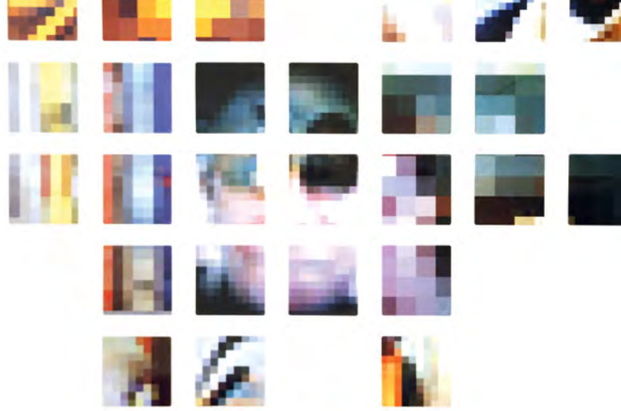
For over 80 years it lay virtually unnoticed in a secluded room – now the historical textile collection of Reutlingen University has come into the public eye. With an international textile symposium in November 2019, the School of Textiles and Design presented some of its textile collection, with a total of 500,000 specimens. Internationally renowned researchers and museum experts reported on fascinating and also curious results from textile research.

More niche items at the symposium were the 900 fabric samples from the Japanese Empire of the Edo period (1603–1868), which the Bietigheim physician Dr Erwin von Baelz had brought to Württemberg at the end of the 19th century and which have been stored at the University since 1933. "This is probably one of the best collections of its kind in the world," says Professor Dr Hans Bjarne Thomsen. A tenured professor of East Asian art history at the University of Zurich, Princeton graduate, and world-renowned expert in this field, Thomsen is confident that the historical textiles will attract a great deal of attention in the research world.

At the textiles symposium, Thomsen and his Japanese colleague Professor Dr Kazuto Sawada (National Museum of Japanese History, Tokyo) for the first time published further results of their research work conducted over several years in Reutlingen. Most of the textiles were made during the Japanese Empire period from the end of the 18th to the middle of the 19th century. The collection includes colourfully patterned handbags, kimono fragments and even belts for female samurai attire. The collection is unique in the world because of its excellent condition and the variety of weaving techniques – some of which, according to Professor Sawada, are extremely complex and very rare. He showcased textiles in bright colours and patterns, often with elaborate gold and silver threads. The Reutlingen collection includes several pieces like this and could therefore become a unique object of research worldwide. Initial research enquiries, including from the US, have already been received at the University.

BETTINE SENG

The organisation team of the international textiles symposium together with speakers and funding partners



1,000 pixels – art in the digital age

While the historic Japanese textiles collection comprises around 900 precious and unique textile patterns of inestimable value, artists from the project "SkypeLab – Transcontinental Faces and Spaces" along with Professor Henning Eichinger inspired the public and experts alike with a similar number of works of art as part of the "1,000 Pixels" exhibition at the Baden-Württemberg State Representation in Berlin.

The installation, which comprises exactly 1,000 pixels and was developed especially for the State Representation, takes the artistic results of the Skypelab project of recent years and displays image sections of artworks by all artists involved in the project with a thousand squares of the size 30 x 30 cm. Skypelab was created in 2012 through an exchange between Professor Henning Eichinger from Reutlingen University and Professor Dr Maggie McCormick from RMIT University Melbourne. Since then, they have worked together to develop and curate the Skypelab project in an effort to promote artistic exchange between students, teachers and artists about the consequences and opportunities of digital transformation. What effect does the digital revolution and social media have on art and design? In the beginning, students from Reutlingen, Melbourne and Shanghai regularly portrayed each other in the form of blind drawings via Skype, thus creating a link between traditional drawing, painting and digital technologies.

The multimedia artistic results and research work have been explored and presented in numerous international exhibitions, workshops and conferences. In the space of seven years, an artistic network has since developed that involves around 100 artists, encompassing five continents and nine cities: Reutlingen, Melbourne, Shanghai, Boston, Rio, Baranquilla, Hobart, Barcelona and Berlin.

The award-winning artist-focused research project is supported by the Baden-Württemberg Foundation to the tune of almost 90,000 euros in total – funding that comes from the Foundation's BWS plus programme, part of the Baden-Württemberg STIPENDIUM scholarship for students. The brilliantly successful 1000 Pixels exhibition in Berlin marked one of the project's highlights to date: "This was a wonderful opportunity to present our project to a captivated, expert audience in the German capital and demonstrate the new and innovative paths the university has been pursuing for a number of years now," Eichinger said.

One thing is certain: the insights gained through Skypelab are already highly praised, impressive and significant for the development of art and design in the digital age. It is possible that in 150 years, art experts will be just as enthusiastic about the collection of 1,000 pixels as renowned textile researchers were about the University's Japanese textiles collection in 2019.

SASKIA GROSS

1,000 pixels exhibition in Berlin

TEC Technik

Good reasons to study one of our programmes:

- Personal supervision by professors, tutors, and higher-semester students
- Close collaboration with industry, including in projects and theses
- Laboratories and high-quality, state-of-the-art industrial machines
- Learning industrial work procedures, launching operations, operating modern machinery under industry conditions

Students

1.055

Occupational fields

Engineering and related areas of science, research and development, project management, technical marketing and purchasing

Study programmes

Bachelor:

- International Project Engineering
- Mechanical Engineering
- Mechatronics (Automation or Micro-Electronics)
- Reutlinger Modell (Mechanical Engineering, Mechatronics)

Master:

- Distributed Energy Systems and Energy Efficiency
- Power Electronics and Micro-Electronics
- Mechanical Engineering
- Mechatronics

Cooperative doctorate:

- Distributed Energy Systems and Energy Efficiency
- Power Electronics and Micro-Electronics

Playground of the possible – when technology inspires

Imagine a playground net: thick, blue ropes connected at the nodes. Playing children, adolescents and adults create ever new patterns of movement. The net is constantly changing. This is how networked thinking and learning works for technicians and engineers.

Over many years, a network of knowledge, projects and research topics has been created and is constantly being expanded. Beginning with their studies, students have developed projects within their degree programmes in which they can gain practical experience and often face seemingly unsolvable problems: whether it's building a real aircraft as an industrial engineer, working on practical industrial challenges, researching artificial intelligence, or starting from scratch with kindergarten and school children and teaching technology in an appealing way at a high level.

KERSTIN KINDERMANN

Smart Starter pack for kids

Teaching and research at the University is focused on specific applications and projects. The students of the Faculty of Engineering at Reutlingen University are already well prepared for the demands of professional life during their studies. Projects are the life and soul of all degree programmes – to a great deal of success! Whether they're related to energy issues, 3D printing and visualisation, electronics for electromobility or energy conversion, aspiring engineers play an important role in all sectors. And in order to ensure a steady and sustainable supply of young talent, the Faculty of Engineering has taken up the cause, offering engineering projects from nursery to university and cooperating with nurseries, schools and vocational colleges. A key issue in all these projects is sustainability and consistency. From preschool age to university, the engineering projects build on each other and generate a great deal of dynamism through cooperation with nurseries, schools, project partners and businesses. Many projects are funded by the federal or state governments, especially because of their experimental way of getting children and young people, especially girls and young women, excited about engineering. In our two Smart Starter packs for nurseries and infant schools, which have been available since the winter semester 2018/2019, we are trying to give children a positive insight into the industry and thus get them interested in becoming an engineer at an early age.

No one can deny the endearment and enthusiasm of children who are in the process of discovering and implementing technology themselves. That's why we also have learning programmes that inspire children at preschool with technology boxes with scientific themes. After all, we are all delighted when another little Einstein makes a discovery or invention that improves the world.

We want to take you on a journey of discovery through the Faculty. And once again we need your imagination – imagine that today is your first day at school. In front of you stands a box with all kinds of everyday objects: screws, adhesive rollers, drinking straws, etc. You must build a snail's house from these, but without any instructions. You are only told the purpose the house should serve and what a snail needs in its accommodation.

In the 'startlearnING' project, children learn about engineering and design based on biological phenomena. The project is aimed at children between grades 3 and 4 in general studies and grades 5 and 6 in science classes. StartlearnING supports schools in teaching curriculum-based scientific and technical skills and takes the strain off teachers by providing materials, training and tutorial support. A solution does not have to correspond to a given formula. This allows young, bright minds to become up-and-coming engineers. Cooperation between Reutlingen University and Weingarten University of Education makes a valuable contribution to making the professional fields of technology and engineering more accessible and diverse. Professor Dr-Ing. Eckhard Hennig received the 2019 State Teaching Award from the Baden-Württemberg Ministry of Science, Research and the Arts for the joint learning project.

letsgoING – the demand rises

Today is your first day at high school and all your classes are about microelectronics. With letsgoING, a learning scheme from the Reutlingen University mechatronics programme, you will learn how to enter the digital world and, using the key technology of microcontrollers as an example, you will learn how algorithms work, how data is recorded and processed, and how systems are analysed and errors found.

Like with the playground net, the process involves trial and error: balancing on the blue rope until you build up the courage to get to the next node. A similar concept is the 'ArduSmartPilot' – a model aeroplane with remote control that you can design, build and fly by yourself. As a student, you will experience the core areas of mechatronics first-hand: mechanisms, drives, sensors, microcontrollers, electronics, computer science and communication technology. As is typical for a university of applied sciences, the focus here is also on practical relevance: like mechatronics students, the children build software and electronic circuits. They design mechanical parts, build kinematics and integrate all these components mechanically, electrically and algorithmically into a functional system.

In the next step, tenth-graders develop a complete mechatronic system. This will allow them to differentiate their choice of studies even before they start studying – whether it's mechatronics, electrical engineering, microelectronics or computer science. The Schüler-Ingenieur-Akademie (SIA), a student engineer academy, is a collaborative project between the Friedrich-Schiller Pfullingen and BZN Reutlingen schools, Robert Bosch GmbH, the association of the metal and electrical industry of Baden-Württemberg, Südwestmetall, the German Federal Employment Agency, and the Faculty of Engineering. The aim is to boost the attractiveness of engineering and scientific courses of study and professions, because in this combination of mechanical engineering, electronics and information technology, young people experience every single step of the work process themselves and they have the opportunity to build products such as solar-powered airships themselves.

Long-lasting academic connections

Now imagine you're running across a well-tied net and some nodes might be reinforced in some way. Now you can put the theoretical expertise you have acquired into practice in a wide variety of projects. Whether you're developing a mobility aid for wheelchair users, working with a team to assemble the wooden wings for a new aerobatic biplane, "practising" on a driving simulator, or "playing" with robots – your time studying has never lost its sense of excitement.

'KI-HNO-Battle' is a research project that allows ear, nose and throat (ENT) doctors to use artificial intelligence in their practices. With their team, Professor Dr Barbara Priwitzer and Professor Dr Michael Lauxmann are conducting research into a software system that organises and analyses the extensive information obtained in an ENT diagnostic procedure so that systematic patterns in the datasets can be identified. The technology would make it easier for physicians to perform medical diagnoses.

Increasing understanding **creates intelligent mobility.** Under this guiding principle, Professor Dr Jens Weiland is conducting research in a number of avenues, including value-adding mobility. Software development in the automotive industry has various communication challenges, such as those between the infrastructures used in cars and those in smart homes.

The **Neckar-Alb virtual power plant demonstration** project gives us some insight into the future of energy supply. Reutlingen University of Applied Sciences is thus continuing to chart its course towards the energy revolution since the introduction of the master's degree course in Distributed Energy Systems and Energy Efficiency. Initial studies show that installing a photovoltaic system on campus can reduce energy consumption by up to 5 per cent. For this purpose, additional project buildings have been constructed at the Reutlingen Energy Center for research and teaching, including a control room, a combined heat and power unit, a photovoltaic system, solar collectors, charging points for electric cars and bicycles, an adsorption refrigerator, a heat pump and the University's own weather station.

Dr-Ing. Steffen Ritter, Professor at the Faculty of Engineering, is the right person to contact when it comes to projects people talk about. His top projects have one priority: sharing knowledge. With his **'Polyman'** project, he has succeeded in the first stroke: a handy piece of plastic that is used to train tool and mould makers with its useful two-component application. Its two-colour design makes this injection-mouldable component design easy to understand. The second stroke followed in the field of additive manufacturing. Here there is a multitude of different manufacturing processes, which due to their complexity are not always understandable to the user at first glance. The **AM Field Guide**, a publication released in collaboration with Formnext, for the first time gives a uniquely structured overview of the individual procedures and the entire product development process. It's also available in three languages: German, English and Chinese. With both guides, he attracted a great deal of attention in the plastics industry, setting an example for how we can implement research and teaching: as an applied science with a high level of sustainable economic activity for the environment, progress, science and life.

