Hochschule
Bonn-Rhein-Sieg
University of Applied Sciences

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Digital Reality

Interview with the Federal Commissioner for Data Protection and Freedom of Information Ulrich Kelber and University President Hartmut Ihne

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change

shaping reality

6 change

Digital diffusion
by University President Hartmut Ihne 6

Highlights 8

Digital Reality
Interview with the Federal Commissioner for Data Protection and Freedom of Information Ulrich Kelber and University President Hartmut Ihne
9

15 study

Changing people, shaping perspectives 15

Virtual lab for prospective electrical engineers 16

New: Centre for Innovation and Development in Teaching (ZIEL) 17

Biomedical Sciences reveals new career paths 20

Integration for foreign students in the International Business programme 21

Computer Science as a dual study programme 22

Sarah Maria Lange,
H-BRS student, e-sports team 18

23 research

Research and change go together 23

Solar energy: Dynamic application of photovoltaic systems 24

Making black holes visible 25

Eight professors found Research Institute for Functional Gene Analytics 26

Velomobile drives up to the Federal President 27

Manufacturing bones: Better medical products in research partnership 30

New electron microscope with computed tomography system 31

Research focus security 32

Women doctoral students on tour at the university 34

Prof. Dr. Christian Dresbach,
Materials Science 28

35 live

Well prepared for change 35

Lecture series “Zwischenrufe zur Sozialpolitik” 36

International Office helps interested refugees study 37

Alumna Verena Thimm lives for mechanical engineering 38

New Building at Rheinbach Campus open 40

University of California and Hochschule Bonn-Rhein-Sieg cooperate 41

Voluntary social year (FSJ) in the natural sciences 44

H-BRS team successful at RoboCup World Championship in Canada 45

Hackers hunt for security gaps 46

Christoph Hermann,
Innovation Manager for Sustainability in Campus to World 42

47 collaborate

Shaping diversity and internationality 47

SME 4.0 Competence Centre Usability 48

Kenyan university graduates fit for the job market 50

Dalex Biotech GmbH revolutionises biotechnology 51

Big Data Innovation Center (BDIC) analyses complex data volumes 55

University staff members gain international experience through Erasmus+ 56

Axel Ifland,
Managing Director of inmex GmbH and H-BRS alumnus 52

57 report

Facts and figures 58

University structure 60

University Council 61

Prizes and awards 62

Staff announcements 64

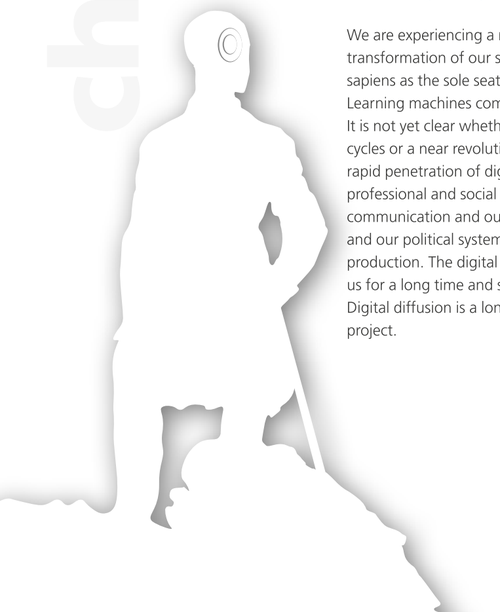
Staff structure 65

Partner universities around the world 66

Budget 68

Photo credits U3

change
Shaping reality



Digital diffusion

by Prof. Dr Hartmut Ihne, President of H-BRS, University of Applied Sciences

Our reality is becoming digital, and we are becoming digital along with it. What we call digitalisation stands for the diffusion of intelligent autonomous technologies and processes into all areas of life. Digital diffusion is the penetration of artificial intelligence into our present world. We are both creators of new worlds with new qualities and witnesses to the emergence of a new digital continent.

At the beginning of social transformation

We are experiencing a radical technological and cultural transformation of our society. Our self-conception of Homo sapiens as the sole seat of thought is also in question. Learning machines compete with it, at least superficially. It is not yet clear whether this is an evolution with long cycles or a near revolution. Both are probably true. The rapid penetration of digital technologies into our private professional and social lives is changing everything: our communication and our behaviour, our infrastructures and our political systems, our working environments and production. The digital seeds we sow today will accompany us for a long time and shape and determine our realities. Digital diffusion is a long-term process, not a short-term project.

Our idea of a completely digitalised reality is primarily influenced by science fiction. Intelligent machines take over and rule. It is not yet clear how this could look in our world – but the signs have long been there. We search the Internet, and Google shows us what we want or should find. We rely on price comparisons on trading platforms, adjust our behaviour according to the recommendations of health apps, drive our cars directed by data from navigation devices, and invest our money in what algorithms suggest. Autonomous driving is ready for the market.

The digital world offers many possibilities for humanising our living environment but also risks of dehumanisation. Our notions of security are changing. Vulnerable infrastructures, cyber-crimes, cyber wars require responses in the form of new security policies and technologies. New forms of communication produce new forms of manipulation. New instruments of domination are also emerging – social scoring, as in China, is one of many.

Digitalisation as a social project

Digitalisation can only succeed as a social project. Our values must become part of the digital world. If we do not ensure that people are brought on board and that human rights and democracy are its guiding values, then digitalisation, as an enlightened project, can fail.

Digital geography

This is where education plays a decisive role. It is not enough to teach programming in schools and universities. There are many computer languages. Which one should it be? Something else is more important, namely imparting a basic understanding of how code is written, what it can do, how it works and how to build algorithms. But even more important is to help people understand digital geography. We need a Gerhard Mercator of the digital world who explains to people on a large “map” what exists out there, what and who is connected to what and with whom, and what works how reciprocally. The actors, their relationships to one other, the connections, dependencies and boundaries in the digital world must be made visible. Vulnerabilities and protection options must be pinpointed. I want to know where I stand as a digital actor in the digital world, who the players are, where they are, and which games are actually being played. And I want to know how and where the digital world with its new path enters the analogue world, how vulnerable our basic infrastructures are. And how valid the information is, and where it comes from when it is distributed over the networks to shape our images of reality.

In the end, it all comes down to our identity as individuals. The meaning of what is referred to as data protection only becomes clear when we realise that it is actually about the protection of our identity. That is why we need a new kind of education that safeguards our values and rights in the digital world, too.

Highlights

Virtual: Remote Lab

No time for laboratory work during the on-campus internship? Conduct experiments from home with the award-winning Remote Lab.

Page 16

Dual: Computer Science Programme

Studying computer science as an employee of the Bundeswehr is possible with the new dual Bachelor's programme. Additional cooperation partners are welcome.

Page 22

Interdisciplinary: Institute for Functional Gene Analytics

Scientists at the new institute can use pioneering Next Generation Sequencing (NGS) technology to conduct research in a variety of biomedical fields.

Page 26

Sustainable: Velomobile

The research team "Efficient Transportation Alternatives" (eTa) presents the aerodynamic velomobile to Federal President Frank-Walter Steinmeier. The special climate-friendly bicycle is the subject of further research.

Page 27

In operation: New buildings at Rheinbach Campus

Studying, teaching and researching in the new building, which is classified as sustainable, at the Rheinbach Campus.

Page 40

Resourceful: Hacker Team RedRocket

Team members of the RedRocket Club increase IT security through hacking. Students can attend a lecture in the discipline; new members are welcome.

Page 46

"Change – shaping reality"

The interview on this year's theme

In discussion: Federal Commissioner for Data Protection Ulrich Kelber with University President Hartmut Ihne

Digital reality and values

Ulrich Kelber, Federal Commissioner for Data Protection and Freedom of Information, and Prof. Dr Hartmut Ihne, President of H-BRS discuss fake news, ethical issues and the rapid changes brought about by digitalisation

What associations does the title picture of this year's annual report evoke in you?

Hartmut Ihne: The romantic person by Caspar David Friedrich has changed. I recognise something familiar, but the metal head is alienating. It awakens doubts, a strange hybrid being. I don't know whether this combination will last in the long run and whether the old values contained in the picture can be carried into the new age.

Ulrich Kelber: Will humans be replaced? Do I see something new in an old garment or vice versa? For me, at any rate, the picture contains nothing disturbing; rather, the old is preserved and fused with the new.

Ihne: I particularly like the fact that attention centres on the head. The change has to do with mental qualities and the construction of reality. In virtual reality, everything takes place in the mind. We travel in time and space without moving from place to place – does this reshape our reality?

Kelber: In many professions, virtual reality (VR) will be used more and more in the future as a complementary technology. We'll also increasingly encounter this form of perception expansion in our leisure activities, when cities offer virtual tours for instance. However, the use of VR will raise the potential for addiction, too, especially in the gaming sector. VR makes it possible to "beam away" from one's own reality in a completely different way. This issue, which reaches far beyond technical questions, will have to be addressed.

Ihne: We already live in a changed reality, because virtual reality is part of our reality. This new dimension of life in which we move – social networks, "intelligent" worlds of information and knowledge – requires a closer look. Many practised forms of communication in society are shifting to virtual space. We have to understand that this is an extension of our reality in which everything can be manipulated as the example of fake news demonstrates. Our "normal reality" itself is always a mental construct. The danger arises that we no longer exactly know what everyday reality is and what digital reality is.

Kelber: A slightly older but good example illustrates this problem. Users of the virtual video game "Second Life" demanded that certain services offered by the cities and banks be transferred from the game into reality! Or – another example – the vehemence of young people shown during the copyright and upload filter protests, which I understand. This illustrates that, to them, the digital world is reality.

How big of a problem is fake news in an increasingly digitalised world?

Kelber: Fake news has always been around, and dealing with it has always been difficult, but its scope and speed require attention. Can I stop the spread of fake news? Does it make sense to demand that misrepresentations on social networks be corrected and that these corrections be displayed to every recipient of the previous false report. Or does this simply empower the misrepresentation? By the way, I consider approaches like "dark ads" to be as dangerous as fake news. In these ads, various aspects are emphasised or presented differently to different groups of recipients without these differences becoming transparent. In extreme cases two different groups are even promised the opposite. Algorithms are programmed to promote sensational notifications in particular. As a result, people have to learn that the digital world calls for new behaviours. Unfortunately, the digital world changes much faster than we can adapt to it.

Ihne: Fake news is so hard to identify because you can only find out where the manipulation took place afterwards. In the case of deep fakes, only specialists can do this. We have to implement ethical standards of truth on the side of the producers and a competence for judging the quality of information and its sources on the side of the recipients. This is a difficult task for society as a whole.

You say that people need to learn new behaviours. What does it take to be digitally competent?

Ihne: In order to understand the background processes and interrelationships of the Internet, a new subject "Digital Geography" is needed in school. Even schoolchildren should learn how the digital system is structured, how it works, how it constructs realities and where they themselves stand in the system. A digitally responsible citizen must understand the functioning of the Internet, algorithms, social media and so on in order to recognise opportunities and risks.

Kelber: Perhaps not a separate subject, but rather an integration of this topic into the curriculum of all subjects. Many fundamental questions associated with digitalisation could, for instance, be incorporated into the subject of ethics. In this context, it would be important to have freely available teaching material that is financed by the state independently of the economic interests of publishers. It should be possible to use this material both in the classroom and for self-learning.

At H-BRS, the Centre for Ethics and Responsibility deals with digitalisation and artificial intelligence. What are the key social and research issues?

Ihne: Through the Centre for Ethics and Responsibility, the university tries to make a contribution to society. We ask, for instance, whether we as a society should allow digitalisation to progress to its full, unbridled potential or whether we should set limits. I see this as the ethics of the digital. Another issue is how the individual should behave in digital spaces. This is ethics in the digital. Ethical questions are being posed more and more frequently in computer science, but the field still struggles with a perceptual

Ulrich Kelber has been Federal Commissioner for Data Protection and Freedom of Information since January 2019. He studied computer science, was a member of the German Bundestag for 19 years and served as Parliamentary State Secretary in the Federal Ministry of Justice and Consumer Protection for five years.

problem. Computer science does not yet sufficiently recognise its responsibility, namely that it is a leading science that pioneers radically new leading technologies and introduces them into society. Here I see a desideratum. We need a better understanding of the consequences digitalisation has for society – urgently – also with a view to the future.

Kelber: Science has a task to discover developments at an early stage and ask the right questions. In research, data analysts should intensively address the ethics and quality of data processes. We are dealing with technologies, often without knowing how the results they produce came about. Research still has a long way to go in ensuring that self-learning systems become transparent and predictable so that decisions can be verified. We also need an ethical debate. How do we want to control algorithms? Where do we want checks in the form of approval and where do we want disclosure? How can a review take place at all, and when is one necessary?

How could digitalisation be limited?

Ihne: One limit involves anonymity on the net. In order to preserve what we have established on the basis of human rights and democracy, we need to transfer our enlightened concepts of values and rights to the digital sphere. Democracy requires, among other things, open discourse on our common concerns. But, this is not compatible with anonymous action on the Internet. Democracies do not tolerate this kind of anonymity; in non-democracies the situation is somewhat different.

Kelber: I disagree. Democracy tolerates anonymity, even needs it. Just as it has been possible thus far to write anonymous letters or call anonymously, anonymity must be possible on the Internet. It is up to me as recipient or addressee whether I deal with these statements or not. But I would like to remind you how important anonymous civil resistance was against the right-wing extremist riots in Freital.

Ihne: The difference to a letter, however, is that today I can reach and incite millions of people with a single click.

Kelber: Yes, multiplier effects exist and make it necessary to examine things differently. Social media sites should offer advanced settings. This could include increasing the importance of verified accounts, or I would like to see notices from organisations, such as Transparency or Netzwerkrecherche, taken into account. This won't stop people from believing anonymous voices, but it does send signals to keep them on track. We need digital assistance services to evaluate which content people can rely on. I want to see providers striving to outdo each other in developing a good, but not nanny, technology. In Germany we are just at the beginning of this process.

