RESEARCH SHAPES THE FUTURE

EU-funded projects in Saxony 2014 to 2020

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European Union
European Regional Development Fund
European Social Fund

Europe funds Saxony.
EFRE ESF

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Freistaat SACHSEN

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Welcome!

Dear readers,

Freiberg. Leipzig. Görlitz. Chemnitz. Dresden. Zwickau or Mittweida. The use of EU funding for research activities results in a tangible benefit to specific projects which are carried out right across various regions of Saxony. New buildings as well as modern laboratories comprising state-of-the art equipment are an important or even essential basis for implementing scientific ideas and obtaining acknowledged results. EU funding is therefore a significant element in further developing scientific research in Saxony. As the allocation of funding is not depending on the size of an institute or university, the large and small benefit in the same way. For the current structural funds period 2014 to 2020 the Saxon budget which is available for investments in the construction of facilities and the required technical equipment as well as research projects amounts to 655 million euros.

This is money well spent. Not least because of substantial EU funding during the last years the Free State of Saxony can rightly say that is part of the premiere league in German research - and for specific sectors it even holds a prominent and highly recognized international position. One of the key factors that has enabled Saxony to develop in such a significant way - and should therefore be mentioned explicitly - is the investment in an outstanding infrastructure – also made possible by EU funding. Altogether we are looking at a success story which we are determined to pursue.

This brochure can only offer a very small glimpse into what has been initiated and achieved by the millions Saxony has received in EU funding. However, all our examples clearly show that funding is not merely an abstract process. It is first of all an instrument which directly - and therefore also locally - supports smart, creative minds working towards the implementation of scientific ideas. Reading this brochure, you will for example learn about the future of living as well as technologies that make mobility and production environmentally friendly. And you are introduced to a brain which works efficiently and economically.

We hope to have made you curious. Be invited to explore this variety of exciting and amazing EU funded projects. You will be positively surprised.