To spread your net further, you will have the chance to start your own company during your studies, to connect with other students and to turn an idea into reality together that will make our world a little bit better. That's engineering in a nutshell. A thick blue playground net of curiosity, discovery, learning and progress.

Research

How AI can improve healthcare

Thinking computers, robots as the arm and eye of the surgeon, operating theatre nurses in metallic grey – it will soon be impossible to imagine the operating theatre without artificial intelligence. How can AI systems help us provide better care to patients? This was the topic discussed by around 120 participants at the annual meeting of the German Society of Computer and Robot-Assisted Surgery (CURAC) last September at Reutlingen.

For the 18th time, CURAC hosted its annual conference, now for the first time at a university of applied sciences (UAS). "It is a great honour to finally host the conference at Reutlingen," says conference president Professor Dr-Ing. Oliver Burgert, Dean of the School of Informatics. There's no denying that CURAC and the universities of applied sciences have a similar concern: using scientific research for practical applications.

A commitment to interdisciplinarity

"What is special is the close collaboration between doctors, technicians and computer scientists," adds Oliver Burgert. There were numerous lectures on topics such as robotics and navigation, image and signal processing, and virtual reality. Even unfinished ideas were presented and discussed: "I was particularly pleased that non-faculty scientists from Reutlingen University were also able to make scientific contributions. For example, Benjamin Sackmann and Dmitrii Burovikhin, co-workers of Professor Michael Lauxmann from the Faculty of Engineering, presented their research on the improvement of hearing diagnostics using mathematical models.

During a tour of the campus, which Professor Burgert organised to get the attendees excited for the conference venue, they were also given an insight into interdisciplinary research at the University: the finest bio-printing by Professor Petra Kluger (see page 70), the entire spectrum of robots in the robotics laboratory of the Faculty of Engineering, the ESB Business School's new werk150 environment, in which 5G technology, which is also relevant for clinics, is put through its paces (see page 68), and of course the Japanese textiles collection of the School of Textiles and Design (see page 58). The participants were enthusiastic "... even though most doctors have a different idea of what 'tissue' means than historical textiles," says Oliver Burgert with a wink.

Burgert himself was also excited – namely about the many ideas for new projects, the positive feedback from participants and how the event was organised. "From the President's Office to the Finance department, the technical and security officers and the caretaker – we have received the best possible support within the University. That's not always something we acknowledge."

Surgery of the future

CURAC attendees also had the opportunity to take a look at the teaching and research operating theatre of the Faculty of Informatics, which is currently under construction. A feature that could already be presented to the CURAC visitors made many of the attending clinic managers envious: the mirrored digital display panel in the washroom. Just like in a real operating theatre, students and visitors can wash themselves in here. The digital egg timer shows how long each step of the surgical hand disinfection process has to be performed. But the panel can do so much more than that. For example, using a foot pedal, the surgeon can display information about the patient he or she is about to operate on, including X-rays, laboratory findings and much more. Such a system does not yet exist on the market, but there is lots of interest being shown in the industry.

Intelligent surgery

In the office next door is the team of the research project 'OR-Pad – use of portable information display devices in the operating theatre', which is funded by the Ministry of Science, Research and the Arts as part of the transfer tender 'HAW-KMU-TT'. The aim of the project is to provide the surgeon with clinically relevant data during surgery using portable devices such as a tablet. "Our main focus is on human-technology interaction," explains Oliver Burgert. "It must allow the surgeon to interact with the tablet in a sterile environment while avoiding distractions under all circumstances, which is why it must be highly intuitive to use."

Patient data such as laboratory results and X-rays, which today are often still printed out and attached to the operating lamp, are particularly relevant here. However, Oliver Burgert has a completely different vision: an intelligent system that knows exactly what needs to be done in the operating theatre and when.

How can this be achieved? For example, the system has to know which instrument is currently being used. To determine this, all instruments, from scalpel to swab, must be tagged and recognised by the system. Another challenge is situational awareness: the system has to use learning procedures to determine the stage of the operation from current data from the surgical devices – and automatically provide the information required at that time. What's more, keeping track of who is in the room and where is anything but trivial. Using image recognition methods and artificial intelligence, the system must determine where the personnel involved in the operation are located.

Only a few institutions around the world, including the universities of Leipzig and Heidelberg, have so far been able to build expertise in this area. As small as Reutlingen University is in comparison with the big universities of the world, Oliver Burgert is surely one of the greats.

LILITH LANGEHEINE

Modern technology – modern factory

In 'werk150', the new factory on campus, the future generation of 5G wireless technology is being put through its paces. Professor Dr techn. Daniel Palm and his team want to find out whether it can really meet the needs of medium-sized companies in production and logistics.

A large light-flooded hall on campus behind building 1, numerous containers with screws and other small parts, conveyor belts and robots. At the back, a huge monitor showing the layout of the factory. The floors and stairs have an industrial appearance, and upstairs there is a modern seminar room with a magnificent view of the surrounding fields. Excavators are still smoothing the access road and not everything inside is perfect yet – but werk150, successor to the ESB Logistics Learning Factory at Reutlingen University, is already fully operational. "We are the testing ground for the factory of tomorrow," says Professor Daniel Palm, project manager of the new transfer centre '5G4KMU' – an initiative that tests 5G for small and medium-sized enterprises.

The focus is on SMEs

The joint project is funded by the regional ministry of business, labour and housing with almost five million euros. More than half a million will be donated to Reutlingen University, specifically to Professor Daniel Palm and the werk150 team. The Fraunhofer Institute for Manufacturing Engineering and Automation (IPA) and Industrial Engineering and Organisation (IAO), Campus Schwarzwald GmbH, the Fraunhofer Project Group for Automation in Medicine and Biotechnology, together with the university hospital of Mannheim and the Reutlingen University of Applied Sciences, are setting up a total of five test environments. Together with SMEs from the region, their intention is to test what the new 5G technology can – and cannot – do for SMEs. "We focus on the specific applications of SMEs – their day-to-day activities and local conditions," Palm explains.

5G, the fifth generation of mobile communications, is a hot topic because it's the key technology for digital transformation. The previous mobile telephony standards 3G (UMTS) and 4G (LTE) are long since established, but they are not sufficient to meet the needs of manufacturing industries. On paper, 5G promises a lot: a significantly higher bandwidth and thus faster data transmission; much lower latency, which is essential for direct communication with and between robots; and the ability to connect thousands of devices together.

MODERN TECHNOLOGY – MODERN FACTORY

At the new on-campus factory, werk150, the next generation of mobile telecommunications technology is being put through its paces. Professor Daniel Palm and his team are testing 5G to see if it can truly meet the demands of small and medium-sized enterprises in production and logistics.

"WE ARE THE TESTING GROUND FOR THE FACTORY OF TOMORROW."

for the supply of goods to ensure that all things in the factory are connected. This is a realistic scenario that is to be put into practice at werk150 with 5G. But the investigations here go even further than that, including mapping out the entire factory along with its processes in what is known as a 'digital twin'.

Is 5G signal fast enough for an interference-free digital twin in real time?

A digital twin is a virtual representation of a real-world entity. Probably the best known example is Google Earth, which details every tiny detail, every tree and every car on our smartphone. For factories, it would be useful to display the machine room virtually – for example to monitor the condition of the machines remotely. The amount of data required to represent the factory in all details of its behaviour is enormous. For this purpose, 5G is currently the only technology suitable for this purpose. The tests at werk150 will show whether it covers all possible application scenarios.

5G in action

But what does 5G really look like in the factory hall? Until now, the robots have been controlled via cables, but these are often in the way or too short – a mobile connection would be much more practical. Palm and his team want to find out whether 5G technology and the frequency ranges of the campus networks reserved for factory applications can meet the special requirements of the logistics industry. Companies can then operate such a network themselves and connect machines and IT systems together in the factory.

Is the 5G signal stable?

The most important thing when robots and humans work together is reliable communication with the robots. "The connection must be reliable; under no circumstances should the signal be disturbed at a key moment," says Palm. Otherwise it is possible, for example, that a robot doesn't stop in time because it misses the signal. "Then if something breaks, worst-case scenario is that someone gets hurt." Other technologies such as WiFi have limitations when used in the factory because they are disturbed by metallic environments such as machines or steel girders.

Can real-time-capable intralogistics be realised with 5G?

Mobile modes of transport such as material handling logistics trains or forklifts are particularly relevant for a wireless data connection. The hope is for logistics teams to be informed in real time about the requirements of the machines and plants and

All network partners in the 5G4KMU transfer centre are testing 5G technology in their respective key areas. The Fraunhofer Project Group for Automation in Medicine and Biotechnology and the university hospital of Mannheim are among those on board. After all, even in the operating room it is increasingly a question of connecting devices, real-time data transfer and communication between robots and doctors. You can read more about this in our report on CURAC and the annual conference of the German Society of Computer and Robot-Assisted Surgery on page 66.

"We are currently holding negotiations with mobile telephony operators to provide the necessary technology," Palm says, explaining the current status of the project. There will then be workshops with small and medium-sized enterprises to find out what their everyday requirements are. The ministry's funding runs until 2022. Until then, the project partners want to test as many use cases as possible in order to make scientifically sound conclusions, i.e. that 5G is the technology of the future.

LILITH LANGEHEINE

3K4SmartBio – a new smart biomaterials research centre

Reutlingen University has a new research centre. Under the title "Smart Biomaterials", Professor Dr Ralf Kemkemer, Professor Dr Rumen Krastev and Professor Dr Petra Kluger are pooling their expertise in the field of biomedical applications and material sciences: 3K4SmartBio – to stick with the terminology of the 5G4KMU transfer centre (see page 68).

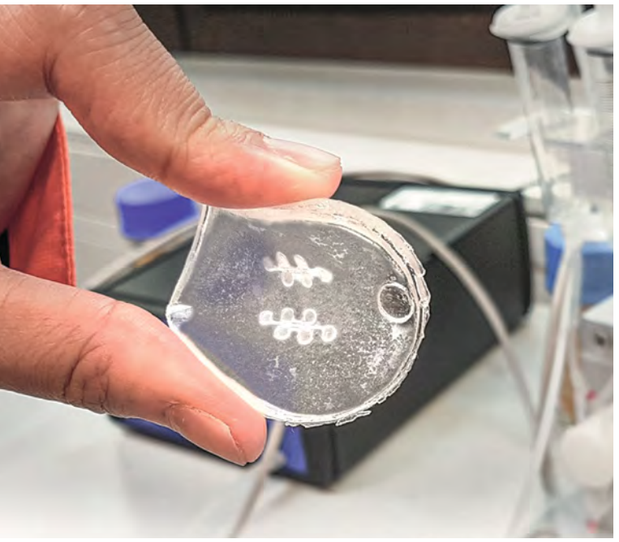
The founding members have much more in common than the 'K' in their names. All three are among the most prolific research professors at the University and bring with them different skills that complement each other perfectly: Rumen Krastev, the classical chemist with his knowledge of coatings and chemical materials for medical applications; Petra Kluger, the biologist who cultivates cells and tissue to heal wounds or replace animal testing, for example; and, as a bridge between them both, Ralf Kemkemer, the biologist and physicist with strong links to pure research. He is also group leader at the Max Planck Institute (MPI) for Medical Research and is thrilled to combine both worlds – that of applied and practical research at Reutlingen University and that of pure research at the MPI – into his day-to-day activities.

Expertise at Reutlingen University

The upgrade of the previous research group into a research centre is a milestone for the subject of 'Smart Biomaterials' at the University. Vice-President for Research Professor Dr Gerhard Gruhler explains: "The subject-specific organisational units of research at the University have long been: individual research – research group – research centre (RC) – teaching and research centre (TRC). In this way, we want to take the needs of researchers into account and support them in the best possible way." As the name suggests, the TRCs, unlike the RCs, pursue a master's programme in their respective fields in addition to intensive research.

The aim of the new research centre is to combine the respective expertise of the centre members in order to carry out even more complex and exciting research projects, forge new relationships and share infrastructure such as laboratories and equipment. "We are now also visible to the outside world as a research unit that specialises in a specific field," says Kemkemer, adding: "the research field of smart biomaterials has numerous interdisciplinary issues, so we are happy to accept members from other faculties."

The following two project examples show how topical the research topics of the centre are, and how important they are for the University, society and each of us individually.