The credibility of information is one problem; the other is the often careless handling of personal data. Why are many people unaware of how valuable their data is?

Ihne: This also has to do with the use of technical language. It's not just about data, it's about our identity. An infinite amount of data exists, but it becomes particularly relevant when it is linked to personality patterns.

Kelber: Data protection does not protect data but people. Most people can't imagine why this protection is so important. The data is used to try to identify an individual's attitude. Typing speed, for instance, provides an indication of emotional state. "Thoughts are free" is no longer true. Today we can draw conclusions about thoughts. A change in behaviour is traced back to a general state, and this is based on the analysis of a large quantity of data. But if I behave differently from the masses, this process can quickly become unjust. And based on this analysis, much more can happen over and above the fact that I receive custom ads.

Ihne: That is an interesting point, Mr Kelber, the interpretability of data. The decisive factor is how the data is used. We are only just beginning to understand how we can protect ourselves from identity abuse.

How does digitalisation change the way we interact with one another?

Kelber: As Mr Ihne has already said, we should undertake to transfer our fundamental values to the digital world. It is not these values that need to adapt, but business models and technologies that need to adapt to this value system. Nor should we accept the fact that other regions of the world do not adhere to them. Digitalisation can and must be shaped.

Ihne: I agree and would like to add that the personal conversation is constitutive of the individual and society. Digitalisation can strengthen this. This is positive, because communication is an essential characteristic of being human. If digitalisation were useless to us, we probably wouldn't have it.

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Shaping reality

Campus to World and the Centre for Ethics and Responsibility introduce themselves in a publication. If you would like to learn more about how Hochschule Bonn-Rhein-Sieg University of Applied Sciences opens itself to the region and its citizens, please order the publication (available in German) from: presse@h-brs.de

study

Changing people, shaping perspectives

As instructors, we do more than simply impart knowledge. We change ways of thinking. We influence and hopefully impress young people and shape their perception of reality.

The students later see the world through our glasses. Do we give them the "vision aids" that they need? Can they distinguish more clearly what is and what is not? Do they develop visions and ideas of what can and should be?

We want well-educated university graduates who help shape reality. Our disciplines all model certain aspects of reality – be it an economic model or the model concept that an apple falls to the ground due to gravity. Anyone who has a false picture of the world cannot act sensibly in it and ignores realities when taking action.

At the same time, the world is changing. Digitalisation encompasses all disciplines and all areas of life. It offers immense opportunities and carries great risks. Artificial intelligence, for instance, has long ceased to be science fiction and has evolved from being an object of research to a part of daily life. Our students will be the ones who have to apply these new achievements, develop them further, and ensure that such powerful tools do not serve the abuse of power.

On the following pages you will find examples of how we use these opportunities in teaching and support students in better understanding the world and acting responsibly:

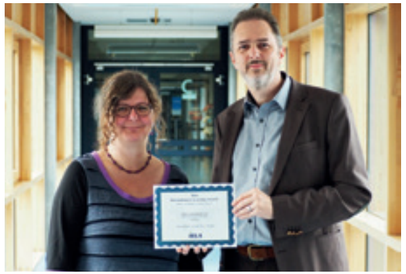
- In the Remote Lab, students can conduct experiments in a real electrical engineering laboratory from their home via the Internet.
- In the Dual Bachelor's Programme in Computer Science, we train experts in data security.
- In the "Cultural Tandem" course, students from a wide variety of backgrounds broaden their horizons together.
- The Centre for Innovation and Development in Teaching (ZIEL) networks all persons involved in order to further develop teaching.

Thank you to all colleagues preparing our students for the challenges of tomorrow – even if we don't know what they are yet.

Prof. Dr Iris Groß
Vice President for Teaching, Learning and Further Education

Experiment when and where you want

The Remote Lab for electrical engineers is well received, both by students at H-BRS and by users worldwide



Excellent: The Remote Lab – developed by Andrea Schwandt and Marco Winzker – is well received by students

"Great opportunity. I can try things out at home while completing my internship. This enables me to conduct experiments that I wouldn't normally have time for in the scope of my on-campus internship." This is how one of the students assessed the Remote Lab during the evaluation in summer semester 2018.

Professor Marco Winzker and colleague Andrea Schwandt developed the lab for the advanced semesters. "It's a real laboratory with technology that can be accessed and used from anywhere via the Internet", explains the electrical engineering professor. "It can be applied in autonomous driving, for instance, for a camera that recognises edges and thus road markings." The students program a circuit for this on their own computer. As soon as the connection to the Remote Lab is established, they can use the images calculated by the circuit to check whether their experiment has worked.

Winzker already received widespread approval for his project during the planning phase. In 2016, the Donors' Association honoured his idea for a Remote Lab plus videos and supported the digital teaching and learning project with 50,000 euros. In the meantime, the lab has passed students' practical test with flying colours. "They appreciate the flexibility because they can use the virtual laboratory at any time and at their own pace", says Winzker. "They also appreciate the fact that not only the programmable circuit from the internship is available, but also the successor model, so that they learn more than in the on-campus internship."

The project initiator explains that it differs from other remote labs at Hochschule Bonn-Rhein-Sieg, University of Applied Sciences because it is combined with instructional videos. The e-lab is already integrated into classroom teaching. But, Winzker also attaches great importance to making the service accessible beyond H-BRS. The YouTube videos, which provide background information for experiments with subtitles in various languages, and the Remote Lab are open to everyone as a free educational resource. This is not only of interest to students at partner universities in Argentina or the Ukraine – the teaching videos have already been accessed from 60 countries and the Remote Lab from 20 countries.

In 2018, the innovative project received yet another award and further recognition: the International E-Learning Award.

More information
www.h-brs.de/fpga-vision-lab

Teaching with ZIEL

A new institute is dedicated to developing teaching: the Centre for Innovation and Development in Teaching (ZIEL)

"Quality teaching is the fundamental task of our university", emphasises Professor Iris Groß, Vice President for Teaching, Learning and Further Education. "Our instructors have always developed many good ideas for improving teaching. The university supports them in this endeavour and has now bundled these support opportunities in a new centre."

The university's most successful project in teaching is Pro-MINT-us. Supported by the Teaching Quality Pact at the federal and state levels, it paves the way for new students in the so-called STEM subjects. They receive tutoring support in the Open Study Workshop, for instance. The university also uses its own resources to develop high quality teaching centrally. Instructors receive competent advice from the e-learning team located in the library. In addition, there is a university support programme for good teaching ideas and the digitalisation of teaching content, as well as a peer-coaching programme for instructors. The President's Commissioner for Didactical Training, Andrea Schröder, also significantly expanded the range of consulting and further education services offered in the scope of university didactics.

Digitalisation of teaching

"What's new is that all ideas and projects are bundled and networked in the Centre for Innovation and Development in Teaching (ZIEL) – and a platform for the rejuvenation of teaching has been created", explains Groß. She heads ZIEL together with Professor Marco Winzker as scientific director and Andrea Schröder as administrative director. In addition to consolidating Pro-MINT-us successes, ZIEL will guide quality assurance in teaching and contribute to making developments in teaching visible to the outside world. The digitalisation of teaching is an important topic because it opens many new opportunities, especially with regard to internationalisation and the various circumstances of students' lives. Together with the new core team digitalisation and the e-learning team, a "digital teaching compass" will be created that will provide teachers with an overview of various digital learning scenarios and suitable contacts.

"The foundation of the centre is a milestone", sums up Groß. "It brings us together and helps us to continually reflect on what we can do to ideally prepare our students – for their daily work and life."

More information
www.h-brs.de/ziel

Language learning via app – Rosetta Stone

Be it a popular foreign language such as Spanish or English or a more unusual one such as Korean or Tagalog-Filipino – the acquisition and in-depth study of 24 foreign languages is possible through the introduction of the language learning software Rosetta Stone digital. Students can use the program in self-study with the support of the Language Learning Counselling Service. Lecturers also integrate it into their courses in the form of e-learning units. Use of the digital program is free of charge for all members of the university library. An app allows flexible learning from home and on the go.

change

Shaping reality

“A lot has been happening in e-sports. A few years ago, competitive computer gaming was completely unknown. Today, in addition to the growing professional field, more and more university teams are emerging, who compete against each other in a university league. The common hobby does more than connect us virtually. The university group TeSSA also changes our reality by bringing us students together in “real life“. I met many of my best friends while gaming. What I particularly like is that in the beginning you only get to know the person through their gameplay without really knowing who is behind it. Exclusion due to prejudices can never arise in the first place.

Even large companies recognise the importance of e-sports. They sponsor teams and events, and new jobs are created in areas such as community support, event planning, talent scouting and marketing. This shows how the virtual gaming world shapes reality.”

Sarah Marie Lange

together with a handful of students, organises TeSSA - the e-sports team at H-BRS

Impulses for the career

The industry track course in the Master's programme Biomedical Sciences reveals new career paths

"The course offers unique insights into fields of work outside the university laboratory", says Lena Fink, a student in the Master's programme Biomedical Sciences. "It's important for biologists to look for employment opportunities in industry at an early stage", explains Professor Martin Sieber, initiator of the industry track. "In addition to classic academic careers with their limitations, there are many exciting professional fields in which biologists are active." This is why it makes sense for students to obtain information at an early stage – and this is exactly where the new track offers support.

Start in the first semester

Students enrol for the industry track in the first semester of the Master's programme. Upon completion of their studies, they receive a certificate that proves that they have already shown interest in a career path in industry before completing their Master's degree.

The Master's programme itself imparts strong and unique practical relevance through numerous application-related compulsory and elective subjects: toxicology and pharmacology, clinical chemistry or medical products. The industry track, also offers a series of lectures in which external speakers provide insight into their day-to-day work. Previous speakers include Hubertus Pietsch, Head of MR & CT Contrast Media Research at Bayer Pharma AG, and Frank Emde, managing director of the technology company Heinrich Frings.

In addition, the industry track participants themselves organise a symposium at which H-BRS alumni present potential career paths. The programme also offers excursions and support in the search for internships. This not only allows students to gain insights into companies but also assists them in building their own networks.

"The new contacts can be helpful for internship applications and for the Master's thesis", stresses Victoria Kneissler, a student in the Master's programme Biomedical Sciences. Martin Sieber adds, "In the best case scenario, students open doors for their applications because they can contact someone they met via the industry track".

More information
www.h-brs.de/en/anna/industry-track

Franco-German double degree

Début of the Franco-German double degree: Seven students in the Applied Biology programme obtained the double degree offered by the Université Paris-Est Créteil Val-de-Marne (UPEC) and H-BRS. The university is currently supervising six other students who are also aiming for a bi-national Bachelor's degree. In order to intensify and strengthen this cooperation, the partner universities have applied for funding from the Franco-German University.

Meeting strangers, finding friends

Integration for foreign students, broadening horizons for all: Language and cultural tandems in the International Business programme

The English language courses for intercultural communication are scheduled for the first semester so that the groups form early. The approximately 70 participants have different goals. Most complete the entire International Business course, but some only stay for one semester. They come from 25 countries, including Bangladesh, China, Cameroon, France, Kazakhstan and Spain.

"The course is intended to help international students feel comfortable in Germany", explains lecturer Eileen Küpper. "And German students can gain international experience at home." Together with two lecturers, she developed the concept and offers three parallel courses. The lecturers themselves form an international team: Eileen Küpper comes from Ireland, Claudia Ruiz-Vega from Colombia and Beate Roggenbuck from Germany.

Learning intercultural communication

Individual components of the compulsory course were already established. Now the teachers are bringing them together in a language and cultural tandem project: discussion in a foreign language, intercultural communication and leisure activities. "Of course, we also address cultural differences and impart learning material, but the scope is broader than that", stresses Claudia Ruiz-Vega. "It's about students transferring theory into life right away by becoming involved with a counterpart from a different culture."

This works according to the proven tandem principle. "Two students form a team, preferably a German and an international", explains Claudia Ruiz-Vega. At the end of the semester, each tandem presents a student project. Before that, one of the tasks is to conduct interviews with each other in order to get to know the other person and his or her cultural background.

In addition to working in tandem, there are joint leisure activities in the group, such as international cooking, a visit to the opera or a karaoke evening.

The teachers observe how well their concept works during the course. They receive confirmation in the form of positive feedback at the end of the semester. "At the beginning, it was just a compulsory assignment to work together with a fellow student", says one of the business students. "Now we're friends."

One adventure, one team, one hour time: The tandem course on tour in Cologne

Film production in the new e-learning lab

It's "Take One" since February 2018 at the Sankt Augustin campus. With financial resources from the joint project "Work and Study" funded by the Federal Ministry of Education and Research, the Department of Computer Science set up an e-learning lab. Here, teachers produce their own educational videos with professional equipment under the guidance of the library's specially trained e-learning team. From screencasting to virtual studio (green screen), creativity is unlimited. The e-learning team guarantees the successful integration of the videos into current teaching.

Focus on security

Computer science as a dual study programme – civilian employees of the Bundeswehr take part

"We deliberately took a lot of time beforehand to discuss the cooperation in detail with all parties involved – with the Bundeswehr as well as with the student body", says Professor Wolfgang Heiden, Dean of the Department of Computer Science, about the new dual study programme. "The Bundeswehr's interest is a confirmation of our expertise, and we're very pleased about that on the one hand", says Heiden. "On the other hand, there were concerns that the Bachelor's programme in Computer Science could be split into two parallel worlds." The fear – students from the German Armed Forces could be separated from their fellow students and given preferential treatment.