Sebastian Gemkow
Saxon State Minister of Science

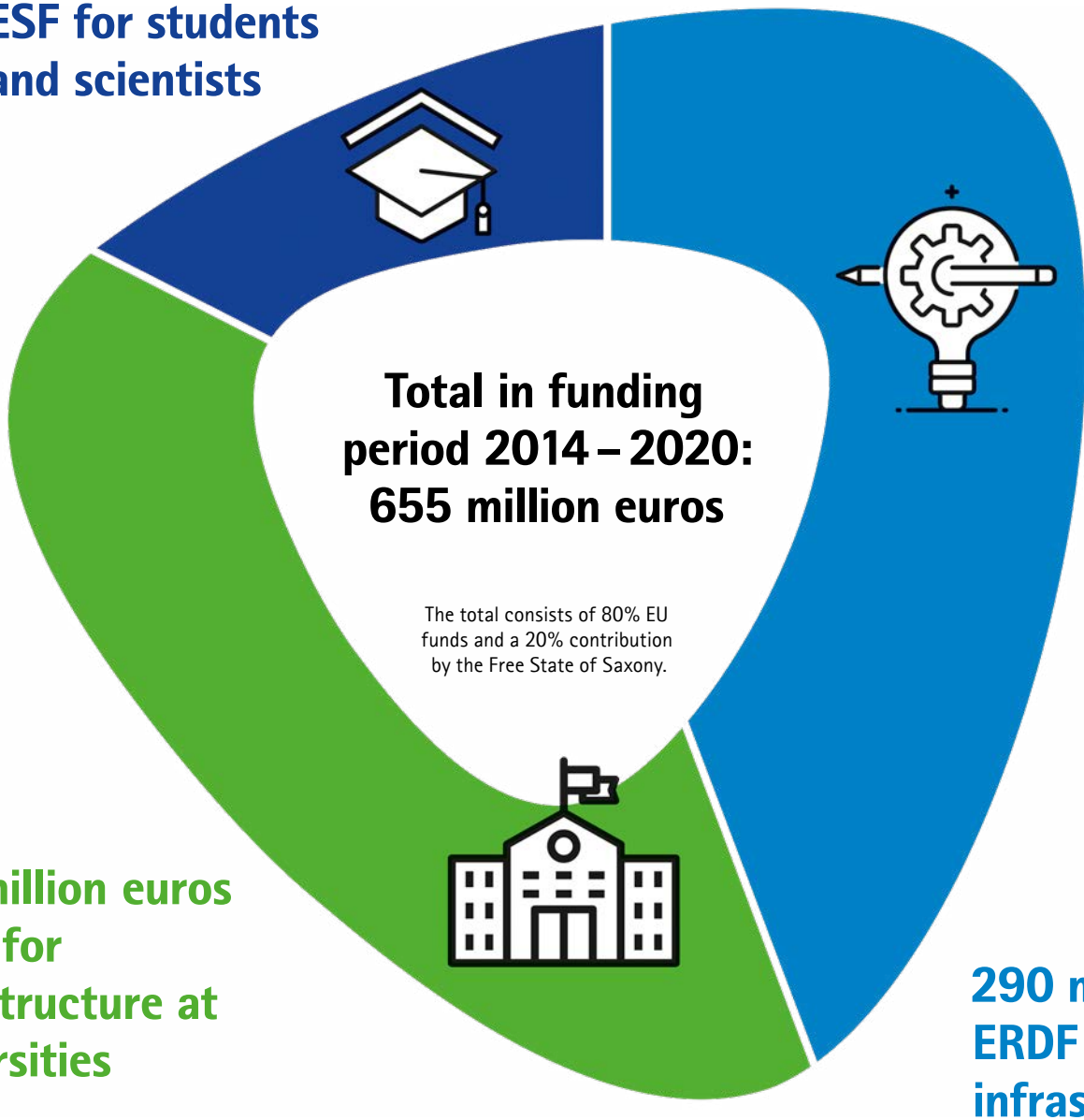
ERDF and ESF for science

EU Structural Funds support research in Saxony

Structural funds are key instruments dedicated by the European Union in order to support less developed regions. By allocating these funds, regional disadvantages within Europe are to be counterbalanced. One designated objective is the encouragement of an overall economic growth or the initiation of processes that lay the foundations for increasing economic strength. The funding of research and innovation is one of the cornerstones of European Policy aiming at economic, social and territorial cohesion. This approach also holds a lot of potential for the Free State of Saxony.

For the current funding period the Saxon research community is in a position to take part in various programmes co-financed by the EU – the European Regional Development Fund (ERDF) and the European Social Fund (ESF). The specific funding guidelines of the Saxon State Ministry for Science allow investments in research infrastructure and specific research projects as well as the support of individual scientists. Thereby universities and non-university research institutions are enabled to benefit financially on numerous levels. Furthermore, the guidelines are thematically open and not restricted to certain technologies. This is immensely important because it complies with the broad field of expertise of Saxony's universities and non-university research institutions. By this open approach maximal support for potential applicants is assured. Last but not least, the existing guidelines complement each other – they for instance not only provide access to funds for building new infrastructures, they also offer the possibility of filling these infrastructures with life by financially supporting specific research projects which are carried out within.

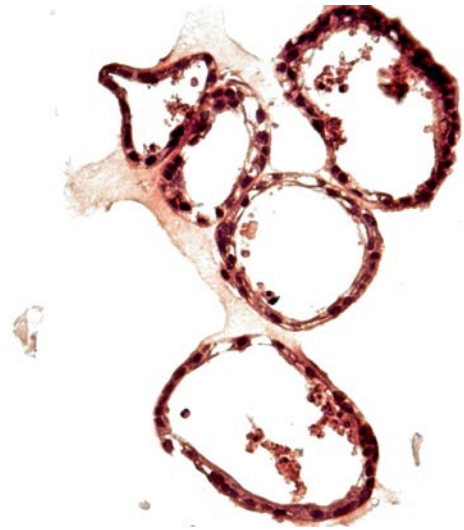
114 million euros
ESF for students and scientists