How we breathe

In the 'MicroLungDetect' project, Kluger and Kemkemer are building a chip that simulates a lung – a microlung the size of a fingernail – in order to mimic the processes involved in breathing. The chip consists of micro-channels and a porous membrane that is thinner than cling film. The air flows past the epithelial cells on one side of the membrane. On the other side are the endothelial cells, which are surrounded by nutrient solution – just like in a real lung. With the membrane, the air pressure is raised and lowered – the membrane stretches and relaxes, just as alveoli stretch when we breathe. How can cells living on the membrane be made to grow? Outside their natural environment in the lungs, they don't feel particularly at home. "We have to outwit the epithelial and endothelial cells so that they grow in the same nutrient solution on the membrane," explains Petra Kluger. "By the time the MicroLungDetect project is completed, we want to have achieved it." The lung on a chip could then replace animal testing and enable more precise predictions to be made, for example about the degradation of anaesthetics.

Cutting-edge foam applications

In the 'InSel' project, which is funded by the state and the EU with almost 1.5 million euros, the lung is also the model from nature. Together with the universities of Pforzheim and Karlsruhe, the Natural and Medical Sciences Institute (NMI) at the University of Tübingen, the Fraunhofer Institute for Chemical Technology and the Karlsruhe Institute of Technology, Reutlingen University is working on the development of high-tech foams in a Centre for Applied Research (CAR) under the leadership of Rumen Krastev. These are metal foams which are suitable as lightweight materials for buildings, but also foams made of plastic, for example for wound dressings. The bubbles in the foams behave very similarly to our pulmonary alveoli; their size has a significant impact on the properties of the material. "So far, foams have been developed using empirical methods," says Krastev. "But they are far too important today to be made on merely the off-chance of success." The Reutlingen team has developed a production process to manufacture polymer and metal foams with the desired properties.

Find out more about other exciting research projects and the team of the new research centre here:
→ https://biomat.reutlingen-university.de/smart-biomaterials-research-center

LILITH LANGEHEINE, BERND MÜLLER

camplus //
international

Turkish, French, Chinese, Russian – even Malaysian: you can hear many different languages on the Reutlingen University campus. 1,100 international students from some 100 countries are currently enrolled here. But internationality is not a one-way street: Every semester about 600 of our local students go abroad to study or do internships with one of our 200 partner institutions around the world. The students especially appreciate our bi-national study programmes with degrees conferred by institutions in two countries and recognized in both. That opens up career opportunities in virtually every part of the world and promotes a lively exchange of knowledge and ideas.

Internationality is not just a fashion at Reutlingen University; it is a central pillar of our mission. Ever since its founding in 1855, the Reutlingen School of Weaving has been a sought-after place for technical training in Germany and abroad. The openness to other nations, languages and cultures remains an important feature of life on campus today.

The Stifterverband für die Deutsche Wissenschaft confirms this. The foundation declared Reutlingen University in 2010 "International University". Since 2012, Reutlingen has also held the German Rectors' Conference "Internationalisation of Universities" award. And in 2019, Reutlingen University became one of the first institutions to pass the Re-Audit.

Successful internationalisation

Ten years of the German Rectors' Conference internationalisation audit and re-audit at Reutlingen University

Reutlingen University achieved major success in 2019 with the successful completion of the re-audit on internationalisation of universities by the German Rectors' Conference. This further boosts its pioneering role as an international university. This result was preceded by a ten-year process in which international outlook was expanded and consolidated through a series of measures.

Reutlingen University is one of the first universities for applied sciences in Germany to have successfully completed the three-year re-audit process on internationalisation of higher education institutions of the German Rectors' Conference (HRK). Professor Dr Hendrik Brumme, President of Reutlingen University, and Professor Baldur Veit, Head of the Reutlingen International Office (RIO), received the certificate in Berlin in autumn 2019. During the ceremony, a total of seven universities were awarded for their strategic international outlook.

This marked the culmination of a process that had been initiated ten years earlier at the university. The former university president Professor Dr Peter Niess had kick-started several initiatives together with the International Office, which ultimately led to this success. These included the founding of the Institute for Foreign Languages (IfF) in 2009, the creation of the umbrella organisation 'RIO' (Reutlingen International Office) for the international office at the university, the international programmes for exchange students, and participation in the internationalisation audit of the German Rectors' Conference. In addition, Reutlingen University won the national competition of the Stifterverband foundation for science in Germany and the DAAD (German Academic Exchange Service) for the best German university for international student exchange in July 2010.

The German Rectors' Conference audit on internationalisation was conducted from 2009 to 2011. The certificate for the successful audit was then accepted by University President Prof. Dr Hendrik Brumme and Prof. Baldur Veit in 2012. The findings of the audit were incorporated into Reutlingen University's structural and development plan (SDP) for the years 2012 to 2016. In 2015, university management decided to register for the German Rectors' Conference re-audit on the subject of internationalisation. As a representative of the President's Office, Baldur Veit, together with the small and large internationalisation committee, took on the task of structuring and synchronising the content of the international affairs division for the subsequent SDP (2017–2021) with the German Rectors' Conference re-audit.

The University was successfully re-audited in 2019 and some measures are still to be implemented in the next two years. University President Brumme is proud of what has been achieved: "Since its beginnings, Reutlingen University has championed internationality and has continuously expanded it. We want to continue to strengthen our pioneering role as an international university."

2009
Foundation of the IfF and the umbrella term RIO

2010
"Best German university for international student exchanges"

2012
Certificate of success for the German Rectors' Conference Internationalisation audit

2019
Certificate of success for the German Rectors' Conference Internationalisation re-audit

As head of the Reutlingen International Office and member of the extended President's Office for international affairs, Baldur Veit is responsible for the coordination of internationalisation. "The results of the re-audit show that the university has successfully focused on its international outlook and that cooperation between the central university and the five faculties works well," says Veit. The fact that everyone within the university is pulling together contributes significantly to the successful expansion of internationalisation. This is also reflected in the two important committees of the University in terms of internationalisation: in addition to Baldur Veit, five professors and five staff members from the five faculties are appointed to the small working group. They mainly advise the international office for the SDP. The large working group comprises around 40 people and is made up of professors, administrative staff, members of central institutions, course coordinators and students. It meets twice every semester in the Senate Hall of the university to discuss and coordinate important international matters.

The importance of the role of internationality at Reutlingen University is demonstrated by the fact that students come from around 100 countries, while Reutlingen students can spend a semester abroad at 200 partner universities. Internationalisation is measured by criteria such as international connections, the international outlook of teaching and research, services such as language courses and integrated semesters abroad, intercultural and bilingual services on campus, and the proportion of foreign students, staff and teachers.

The German Rectors' Conference certification demonstrates that Reutlingen University has made systematic progress in terms of internationalisation and has committed itself to self-defined internationalisation goals. The German Rectors' Conference acknowledges the efforts made throughout the higher education institutions in developing strategies and, on the other hand, the systematic implementation process of specific goals and measures.

Looking back, a lot of time has passed from the beginnings of a department of international relations to the establishment of an international office and eventually the entire RIO department. The RIO identifier stands for the three pillars of internationalisation: academic exchange, languages and culture, and international programmes for exchange students.

PROFESSOR BALDUR VEIT

Dr. Jens-Peter Gaul, Secretary General of the German Rectors' Conference, presents the certificate to Reutlingen University, represented by Prof. Baldur Veit and Prof. Hendrik Brumme (left to right).

Ten years of Students4Students

The Students4Students buddy programme was launched in the winter semester 2009/10 as part of the DAAD project PRO-FIN and has since been used by almost 2,000 students. In the Students4Students programme, international students are assigned students for their first semester in Reutlingen to help them with questions about studying, course organisation and everyday student life.

INTERVIEWS: CLAUDIA FRANK

Reutlingen students

Why did you join Students4Students?

Benjamin Batt: When I studied abroad myself, I realised the difficulties involved in arriving in a foreign country and the importance of having locals to help with simple things. My buddy and I became close friends. Now I'm back home, I wanted to pass on this experience. Now I enjoy the time with my exchange students – they are friendly, appreciative and we have lots of fun!

Marietheres David: I can meet people from all over the world and get in touch with different cultures, languages and personalities. I am happy to be a go-to person for international students who need some support and help settling in. Sharing customs and hobbies makes the relationship with my student interesting and exciting. I would recommend this experience to everyone!

Nisha Pramithra: I liked the idea of meeting other international students. As an international student at Reutlingen, I knew very well the difficulties of going to a foreign country and getting used to life there.

Nisha Pramithra, Nathaniel William Phillip; Marietheres David, Daria Shueva; Benjamin Batt, Chien-Hsun Lai and Ting-Hsuan Wang

Exchange students

What has your Student4Student helped you with?

Daria Shueva: My Student4Student helped me to get used to a new place and meet new people. I like the programme because it supports less experienced students from other countries and allows me to participate in international student life.

Chien-Hsun Lai: My Student4Student helped me with questions about student accommodation, registration in the city, and opening a bank account. I couldn't speak any German, so that saved me a lot of trouble. He also answered so many questions about Germany, so a big thank you to him!

What was your biggest culture shock in Germany?

Nathaniel William Phillip: My biggest culture shock was how traditional the Germans are – for example, cash payments, paper tickets for public transport and bureaucracy – and yet it's efficient and orderly in many ways.

Daria Shueva: Actually I didn't have a culture shock, because Germany and Russia are not so very different. For example, I knew that in Germany they sort rubbish for recycling, so I was prepared for that.

Why spend a semester abroad in Reutlingen?

Ting-Hsuan Wang: My home university in Taiwan offers many exchange places for Reutlingen University. A friend recommended Reutlingen to me and I wanted to know how an applied university works.

→ www.reutlingen-university.de/en/international/intercultural-communication/students4students

Ten years of the Institute for Foreign Languages

Ten years ago, a central language centre in the form of the Institute for Foreign Languages (IfF) at the RIO was established at the University. Contrary to what the name suggests, it's not just foreign languages that are taught there. The service is aimed at both German and international students and offers courses in ten languages, German courses, workshops, plus advice on intercultural skills and academic writing. Karin Bukenberger and Angela Beverley-Gilbertson, who are still leading the IfF today, have been there from the beginning.

"Before the Institute for Foreign Languages was founded on the initiative of Baldur Veit, language courses were offered locally in the various faculties. The establishment of the IfF meant there was a central coordinating institution for all students at the University for the very first time. The role of coordination was initially very important," recalls Angela Beverley-Gilbertson. The next step was to extend the services being offered. Whereas initially six foreign languages were taught, today there are ten. In addition to the popular English and Spanish courses, students can learn French, Italian, Chinese, Russian, Portuguese, Arabic, Malaysian and, starting from the summer semester 2020, Swedish. The majority of people using these services are students who are preparing for a semester abroad, although University staff also take part as well. Language certificates for semesters abroad, language tests such as the TOEIC test for English skills and the TestDaF test for international students can also be taken at the IfF.

Just as successful is the range of services for learning German as a foreign language and for intercultural communication, which Karin Bukenberger manages. In addition, German and international students were offered the opportunity to improve their writing during their studies. Particularly popular are the German intensive courses before the start of the semester in September, the 'Schreibnacht' (writing evening) and the 'Sprach-Tandembörse' (language tandem exchange), where 50 to 60 tandem pairs improve their language skills in direct exchanges each semester. The orientation course for refugee students is also offered with participation in the IfF.

The IfF courses are in great demand – on average, the programme attracts around 1,500 students per semester. "Every semester, around 10 per cent of students are enrolled, and that's just in the foreign language courses," says Angela Beverley-Gilbertson. What accounts for this success? The IfF has incredible expertise in language learning – the 50 lecturers are mostly native speakers in their specific languages. Karin Bukenberger adds: "Our service is well known and well subscribed within the University."

The two directors of the IfF want to do one thing above all else: to convey an enjoyment of languages and language learning. "We want to awaken people's love for languages. We try to take away the students' fear of making mistakes. We want to stop international students feeling shy when they speak German, but also encourage German students who find writing difficult – we want them to get a taste for languages," adds Karin Bukenberger. Boring exercise sheets are a no-go in her courses. "We respond to the desires and needs of the students, even when it comes to the range of courses on offer," says Angela Beverley-Gilbertson.

The commitment pays off – there is feedback from students like "The course was so good that I wanted to buy fan merchandise!" or "Send the teachers to teach at my home university! Please!" Was there anything you thought was lacking? "Last winter semester I had 995 participants in my field. I want to break the thousand mark," says Karin Bukenberger with a smile. Both agree: "We could grow even further, there is no shortage of ideas."

TINA SCHMIDT

Angela Beverley-Gilbertson (left) and Karin Bukenberger at the tenth anniversary celebration of the Institute of Foreign Languages in January 2020.