"We attach great importance to the fact that Bundeswehr students are fully integrated into the Bachelor's programme", emphasises the dean. In this way, all students will be able to take advantage of the opportunities that make the cooperation partner's money possible in the first place. This includes benefits such as additional staff in the Open Study Workshop to help with questions on coursework and studying for exams.

Nevertheless, there are differences. "The focus on information security is set for Bundeswehr employees", says Heiden. It is also possible for the employer to specify certain elective subjects. During the lecture-free period, Bundeswehr employees complete the practical phases and the preparatory service in the business department of the Federal Ministry of Defence. They are all civil servants with revocable appointments ("Beamte auf Widerruf"). Upon graduation, they acquire the career qualification for senior technical administrative service.

The dual study programme in computer science is designed to be open to additional cooperation partners. Interested parties have already registered. Heiden sees the expansion as a confirmation of the department's work and an opportunity for the students. He explains, "Computer scientists are in demand on the job market. This means that many of our students get job offers very early, do not remain concentrated on their studies or even drop out". Dual students, on the other hand, tend to work quickly and consistently towards their degree. "We hope to send positive impulses to our fellow students here. After all, a degree always pays off in the long run."

More information
www.h-brs.de/inf/informatik-dual-bsc

research

Research and change go together

Those who research, search and find – sometimes – new answers to the questions of life. Should this mean that research both brings about knowledge and induces change? Can we conduct research without thinking about how our research can change the world around us?

At the universities of applied sciences, the desire for change through research is a top priority. The guiding principle in research is its application. We want our research to contribute to innovation, and innovation means change. We conduct research at a high scientific level, but our answers are also intended to advance society, help secure Germany as a business location and increase the security of its citizens. High standards and an emphasis on application are not contradictory! Networking with all social groups helps to ensure that our questions are continually compared to what is socially relevant. We also pass this sense of responsibility on to our students and doctoral candidates. Young scientists are the backbone of research, and at the same time it is young people who can implement changes in the future.

But today we are also experiencing that many people are afraid of change. New technologies, digitalisation – here too, universities are called upon to provide answers, in the social sciences, for instance, to deal with social security. Change is also frightening because it is associated with uncertainty. What will my workplace look like in the future? Can I keep up with the latest technologies? I read many assertions on the Internet – what is a lie, what is the truth? Universities also play a central role here, through education and raising awareness in cooperation with many social groups.

Therefore research that does not lock itself in an ivory tower but opens itself up to the public, induces change on a broad scale. Not just in Industry 4.0.

Prof. Dr Margit Geißler
Vice President for Research and Young Academics

Solar energy is not predictable – or is it?

In the joint project MetPVNet , researchers are collecting important data on the dynamic application of photovoltaic systems

Christoph Schirrmeister, research associate, checks the measuring station in the Allgäu: This time measuring takes place under summer conditions

MetPVNet stands for the development of innovative satellite-based methods for improved photovoltaic (PV) yield forecasting. The question in this research project is how the weather affects the amount of electricity produced by photovoltaic systems and the power grid. To answer it, H-BRS scientists are working in an interdisciplinary team with eight partner institutions. "With MetPVNet we are bringing two scientific communities together", explains Professor Stefanie Meilinger, "on the one hand the atmospheric researchers and on the other the photovoltaic experts, who also keep an eye on energy management aspects". The latter is very important because the aim of the project is to develop computer models that will help energy providers guarantee an optimal power supply.

The sun does not shine permanently with the same intensity, and when the sky is cloudy, photovoltaic systems produce less electricity. Energy providers react by feeding in energy from other sources. However, in order to be able to make well-founded statements about when an energy provider should supply how much reserve energy, data must be available on exactly how the clouds are affecting the performance of the systems in a grid area. This data is exactly what MetPVNet collects. "The data is also of interest to atmospheric scientists because it provides them with information on the solar radiation effects at the locations where solar energy plants are installed. This enables them to draw conclusions about the composition of the atmosphere and the impact of the clouds. These findings should help to improve weather models and forecasts", adds Meilinger.

Good data set from measurements in September

Project partners of H-BRS are the Universities of Munich (LMU) and Heidelberg, the German Aerospace Center (DLR), the Leibniz Institute for Tropospheric Research (TROPOS) and the Fraunhofer Institutes for Energy Economics and Energy System Technology (IEE) as well as for Solar Energy Systems (ISE). Also involved are the energy companies egrid as a subsidiary of the Allgäuer Überlandwerk group and BonnNetz as an associated partner. In September 2018, the first field campaign for taking measurements took place in the Allgäu. "The conditions were perfect because the weather offered everything. There were days with bright blue skies, days with fog and days of constant rain", says Meilinger. She is enthusiastic about the collected data and is looking forward to the next campaign in June 2019, in which measurements will again be taken in the Allgäu – this time under summer conditions.

More about the joint project
http://metpvnet.de/

Images of the building blocks of the universe

Professor at H-BRS involved in American research project

Black holes are regarded as important but also mysterious building blocks of the universe. One of their characteristics is that they are virtually invisible. Researchers working in the Event Horizon Telescope (EHT) network have recently succeeded in taking the first pictures of them. The EHT is a global network of telescopes and institutions. In their ambitious project, the EHT scientists are working with partners from various disciplines, also from H-BRS.

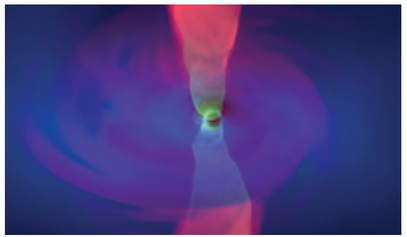
Processing large quantities of data in real time

The PIRE project "Black Hole Astrophysics in the Era of Distributed Resources and Expertise" of the National Science Foundation (NSF) is an American contribution to international cooperation. NSF PIRE projects (Partnerships for International Research and Education) focus on the education of young academics. In the black hole programme, researchers are to develop a technological and algorithmic infrastructure for large quantities of data for the EHT. Professor André Hinkenjann, founding director of the Institute of Visual Computing at H-BRS, has been coordinating the PIRE subproject "From Raw Data to Calibrated Products", together with Matthew Turk from the University of Illinois, for his American colleagues since June 2018. In this function, he has, among other activities, drawn up the project plan, clarified organisational and content-related questions, and organised webinars.

"The challenge is to process the large quantities of data supplied by the many telescopes efficiently in real time and to visualise this data for the scientists involved", explains Hinkenjann. Transferring the data is a problem because of its volume – "So far, the data has been stored on hard disks and sent". The data will later be processed in two data correlation centres.

In cooperation with the Max Planck Institute for Radio Astronomy in Bonn, H-BRS is also preparing an application, under the direction of Hinkenjann, to the German Research Foundation. The application is based on the PIRE project and involves the use of different types of displays to support collaboration among numerous astronomers.

More information about the PIRE project
bhpire.arizona.edu/pire



Visualising large quantities of data is the challenge: Multi-wavelength image of a fast rotating black hole

Down to the last detail

Eight professors found the Research Institute for Functional Gene Analytics at H-BRS

"Next Generation Sequencing (NGS) is an emerging technology that will be groundbreaking in the next ten years", says biology professor Harald Illges. The technology is a high-throughput procedure for the determination of DNA sequences. His colleague Professor Richard Jäger explains the advantages of the method: "It has been possible to determine individual DNA sequences for quite some time. The special thing about NGS is that it can simultaneously determine and evaluate the sequences of millions of individual pieces of DNA".

The two scientists founded the Institute for Functional Gene Analytics (IFGA) in 2018, together with six other professors ffrom H-BRS: Wolfgang Heiden, Jörn Oliver Sass, Martin Sieber, Ralf Thiele, Christopher Volk and Hans Weiher. The scientists want to use the new NGS technology to conduct research in various biomedical fields.

Interdisciplinary Cooperation

The team is interdisciplinary. It consists of computer scientists and bioscientists from very different fields. Illges explains, "It's impossible to analyse the huge data sets without bioinformatics. It's only through this interdisciplinary cooperation that the complex research projects can be carried out successfully".

All institute members use the technology for their specific questions. "Therefore, the purchase of shared analysis equipment made sense. The technology is too complex and versatile for one of us to be able to exploit its full potential on our own", explains Illges. The door is therefore open to other cooperation partners as well, from both inside and outside the university – the institute wants to expand.

Many projects are still in the start-up phase, but some are already proving successful. Richard Jäger uses the new technological possibilities in forensics. "We've developed a process with which we can create DNA profiles from individual hairs. That was hardly possible before", explains Jäger. In contrast, Jörn Oliver Sass is focusing on rare hereditary metabolic disorders. He uses NGS to identify DNA variants that are associated with them.

Still other projects deal with Parkinson's disease or mitochondrial DNA depletion syndrome. "By establishing the institute, we've created a basis for the future. That's a long-term project", emphasises Harald Illges.

Institute for Functional Gene Analytics
www.h-brs.de/ifga

Water purification with ozone

Strategic partnerships with industry: Since the beginning of 2018, internal and external scientists have been conducting joint research at the new Centre of Applied Research (ZAF). One of the focuses is research on innovative processes for water and air purification in cooperation with Innovatec Gerätetechnik GmbH from Rheinbach. In the course of several projects, the scientists developed systems for the targeted and central addition of ozone for water purification. In the LOS project led by Professor Peter-Michael Kaul, for instance, a new LED sensor system is being developed to improve the features of ozone measuring instruments. Further research into water and air purification is planned and will be supported by Innovatec.

New acquisition

With support from the state of NRW and through its own resources, the university is acquiring an NGS device. The funds obtained from NRW amount to 67,500 euros.

Velomobile drives up to the Federal President:

Curious glances and interested questions – the research team "Efficient Transportation Alternatives" (eTa) presented the new velomobile to Federal President Frank-Walter Steinmeier on Open House Day in the Villa Hammerschmidt. Scientists are using a special, fully enclosed bicycle to investigate the aerodynamics and energy efficiency of vehicles. Further research areas of eTa are alternative and more efficient mobility concepts as well as the issue of technology acceptance.

change
Shaping reality

“Microelectronics, automotive industry, aviation – my work in these different industries has taught me, as a materials scientist, to be flexible. I never wanted to focus on just one material, but rather to develop myself by working with a variety of materials. I consider scientific approaches and methods to be at least as important as knowledge of individual materials, and I enjoy passing them on to my students. I try to show them how necessary it is to keep a close relationship between experimental and theoretical work. I hope that in the future there will be more engineers who are familiar with both fields. After their studies, when they’re working in companies, the graduates should be able to meet the challenges of the future for sustainable development and thus shape reality.“

Prof. Dr Christian Dresbach

studied materials science at H-BRS and returned there in 2018 as professor of materials science.

Manufacturing bones

The joint project Hybrid-KEM aims to improve medical products

In November 2018, the Hybrid-KEM project was launched at the Department of Natural Sciences. The team, led by project director Professor Steffen Witzleben and professors Margit Schulze and Edda Tobiasch, plans to synthesise bone substitutes. Steffen Witzleben explains how the project came about: "We've built up a great deal of expertise in this field at the university over a number of years and have been in contact with companies that produce bone substitutes for a long time". One such company is Artoss GmbH, which is involved in the project. "The products that are currently being used mainly consist of calcium phosphate. This works, but we see a need for improvement." The project is funded by the Federal Ministry of Education and Research until September 2022. In addition to Hochschule Bonn-Rhein-Sieg University of Applied Sciences, the network includes the universities of Bonn, Bochum and Jena as well as the RWTH Aachen. Spectral Service AG also supports the researchers in analytical tasks.

Supporting the search for the best bone substitute: Doctoral candidate Philipp Gillemot takes an atomic spectroscopic measurement

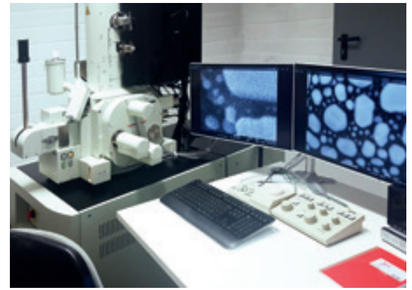
Close to nature

"We want the bone to grow fast", explains Witzleben. "This is only possible if the composition of the substitutes that we produce is more similar to that of complex natural bone than before." This is the challenge facing the trio of researchers. A second important aspect involves examining materials that also stimulate bone growth. Witzleben and his colleagues want to apply their findings to practice as soon as possible so that companies can manufacture even more effective medical products in the future.

One in a million

Centre of Applied Research: New electron microscope with computed tomography system can analyse materials more thoroughly

An innovative combination of modern analysis technologies – this is what the approximately three-quarter of a million euros field emission electron microscope offers. "With this new instrument, we can examine materials with a magnification of up to 1:1,000,000. This provides us with information about the chemical composition and topographical properties of these materials", explains Steffen Witzleben, professor of chemistry and project manager. The acquisition was supported by the Federal Ministry of Education and Research through the FHInvest programme – funding of strategic investments at universities of applied sciences. "The special feature is the integrated computed tomography system, which helps with visualisation and enables materials to be determined from 3D images", continues Witzleben. The system can examine very different materials and can therefore be applied in many different ways. The equipment, housed in the new Centre for Applied Research on the Rheinbach Campus, will be used in the areas of materials research, resource conservation, detection technologies and security research.



Entering new dimensions: The field emission electron microscope at the Rheinbach Campus

Strategic investment

"The devices create a very good basis for expanding our cooperation with local partners", says Witzleben. These partners come from the branches functional materials (ceramics and polymers), superconducting materials and sensors. The companies involved are INMATEC Technologies GmbH, WZR ceramic solutions GmbH, Deutsche Nanoschicht GmbH and Innovatec Gerätetechnik GmbH. "Thanks to the new technology, we can now launch further projects with these long-standing partners.