251 million euros
ERDF for infrastructure at universities

290 million euros
ERDF for research infrastructure and projects

Research infrastructure and projects	Infrastructure at universities	ESF for students and scientists
FUNDING GUIDELINE		
EFRE-RL Forschung InfraPro	**VwV EFRE-Infra**	**RL ESF Hochschule und Forschung**
OBJECTIVES		
» Reinforcement of application-oriented research at universities and non-university research institutions » Enhancement of conditions for successful innovation transfer to industry/economy	» Enhancement of conditions for research focussing on application » Encouragement of cooperation between universities, non-university research institutions and the industry	» Utilization of individual education potential for the enhancement of innovative power within the Free State of Saxony » Rise in quantity as well as quality of expertise of academic professionals in order to meet the increasing demand for a highly qualified workforce in the Free State of Saxony
OBJECTS COVERED BY GUIDELINES		
» New constructions, rebuilds and investments in equipment » Application-oriented research and development projects » Projects of university libraries for the enhancement of a scientific information infrastructure » Pre-competitive research for specific spin-offs (incubation)	» Construction of institutional and laboratory buildings » Technology centres and test halls » Acquisition of user-specific equipment directly related to construction investments	» PhDs » Junior research groups » Projects focussing on the enhancement of academic achievement
NUMBER OF PROJECTS FUNDED BETWEEN 2014 AND 2020		
» 80 construction projects and investments in equipment » 89 research projects » 8 library projects » 3 incubation projects	» 7 institutional and laboratory building » 3 technology centres / test facilities » 1 user-specific equipment	» 310 PhD students » 573 scientists organised in altogether 85 junior research groups » 8.542 participants within 36 academic achievement projects



Lung organoid as seen under a microscope.
© Claire Fabian/Mandy Laube

Helping new therapies for newborns

Leipzig scientists from the Fraunhofer IZI and Leipzig University creating a model of underdeveloped lungs

745k
euros

Dr Claire Fabian and Dr Mandy Laube.

The lungs of newborns are not fully formed, which is why premature babies often suffer from respiratory distress and require artificial ventilation. Researchers currently use primarily two-dimensional cell-culture models or test new materials on animals in order to develop effective treatments for this. With financial backing from the European Regional Development Fund, two Leipzig scientists are now creating a three-dimensional model of the underdeveloped lungs to monitor their development over time. The innovative 3D model could make it easier for new treatments and materials to be developed, and reduce the need for testing on animals.

'Our lung organoids are designed to realistically reproduce lung development so that we can study this development and see whether they are starting to perform the functions so vital for newborns', explains Dr Claire Fabian from the Fraunhofer Institute for Cell Therapy and Immunology (IZI). Her colleague, Dr Mandy Laube from Leipzig University, generated the first lung organoids, initially using rat cells. She adds that 'this enables us to validate the biological functions of lung organoids with the help of established in-vitro models such as pneumotomy procedures or animal models. They also serve as a basis for us to eventually create human lung organoids.' Of particular note are the functional studies, such as those of electrophysiological cell activity, the likes of which are not conducted anywhere else in Germany. Both scientists hope their work will help develop new therapies down the track.

Project:
Establishing lung organoids to develop treatments and test materials for perinatal lung diseases

Grantee:
Leipzig University, Medical Faculty and the Fraunhofer Institute for Cell Therapy and Immunology (IZI) (joint research project)

Financing period:
February 2018 – September 2020

Funding amount:
745,000 euros (of which 596,000 euros have been provided by the EU)

Funding guideline:
EFRE-RL Forschung InfraPro

Scientists use sensors to warn the person about an autonomous transport system.

Safety First

Research project at the TU Chemnitz and University of Applied Sciences Mittweida making autonomous systems safer

A logistics staff member is standing in a warehouse. A driverless transport system – an autonomous robot – is closing in behind him. These sorts of autonomous systems are being used with increasing frequency in the logistics industry. But as their electric drive system makes them very quiet, they are quickly drowned out by ambient noise, meaning workers, deep in concentration, don't hear them – and the risk of accident increases. 'It often only takes a brief moment of inattention to cause a collision', says Prof Michael Kuhl from the engineering faculty of the University of Applied Sciences Mittweida. Researchers from the Chemnitz University of Technology (TU Chemnitz) and the University of Applied Sciences Mittweida have thus teamed up as part of the joint interdisciplinary '3DSys' project to develop a system aimed at helping prevent such accident scenarios.