→ www.reutlingen-university.de/en/international/reutlingen-international-office/institute-for-foreign-languages

Internationality in figures

This KPI project was originally developed at the ESB Business School as an instrument to measure the impact of internationalisation measures and thus make them comparable. In the course of the German Rectors' Conference re-audit on internationalisation (see also page 74), the project was extended to the entire university and committed to by all faculties, including RIO, the Students and Academia department and Human Resources. Here is a small overview of the figures we already have:

International campus

20%
International graduates
(academic year 2017/18)

International students

Summer 2018	*Winter 2018/19*
1,120	1,121
international students from	
94 countries	97 countries

21%
share of international students at the University

Institute for Foreign Languages

Number of participants in the courses offered *(2018)*

- German courses during the semester: 499
- Foreign language courses during the semester: 1,095
- Workshops on intercultural communication: 298
- Writing classes during your studies: 298

International university members

Teaching staff and employees

11%
Share of international university members

Students4Students mentoring programme

95	192
Mentoring students	Supervised (international) students

2018

Mobility

International exchange

Students moving around...

Incoming	Outgoing
Winter semester 2017/18	*Winter semester 2017/18*
486	744
Winter semester 2018/19	*Winter semester 2018/19*
463	717

Top 10 most popular countries for exchanges

International partner university network

204
Partner institutions from
52
countries

of which

29	in the US
17	in the United Kingdom
15	in France
13	in Spain
11	in Australia

International beacons across faculties

Applied Chemistry
13 % of the professors are international

ESB Business School
30 % of the students are international

Textiles & Design
29 % of research assistants are international

Informatics
The first fixed semester abroad since 2018

Engineering
12 % of non-research assistants are international

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entrepreneurial

Entrepreneurial thinking is only for business managers? Not at all! Today, engineers, chemists, computer scientists and textile technicians all need managerial knowledge and understanding of the markets in their sectors. So, they can successfully plan and carry out projects within a business – and maybe one day to found a company of their own. Whichever career path they choose – at Reutlingen University, students get the knowhow they will need.

Our graduates are full of energy and creative ideas – as many new start-ups show. The Schools, and in particular the Center for Entrepreneurship, support talented students prior to graduation with workshops, events and counselling. And to help our young entrepreneurs get off to a good start, the university and the city of Reutlingen provide free office space on campus for new start-ups.

Even after they have their degrees, many of our graduates maintain close ties with their alma mater. Some even return – as teachers or as active members of the university's associations. That means studies at Reutlingen University are always up-to-date, and our networks are lively – to the benefit of future generations.

Center for Entrepreuneurship

A variety of services for potential start-ups

The Center for Entrepreneurship (CfE) was founded in 2017 from "Spinnovation", a joint project with Aalen University and Stuttgart Media University. The aim of the project is to promote a start-up culture at the university and to give entrepreneurial thinking a permanent place in teaching.

All information and figures refer to the year 2019.

8 members of staff in the Spinnovation/ Spinnovationplus and Textile-Accelerator projects

57 teams or individuals in 100 consultations

9 start-ups by students or graduates of Reutlingen University

Success story of the Spinnovation project

March celebrations: 1,000 days of 'Spinnovation' with the three collaborating universities and they are happy to share their experiences at their best-practice event in Aalen. In addition to the project mission to inspire as many students as possible into entrepreneurship and innovation, each project team worked on its own focus areas. The Hochschule der Medien university, which is experienced in founding start-ups, has tested new training methods and is building up a close-knit network for attendees of its numerous events. In Reutlingen, an extensive training programme with seminars and workshops is being developed to give future entrepreneurs the tools they need to succeed. In addition, an entire toolkit for supporting teachers and students with the most important innovation methods and templates has been developed in Aalen. "We all benefit enormously from the mutual exchange of these new services, which are actively used by our students and enable them to gain positive experiences when it comes to establishing a start-up business," says Thomas Rehmet, Head of the Center for Entrepreneurship at Reutlingen University.

With the funding project 'EXIST-Potenziale', the CfE team is getting the word out for on-campus start-up support with strong partners in the region.

The new accelerator programme 'Stoff im Kopf' (Think textiles) promotes the development of textile start-up ideas.

In-house events and networking events

- March/October: 'Start-up Night' in the assembly hall
- March: Best-practice event '1,000 Days of Spinnovation' in Aalen
- March: Textiles accelerator 'Stoff im Kopf' starts on campus
- April/November: Making contacts at the 'Gründer-Talk' (founder discussion)
- May/December: 'Move your idea' ideas competition in the assembly hall
- July: Start-up business summit at the Stuttgart Trade Fair

Latest events and information:

www.instagram.de/reutlingen.ce

www.facebook.com/ReutlingenCE

Patrick Reiber (left) and Georgios Karaiskas founded the start-up company PriLogiX.

From semester project to start-up

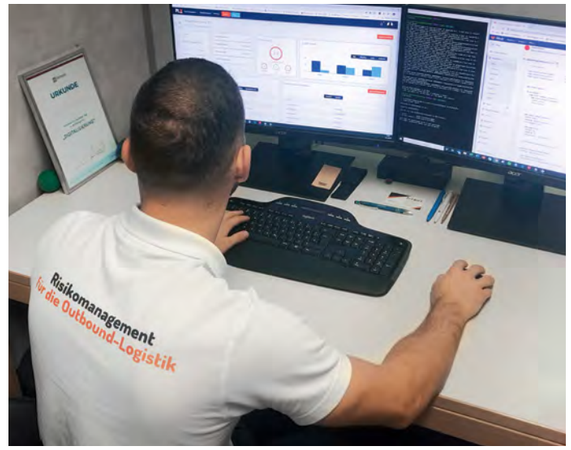
With its software, PriLogiX helps companies to manage risk along their supply chain at the order-specific level and to simplify complex transit operations. "Go big or go home!" thought Georgios Karaiskas and Patrick Reiber after a successful industrial project, so they founded their own company.

An interview? Sure, let's do it! As Georgios and Patrick casually sit in their chairs in the FirstStep container office and talk, they are always amazed at everything that has happened in the past 18 months. But let's start from the beginning: the two students got to know each other two years ago at the beginning of the semester of their master's degree course in Operations Management. Right at the beginning, in March 2018, an industrial project for the students during the semester was on the agenda. A large southern-German plant manufacturer wanted a tool that would assess the risk aspects of shipping goods abroad. Because if something goes wrong with the distribution of large machines, it becomes really expensive for businesses. From then on, Georgios and Patrick not only spent the lecture days together, but also spent evenings working hard on their project. Although eight of them worked on the task at hand, the project was very complex – especially for the two students who wrote the software. But the effort was worth it. At the end of the semester, not only did the team receive a very good grade, but the company also offered them the opportunity to develop the tool as working students.

So the choice was clear: a secure employment contract or risky start-up business?

"What should we do?" the two industrial engineers thought one summer night at a Reutlingen beer garden. They had known for a while that they both worked well together as a team. Moreover, both of them had always wanted to start up a business. Over a second beer, the decision was made: they were going into business for themselves. Their mission: to simplify complex transport with a single software application. A week later, they presented their project to the industrial partner, who immediately agreed and became their first customer. PriLogiX GmbH was registered as a company on 22nd October 2018.

PriLogiX won a coaching session for the best digital business model with 'Move your idea'.



PriLogiX provides software for order-specific risk and project management.

"YOU BECOME A DIFFERENT PERSON WHEN YOU START UP A BUSINESS. YOU LEARN AN INCREDIBLE AMOUNT IN SUCH A SHORT SPACE OF TIME."

Then everything happened in rapid succession. Although they had to complete their second semester of studies, Georgios and Patrick worked flat out on their company, processing orders and developing their software step by step. "You become a different person when you start up a business. You learn an incredible amount in such a short space of time," says Patrick, recalling the times where he had little sleep and a lot of work to do. "You really outgrow yourself and the great thing is that it just doesn't feel like work," adds Georgios.

Promoting start-ups on campus

The two amiable founders did not just receive support from their peers. Their professor Wolfgang Echelmeyer, who had already founded several companies and supported them during the semester project, was at their side as an advisor, as was the IHK's start-up consultant during her office hours on campus. Because Georgios knew the Center for Entrepreneurship, they also took advantage of Thomas Rehmet's consulting services. The Center's director provided them with an office in the FirstStep container and recommended various support programs. This marathon of applications eventually paid off – in August 2019, PriLogiX became part of the ESA Business Incubation Centre of Hessen and Baden-Württemberg, which supported it for one year with 50,000 euros and dedicated facilities. In addition, they will receive another 50,000 euros from the EU's 'Copernicus Incubation' programme by the end of the year. Both grants focus on the integration of space technologies into their software. Daily updated satellite images are used for better logistics planning at the destination and near-real-time notifications of natural events affecting the supply chain. Patrick and Georgios also benefit from participation in regional accelerator programmes. For example, at the Stuttgart 'Gründermotor' or 'start-up engine', they accelerate the fine-tuning of their business model and the validation of their service offering with the help of experienced coaches. The 'M.Tech' accelerator programme also broadens their special start-up knowledge in workshops. In addition, both programmes provide first-class business contacts.

Learning quickly is crucial

"You have to learn quickly and be agile, adapting quickly to changing circumstances or requirements. This is generally true in life today, but especially for start-ups," says Patrick, summing up his experiences of the past few months. "Just try it, but also believe in yourself and don't let the headwind get you down right away," says Georgios, revealing his positive attitude. It is then that you notice that both of them have the same spirit. Having completed their MSc in Operations Management in the summer of 2019 – with a top grade of 1.0 for their thesis on their own business and software development – they are now working full-time on PriLogiX. In the meantime, they are also being supported by Jan Kaderabek, who is the first employee to co-develop the new supply chain risk management software. He has pared down his job at a software development company in Stuttgart to be able to do this. A colleague had spoken warmly about the PriLogiX team, which had made a pitch in the university competition 'Move your idea' for the best digital business model and won a coaching session at the company. He simply wanted to be part of it. He has since become an important team member at PriLogiX. This is a prime example of what a single pitch can do.

KATHRIN ENGELS

Twice the impact in a double degree

They are a well-integrated team: Denise Hellmann and Colin Lieb not only share their lives together, but also the vision of founding their own company after graduation. They are currently acquiring the necessary skills in various qualification courses offered by the Center for Entrepreneurship (CfE).

INTERVIEW: KATHRIN ENGELS

Denise Hellmann and Colin Lieb had already completed four semesters of studies at Dublin City University in Ireland and several internships. They then returned to the ESB Business School in the summer of 2019, where they are now taking the second part of their International Management programme. Sharing an affinity for start-ups, the couple started the semester with the Startup Weekend®. In December we met them again when they took part in the ideas contest 'Move your idea'.

You have won prizes for your idea at Startup Weekend® and 'Move your idea'. What is 'Remca' and how did you come up with it?
Denise Hellmann: Remca is short for 'remote care'. The name reflects our idea of connecting IT-savvy students with older people and to solve their IT problems by allowing the students remote access to their computers. The idea occurred to us back in Ireland, where we regularly helped our grandparents with similar things. However, we fully fleshed out the idea at the Startup Weekend® in September. Here we had professional support from mentors, learned new methods and received pitch training. With that we also felt very comfortable on stage during 'Move your idea'.

How has your idea evolved?
Colin Lieb: While the idea was only born from our own experience at the beginning, we have since gathered input from other students, the CfE, mentors and even an IT assistance association for the elderly. In the business plan seminar, we crystallised our idea in a large team, drew up an implementation schedule and created 'personas'.

Denise: Our idea has developed quite differently than we initially thought, especially in terms of who the customers and users are. In this early phase, however, course corrections are still easy to make. It's great to see how the idea is taking shape and no longer just exists in your head – especially since we started the first test phase with 20 senior citizens in January.

What are your plans for the future?
Denise: We are planning to start up the company in the near future. But before that, we still have to reach a number of milestones. The first step is the completion of a three-stage validation stage. The first step has confirmed that there is an issue. We are currently testing our solution to the problem with potential customers. The third step is to show whether customers are also willing to pay for the service.

Colin: At the same time, we want to visit events such as the start-up barbecue in Stuttgart and attend the events of the CfE. At the same time, we are in regular exchange with other start-ups, not only to expand our 'entrepreneurship toolkit' but also to establish valuable contacts. And then we are looking around for suitable support programmes that can help us with starting up the business.