At the same time, we are open to new cooperation", notes Witzleben. These companies generally offer highly individualised products. "Our analysis procedures and measurements on preliminary products help to check and guarantee the quality of small series."

The electron microscope with computed tomography system benefits more than scientists and cooperation partners – an essential component of the FHInvest funding line is the training of young academics in the use of innovative technology. Several students and doctoral candidates have already been trained.

1.8 million euros for IT infrastructure

Learning independent of space and time as a supplement to classroom courses. Soon this opportunity will be widely available to H-BRS students. On the recommendation of the German Research Foundation (DFG), the state of North Rhine-Westphalia is supporting the university with 1.8 million euros. In addition to the expansion of video-based communication and collaboration systems, applications will be virtualised. A uniform identity and access management system provides centralised access via a password to all university services.

Research focus security

The Institute of Safety and Security Research (ISF) develops and improves methods to counter threats to security

A changing society and technological innovations place ever higher demands on security systems. H-BRS scientists are conducting research in various disciplines to contribute to meeting these increasing demands. Three examples:

Mobile laser cutting system supports bomb technicians

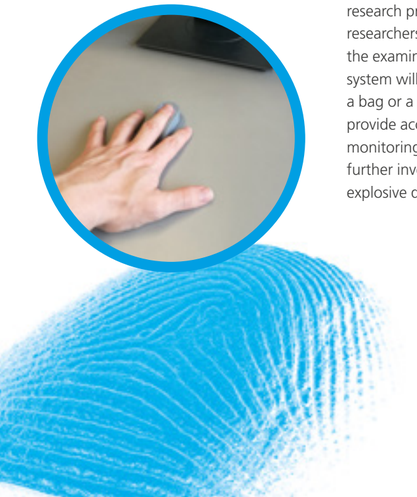
Laser beams can be modified in such a way that they do not trigger explosives on impact. This was the finding of a research team led by Professor Gerhard Holl from the Institute for Detection Technologies in the LAGEF research project. In the follow-up project mobiLaS, the researchers are now developing a system that facilitates the examination of an object. "Our mobile laser cutting system will be used when a suspicious object – a suitcase, a bag or a parcel – is in a public space. The laser should provide access to the interior of the object under sensory monitoring so that bomb technicians can carry out further investigations with regard to a possible improvised explosive device (IED)", explains Holl.

The advantage is that the system can be operated remotely and samples can be secured to preserve as evidence and use in forensic investigations. For the mobiLaS joint project, Hochschule Bonn Rhein-Sieg, University of Applied Sciences is receiving funding of 1.3 million euros from the Federal Ministry of Education and Research (BMBF).

In addition to the university, the State Criminal Police Office of North Rhine-Westphalia, as coordinator, the ELP GmbH European Logistic Partners from Wuppertal, the Federal Criminal Police Office (BKA) and the Düsseldorf Bomb Disposal Service of the Federal Police Headquarters in Sankt Augustin are involved. "It was important that the bomb technicians be involved in the project right from the start, because the technology will only be implemented if it works quickly and easily for users in a variety of scenarios", says Holl. At the end of the three-year period, the researchers want to show that they can open containers with the system being developed without detonating any explosives they might contain.

3D fingerprints improve forgery protection

In 2018, the university acquired the essential technology for the "3D-Finger" project. It is based on the new procedure of Optical Coherence Tomography (OCT). A commercial manufacturer produced a prototype OCT fingerprint scanner, tailored to special requirements. In cooperation with the Federal Office for Information Security, the researchers hope to optimise the conventional identification process through the use of biometric fingerprints.



The OCT fingerprint scanner optimises identification procedures

Every human being has an outer fingerprint and one that is an exact image in the inner layer of skin. After a slight injury to the skin surface, the outer fingerprint grows back from the inner fingerprint. Computer science professor Norbert Jung explains, "The OCT scanner not only captures the outer fingerprint as usual, but can also image the inner fingerprint using 3D technology". This is doubly helpful. First, scanning this way makes it considerably more difficult to forge a fingerprint. Second, there are exceptional cases, such as people with very slight finger ridges and grooves, that conventional fingerprint scanners have not yet been able to capture. Other features such as sweat glands on the fingertips or the structure of the skin layers are only visible with the OCT procedure. They can significantly improve forgery detection.

The practical project is funded by the Federal Ministry of Education and Research. "It was important to us", emphasises Jung, "that the system could be used in the future for access control at airports, at border crossings or at major events. Optimising the system for everyday use is therefore crucial". The researchers are currently working on data throughput and image quality. The project ends in June 2021.

International cooperation on container scanning

The joint project C-BORD dealt with the question of how to get as much information as possible about the contents of containers without having to open them. The goal is to assist border guards in detecting smuggled goods. In 2018, the cooperation partners carried out field tests at the end of the project, which started in 2015. The three-week trials took place in Röszke, Gdansk and Rotterdam.

In the EU-funded project, 19 cooperation partners throughout Europe researched different technologies. In addition to universities and research institutions, such as the University of Manchester and the Fraunhofer-Gesellschaft, the partners also included ministries from European countries. "We at Hochschule Bonn-Rhein-Sieg, University of Applied Sciences have filled a gap in the C-BORD network. We've been working on gas phase detection for many years and were able to add an important component to container screening", says physics professor and project manager Peter Kaul. In gas phase detection, the gas composition in the container is analysed in order to obtain information about possible smuggled goods. Other methods include scanning with X-rays or the detection of radioactivity.

Peter Kaul has a positive feeling about the international cooperation: "We've met many partners with whom we want to undertake research projects in the future". The final field tests were a highlight. It became clear that every technology has its strengths but that not all are necessary in every context. "A small border point on land will only require a few, while Europe's largest port in Rotterdam will perhaps even use all them."

Institute of Safety and Security Research
www.h-brs.de/isf

C-BORD: Preparing a wipe test on a cargo container door to detect traces of drugs or explosives (top)

Safely stored and labelled, the test stick is sent to the laboratory for analysis (bottom)

Women doctoral students on tour

The Graduate Institute (GI) organises roadshows

Women doctoral students - where are you? This was the question asked by the Graduate Institute and the Equal Opportunities Office when looking at the statistics for 2017. Only 26% of doctoral students were female at that time, although the proportion of women in the Master's programme was 42%. Annegret Schnell, Equal Opportunities Officer, and Dr Barbara Hillen, research associate at the Graduate Institute, want to counteract this drop-out of female researchers. They developed the idea of making women doctoral students visible as role models.

At a roadshow at the Rheinbach and Sankt Augustin locations, women doctoral students from all disciplines answered questions from both female and male Master's students on the subject of doctoral studies and shared their knowledge and experience. In this way in the course of 2018, about 200 students learned first-hand what it means to work on a doctoral project over several years.

Financing and work-life balance

The events focused less on subject-specific details and more on fundamental questions affecting all doctoral students: project identification, intention and motivation, supervision situation, cooperative doctoral procedures in collaboration with the GI NRW, seminars offered by the Graduate Institute and, finally, the financing of a several-year research project through means such as scholarships. "In each course questions were also asked about the particular challenge of reconciling doctoral studies and family life", says Barbara Hillen. Doctoral students with children in particular were able to show that a doctorate can continue to progress successfully even if it is interrupted by parental leave. The role models gave the students valuable tips and encouraged those with a deeper interest in research to take this career step.

In the future, female doctoral students will continue to pass on their experiences at the roadshows in order to maintain the current upward trend in the proportion of women among doctoral students. By the end of the year, 30% of the 94 doctoral students were already women.

Graduate Institute HBR-S
www.h-brs.de/gi

Graduate Institute NRW
www.gi-nrw.de

BiKuMedia – Bioplastics in the press

Plastic made from renewable raw materials conserves fossil resources and is considered climate-neutral. But how does the mass media report on bioplastic products? Which voices get to speak and what conclusions can be drawn about the acceptance of bioplastics? A team led by Professor Katharina Seuser at the Institute of Technology, Resource and Energy-Efficient Engineering (TREE) is investigating these questions in the "BiKuMedia" project, which is funded 100% by the German Federal Ministry of Food and Agriculture (BMEL) and the Agency for Renewable Resources (FNR).

live

Well prepared for change

We are living in a time of complex challenges and constant change. And we play an active role in shaping this change by meeting the requirements that a successfully growing university demands of us every day.

In 2018, the number of students rose to about 9,000. We want to offer these young people the best possible conditions for their studies. We already improved the spatial and technical infrastructure at Sankt Augustin and Rheinbach in 2017 with the new buildings, which were awarded the Silver Certificate for sustainability in materials and construction in 2018.

Not only does the quantitative increase in the number of students present us with challenges, but also their increasingly heterogeneous composition. The needs and issues of students today are as diverse as their biographies. We have also adapted to this change and further expanded our range of student services at the Rheinbach location. Since 2018, the Examinations Office and the Registrar's Office have been providing students with permanent on-site support. The International Office – already in Rheinbach since 2011 – has expanded its range of advisory services to cover all aspects of studying abroad. And the Central Study Guidance Service is on site once a week with a comprehensive advisory service for both prospective and current students.

H-BRS is not only shaped by the students, but also by the employees in science and administration. Here, too, we keep up with the times and adapt what we have to offer to the needs of a modern university. We are therefore proud to have been named the most attractive employer in the Rhein-Sieg district in 2018.

Digitalisation is a central issue in university administration. This enables students to use nearly all the functions that concern them online. We also provide digital access to a large number of processes for our more than 1,000 employees. It has been said that "changes only benefit those who are prepared for them". We have prepared – by setting the course for change in 2018.

Barbara Schubert
Vice Chancellor

Best biology lab assistant

For the third time in a row, the best trainee comes from H-BRS: The Bonn/Rhein-Sieg Chamber of Commerce and Industry honoured biology lab assistant Miriam Krause as best graduate in 2018. "With her great dedication and quick comprehension, which she successfully used to solve tasks, she was a good role model for other trainees", says Dr Andreas Pansky from the Department of Natural Sciences.

Beyond hackneyed topics

The series "Zwischenrufe zur Sozialpolitik" fills lecture halls thanks to fresh topics

With guest lecturers from all over Germany, the lecture series "Zwischenrufe zur Sozialpolitik" ("Interjections on Social Policy") has been bringing new topics and external expertise into the Bachelor's programme Sustainable Social Policy at H-BRS since summer semester 2018. The lecture series deals with a variety of issues, ranging from the role of utopias in social policy to philanthrocapitalism – the charity work of entrepreneurs or foundations. Another topic in the series is the economical bias surrounding incentive thinking. Course coordinator Sandra Wrzeziono cites blood donation as an example: "Studies have shown that financial remuneration does not lead more people to donate blood. Blood donation is not a business. Most donors donate for idealistic reasons".

Sandra Wrzeziono attaches great importance to an open approach and the courage to take on unconventional social perspectives. As a research associate she organises the lecture series together with its initiator, Professor Remi Maier-Rigaud. "We don't want to discuss hackneyed topics that everyone has heard so many times", says Wrzeziono. That's why pressing yet common sociopolitical topics such as unemployment or migration are not on the agenda. The concept is well received by both students and external guests. Although the lectures take place in the evening after the regular courses, the hall is always well filled. "This could also be due to the interactive design of the events. Asking questions and discussing issues is expressly encouraged", says Sandra Wrzeziono.

Interjection from the University of Hamburg: Philipp Degens talks about philanthrocapitalism; right: Remi Maier-Rigaud, head of the programme

After the lectures, the lecturers and students continue the discussion over a drink. Sandra Wrzeziono and Professor Remi Maier-Rigaud are already planning a continuation of the series for summer semester 2019. Then the challenges of and reform prospects for health policy will be examined.

Information about the Sustainable Social Policy programme
www.h-brs.de/sv/nachhaltige-sozialpolitik

Paths to studies

The HBR-S International Office helps interested refugees integrate into a study programme

Unlike other international students, refugees come to Germany without a clear plan. "Documents are often missing, and many of them are unaware of how they can use their degree in Germany. For this reason, guidance of prospective students with a refugee background is much more comprehensive than usual", explains Marina Kohl. In 2017, her position in the International Office (IO) was specially created to support these students in the scope of the project "NRWege ins Studium" ("Integrating Refugees at Higher Education Institutes in North Rhine-Westphalia"). In addition to helping students find their way around the university, the IO team also supports them in their search for accommodation and with German courses.

Many of them first need basic advice on the training opportunities available in Germany. "It doesn't always have to be a study programme", says Dr. Roland Weiß, head of the IO. "For those who don't have a recognised university entrance qualification, we recommend other paths such as vocational training or further education and refer them to the appropriate offices in the counselling network." The IO also provides information on taster courses in study orientation, which offer low-threshold insight into various subjects and teaching situations.

German courses and soft skills

The university offers advanced German courses from language level B2. "These courses are intended for those for whom studying seems realistic in terms of language requirements", says Marina Kohl. In 2018, around 70 refugees took part in these courses. In addition to language skills, the course instructors impart other important competencies for later studies, such as presentation techniques, writing protocols or scientific work.

Marina Kohl from the International Office advises students who have fled to Germany

Marina Kohl and Roland Weiß hope that this offer will be established long term at the university. "People underestimate how long it takes for refugees to study", says Weiß. Many refugees came to Germany in 2015 and are just now beginning their studies because it took so long to clarify their residency status, learn the language and decide on a subject. "We want to support the students, not only at the beginning but all through their studies – just as we do other international students", adds Marina Kohl.

Funding for "NRWege ins Studium" comes from the Ministry of Culture and Science of North Rhine-Westphalia and is distributed via the German Academic Exchange Service (DAAD).