The predecessor 'FOLLOWme' project at the TU Chemnitz already created a driverless vehicle designed to co-operate with humans. '3DSys' seeks to make interactions between humans and machines even smarter. Staff wear a vest containing sensors, which emit a signal when a driverless vehicle is approaching. The system detects the hazard and sends a vibration alert, e.g. to a wristband, to warn the staff member.

'To test the autonomous transport system operations and the interactions, we use a virtual environment produced through simulation', explains Christoph Allmacher from the mechanical engineering faculty of the TU Chemnitz. Linking reality and simulation provides crucial, general advantages in terms of the development of such systems. These advantages include a much faster design and risk-free testing of hazardous situations. The simulation results can then be easily applied to the real scenario later on. It is a principle that not only reveals its strengths as part of 'Industry 4.0', but which can also be applied to aspects such as driverless cars on the road, e.g. to protect passers-by.

Project:
Cross-system safety of autonomous and semi-autonomous systems ('3DSys')

Grantee:
TU Chemnitz and University of Applied Sciences Mittweida (joint research project)

Financing period:
April 2019 – March 2021

Funding amount:
329,000 euros (of which 263,000 euros have been provided by EU)

Funding guideline:
EFRE-RL Forschung InfraPro

The new building combines the two research centres into one state-of-the-art complex.
© Luc Saalfeld

Project:
Construction of the new B CUBE Innovation Centre

Grantee:
TU Dresden

Financing period:
March 2015 – April 2021

Funding amount:
20,782,000 euros (of which 16,625,000 euros have been provided by the EU)

Funding guideline:
VwV EFRE-Infra

New biotechnology facility

DZNE and B CUBE now both researching under one roof in Dresden

The new, modern building at Tatzberg 41 in Dresden is now bright and spacious. The approx. 5,400-square-metres research complex is now home to new research laboratories for biotechnology and neurodegenerative diseases. The particular challenge for architects lay in housing two different research facilities in one building. Because the new complex will be shared by the TU Dresden's B CUBE Innovation Centre (ZIK) and the Helmholtz Association's German Centre for Neurodegenerative Diseases (DZNE). The ZIK B CUBE examines molecular functional units using state-of-the-art microscopic methods, and transfers the biologically active matter's structures and functions into synthetic materials. The DZNE, meanwhile, utilises findings from stem-cell and plasticity research to treat neurodegenerative diseases such as Parkinson's and Alzheimer's.

'We urgently needed the extra space', says the DZNE's Dr Klaus Fabel. The new facility provides both institutions with modern laboratory, office and seminar spaces tailored specifically to their needs. 'Our algae culture laboratories, for example, have very strict air-conditioning requirements', says the ZIK B CUBE's Prof Nils Kröger. A large hall at the centre encourages contact between the disciplines, with Dr Fabel adding that, 'our new outpatient clinical research centre also enables us to be in closer consultation with the clinical staff at the teaching hospital and medical faculty, who are able to visit us much more frequently thanks to the geographic proximity.'

Project:
Construction of the new German Centre for Neurodegenerative Diseases (DZNE) e. V. in Dresden

Grantee:
DZNE e.V.

Financing period:
March 2015 – January 2022

Funding amount:
17,587,000 euros (of which 14,070,000 euros have been provided by the EU)

Funding guideline:
VwV EFRE-Infra

A monitoring system tracks the building's air quality and reports moisture damage.
©Marco Dirr/HTWK Leipzig

Project:
System solutions to shape demographic and structural change (DemoS)

Grantee:
University of Applied Sciences (HTWK) Leipzig

Financing period:
April 2016 – September 2019

Funding amount:
1,150,000 million euros (of which 920,000 euros are provided by the EU)

Funding guideline:
RL ESF Hochschule und Forschung

The exoskeleton can learn a human's individual gait.
©Marco Dirr/HTWK Leipzig

Architects Sophie Seifert and Lena Salm moved into the business world after 'DemoS'