What role does Reutlingen University play in your start-up project?
Colin: Reutlingen University plays three major roles. Firstly, our International Management course prepares us well in terms of content for life as a self-employed person due to the wide range of modules on offer from the field of entrepreneurship. Secondly, the many extra-curricular courses offered by the CfE – for example within the StudierenPlus framework – allow us to build on the things we have learned during our studies. We had an intense consultation with the head of the CfE, Thomas Rehmet, who, in addition to an action plan, also introduced us to one of our current mentors. In the FirstStep office containers on the campus, we can concentrate on our idea, meet other entrepreneurs and benefit from the positive spill-over of ideas. It was also a great opportunity to present our idea to more than 100 people at the 'Move your idea' pitch. In addition to the unique stage experience, we established contact with the Stuttgart 'Gründermotor' accelerator programme. In the next practical semester, we definitely want to continue taking part in events and workshops such as interview training, design thinking and so on. Thirdly, there are many other people at Reutlingen University who are interested in setting up a company and with whom it is fun to spend time and exchange ideas.

What tips do you give to students who are considering becoming self-employed?
Denise: Just get started – even if you don't have an idea! Founding a company not only requires a great idea, but also the necessary knowledge about the foundation process itself, including techniques for evaluation and contacts. If you don't have an idea yet, why not try the network or the toolkit first.

Colin: Use the resources at your disposal. At the University, you are surrounded by people who have a lot of experience and insight in their subject areas. Don't be afraid of tapping into that.

Thank you very much for talking to us.

"WE ARE PLANNING TO START UP THE COMPANY IN THE NEAR FUTURE. BUT BEFORE THAT, WE STILL HAVE TO REACH A NUMBER OF MILESTONES."

Colin and Denise (left) pitch with their team at the Startup Weekend® and win an annual membership in the city of Reutlingen's new InnoPORT from business promoter Markus Flammer (centre).

Buildings structures for future growth

Raphael Hummel studied at the ESB Business School. He has been Production Manager at MTS AG since 2016.

Raphael Hummel completed three courses of study at the ESB Business School before becoming production manager at MTS AG.

The topic of Industry 4.0 and automation is also revolutionising the construction industry. The company MTS Maschinentechnik Schrode AG (MTS AG) is located in Hayingen, in the middle of the idyllic Swabian region of Germany, and can look back on growth over recent years that many others can only dream of. MTS AG's product range includes mounted compactors, tiltrotators, soil recyclers, excavator controls and navigation systems, along with many other devices from the field of automation in civil engineering. Notable customers include construction companies like Strabag, Leonhard Weiss and Wolff & Müller. With innovative products and changes to the construction process that have been initiated, there is plenty of potential for further growth.

Raphael Hummel has been Production Manager at MTS AG since 2016 and reports directly to management. He is responsible for overall production planning and control of MTS AG at both production sites. Prior to this, he held various positions at ESB Business School. First, in 2012, he obtained a bachelor's degree in Production Management, followed immediately by a master's degree in Operations Management in 2014. In 2018, he added a part-time MBA in International Management. Since 2013, he has been supporting teaching at the faculty as a research assistant and has worked as a supervisor in industrial projects for the master's programme in operations management. This also brought him into contact with his current employer.

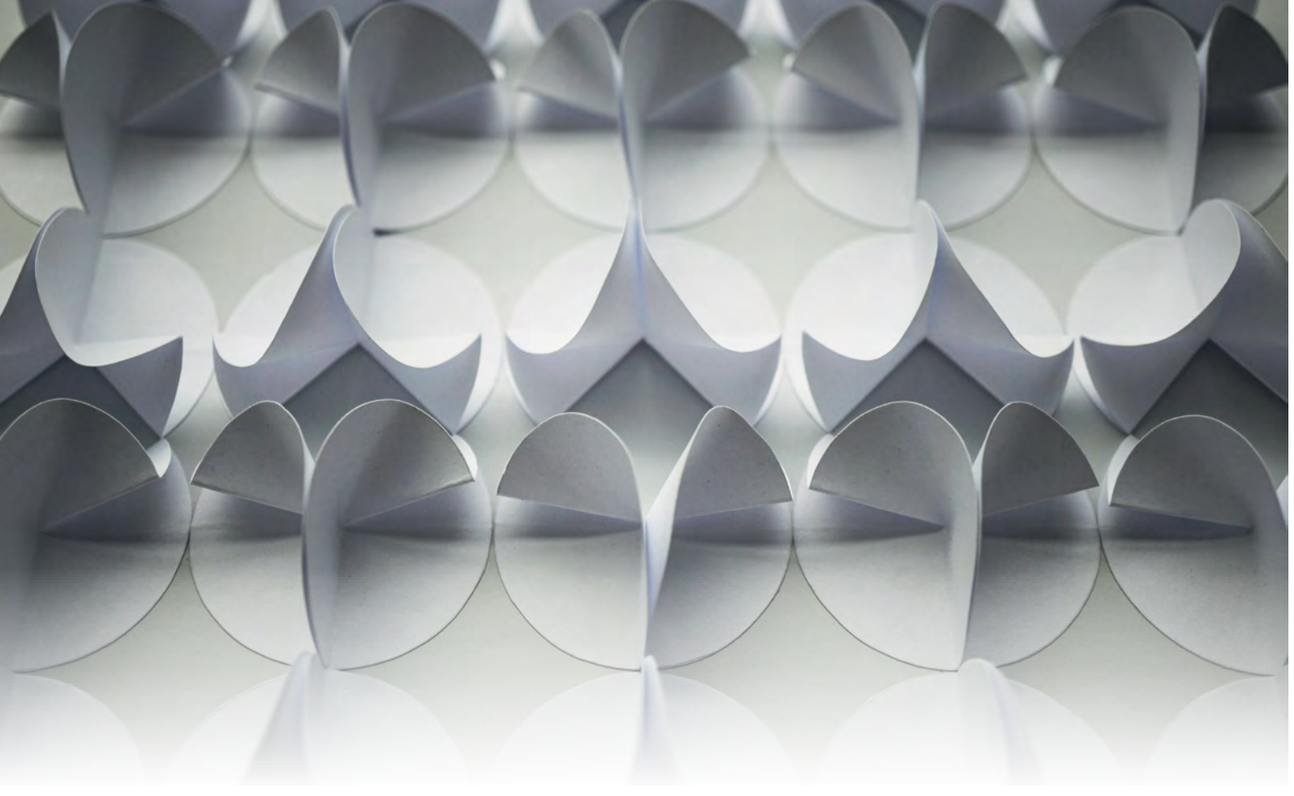
He was already in talks with two or three potential employers when MTS AG learned that he wanted to reorient himself, so they made him an attractive job offer. And so far, he has absolutely no regrets. He enjoys the excitement of building structures and processes in order to sustainably cope with the high annual growth rate of 18 per cent on average with a high vertical range of manufacture of around 95 per cent in the areas of steel construction, CNC machining, painting, and electrical and final assembly. He was given full responsibility right from the start and had a lot of scope for independence on the job. The job is particularly exciting due to the innovative environment of MTS AG, which now has almost 200 employees and had a turnover of 33 million euros in 2019, with many new innovative products, as well as the constantly evolving environment via improvement and structuring projects.

"EXPERTS FOR THE INTERFACES ARE ALWAYS NEEDED, AND THE PRODUCTION MANAGERS ARE WELL PREPARED HERE."

When asked how he chose his course of study, Hummel bristles slightly. There was never really a question of him doing anything else. His father was a telecommunications technician and his mother was also an 'ideas manager' of sorts. He grew up in Eningen and elsewhere and has always been fascinated by technology, structures and processes. The good reputation of Reutlingen University did the rest. His expectations were then also met. He particularly appreciated the focus on practical elements such as projects, internships and semesters abroad. The MBA then perfectly complemented his industrial engineering knowledge with corporate management and business administration expertise. The only thing he would have liked more for his current job would have been to prepare for direct management responsibility.

He has no fixed plan for his professional future. It is important to him to constantly develop himself further. He definitely sees this possibility with his current employer. He also has a positive outlook for the future graduates of his course. Experts for the interfaces are always needed, and the production managers are well prepared here. Raphael Hummel gives the students of today this advice: "Always stay curious! Courage is key – it is important to constantly challenge yourself and learn from your mistakes."

THOMAS REHMET



Designing the future with colours and fabrics

Dorothee Haid graduated from Reutlingen with a bachelor's degree in Transportation Interior Design (TID) and then completed a master's degree in textile design. Now, she works in Porsche AG's design studio in Weissach and as a lecturer at the School of Textiles and Design.

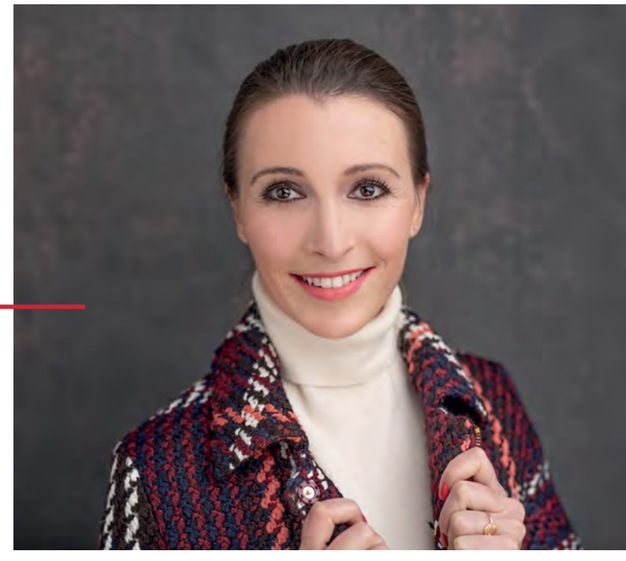
INTERVIEW: THOMAS REHMET

How would you describe your current job at Porsche?
Dorothee Haid: I was lucky and got a job as colour and trim designer at Porsche right after my studies. For the last four years, I have worked as lead designer on the colour and material concept of the Taycan – the first fully electric Porsche. The conceptual, strategic aspect is what I find really exciting. In the automotive sector, it usually takes four years from the initial idea to the design and series production of a vehicle, and as a colour and trim designer, I have a major influence on the overall product experience at the beginning of this process. For example, I set the direction for what a concept could look like by asking which materials should be used going forward. In addition, I recently developed a materials scheme for all Porsche vehicles, which is already being successfully implemented in individual projects.

How do you assess the prospects of graduates of the Transportation Interior Design course on the job market?
Haid: Back then I applied the traditional way: with a portfolio. That also applies to design graduates today. At the moment, there are four issues in the automotive industry that I can see. Firstly, the transition from conventional combustion engines to alternative drive systems, such as electric mobility, has begun. Secondly, people are searching for ever new forms of mobility such as car and ride sharing. Thirdly, the whole world is talking about the digital revolution, which is also transforming the automotive sector. The fourth issue is that the focus is shifting from pure product development towards the overall product experience.

Specifically for TID graduates, this means that interiors will still need to be designed, but also that answers must be given to the big questions, such as those about sustainable mobility. I think that material design in particular can make a major contribution to this in the coming years.

"LEARNING BY DOING APPLIES TO CYCLING JUST AS MUCH AS EVERY NEW TASK, EVERY THESIS, EVERY FIRST JOB AND EVERY SUBSEQUENT ONE. LEARNING NEVER STOPS. "



What professional development opportunities do you see in your current position?
Haid: Above all, I want to prepare myself for my future. For me, this includes analysing how people work together, what drives them and makes them perform at their best and what it takes to have an efficient team.

What significance does your degree have for your work today?
Haid: Even in my time, the workshops at Reutlingen University were extremely well equipped and, as well as the tools that were made available, it was above all the very good range of courses and the proximity to industry that I found very helpful. The interdisciplinary approach, such as sometimes doing a project with students from another faculty, is also very helpful for later professional life. I have been noticing this in my day-to-day life for quite some time now and would like to see more focus on a professional and open discussion in the future.

Why did you decide to study at Reutlingen?
Haid: Reutlingen University was the first university in Germany to offer vehicle design with a focus on interiors. In retrospect, I appreciate on the one hand the range of basic subjects of shape design, colour and trim design, 3D visualisation, 2D visualisation and clay modelling, and on the other hand the freedom to concentrate on colour and material design right from the first semester.

Do you have a plan for your career?
Haid: That's not the kind of thing you can really plan for. Of course I want to develop myself, take on responsibility and work on exciting projects. Through my education at university and the last eight years of experience in industry, it has become clear to me that the design of a product is above all a tripartite of form, colour and material, which follows a function and contributes significantly to the success of a product. That said, the material factor plays a subordinate role in things that we perceive less through the medium of touch, such as the exterior design of cars or architecture.

I am very pleased to have been able to pass on my knowledge and experience in the field of design, colour and material to young students here at Reutlingen University for the past two years in the form of a teaching assignment.

What tips would you give today's students?
Haid: Take advantage of the excellent foundation Reutlingen University gives you, and build on it yourself. Learning by doing applies to cycling just as much as every new task, every thesis, every first job and every subsequent one. Learning never stops. Do not forget to forge your own path.