More information
www.h-brs.de/wege-ins-studium

ALUMNA IN THE SPOTLIGHT

Establish a network early on

Alumna Verena Thimm already combined studies and career as a mechanical engineering student

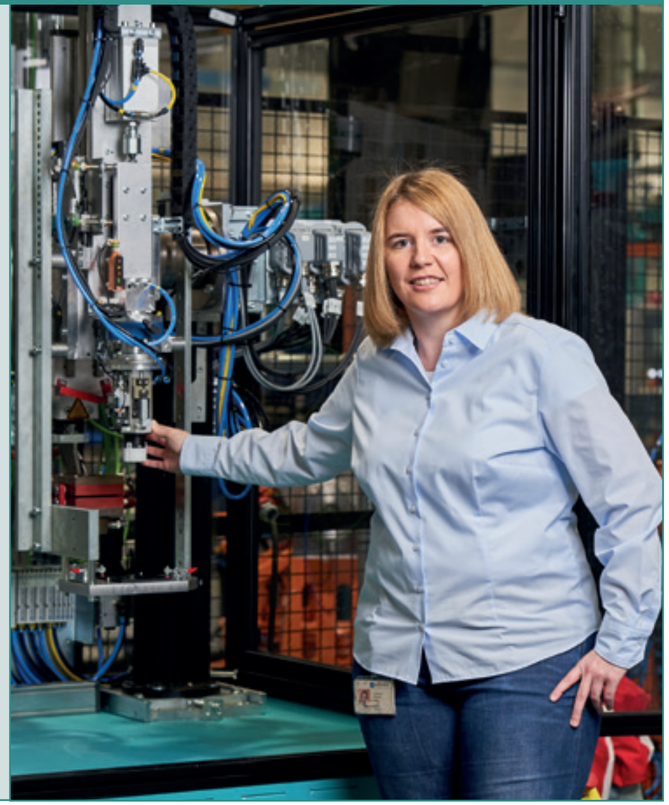
Verena Thimm's passion for industry runs in the family. "My grandfather was an art blacksmith, one uncle is an electrical engineer, the other a master metal worker", says Verena Thimm, who now works as a project manager at the plastics processing company Kautex Textron. She wanted to gain practical experience immediately after completing her university entrance qualification. "And I wanted to find out if an industrial working environment was the right choice for me." An apprenticeship as a mechatronics engineer at Kautex Textron was the first step. There she asserted herself as a female trainee. "The experience sparked my enthusiasm, but after the training, I wanted to continue to develop."

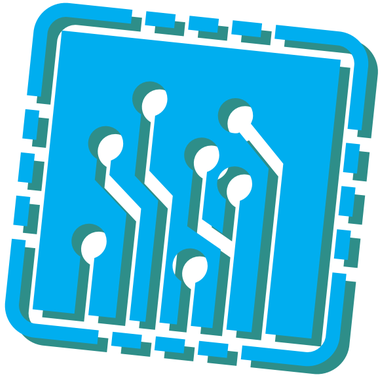
From robot welding machine to lecture hall

For this reason, the young woman enrolled for a full-time programme in mechanical engineering at H-BRS. At the same time, she continued working for Kautex Textron, where she also completed her practical semester and wrote her Bachelor's and Master's theses. Her speciality is rotational friction welding – a fast and energy-efficient welding process used in the automotive industry. "The process had already been introduced at Kautex Textron, but little research had been done into its basic principles. I worked them out." Thanks to her knowledge, she took over the project management for the development of a welding tool at the company in 2017. In addition to working at her desk, where she plans projects, the trained mechatronics engineer occasionally works on welding machines herself to test prototype tools.

Verena Thimm took her first steps in project management at H-BRS – in the motorsport team. "The FormulaStudent team is a great opportunity to apply and expand the knowledge I acquired during my studies", she says. "We developed a steering system and a concept for the first electric racing car, for instance. This calls for a lot of personal responsibility, project management and teamwork – the best preparation for your professional life." The student was also enthusiastic about the practical seminars. "In the advanced subject product development, we often worked on projects, such as developing a snowbike from the first sketch to the finished construction."

Verena Thimm advises students to cooperate with a company for practical semesters and theses and to establish a network early on. Another tip: "Don't just focus on exams, but take advantage of opportunities outside the module plan, such as the motorsport team or participation in student committees".





Institute for IT-Service established

Since January 2018, the Institute for IT-Service has been responsible for administrating the entire university IT system as well as all communication and collaboration platforms. Special project teams are responsible for the ongoing scientific development of the network, the software and all systems in order to simplify the handling of databases and software for teachers and students. The newly founded institute also offers computer science students the opportunity to conduct their own research for theses and doctoral work. This contributes to the structural development of the institute.

New Building at Rheinbach Campus open

Since winter semester 2017/18, students at the Rheinbach Campus have been learning in a new sustainable building. At its opening in January, Sebastian Schuster, administrator of the Rhein-Sieg district, praised the university as "the largest and most important project of the Bonn-Berlin-Compensation in the district". With its growing number of students, it is "a successful project of the structural change".

Yet another success is that the new buildings in Rheinbach and Sankt Augustin met the standards of the Assessment System for Sustainable Building (BNB) in the category Silver. H-BRS is only the second state institute of higher education in NRW to receive this classification.

Studying and researching in California

The Davis Campus, University of California and Hochschule Bonn-Rhein-Sieg, University of Applied Sciences sign cooperation agreement

"Personal contacts are crucial", says Professor Dirk Reith, scientific director of the TREE Institute, summing up the reason for the successful cooperation with the University of California (UC). Since his research stay as a visiting professor in 2017, Dirk Reith has been working to intensify cooperation with the UC, especially with the campus in Davis.

"Roland Faller from the UC Davis and I earned our doctorates together and have been collaborating for many years – this opens the way for an institutional consolidation of research activities", says Reith. The partnership offers benefits over and above personal contact. "The UC is an umbrella organisation of renowned universities throughout California. The teaching is excellent, and some of the universities, such as UC Berkeley, have produced Nobel laureates."

Four H-BRS students at UC Davis

The cooperation focuses on the Department of Chemical Engineering and the Department of Mechanical and Aerospace Engineering at UC Davis. In the former, there are no equivalent courses at H-BRS, but the contents fit in with those of applied chemistry and process engineering.

Four students from the Department of Electrical Engineering, Mechanical Engineering and Technical Journalism who spent winter semester 2018/19 in California gained an impression of the versatile and varied work of the two departments. Two of them were supervised by Professor Adam Moule in his research group, which specialises in the study and research of photovoltaic technology. The other two were with Professor Barbara Linke and researched industrial sustainability.

In 2019, Master's students in Sankt Augustin will also benefit from the cooperation. "My American colleague Roland Faller will offer a compulsory elective course in the Master's programme Materials Science and Sustainability Methods at H-BRS", says Dirk Reith. In addition, joint research proposals and the continuation of student exchanges in both directions are on the to-do list.

More information
www.h-brs.de/news/university-california-und-h-brs-ruecken-naeher-zusammen

www.ucdavis.edu

Dirk Reith, scientific director of the TREE Institute, initiated the cooperation with the University of California

change

Shaping reality

"Sustainability must be at the top of our agenda in all areas in order to shape the reality of our lives in a positive way. At the university, we conduct research into technological solutions for efficient mobility, renewable energies and responsible management. As tomorrow's experts in the field of sustainable engineering, our students are sensitised to the responsible use of our resources today. They can later shape and change companies with this knowledge so that sustainability is lived and less greenwashing is carried out. It's great that sustainable action has a market. This results in innovations that not only make ecological sense but also economical sense.

Each of us can contribute to more sustainability by questioning our behaviour and our consumption patterns: taking season and region into account when buying fruit and vegetables, leaving the car at home and taking a bike or organising a carpool instead. We must focus on what we have in common – then we can achieve a lot. We have to start shaping and changing the future now for the next generations."

Christoph Hermann

is Innovation Manager for Sustainability in the "Campus to World" project.

From school to research

Voluntary social year (FSJ) in the natural sciences

Applying theory in practice – Christian Radkte is very satisfied with his FSJ in research

"It was definitely the right decision", says Christian Radtke. The secondary school graduate is completing a voluntary social year (FSJ) in the Department of Natural Sciences at the Rheinbach Campus. The FSJ in research is still unusual but could become well established in the future, according to Jörn Oliver Sass, professor of bioanalytics and biochemistry. "It offers an ideal orientation for school leavers interested in the natural sciences, because they experience daily research work and gain insights into bioscientific programmes of study. This provides a very good basis for choosing their future studies and career." FSJ participants can also talk to students about relevant research questions for a potential study programme in the corresponding department. Christian Radtke confirms this: "The discussions have given me a good orientation. It's also exciting to see how the methods that I learned in school, mostly in theory, are applied in practice here".

After extensive training in the basic skills of lab work, the FSJ participant first watched complex processes and carried out supportive activities for other team members. Over time, he became more and more integrated into the daily work routine and has since taken on a small project of his own. "In the scope of our research on congenital metabolic disorders, he has also taken care of certain cell lines almost from the very start, which works quite well", says Professor Sass. The transfer of personal responsibility was an important component in the conception of the FSJ. Radtke also emphasises, "This experience, independent of the technical aspect, will benefit my future life".

Continuing FSJ in research

The project is going so well that Sass wants to establish it at H-BRS long term. The only problem is the financing. The FSJ costs around 9,000 euros per year for personnel alone – funds that Sass has to raise. The first year there was support from the university's Equal Opportunities Office. In 2018 and 2019/20, the Joachim Herz Foundation is funding the FSJ. In order to continue the concept of the FSJ in research, Sass is now striving to build reliable financial structures. "The concept is still new. Hochschule Bonn-Rhein-Sieg, University of Applied Sciences is probably the first institute of higher education in NRW to offer something like this. After our successful start, we're now looking for a sponsor to consolidate the programme. Then the university could continue to offer the FSJ after 2020."

More information about FSJ and application procedures
joern.oliver.sass@h-brs.de

Athletic successes

Bronze medal at the Karate World University Championship: Chemistry student Jenny Warling fought her way up to the podium in Japan and is now regarded as a promising candidate for the 2020 Olympic Games in Tokyo. In cycling, electrical engineering graduate Simon Happel delivered an impressive performance with a successful seventh place at the German University Championships. He finished fourth in the XXXL Rück Prize in the Ruhr region. Business psychology student, Martin Stach, became German University Champion in Taekwondo.

Silver in Montreal

H-BRS team successful at the RoboCup World Championship in Canada

The university's b-it-bots competed against six other teams at the RoboCup World Championship in Montreal, Canada, and took second place in the RoboCup@Work competition. The four students from the international Master's programme in Autonomous Systems and their team leaders, Deebul Nair and Santosh Thoduka, both research associates at the Department of Computer Science, developed a robot every technologist would be proud of. "Our robot can recognise items, such as screws, and move them from one workbench to another", says Torsten Jandt, explaining the invention. The robot uses a camera to detect objects, lifts them up with a gripper arm and transports them to the desired location.

In addition to second place in the overall standings, the team did outstandingly well in two special technical competitions. In the Arbitrary Surface Test the b-it-bots took second place, in the Line Following Test first place. "In the Arbitrary Surface Test, we were able to prove that our robot not only works on a standardised white surface but also detects objects in the grass or on a gravel surface", says Torsten Jandt. The Line Following Test has to do with the interaction of camera and gripper arm. The robot must be able to recognise a painted line with the camera and follow it as closely as possible with its arm.

Team members on RoboCup committees

The highly successful work of the team was also recognised through the appointment of several members to the central committees of the RoboCup Federation. Torsten Jandt was appointed to the Organisation Committee and is helping to prepare the RoboCup 2019 in Sidney. Deebul Nair will be involved in developing the tasks and rules in the Technical Committee. Professor Gerhard Kraetzschmar, who together with Professor Paul Plöger is responsible for the scientific and administrative aspects of the b-it-bots, was re-elected to the Trustee Board, the highest governing body of the RoboCup Federation.

More information
www.robocup2018.com

Proud of second place: b-it-bots team with successful robot in Canada

Hunting for security

Internationally successful hackers study at the university

"We make IT more secure by hacking." The RedRocket Club is seeking new recruits for this task

When the word hacking is mentioned, many people think of what occasionally happens with the data of politicians or celebrities. Someone hijacks a Twitter or Facebook account and makes the data publicly available on the Internet. The hacker team at H-BRS expressly distances itself from this. "We make IT more secure by hacking. Hacking is the most demanding discipline in computer science. A good hacker has to become familiar with systems quickly and understand them better than the developer him or herself", says Ruben Gonzalez. He is a computer science student and, together with Konstantin Wurster, a founding member of the RedRocket Club. Since the summer semester, the two have been offering a lecture of their own: the hacker internship.

Protecting private data

In the hacker internship, students learn about the legal situation, so-called hacker ethics. In a nutshell this means using public data, protecting private data. "Hackers uncover security gaps and report them to the respective developers so that they can correct the errors", says Konstantin Wurster, clearing up prejudices. The industry has long since recognised the benefits of hacking. "Companies like Google pay five to six-figure sums if a security gap is found", says Gonzalez. "Hackers are in high demand and paid very well."

With this knowledge, the RedRocket Club successfully competes in international hacker competitions. "An organiser makes IT systems available online. The team that cracks as many systems as possible the fastest wins", Ruben Gonzalez explains the principle. Speed depends on the quality of the website or system. "Some sites are poorly programmed. In five minutes, we have full access to the server."

What hackers always want to achieve for demonstration purposes is called remote code execution in IT lingo. The intruder can then run his or her own code on the external machines and take over the administrative account of a website, for instance. Konstantin Wurster and Ruben Gonzalez pass on various attack strategies in the hacker internship.