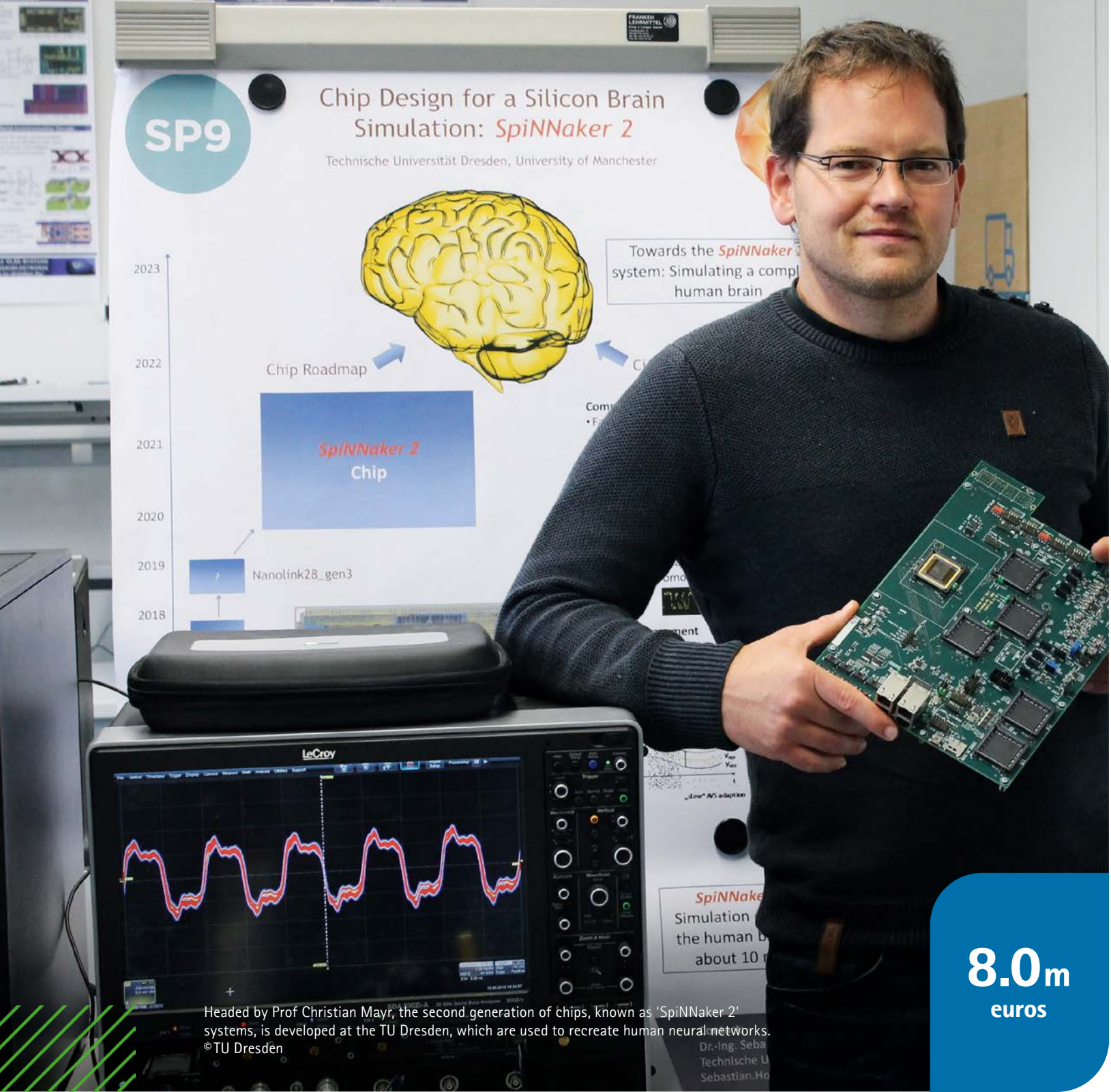
The future of housing

ESF junior research group at the University of Applied Sciences Leipzig seeks solutions to the challenges of demographic change

The effects of demographic change are being felt in many areas of life. The rise in average age goes hand in hand with a rise in the number of elderly people needing help to live independently. Many buildings in country areas lie vacant, leading to dilapidation. And rural communities are losing residents, who are migrating to the metropolitan areas. Financed by the European Social Fund (ESF), the interdisciplinary 'DemoS' junior researcher group at the University of Applied Sciences Leipzig is exploring how these very different challenges can be tackled. Four engineers, two architects and a cultural scientist have devised various solutions.