Thank you very much for talking to us.

Our associations – a lifelong network

Reutlingen University stays in contact with its students well beyond the end of their studies. Divided into a number of alumni and support associations, the members contribute to the development of the university and its students – not only financially, but also with a wealth of professional expertise, contacts and experience.

The **alumni and support association 'Aufnet'** of the School of Informatics was founded in 2001 by former graduates and currently consists of 145 members. Its goal is to support particularly committed students and to establish and expand a network of students, alumni, teachers and industry. Each semester, the association awards a scholarship abroad and hands out awards for the best bachelor and master theses. The association aims to connect students and alumni with each other and also invites all members and alumni to an annual alumni meeting.

ESB Reutlingen Alumni e.V., with over 5,000 members, is the largest and best-known alumni association on campus – and therefore the best in Germany. For over 30 years, this strong network has been available to all graduates and ESB students from the first day of their studies. The association regularly organises international networking events, publishes the quarterly membership magazine 'Europolitan' and offers a mentoring programme for students. ESB students can also get valuable tips and suggestions at a variety of events on campus. The association also offers working alumni the 'Alumni Learning' event. The service also provides an alumni platform, complete with profile, professional background and contact details of all members.

Vereinigung Reutlinger Ingenieure e.V. is a network for students and graduate engineers, mainly from the School of Textiles and Design. The association has set itself the goal of supporting its members so they can realise their potential in future stages of life. The network aims to provide the very best support, particularly during periods of change such as starting a career, retraining, or the challenge of combining family and career. Through direct, appreciative and reliable contact with each other, members want to offer support in order to orientate themselves with ease and to become good communicators when professional or personal questions arise during or after their studies.

As a co-founder of Reutlingen University, Campus Reutlingen e.V. has been the support **association for students as** well as teaching and research on the Hohbuch campus since 1855. With 160 corporate and individual members, the association invests well over 100,000 euros annually to finance a wide range of projects for the university and students. These include the Studium Generale with renowned guest speakers, scholarships abroad, excursions, awards for outstanding master and bachelor theses, university events (symposia, fairs and graduation ceremonies), the research and preparation of the historical textiles collection as well as the distribution of university merchandising. Campus Reutlingen also promotes professional development with its own foundation, the Knowledge Foundation at Reutlingen University.

The **Verein des Internationalen Projektingenieurwesens der Hochschule Reutlingen e.V.** (International Project Engineering Association of Reutlingen University) is the student association of the International Project Engineering degree programme, which supports students in many ways. Student projects are supported both financially and in terms of ideas: seminars, excursions and workshops are organised where students can further their education and exchange ideas. In addition, there are various social events to boost social interaction, such as barbecues, excursions and a special sports programme. Those who wish to do so can actively participate in the development of the course through the association. Alumni can stay in touch with their studies through the association.

→ www.reutlingen-university.de/en/after-studying/welcome-back/

Knowledge Foundation
@ Reutlingen University

Why take part in Reutlingen University's study-while-working programmes?

- High Potentials link a Master's degree with corporate careers
- Respected professors train top talents with successful executives
- Interdisciplinary programmes in growth areas
- Best practice meets science for experienced employees
- Academic further education for executives
- Customised to the needs of companies

Participants in further study programmes

525

Occupational fields

Corporations and organisations in an international context:

Physiotherapy, sales, marketing and business, technical consulting, project management, quality management and assurance, production and logistics, personnel management and sales, digital business

Study programmes

Bachelor:

- Bachelor of Science Digital Engineering & Management
- Bachelor of Science Physiotherapy

Master:

- Master of Science Consulting & Business Analytics
- Master of Science Digital Business Management
- MBA International Management for Military Officers and Professionals
- Master of Science International Purchasing Management
- Master of Arts International Retail Management
- Master of Science Pharma Business
- Master of Science Professional Software Engineering
- Master of Arts Strategic Sales Management

Want to be an architect of the future?

Dual, digital, innovative – in this interview, Professor Dr-Ing. Jochen Brune talks about the Knowledge Foundation's new part-time bachelor's programme in Digital Engineering & Management (BSc) at Reutlingen University in collaboration with the Faculty of Engineering, which will start in autumn 2020.

INTERVIEW: SIMONE LÖFFLER

How did the idea for a new industrial engineering programme come about?
Jochen Brune: Companies from a wide variety of industries are currently having to face the challenges of digital transformation. This requires highly qualified workers who are equipped with a unique set of skills so that they can think and act cross-functionally. These people are currently difficult to find on the labour market.

Prof. Dr-Ing. Jochen Brune, MBA, Executive Programme Adviser at the Digital Engineering & Management programme

In the district of Ludwigsburg, renowned companies from the automotive and financial sectors, mechanical engineering and the IT industry have sought contact with Reutlingen University in order to combat this shortage with a specially developed study programme. This visionary exchange gave rise to the new part-time study programme in Digital Engineering & Management (BSc), or DEM for short, which builds on traditional industrial engineering disciplines. It combines content from the fields of technology, IT and business, so it reflects the interests of all participating industries and businesses.

In the context of digital transformation, the buzzword 'VUCA' is often used. What does it mean exactly?
Brune: The term VUCA, which stands for volatility, uncertainty, complexity and ambiguity, sums up the challenges we face in terms of digital transformation. Markets and technologies will be subject to a high degree of fluctuation in the future and will also be characterised by uncertainty, complexity and ambiguity. Predictions are becoming more difficult and the stability we value so highly will become the exception rather than the rule. This naturally places special demands on companies and their employees.

The technological changes that the various industries and companies are facing are outlined by terms such as Big Data, Internet of Things, Industry 4.0 and artificial intelligence. They lead in parallel to a revolution in business models, customer interfaces and corporate value-creation processes.

Digital Engineering & Management

The Digital Engineering & Management (BSc) study programme is a modern form of industrial engineering studies to be taken alongside employment. It is specially tailored to careers in the digital world and provides the necessary skills for successfully adapting to digital transformation. In terms of content, these are represented by the areas of digital engineering (engineering sciences), computer science (computer science), digital business management (business administration, project and process management), social skills and languages.

And the tools to adapt to this revolution will be available in Kornwestheim from autumn 2020. Why was the 'Salamander Areal' site chosen in Kornwestheim?
Brune: Kornwestheim represents an incredibly successful transformation from the old economy to the new economy: since the end of the 19th century, it was the home to the world-famous shoe company 'Salamander'.

Since the beginning of the 21st century, high-tech companies have moved into the former Salamander production facilities. The TechMoteum, a start-up incubator organisation, provides innovative start-ups from the fields of mobility, technology and environment with the necessary support to turn their ideas into innovative products. We want to convey this unique, innovative spirit to our participants from day one.

Who is the programme aimed at and what is special about it?
Brune: The DEM is aimed at school graduates with above-average A-levels or advanced technical college entrance qualifications who want to prepare themselves for the opportunities of the digital future. It is also aimed at employees from companies in all industries who want to overcome the challenges of digital transformation.

In terms of content, it addresses the most important issues of the digital revolution. These include autonomous driving, electromobility, digital product development, the Internet of Things, cloud computing and agile management. Of course, the necessary basics in mathematics, engineering and computer science are also taught. The programme enables attendees to look beyond their own professional horizons, develop ambitions for the economy of tomorrow, lead in an agile way and build solutions that the market really needs.

How important is the topic of interdisciplinarity here?
Brune: Reutlingen University has always offered a wide range of interdisciplinary education and development opportunities. This is reflected not least in the outstanding level of cooperation between the various faculties. This interdisciplinarity is also particularly evident at DEM. Precisely because we are heading for a world dominated by VUCA, digital transformation requires interdisciplinary skills. This includes basic engineering and computer science, business administration, project and process management, and leadership and social skills.

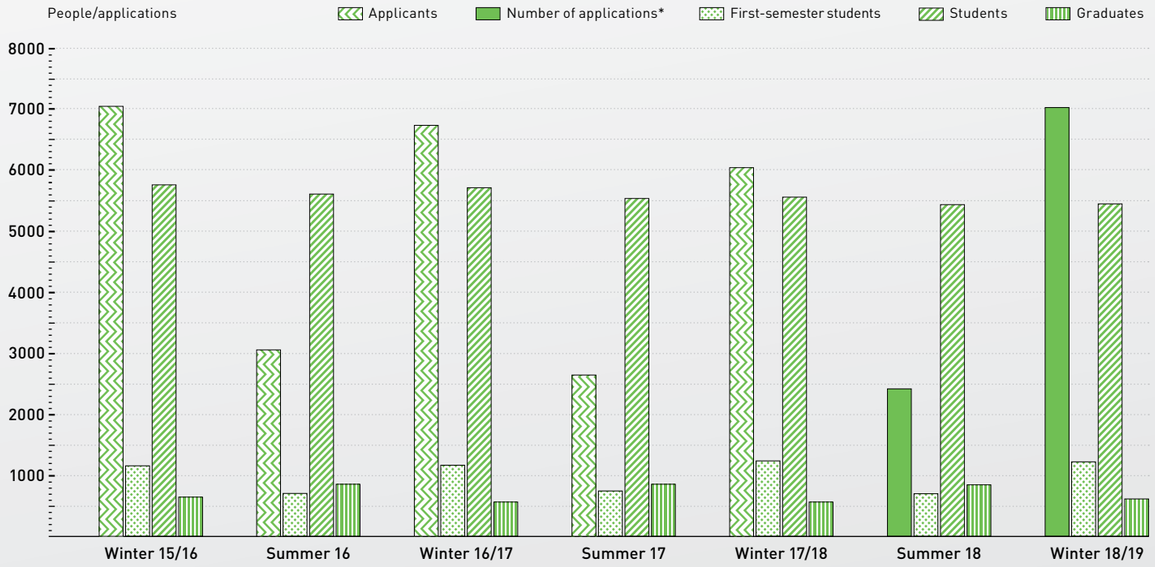
Are there already plans for the future?
Brune: Corporate partners are taking a lot of interest in master's programmes. We are therefore planning at least one master's programme in the future in order to offer current employees a more in-depth qualification. With this, we also want to offer future DEM graduates an interesting next step.

Thank you very much for talking to us!

camplus //

Facts & figures

How student numbers have changed



OVERVIEW

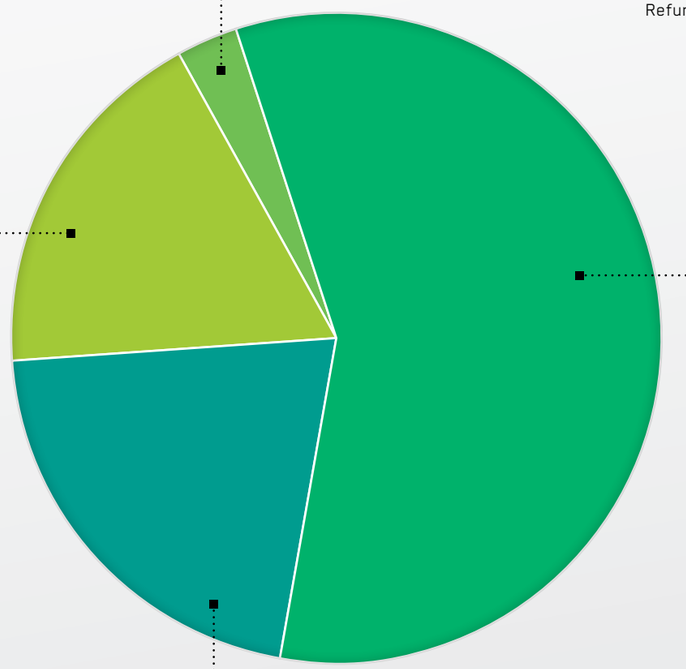
Semester	Winter 15/16	Summer 16	Winter 16/17	Summer 17	Winter 17/18	Summer 18	Winter 18/19
Number of applicants up to winter 17/18 / number of applications*	7,053	3,072	6,740	2,670	6,023	2,424	7,012
First-semester students	1,160	711	1,197	786	1,243	709	1,232
Students (without those absent)	5,786	5,615	5,712	5,566	5,683	5,451	5,469
Graduates	649	885	592	886	589	861	621

Development of the number of applicants, first-year students, students and graduates
** Since summer 2018, it is no longer the number of applications that is recorded, but the number of applications.*