Anyone interested in participating in RedRockets is very welcome. An entrance exam, in the form of a hacking task, is waiting on the website:

More information
www.redrocket.club

collaborate

Shaping diversity and internationality

In our everyday lives we encounter changes daily. The world is becoming more international and more diverse. As a university, as a mirror of society, we cannot and do not want to withdraw from this change. H-BRS not only wants to react openly, without fear, but also wants to initiate changes, to be courageous and to help shape them in order to remain fit for the future and prepare for a world of work that is no longer conceivable without internationality and diversity. In this way, we too can shape reality and look to the future with confidence. Our initiative "Respect! Time for diversity, time for sustainability" is an outward sign of this engagement.

Internationalisation is an inevitable cause of change. H-BRS shapes and lives this process. We build bridges across national borders and give all university members the opportunity to experience internationality, be it far away from home or here on campus. We pass on our know-how by cooperating with universities in developing and emerging countries. The approval of cooperation projects in the Arab world, sub-Saharan Africa and Asia promotes our international activities and encourages us to continue along this path.

Increasing diversity can be a result of or an occasion for change. Every human being is different and therefore affected by diversity. At H-BRS we aim to set an example of a respectful way of dealing with all supposed differences. Participation in the Donors' Association's Diversity Audit gives us the opportunity, with professional support, to develop a diversity strategy that takes into account the diversity of all university members, equal opportunities and an appreciative approach.

Internationalisation and diversity themselves are also changing as a result of the trend towards digitalisation. With the newly created position of Presidential Commissioner for Global Digital Teaching, we would like to make greater use of the associated potential.

We are setting a positive example for the university and the region and demonstrating that internationalisation and diversity can be shaped in such a way that individuality and personal qualities are not lost, but gain in multi-faceted nature.

Prof. Dr Jürgen Bode
Vice President for International Affairs and Diversity

Assisting the birth of smart products

The SME 4.0 Competence Centre Usability at H-BRS supports businesses in the fourth industrial revolution

Sharing information about new markets and products in the SME 4.0 Competence Centre

The keyword digitalisation is associated with a multitude of topics that have an enormous impact on the modern working world. These include big data and artificial intelligence, the networking of digital systems, and data security on the Internet. Products, services and the market itself are changing along with digitalisation. Large companies and corporations have sufficient capacity to master the challenges of this so-called fourth industrial revolution. But this is not the case for small and medium-sized enterprises (SMEs). "Our goal is to optimally combine scientific expertise and methods with concrete knowledge and experience from the business world", says Dr Daryoush Vaziri, research associate at the Department of Management Sciences and head of the centre.

The Competence Centre opened its digital doors in June 2018. It is part of the SME 4.0 funding initiative of the Federal Ministry for Economic Affairs and Energy (BMWi), which aims to promote the digital transformation of business processes across Germany. The result is a network of centres distributed throughout the country. The focus of the network in the Rhineland is on user research and the usability of digital data for companies and their customers. The project, which runs until 2020, is funded by the BMWi with a total of 4.5 million euros, around 960,000 of which will go to H-BRS. The establishment of the SME 4.0 Competence Centre Usability has also been made possible through the hard work and commitment of project manager and business information scientist Professor Gunnar Stevens.

Smart technology alone is not enough. "Studies have shown that customers are willing to pay more for user-friendly products that they understand and can operate easily", says Daryoush Vaziri. He underscores the focus: "Together with the companies, we are working on a change in perspective – it's about looking at the products from the customers' point of view and responding to their needs". On the website of the competence centre, the companies can find information, contacts and event notifications. The competence centre regularly offers virtual get-togethers and training events. In 2018, workshops were held on user research, data protection, rapid prototyping and the handling of health data.

More information
www.kompetenzzentrum-usability.digital

Special prize for practical project

Under the motto "Science Makes Business", 23 entrepreneurs from the region presented their projects at the sixth idea marketplace "Best of Start-Ups in the Region" held at the Sankt Augustin Campus. Axel Ifland took 3rd place with inmex GmbH, a university spin-off start-up (more on page 46). A special prize went to Professor Christoph Zacharias, five management sciences students and a technical journalist for their project "Preventative Health Care for People Working in Coworking Spaces".

A fresh look at your own country

Spring school in Kenya enables students to gain intercultural experience

Many students do not have African countries in mind when considering a study visit or further education abroad. H-BRS maintains a variety of partnerships with African universities and institutions, in Kenya for instance. The Department of Management Sciences Rheinbach Campus attaches great importance to an international orientation and has successfully organised spring or summer schools for many years. They are intended to arouse students' interest in studying abroad. The short-term exchange "Mount Kenya Spring School Programme" has been in place since 2018.

"The launch of the spring school in Thika was a complete success", says Eileen Küpper, head of intercultural communication and English at the Language Centre. Together with Karsten Heinrich, coordinator of the department's international programme, she initiated the short-term exchange programme at Mount Kenya University (MKU) and accompanied eight H-BRS students during their three-week stay. In addition to cultural activities, visits to the German Embassy, the German Academic Exchange Service (DAAD) and the UN Campus in Nairobi, they took part in regular classes and a Swahili language course. This resulted in contacts with Kenyan students.

"An important focus is bringing the students into contact with lesser known cultures and strengthening their intercultural competence", Küpper explains. Joint learning in particular changes your view of your own country and study conditions. "The hierarchy at MKU is much more pronounced, and students treat their teachers with great respect", says Küpper. The desire to learn is clearly perceptible. Over the medium term, the initiators also want to inspire Kenyan students to study at Hochschule Bonn-Rhein-Sieg, University of Applied Sciences. They also hope that the spring school in Kenya will become permanently established as a low-threshold opportunity for H-BRS students.

Visit to the German Embassy in Nairobi during spring school

More information about the spring school programme Kenya
www.h-brs.de/wiwi/spring-school-programme-kenya

Dare more practice

CEPU project prepares Kenyan university graduates for the labour market

Peter Kirira, Bonface Joel Malala and Peter Manani Atika from Mount Kenya University discover how H-BRS students are prepared for the job market

"Students in Kenya are used to following instructions. By the time they enter the professional world, they have learned that they are told exactly what to do", says Christine Freitag, a research associate at the Department of Management Sciences. "But employers expect the graduates to be self-reliant and proactive", Freitag describes the problem. She is part of the H-BRS Africa team and heads the projects "German-African Entrepreneurship Project – GAUP" and "Collaboration for Entrepreneurial Universities – CEPU".

Launched in May 2018, the CEPU project is funded through the German Academic Exchange Service (DAAD). The aim is to support higher education institutions in Kenya in better preparing students for the labour market. CEPU is backed by a consortium, which includes Hochschule Bonn-Rhein-Sieg University of Applied Sciences, as consortium leader, the Universities of Leipzig and Leuphana in Lüneburg, Hochschule Wismar University of Applied Sciences and the School of Design Thinking (d-School) of the Hasso Plattner Institute at the University of Cape Town. Project partners in Kenya are Kenyatta University and Mount Kenya University. The funds for the DAAD programme and thus for CEPU come from the Federal Ministry for Economic Cooperation and Development (BMZ).

Knowledge transfer to business

"The Kenyan universities are aware of the challenge", explains Freitag. First of all, they need support sharpening the professional skills of their graduates to improve their position in the labour market. The transfer of knowledge from universities to business and industry is also to be stepped up. A stronger practical orientation of the courses on offer as well as good networking within the social and economic sphere in Kenya are prerequisites for this.

The first steps towards a stronger labour market orientation at the two Kenyan universities were taken in July 2018. Christine Freitag held various workshops at both MKU and Kenyatta University. The topic was the application of the tool HEInnovate (Higher Education Innovate) developed by the Organisation for Economic Cooperation and Development (OECD) and the European Commission. It assists universities in self-assessing their entrepreneurial potential and developing strategies for more practical relevance. Four colleagues from Kenyan partner universities came to H-BRS for job shadowing at the end of 2018. Further shadowing is planned.

More information about the project:
www.h-brs.de/izne/german-african-university-partnership-platform-development-entrepreneurs-and-smallmedium-enterprises

Protein isolation in turbo

Dalex Biotech GmbH, a start-up in the life sciences sector, is revolutionising biotechnology

Time-saving, stable and user-friendly – who wouldn't say that about their products if they wanted to place them successfully in the market? At the start-up Dalex Biotech, the inventor of the innovative protein isolation process, David Frommholz, can prove these claims scientifically. The biologist developed the new procedure while working on his doctorate at H-BRS in the Department of Natural Sciences.

"Proteins are important basic components for the development of new drugs, vaccines, diagnostics, detergents and cosmetics", explains Frommholz. However, since proteins do not occur in their pure form but adhere to other substances, they have to be "purified" or isolated in order to test their usefulness. The usual isolation procedure is very complex and lengthy, as Frommholz knows. Thanks to the now optimised process – protein isolation in turbo – users save a lot of time.

Together with his colleague Alexandra Ehl, also a former research associate at the Department of Natural Sciences, Frommholz founded Dalex Biotech GmbH in autumn 2018. The third member of the team is Nadine Stefanczyk, a former trainee at the department and current management sciences student. An important contact at H-BRS is co-founder Harald Illges, professor of immunology and cell biology.

"The special aspect of this start-up is that we aren't dealing with a hopeful idea but with tangible products, some of them unique, that make real technological sense. They have many advantages over the competition", says Illges. He is pleased that the spin-off took place on the campus

Entrepreneurs Alexandra Ehl and David Frommholz

itself because there are only a few spin-offs from biology. H-BRS remains an important cooperation partner for joint research projects.

Professor Illges' network is very valuable for acquiring customers "especially in our area", says Frommholz. And Illges hopes that the successful spin-off will also have a positive impact on research: "It would be ideal if Dalex Biotech became a nucleus for more biomedical start-ups".

Dalex Biotech GmbH on YouTube
http://ow.ly/xDBN50u7lCD

Stem Cell Network.NRW

H-BRS is the only university of applied sciences to be a founding member of the Stem Cell Network.NRW. The university is represented in the steering committee by Professor Edda Tobiasch from the Department of Natural Sciences. The Stem Cell Network.NRW is an association of 19 universities, university clinics and research institutions and institutionalises the Stem Cell Research Competence Network, which has been funded by the NRW Ministry of Science for 16 years. It ensures the further development of stem cell research in biomedicine as well as in the humanities, law, and social sciences.

www.hn-nrw.de/stammzellnetzwerk-nrw

change

Shaping reality

"It feels good to make a difference in a much criticised industry like plastics. Melting the plastic in the machines is very energy-intensive. We've changed the core of the machine at this crucial step in production. Now the system consumes 50% less energy! The more sustainable production method reduces the ecological footprint of each individual plastic part.

The professional transition to self-employed managing director is a personal enrichment. Not only do I have insight into the technological processes, but also into areas such as purchasing and marketing. I also have more flexible working hours and holiday times. I end up working more, but I feel freer. I have a different kind of drive because I can shape my daily life and the future."

Axel Ifland

is an alumnus of H-BRS and managing director of inmex GmbH, a company that makes plastic processing machines more energy-efficient.

Conference: Architecture in the Media

In cooperation with the NRW Chamber of Architects, the Institute for Media Development and Analysis (IMEA) hosted the specialist conference "Architecture as a Media Topic" for the first time. Media representatives, architects, urban planners, experts from architecture PR, and students discussed why architecture and urban planning are rarely reported on. They then developed concepts for solutions to this question together. A continuation of the successful symposium is planned.

Cyber security learning laboratory

Protection against cyberattacks: In the H-BRS "High Security and Emergency Response" learning lab, specialists and managers from companies develop new IT security skills. In cooperation with the Fraunhofer Institute for Communication, Information Processing and Ergonomics, a seven-member scientific team provides new insights into the analysis of and defence against cyberattacks. In addition to commercial training courses, the learning lab also offers internal workshops for computer science students.

www.h-brs.de/news/jonas-co-im-interview-lernlabor-cybersicherheit

Cutting through the data jungle

The Big Data Innovation Center (BDIC) supports companies in the analysis and processing of complex data volumes

As a term for describing large and complex amounts of data, "big data" has already entered our daily speech. The networking of vehicles, machines, household appliances and other devices that use sensors and APIs (application programming interfaces) to connect and then exchange data via the Internet results in a very high volume of data, for instance. The management, storage and analysis of such data is a growing challenge for companies. This is where the newly founded cross-university research project "Big Data Innovation Center" (BDIC) at the Institute for Management (IfM) of the Department of Management Sciences comes in.

Three universities of applied sciences cooperate

"We see ourselves as a central contact point for companies that want to improve their business through the targeted application of big data technologies", explains the scientific project manager, Professor Andreas Gadatsch. The aim is to further develop big data and the related subject area of data science in research and teaching as well as in industrial cooperation. In addition to H-BRS, the Niederrhein and Dortmund universities of applied sciences are founding members and cooperation partners of the BDIC. The BDIC also works closely with companies.

Scientific expertise at the BDIC should go hand in hand with economic innovation. "Teaching should benefit from the fast-paced technological developments in connection with big data and vice versa", according to Gadatsch. Software tools will be used that make it possible, among other things, to flexibly analyse massive amounts of data in real time. The in-memory computing platform SAP HANA, for instance, provides the necessary technology for this. In line with the data science process, the BDIC is also dedicated to other software products in teaching and applied research, including the implementation of doctoral projects related to big data.

Further education for students and professionals

The BDIC offered a well-attended pilot workshop on the potential of big data in December 2018 at Hochschule Niederrhein, University of Applied Sciences. Andreas Schmidt, research associate at the BDIC, explains that further training courses will be offered in the future on this topic as well as on other data science topics. Participation is open to students and professionals.

www.h-brs.de/de/bdic

The advisory board of the Big Data Innovation Center during an excursion to the mechanical engineering company Wirtgen

Broadening professional horizons

University staff members gain international experience through the Erasmus+ programme

Susanne Patt-Bohlscheid from the University and District Library shadows colleagues in Dublin

The EU's Erasmus+ funding programme benefits technical and administrative employees as well as academic staff members who wish to broaden their professional horizons abroad. The fact that not just students are internationally mobile and interculturally competent is of advantage for the internationalisation of H-BRS – it also supports the interest in international further education at all levels.