Felix Weiske and Max Böhme, for example, have developed an exoskeleton that helps older people climb stairs. In the summer of 2019, they presented their prototype to seniors at the Leipzig-Grünau District Centre. Engineers Dr André Dollase and Johannes Braun, meanwhile, grappled with the issue of vacant buildings. They have devised a monitoring system that identifies moisture damage. It measures the building's air quality and sends the data via radio to a central control unit. If the readings are too high, a warning notice is issued to the property managers. Two architects have also been focusing on a smart solution to survey old buildings using 'mixed reality' headsets. And cultural scientist Friederike Frieler has been studying how cities can use their housing policies to respond better to mass population influxes or exoduses.

Upon completion of the project, some of the junior scientists continue their research as part of a doctorate, one has already finished their doctorate, while others moved from the university setting to the business world. 'These sorts of research activities are a career springboard, and would simply not be possible without funding from the EU', stresses Prof Jens Jäkel, who led the junior research group.



Headed by Prof Christian Mayr, the second generation of chips, known as 'SpiNNaker 2' systems, is developed at the TU Dresden, which are used to recreate human neural networks.
©TU Dresden

8.0m
euros

The electronic brain

TU Dresden – Home to the supercomputer that's simulating human brain processes in real time

From the outside, it just looks like a group of servers at the electrical engineering and IT faculty of the TU Dresden. But what's playing out inside the boxes could be an important step forward in artificial intelligence. Since 2013, the Human Brain Project, one of the largest research projects being carried out by the European Union, has seen researchers at over 100 European institutions work to build a computer that functions like the human brain. The TU Dresden, together with the University of Manchester, is developing the second generation of chips, known as 'SpiNNaker 2' systems, which are used to recreate human neural networks.

'Our brain is thrifty, only drawing on energy when it is working. The 'SpiNNaker 2' will also do exactly this, except that we have not recreated a blood network, but rather the underlying concept as a circuit', explains Prof Christian Mayr. This enables the computer to immediately process information without delays, facilitating real-time interaction with the human. 'It could unlock new prospects for things like driverless cars, robotics and telemedicine', Prof Mayr adds.

The 'SpiNNcloud' project is financed by the European Regional Development Fund, and the team has full access to the resources offered by Silicon Saxony. 'The chip design, our research and production all take place locally in Saxony, which demonstrates how relevant and topical the issue is in Saxony's research landscape at the moment.' The TU Dresden's CeTI Cluster of Excellence is conducting research on interactive robotics, and could end up being the primary user of the supercomputer.

Project:
The SpiNNaker2 system as a tactile edge cloud ('SpiNNcloud')

Grantee:
TU Dresden

Financing period:
September 2019 – September 2021

Funding amount:
7,964,000 euros (of which 6,371,000 euros have been provided by the EU)

Funding guideline:
EFRE-RL Forschung InfraPro

58k
euros

IT specialist Dr Stefan Kahl. © TU Chemnitz/Lars Meese

Stefan Kahl successfully completed his doctorate in December 2019. A number of small and medium-sized Saxon enterprises have expressed interest in his work, as using artificial neuronal networks to process audio could unlock new fields of business, e.g. in relation to smart homes or ambient assisted living.