Budget & finances

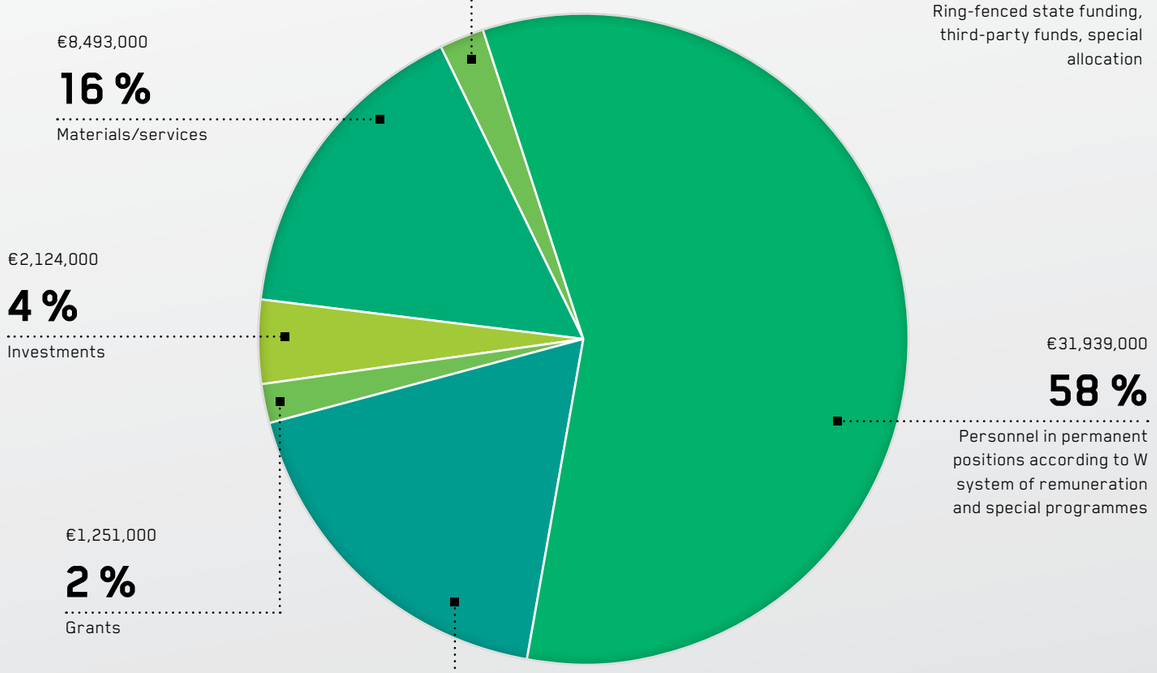
Financial results for the year 2018

Payments in



PAYMENTS 2018	IN €
State funding (current subsidy) incl. HSZ	
State funding for the current year (basic funding)	31,547,000
State funding from the previous year (including residual funds from quality management)	0
Allocations from:	
special programmes	11,271,000
performance-based allocation of funds	0
Third-party funding from:	
research/teaching/donations	9,870,000
research/teaching/donations carried over from previous year	0
Refunds/administrative revenue	1,773,000
TOTAL REVENUE	**54,461,000**

Payments out



PAYMENTS OUT 2018	IN €
Human resources	
Personnel in permanent positions according to W system of remuneration and special programmes	31,939,000
Other fixed-term employees, teaching assignments and auxiliary staff	9,561,000
Grants	1,251,000
Investments	2,124,000
Materials/services	8,493,000
Ring-fenced state funding, third-party funds, special allocation	1,093,000
TOTAL OUTGOINGS	**54,461,000**

Organisation

at Reutlingen University

Administration
Human resources
Budget and finances
Students and academia

Technology and security
Workshop
Facilities management

University Advisory Board

Senate

President's Office

Extended President's Office

Senate Commissioner

Delegate by law

Administrative departments

Faculties

- AC Angewandte Chemie
- INF Informatik
- ESB Business School
- TEC Technik
- TD Textil & Design

Institutions

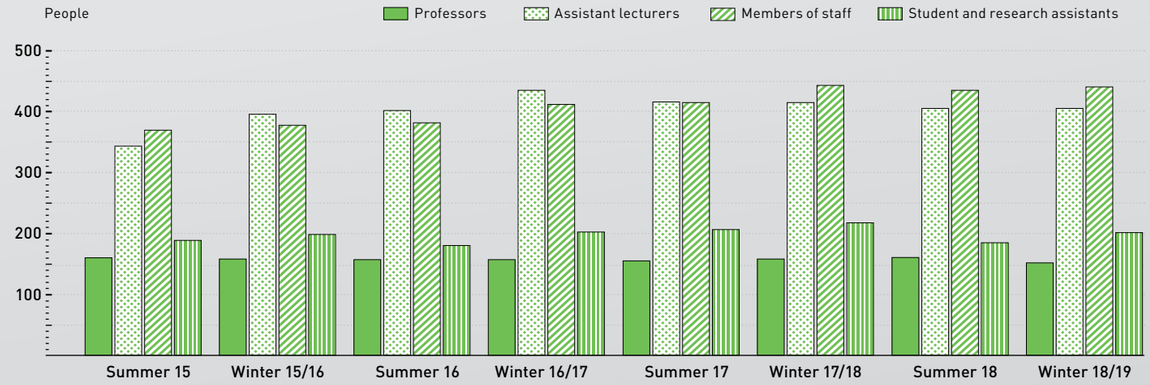
- University library Computer and Media Centre
- Reutlingen Didactics Institute
- Reutlingen International Office
- Reutlingen Fundamentals Learning Centre
- Reutlingen Research Institute

Human resources

Staff composition

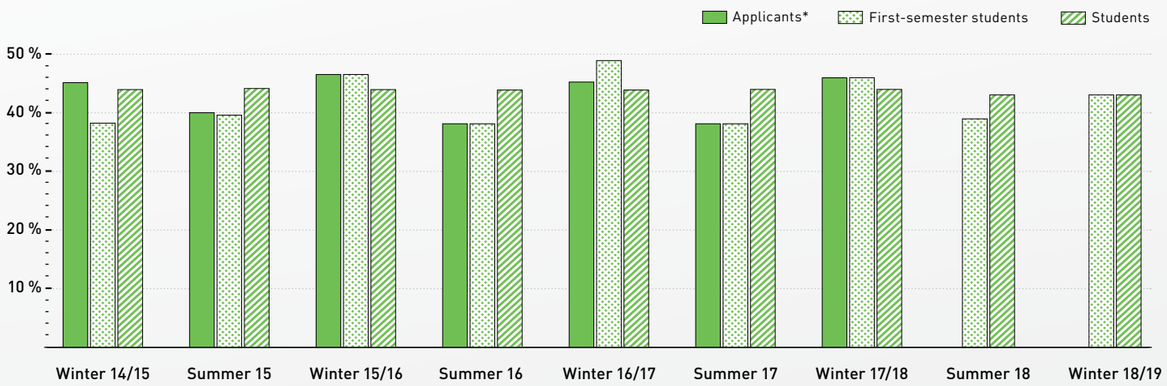
HUMAN RESOURCES																
Year	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Total	322	329	320	325	338	370	382	393	425	439	480	511	535	569	600	594

Semester	**Summer 15**	**Winter 15/16**	**Summer 16**	**Winter 16/17**	**Summer 17**	**Winter 17/18**	**Summer 18**	**Winter 18/19**
PROFESSORS								
Total	160	158	157	157	156	158	160	153
Women	22	22	22	25	26	27	28	28
Men	138	136	135	132	130	131	132	125
ASSISTANT LECTURERS								
Total	343	399	401	436	418	416	404	404
Women	120	130	146	148	151	135	151	138
Men	223	269	255	288	267	281	253	266
MEMBERS OF STAFF								
Total	369	377	383	412	417	442	436	441
Women	179	181	183	200	207	218	216	228
Men	190	196	200	212	210	224	220	213
STUDENT AND RESEARCH ASSISTANTS								
Total	190	198	181	201	207	219	187	201
Women	94	84	78	83	89	97	81	84
Men	96	114	103	118	118	122	106	117

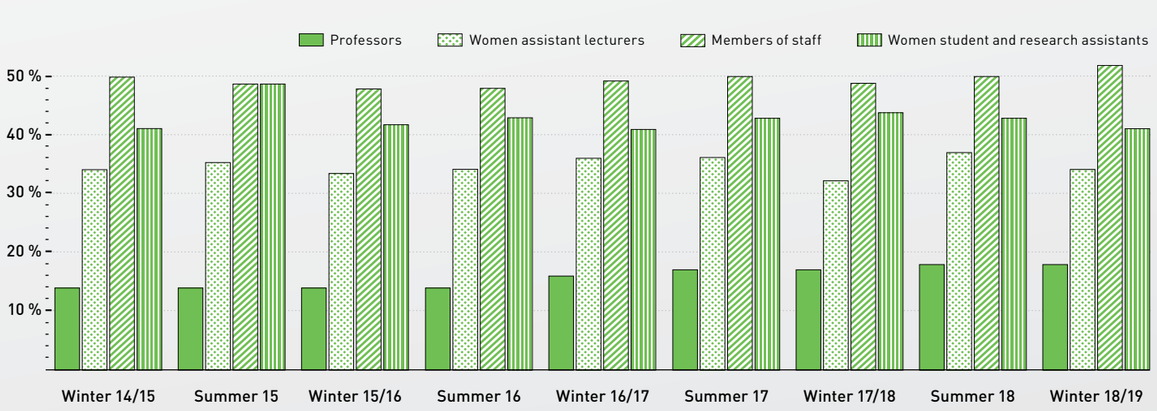


Gender equality

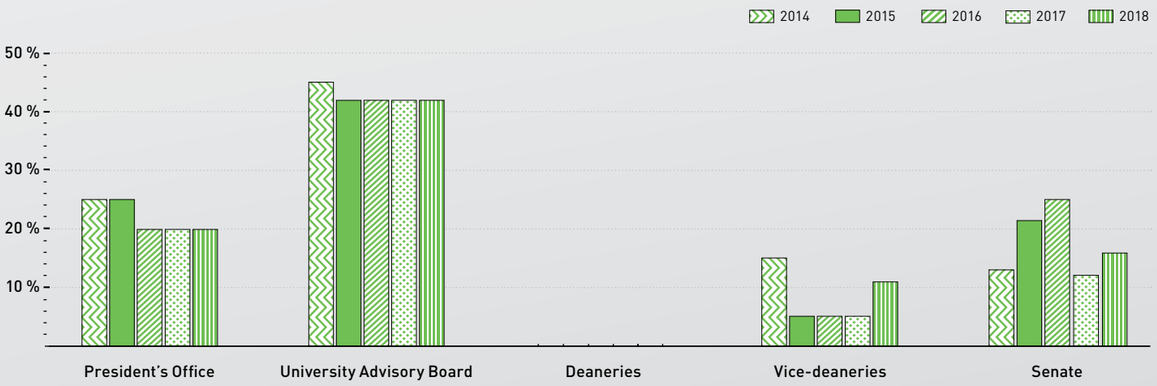
Proportion of women at the university



Proportion of women among students
** Since summer 2018, it is no longer the number of applicants that is recorded, but the number of applications.*



Proportion of women among university staff



Proportion of women at university bodies and committees

Quality Management

Grade:

On a scale of 1 to 5, students rated the lectures at Reutlingen University with an average grade of 2.1. A total of **9,677** responses were aggregated.

COURSE RATINGS	
Summer 18	587
Winter 18/19	528

In 2018, **13** university teaching workshops were offered. In total there were **125** participants.