Susanne Farha, an employee in the International Office, provides advice on all aspects of staff mobility in the programme and noted a growing interest in 2018. "We'd like to shed positive light on the topic and explain the personal benefits of the programme to our colleagues. We want to organise information events and speak with them personally", she says.

Erasmus Staff Weeks are a popular format for staff mobility. These events, in which employees from different countries can participate, last several days and focus on one specialist area. Annika Zimdars, then a member of the H-BRS Central Study Guidance Service, received many new impulses during a Staff Week at Tallinn University of Technology (TTÜ) in 2018. She was particularly impressed by the Mektory School of Technology. "This is a building at TTÜ in which every room can be used as a 'hands-on lab'. Here schoolchildren, for instance, can gain a practical introduction to all TTÜ study courses. On offer are a Lego robotics lab, an environmental lab and a nautical lab", reports Zimdars.

Job shadowing is also popular. Susanne Patt-Bohlscheid, staff member at the University and District Library, wanted to improve her knowledge of English and social media. "With these goals in mind, I chose the Dublin Business School Library – a library that is active in social media, especially on Twitter and that is similar to ours in size", she explains. All her expectations have been met. The first professional fruits of her stay are already apparent. The H-BRS library has been much more actively involved in the H-BRS Facebook and Instagram accounts. A library blog is also in planning.

More information about Erasmus+ opportunities:
www.h-brs.de/erasmus-neu#mobilitaet

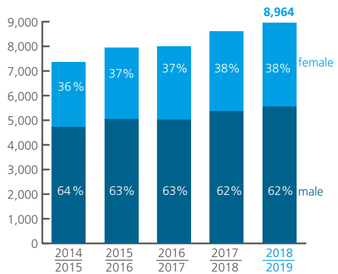
Read more about Patt-Bohlscheid's experience
http://ow.ly/B4LQ50u7lDW

report

Facts and figures

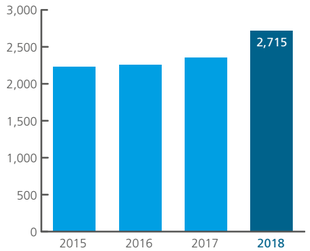
Number of students

winter semester 2018/19



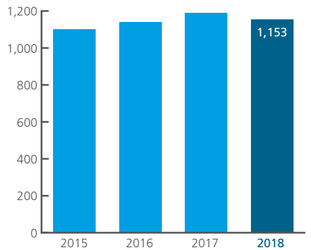
First-semester students

to academic year 2017/18



Graduates

to academic year 2017/18



Degree courses at H-BRS

Bachelor's programmes

- Applied Biology
- Business Information Systems
- Business Management
- Business Psychology
- Chemistry with Materials Science
- Computer Science (+ dual)
- Electrical Engineering (+ cooperative)
- Forensic Sciences
- International Business
- Mechanical Engineering (+ cooperative)
- Social Security Management – Accident Insurance
- Sustainable Engineering (+ cooperative)
- Sustainable Social Policy
- Technical Journalism/PR
- Visual Technical Communication

Master's programmes

- Analysis and Design of Social Protection Systems
- Analytical Chemistry and Quality Assurance
- Autonomous Systems
- Biomedical Sciences
- Business Psychology
- Computer Science
- CSR & NGO Management
- Electrical Engineering
- Innovation and Information Management
- International Media Studies
- Management Accounting and Management Control
- Marketing
- Materials Science and Sustainability Methods
- Mechanical Engineering
- Technology and Innovation Communication
- Visual Computing & Games Technology

Doctorates

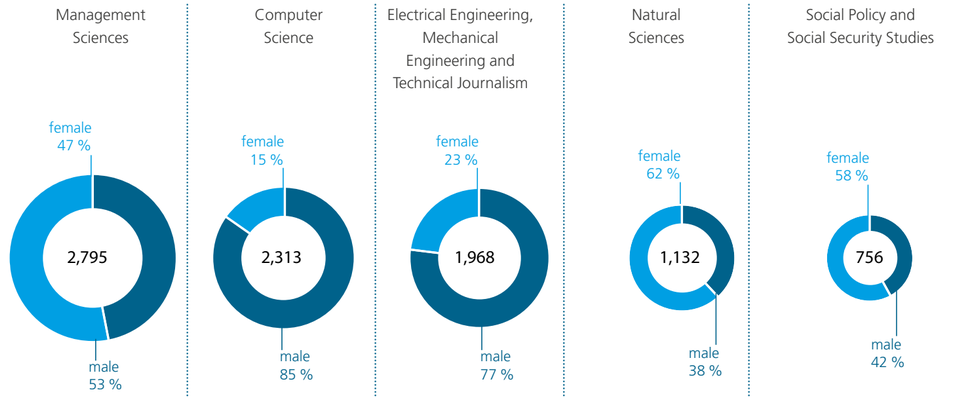
PhD programme at the H-BRS Graduate Institute:

- 94 doctoral candidates

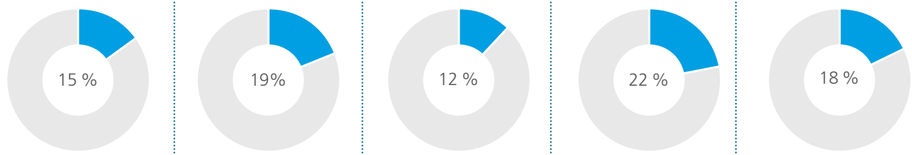
all numbers, status 31/12/2018

Students winter semester 2018/2019

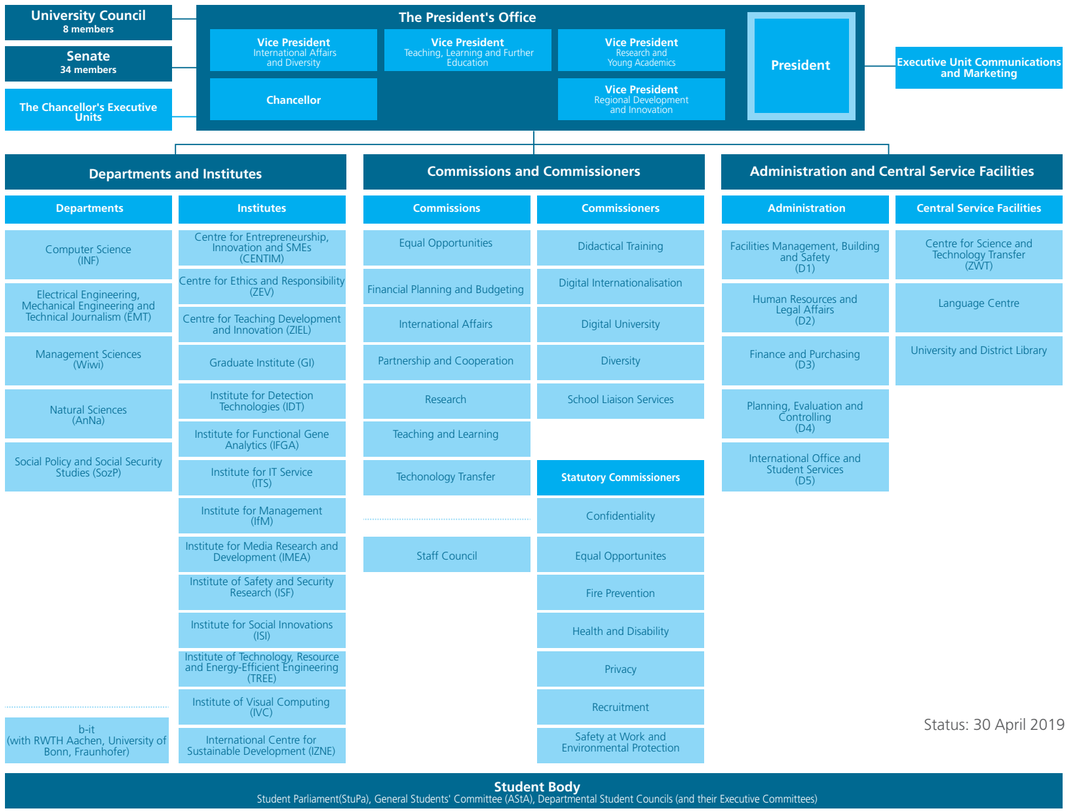
Students by department and gender



Percentage of international students by department



Organisational structure of the university



Status: 30 April 2019

State Secretary Ministry Innovation, Science and Research Annette Storsberg (3rd from right) und University President Prof. Dr Hartmut Ihne (right) with the University Council, from left: Prof. Dr Simone Bürsner, Rainer Otto, Prof. Dr Jakob Rhyner, Sylvie Hambloch-Gesinn, Prof. Dr Karin Hummel, Dr Andrea Niehaus, Prof. Dr Peter Kaul, Prof. Dr Klaus Deimel

The University Council

The newly composed University Council has been on duty for H-BRS since September 2017. It is made up of four external members and four members of the university. The University Council is responsible for all strategic matters relating to the university. It advises the President's Office and monitors the way business is conducted. It also appoints the President of Hochschule Bonn-Rhein-Sieg, University of Applied Sciences and acts as a supervisory body. The eight members of the University Council are:

- **Sylvie Hambloch-Gesinn**
  Solicitor (Chair)
- **Prof. Dr Jakob Rhyner**
  University of Bonn, Scientific Director of the Innovation Campus Bonn
- **Prof. Dr Simone Bürsner**
  Hochschule Bonn-Rhein-Sieg
- **Prof. Dr Klaus Deimel**
  Hochschule Bonn-Rhein-Sieg
- **Prof. Dr Karin Hummel**
  Hochschule Bonn-Rhein-Sieg
- **Prof. Dr Peter Kaul**
  Hochschule Bonn-Rhein-Sieg
- **Dr Andrea Niehaus**
  Director of the Deutsches Museum Bonn
- **Rainer Otto**
  Commercial Managing Director WIRTGEN GROUP Holding GmbH

Prizes and awards 2018

Prizes for the university

"Wirtschaftswoche" University Rankings
- In the category Top 10: Departments of Computer Science and Management Sciences

Most Attractive Employer Rhein-Sieg district – BILD-Zeitung and Beratungsgesellschaft ServiceValue
- Hochschule Bonn-Rhein-Sieg, University of Applied Sciences

Award of the International E-Learning Association (IELA)
- Teaching project Remote Lab

Silver Certificate for sustainability in materials and construction
- Hochschule Bonn-Rhein-Sieg, University of Applied Sciences

Graduate Institute, doctorates awarded in 2018

- Anastassia Küstenmacher, Department of Computer Science
- Shatha Abu Shanab, Department of Electrical Engineering, Mechanical Engineering and Technical Journalism
- Daryoush Vaziri, Department of Management Sciences
- Dominik Wild, Department of Natural Sciences
- Michel Bergs, Department of Natural Sciences

Individual awards

HBR-S Award for Teaching
- Prof. Dr Irene Rothe, Department of Electrical Engineering, Mechanical Engineering and Technical Journalism

DAAD Prize (German Academic Exchange Service)
- Juliana Baranova, Department of Natural Sciences

Prize for Responsibility and Sustainable Development 2018 from the International Centre for Sustainable Development (IZNE)
- Fenja Scheddler, Department of Management Sciences
- Maria Pankrath, Department of Management Sciences

AFCEA Student Award
- 2nd place for Oliver Grentz, Department of Electrical Engineering, Mechanical Engineering and Technical Journalism
- 2nd place for Alexander Kirfel, Department of Computer Science

Doctoral Scholarships 2018
- Ahmed Drak, TREE scholarship holder, Department of Computer Science
- David Dreistadt, scholarship holder in the Department of Electrical Engineering, Mechanical Engineering and Technical Journalism
- Thomas Havelt, scholarship holder in the Department of Natural Sciences
- Daniel Klein, ISF scholarship holder, Department of Natural Sciences
- Alexander Marquardt, IVC scholarship holder, Department of Computer Science
- Brian Mathebula, Reiner Clement Scholarship of the GI, Department of Social Policy and Social Security Studies
- Michael Meurer, TREE scholarship holder, Department of Natural Sciences
- Patrick Ottensmeyer, scholarship holder in the Department of Computer Science
- Christoph Pomrehn, scholarship holder in the Department of Computer Science
- Lea Prochnau, Equal Opportunity Officer's scholarhip holder
- Santosh Thoduka, GI scholarship holder, Department of Computer Science
- Maximilian Schöbel, GI scholarship holder, Department of Computer Science
- Christina Trepkowski, IVC scholarship holder, Department of Computer Science

Equal Opportunity Officer's Award for the best Master's thesis
- Juliane Schneider, Department of Electrical Engineering, Mechanical Engineering and Technical Journalism
- Sabine Schmidt, Department of Electrical Engineering, Mechanical Engineering and Technical Journalism

MidnightSun CTF at the Royal Institute of Technology in Stockholm
- 2nd place for the hacker team RedRocket Club, students in the Department of Computer Science

Advancement Award from H-BRS Donors
- Larissa Nolden, Department of Management Sciences – dhpg Dr Harzem & Partner mbB
- Elisabeth Hönig, Department of Management Sciences – true fruits GmbH
- Alexander Huppertz, Department of Management Sciences – true fruits GmbH
- Michael Malschützky, Department of Management Sciences – Siegwerk Druckfarben AG & Co. KGaA
- Helena Balabin, Department of Computer Science – SVA System Vertrieb Alexander GmbH
- Lisa Fink, Department of Computer Science – Bechtle IT-Systemhaus Bonn
- Jasmin Gries, Department of Electrical Engineering, Mechanical Engineering and Technical Journalism– Wirtgen GmbH
- Markus Rohde, Department of Electrical Engineering, Mechanical Engineering and Technical Journalism – Eaton Industries/Hein-Moeller Foundation
- Chantal Clement, Department of Electrical Engineering, Mechanical Engineering and Technical Journalism – BRS Institute for International Studies
- René Burger, Department of Natural Sciences – Dr Reinold Hagen Foundation
- Sarah Brettschneider, Department of Natural Sciences – Innovatec Gerätetechnik GmbH
- Virginia Malchus, Department of Natural Sciences – Evolution Foundation

Advancement Award for Master's thesis
- Lena Cassens, Department of Management Sciences – Kreissparkasse Cologne
- Marcel Hasler, Department of Computer Science – Detecon International GmbH
- Robin Paul Strickstrock, Department of Electrical Engineering, Mechanical Engineering and Technical Journalism – BPW Bergische Achsen
- Hannah Karbach, Department of Natural Sciences – Universal DX (UDX)
- Chantel Pearson, Department of Natural Sciences – German Social Accident Insurance e. V. (DGUV)

Advancement Award for PhD dissertation
- Dr Nico Hochgeschwender – Industrie- und Handelsclub Bonn e. V.
- Dr Daryoush Daniel Vaziri – Industrie- und Handelsclub Bonn e. V.