Ornithology via app

IT specialist at the TU Chemnitz using machine learning to identify bird calls

Wild birds in nature are regularly monitored to ensure they are lastingly protected. But observing the animals is a difficult task, which is why image and sound recorders are often used to identify species. This is very laborious, however, as large quantities of data need to be analysed. So Dr Stefan Kahl from the Media Computing endowed junior professorship at the TU Chemnitz's IT faculty has developed a special app that recognises and classifies bird calls in auto recordings. 'To do this, the software converts the sounds into images, which are then compared with similar image models', the media IT expert explains. The project gave rise to Stefan Kahl's doctorate, which has been financed by the European Social Fund (ESF) through a doctorate grant.

Dr Stefan Kahl obtained the bird sounds from the USA – specifically from the Center for Conservation Bioacoustics at the Cornell Lab of Ornithology in Ithaca, New York. 'The ornithologists supplied us with masses of raw audio data', Kahl explains. He uses the sound recordings, which have been converted into spectrograms, to train an artificial neuronal network specialising in bird calls. Anyone can test out its effectiveness on their smartphone by downloading the 'BirdNET' app. 'The app is a challenge for AI, because mobile-phone recordings contain various pieces of noise interference from other animals, humans or car noise. The system needs to be able to distinguish these', the TU researcher explains. He wants to keep sticking to the research in the field of machine learning, and constantly improving sound recognition so that the technology soon also starts attracting regional businesses seeking to develop new, innovative products.

Project:
ESF doctorate grant

Grantee:
TU Chemnitz

Financing period:
June 2016 – May 2019

Funding amount:
58,000 euros (of which 46,400 euros have been provided by the EU)

Funding guideline:
RL ESF Hochschule und Forschung

Tracking organic substances in the air

1.5m
euros

Developing an analysis chip which has the potential to e.g. diagnose diseases based on exhaled air.

Scientists at the Fraunhofer IPMS and ZAFT developing a new analysis chip

Ion mobility spectrometers (IMS), chemical-analysis devices, are currently being used to measure low-concentrated, gaseous substances in the air, e.g. to detect explosives or mould. They have future potential for use in breathing-gas analytics, which can help diagnose diseases based on exhaled air. One of the disadvantages of IMS devices is their relatively cumbersome size. Most modern-day devices adopt a Time-of-Flight (ToF) approach to separate different ions, requiring a correspondingly long drift path – making it impossible for them to be manufactured in compact sizes.

The Fraunhofer Institute for Photonic Microsystems (IPMS) and the Centre for Applied Research and Technology (ZAFT) at the University of Applied Sciences Dresden are currently working on an alternative: A smaller (approximately fist-sized), MEMS (Micro-Electro-Mechanical System)-based detector unit. 'In doing so, we are focusing on developing a special analysis chip that measures the ion flow, and is thus able to detect and quantify fleeting organic components in the air', says Dr Olaf Hild from the Fraunhofer IPMS to describe the project. The chip is being developed at the Fraunhofer Institute, which has the necessary know-how and clean-room equipment. The ZAFT is developing new electronics components, as well as control and signal-processing algorithms to completely automate the measurement process. 'We then want to use a test module to prove the sensor's functionality', adds Prof Günter Rösel from the ZAFT. 'A device so handy in size would be perfect for a number of applications in the fields of environmental analytics, medical technology and safety engineering', says Rösel. The prototype will ideally serve as an incentive for a subsequent project to create a new product for the market, in co-operation with an industrial partner.

Project:
Detecting fleeting organic substances using a MEMS-based ion mobility spectrometer ('DoSIs')

Grantee:
Fraunhofer Institute for Photonic Microsystems (IPMS) and the Centre for Applied Research and Technology e.V. (ZAFT) (joint research project)

Financing period:
September 2019 – February 2022

Funding amount:
1,466,000 euros (of which 1,172,800 euros have been provided by the EU)

Funding guideline:
EFRE-RL Forschung InfraPro

Biopolymers for clean water

Combating iron sulphate in Lusatia's waters through the 'DeFloWasser' project at the IPF Dresden and the KSI Meinsberg

The project uses biopolymers to combat the iron clogging of the Spree River.