2,1

Learning centre

2018 statistics

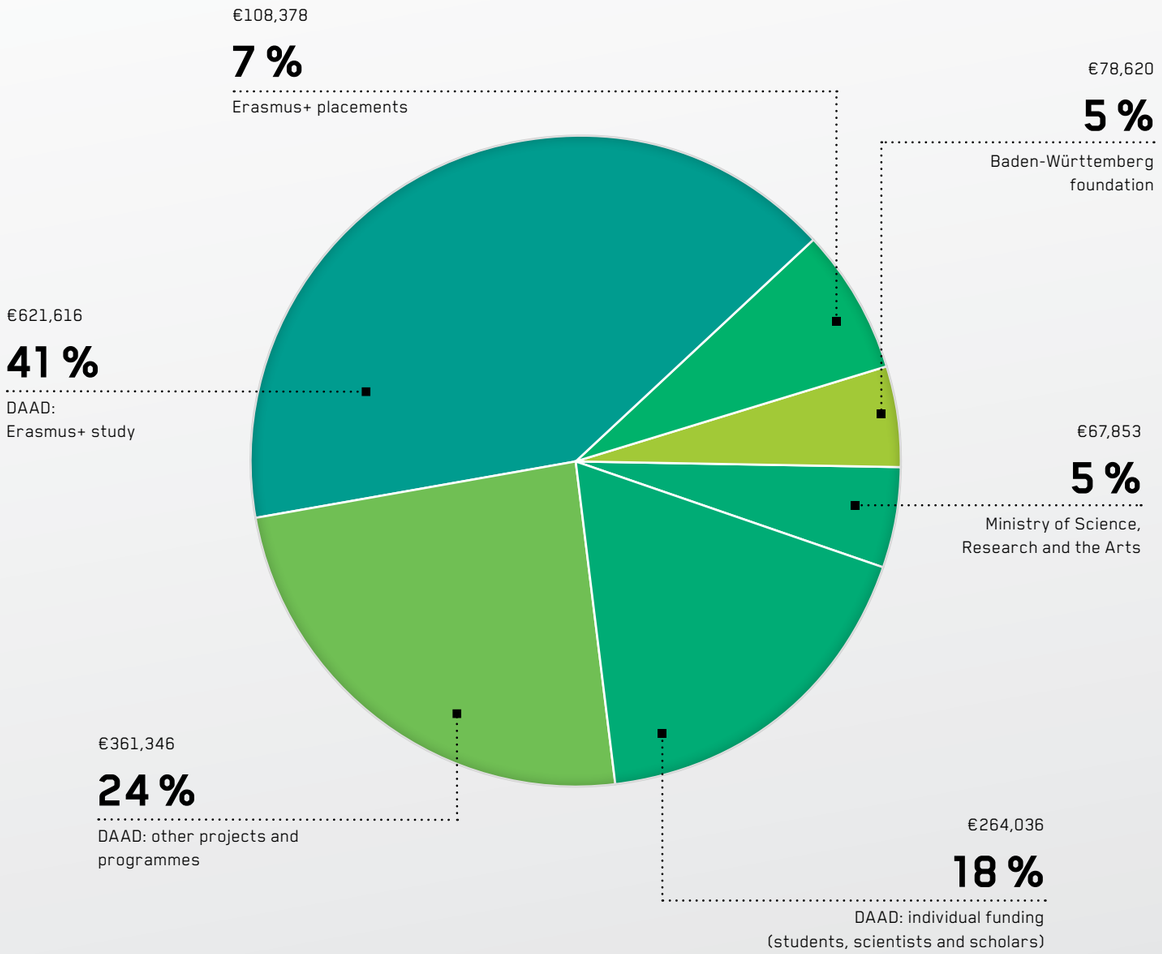
Outgoings	€575,798
Revenues	€42,697
Visits to the learning centre	292,927
Print inventory in volumes	183,961
E-book usage (number of downloads)	980,723
E-journal usage (number of downloads)	196,029

Campus Reutlingen e.V.

2018 members	158
Grants per semester for the award of the Otto-Johannsen prize for bachelor and master theses	€1,500
per semester for the Design Award, Textiles and Design	€1,000
per year for semester-abroad scholarships	€1,800
per year for Studium Generale	€3,000
per year for DAAD Stibet Matching Funds	€10,000
Other funding projects	€88,000

Reutlingen International Office

Funding balance 2018



Acquired project funds

2018 REVENUES	IN €
German Academic Exchange Service (DAAD) (2018)	**1,246,998**
Erasmus+ study (mobility of individuals)	621,616
Other projects and programmes	361,346
DAAD: individual funding (students, scientists and scholars)	264,036
Erasmus+ placements	**108,378**
Baden-Württemberg foundation	**78,620**
Baden-Württemberg grant	63,281
Regional development-specific component	15,339
Ministry of Science, Research and the Arts	**67,853**
Kettering International Programs 2018	28,000
Internationalisation funds	31,053
Erasmus+ initiatives, South Africa	3,425
Israeli government grants	5,375
Go-Out-Lions grant (summer 18 and winter 18/19)	**4,000**
Reutlingen grant (summer 18 and winter 18/19)	**2,000**
TOTAL	**1,507,849**

Institute for Foreign Languages

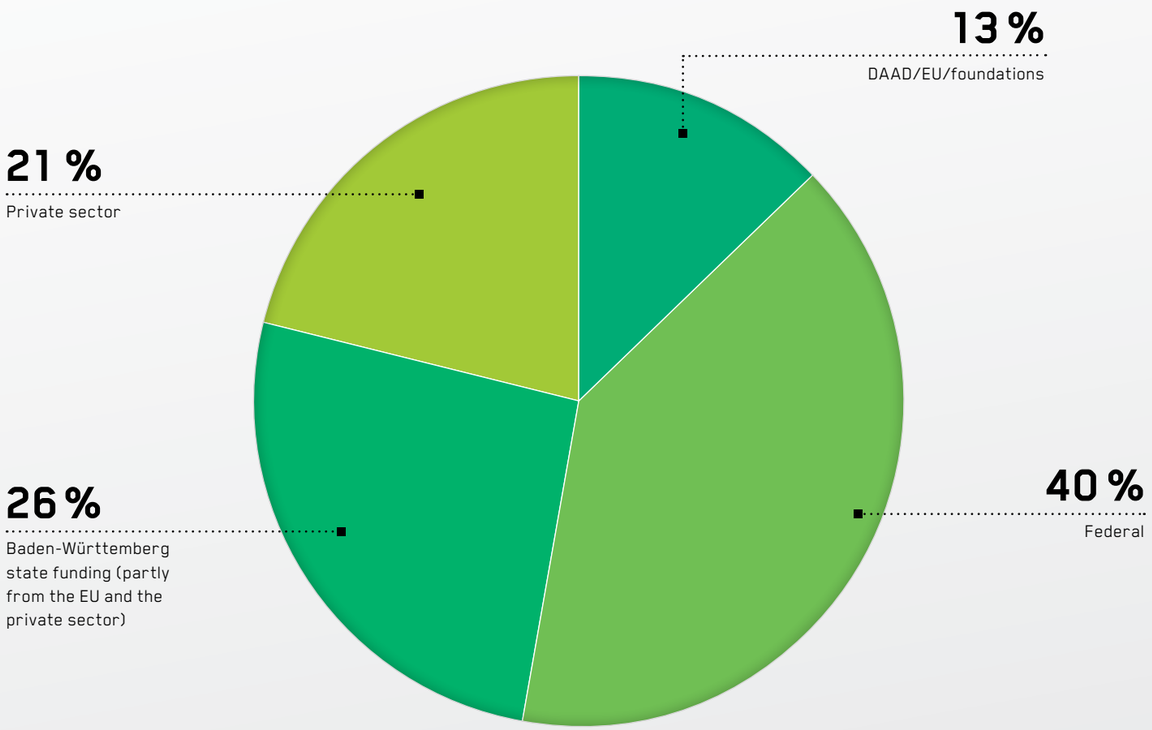
COURSES IN FIGURES	PARTICIPANTS Summer 18	PARTICIPANTS Winter 18/19
Preparatory German courses	15	191
German courses during the semester	210	289
Foreign language courses during the semester	545	550
Workshops on intercultural communication	91	207
Writing classes during your studies	175	123
Language courses for staff	19	43
Tandem exchange	169	145
TOTAL	**1,224**	**1,548**

Students4Students

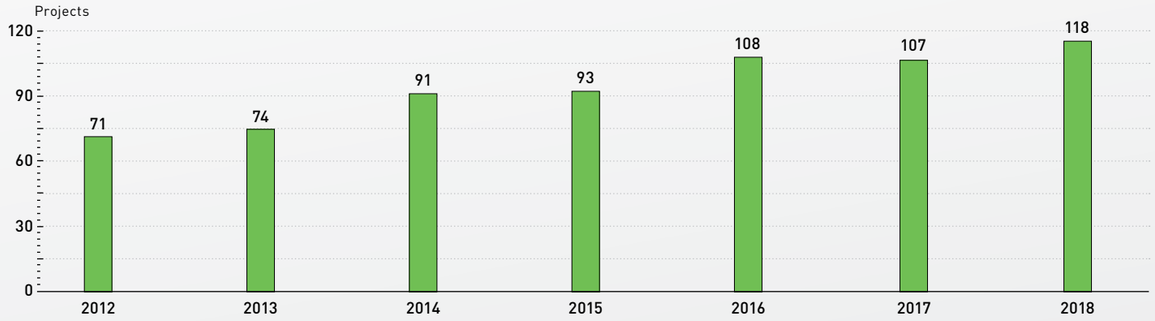
	Summer 18	Winter 18/19	TOTAL
Students4Students (mentoring students)	49	46	**119**
International students (mentored students)	70	122	**168**

Research

Sources of research project funds raised in 2018



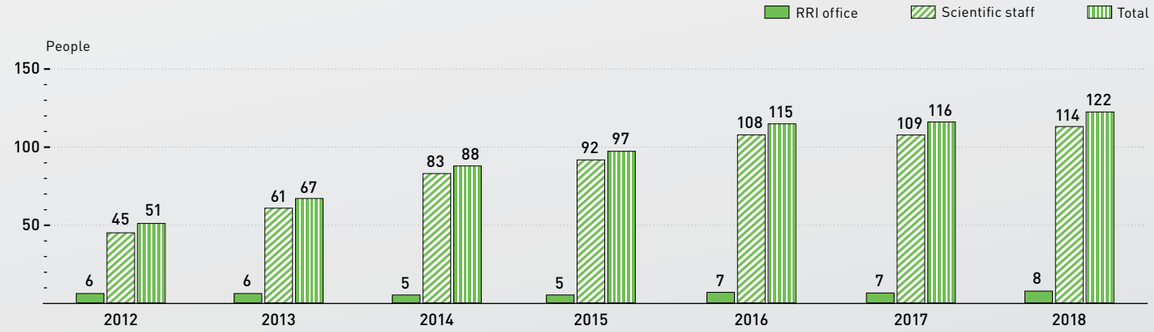
Research projects



Number of active research projects in one year

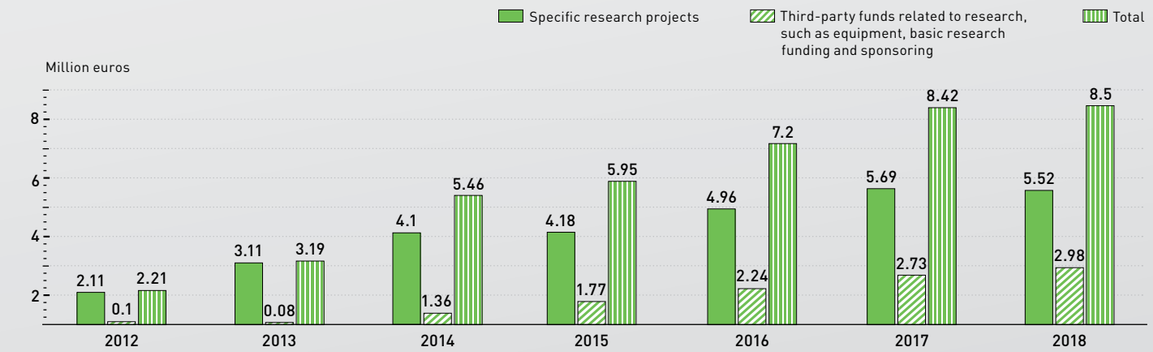
Members of staff

Full-time and part-time



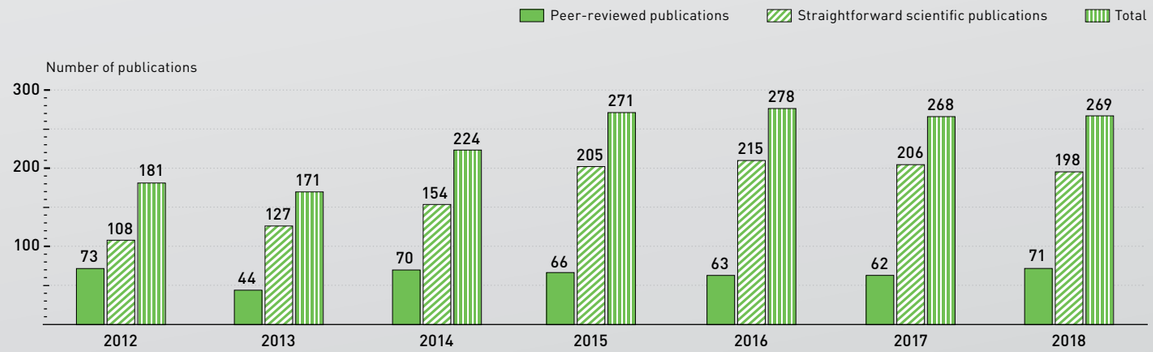
Staff employed in research for one year (no full-time equivalents)

Third-party research funding



Third-party research funds received in millions of euros, calculated according to the criteria of AG IV (Research Advisory Board of the German UAS Rectors' Conference of Baden-Württemberg), net values from 2014

Scientific publications



Number of reported publications (dissertations counted as peer-reviewed publications)

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