Special Prize at idea marketplace "Best of Start-ups in the Region"
- Practical project "Preventative Health Care for People Working in Coworking Spaces", Prof. Dr Christoph Zacharias

Ars Legendi Faculty Award Chemistry
- Prof. Dr Klaus Lehmann, Department of Natural Sciences

Departmental Day Award Social Policy and Social Security Studies 2018
- Patrick Baues, Department of Social Policy and Social Security Studies

Best Paper Award at the 19th International Arab Conference on Information Technology, Lebanon
- Ahmad Drak, Department of Computer Science

Best Paper Award (Complex Systems) at the Genetic and Evolutionary Computation Conference (GECCO) 2018, Kyoto
- Adam Gaier, Prof. Dr Alexander Asteroth and Jean-Baptiste Mouret, all Department of Computer Science

Best Paper Award 2018, Vancouver
- Martin Weier, Thorsten Roth, Prof. Dr André Hinkenjann, Prof. Dr-Ing. Philipp Slusallek, all Department of Computer Science

MINT Award IT 2018, Friedrichshafen
- Markus Wiktorin, Prof. Dr Gerhard Kraetzschmar, Prof. Dr Kurt-Ulrich Witt, all Department of Computer Science

Staff announcements 2018

New appointments

- **Prof. Dr Matthias Bertram**
  Department of Computer Science, Professor of Business Information Systems, especially Information and Communication Systems
- **Prof. Dr Tanja Clees**
  Department of Electrical Engineering, Mechanical Engineering and Technical Journalism, Professor of Engineering, especially Informatics for Engineers, Modelling and Simulation
- **Prof. Dr Hektor Haarkötter**
  Department of Social Policy and Social Security Studies, Professor of Communication Science, focus Political Communication
- **Prof. Dr Robert Lange**
  Department of Electrical Engineering, Mechanical Engineering and Technical Journalism, Professor of Engineering, especially Electrical Engineering and Electric Circuitry
- **Prof. Dr Ralf Meyer**
  Department of Management Sciences, Professor of Business Administration, specialising in International Financial Management
- **Prof. Dr Michael Sauer**
  Department of Social Policy and Social Security Studies, Professor of Social Policy
- **Prof. Dr Christine Syrek**
  Department of Management Sciences, Professor of Business Psychology

Honorary professorships

- **Dr Bernd Diehl**
  Honorary Professor in the Department of Natural Sciences
- **Dr Dirk Lanzerath**
  HonoraryProfessor at the Centre for Ethics and Responsibility
- **Dr Klaus Lehmann**
  HonoraryProfessor in the Department of Natural Sciences

Retirement

- **Prof. Dr Rüdiger Buck-Emden**
  Department of Computer Science
- **Prof. Dr Wolfgang Fink**
  Department of Natural Sciences
- **Prof. Dr Kurt Steuer**
  Department of Social Policy and Social Security Studies

25th anniversary

- **Prof. Dr Margit Ernenputsch**
- **Prof. Dr Karin Hummel**
- **Prof. Dr Harald Illges**
- **Prof. Dr Volker Sommer**

Employees (number) as of 31/12/2018

	2016	2017	2018
Professors	150	151	152
of these substitute professors	*6*	*5*	*3*
of these endowed and third-party funded professors	*19*	*18*	*16*
Honorary professors	31	35	36
Lecturers with special responsibilities	31	43	48
Research associates	231	264	286
Employees in technology and administration	197	207	233
Apprentices/trainees	13	14	17
Number lecturers	316	337	326
TOTAL	**969**	**1051**	**1098**

Employees (full-time equivalent) as of 31/12/2018

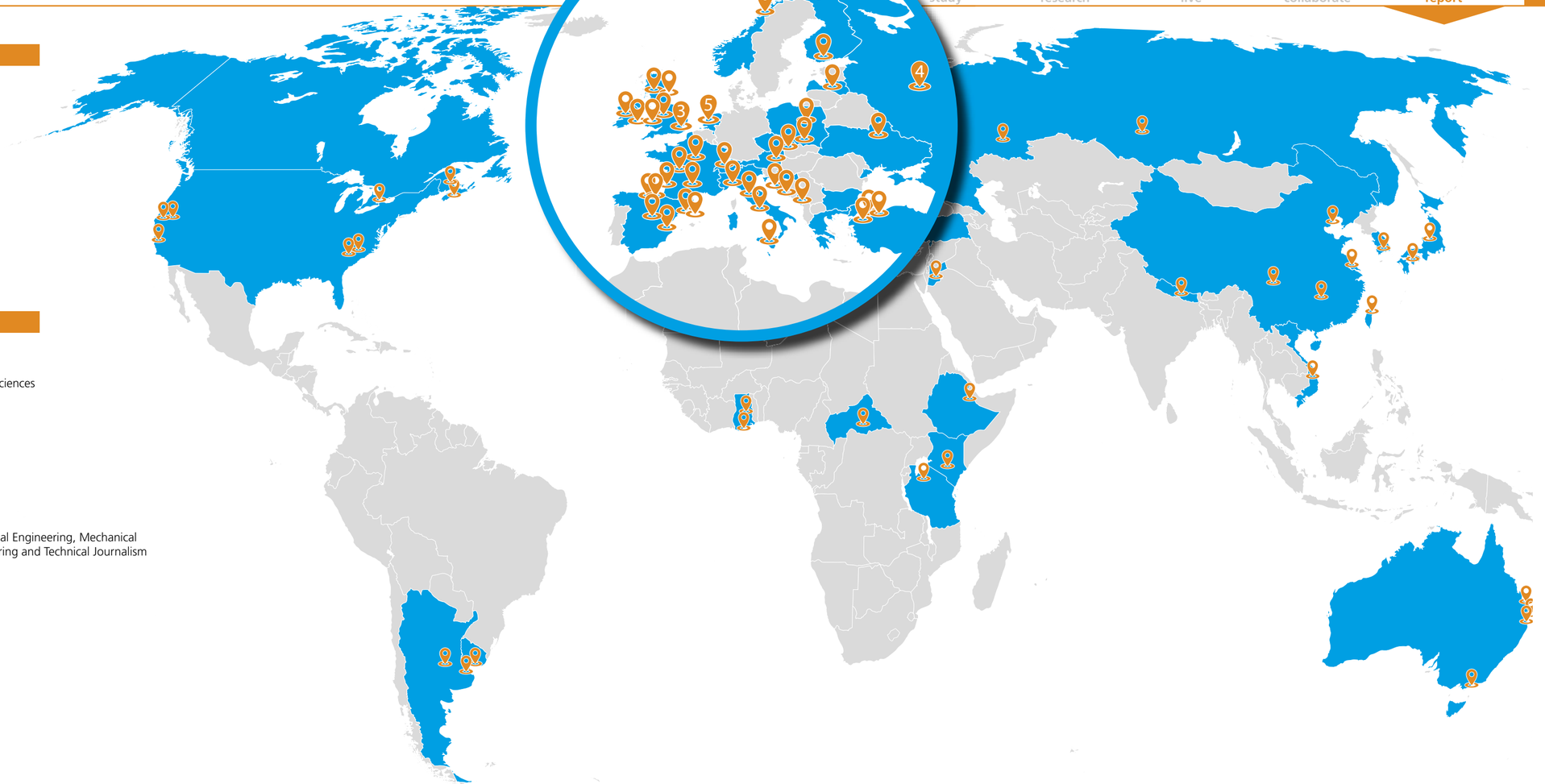
	2016	2017	2018
Professors	138.42	142.58	143.66
of these substitute professors	3.72	3.64	2.25
of these endowed and third-party funded professors	14.44	14.12	13.12
Honorary professors	2.33	3.89	3.96
Lecturers with special responsibilities	30.75	33.59	35.93
Research associates	175.13	200.03	214.42
Employees in technology and administration	154.09	169.42	183.98
Apprentices/trainees	14.00	14.00	17.00
TOTAL	**514.73**	**563.51**	**598.95**

Third-party funded staff (full-time equivalent) as of 31/12/2018

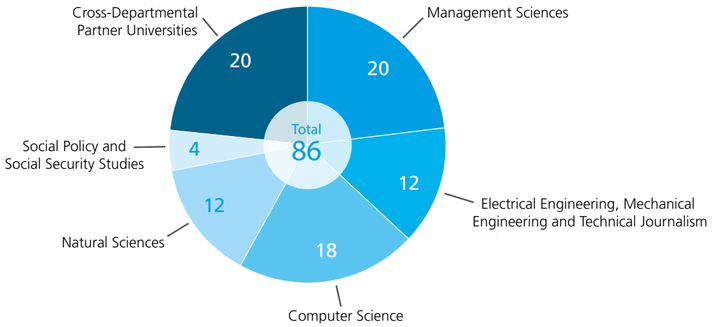
	2016	2017	2018
Departments	63.77	65.43	64.58
Administration	5.01	5.11	9.54
Central services	24.79	27.54	37.37
Other	0.50	0.50	1.50
TOTAL	**94.06**	**98.58**	**112.99**

Partner universities around the world

www.h-brs.de/files/partnerhochschulen_dtsch.pdf



Partner universities by department



Revenue by budget heading (in euros)

		2017	2018
State subsidies for running costs	Personnel	19,534,100.00	20,164,900.00
	Management	3,240,600.00	3,877,100.00
	Material expenses	1,476,900.00	1,476,900.00
	Performance-based allocation of funds	359,900.00	374,200.00
	Investments	477,400.00	577,400.00
	Consistent University Pact funds	1,447,200.00	2,860,300.00
	Reduced expenditure from Hochschulvereinbarung 2021	-70,600.00	-70,600.00
	Building/immovable property	6,903,800.00	6,904,000.00
	Total	**33,369,300.00**	**36,164,200.00**
State allocations	Higher Education Pact II and Master	1,950,000.00	775,000.00
	Higher Education Pact II	12,013,075.00	14,853,375.00
	Device programme	0.00	0.00
	Other	531,950.37	907,397.02
	Total	**14,495,025.37**	**16,535,772.02**
Quality improvement funds		**3,451,021.00**	**3,747,619.00**
Third-party funds		**10,109,786.81**	**11,233,921.54**
Own resources		**214,594.89**	**172,498.86**
Total revenue of H-BRS	**Sum of the above-listed portions**	**61,558,579.44**	**67,854,011.42**

All figures for the year 2018 on pages 68 to 70 are provisional.
The figures for 2017 differ from those mentioned in the 2017 Annual Report as they are now available on an adjusted basis.

Expenditures by type of cost (in euros)

2018		State subsidies for running costs	State allocations	Quality improvement funds	Third-party funds	Total expenditures
All expenditures of the budget headings split according to	Material expenses	5,661,066.76	4,738,685.95	272,101.99	2,487,435.77	13,159,290.47
	Personnel	21,496,143.08	10,540,626.09	3,193,844.64	9,200,397.77	44,431,011.58
	Investments	1,109,213.01	1,958,441.70	33,951.29	1,568,972.49	4,670,578.49
	Immovable property	0.00	837,066.24	0.00	0.00	837,066.24
	Other	1,848.61	32,146.50	0.00	-33,995.11	0.00
		28,268,271.46	**18,106,966.48**	**3,499,897.92**	**13,222,810.92**	**63,097,946.78**

Construction activities (in euros)

Minor building activities

Activity	Location	2016	2017	2018	Status
Adaptations renting	RhB	18,942.00	234,901.54	89,369.17	completed
Student services	RhB		60,146.07	30,090.64	completed
Refrigeration system	RhB			15,321.83	in progress
Modifications to ventilation system	RhB			32,084.02	in progress
Seminar rooms	StA			59,425.87	in progress
Biometric evaluation centre	StA			193,032.04	in progress

Renovation activities

Department	Location	2016	2017	2018	Status
Renovation glass roof	StA	15,000.00	523,866.23	75,472.85	completed
Upgrading studio technology	StA			1,354,978.39	in progress
Renovation laboratory water pipes	RhB			23,476.74	completed
Fire alarm system	StA			15,564.01	in progress
Renovation climatic chamber	StA			31,604.32	completed

Major building activities

Activity	2016	2017	2018
Expansion buildings both locations	8,980,604,20	20,892,750,39	878,367,90
Initial setup in expansion buildings		717,123,51	465,386,63

H-BRS supervises its own construction activities (“Bauherrschaft”).

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Barbara Frommann: 36

Jan-Philipp Forche: 36

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Andreas Schmidt: 55

Susanne Patt-Bohlscheid: 56

H-BRS: 61

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