Brown-coal mining in Lusatia required large-scale lowering of the groundwater table. This results in pyrite, which is otherwise surrounded by groundwater, coming into contact with atmospheric oxygen in the substratum. The pyrite weathers and forms water-soluble iron sulphates that then appear on the surface when the former mine pits are flooded. This process, known as iron clogging, gives the Spree and many water bodies in Lusatia a brownish tinge instantly visible to any observer. Most notable, however, is the fact that this iron-sulphate pollution is causing fewer and fewer animals to live in the water, resulting in birds staying away because they can no longer find food there. This is an ecological time bomb that the 'DeFloWasser' project is seeking to combat.

Scientists want to use environmentally friendly biopolymers to remove the iron sulphate from the water. 'Biopolymers are inexpensive, biodegradable, and not harmful to humans or animals, because we actually eat pectin and starch ourselves', explains Dr Simona Schwarz from the Leibniz Institute of Polymer Research in Dresden. In co-operation with the Kurt Schwabe Institute for Measuring and Sensor Technology in Waldheim, the team of researchers is building a sensor-actor system that can use biopolymers to both measure the pollutant content in the water and bind the iron and sulphate. 'Calcium carbonate is often used in these sorts of water bodies, as it clears up the surface water. The resulting brown sludge, however, is not removed; it instead simply sinks to the ground as iron oxide, and can be stirred up again later on', adds Prof Michael Mertig. 'Our strategy here is much more effective and environmentally friendly, because we are solving an environmental problem using natural substances.'

Project:
Biopolymer-based sensor-actor systems to detect and flocculate pollutants in iron-clogged surface waters ('DeFloWasser')

Grantee:
Leibniz Institute of Polymer Research Dresden e.V. (IPF) and Kurt Schwabe Institute for Measuring and Sensor Technology e. V. Meinsberg (KSI) (joint research project)

Financing period:
September 2019 – March 2022

Funding amount:
502,000 euros (of which 401,600 euros have been provided by the EU)

Funding guideline:
EFRE-RL Forschung InfraPro

1.2m
euros

A number of projects are on offer to help students complete their courses successfully at the TU Dresden.

Well prepared and motivated to study

The ESF-funded project at the TU Dresden supports academic success

Project:
Guide system to academic success (SELS)

Grantee:
TU Dresden

Financing period:
March 2018 – February 2020

Funding amount:
1,175,000 euros (of which 940,000 euros are provided by the EU)

Funding guideline:
RL ESF Hochschule und Forschung

The TU Dresden has a number of offerings to help students successfully complete their courses. The aim is to boost motivation to study, and reduce the number of dropouts. Seven of these offerings were pooled as part of the 'Guide system to academic success' (SELS) project and financed by the European Social Fund (ESF).

A SELS sub-project available to school students before they commence their university studies helps ensure they are perfectly prepared for STEM courses at the TU Dresden, explains project manager Christiane Einmahl: 'Online preparatory courses enable them to refresh their skills in mathematics or physics, and fill any gaps in knowledge. It is particularly worthwhile supporting school students and first-semester students in STEM fields, so as to prevent any early dropouts.'

The 'Research & practice orientation platform' sub-project, meanwhile, focuses on the young people's professional future. Engineering and science students gain initial insights into their subsequent professional life through various formats, including workshops, excursions and team challenges. 'Participants see first-hand the exciting professional life that awaits them after their studies', says Christiane Einmahl.

Upon completion of the project, the offerings are set to become permanent fixtures at the university. 'This has already been successful, for instance, with the "subject-specific German classes for international students", most of whom we were able to integrate into the TU Dresden's language courses', the project manager adds.

Technology merger in lightweight construction

New laboratory building for the MERGE technology centre at the Chemnitz University of Technology

Climate change is challenging industry to develop technologies that facilitate environmentally friendly mobility and production. Prof Lothar Kroll recognised the great potential offered by the key technology of lightweight construction as a cross-industry driver of innovation, jobs and environmental protection nearly ten years ago, when the MERGE Federal Cluster of Excellence was established at the Chemnitz University of Technology (TU Chemnitz).

The MERGE technology centre sees researchers from six different scientific disciplines work on fusing manufacturing techniques in a bid to pool various materials, such as metal, plastics and textiles, for mass production. 'As part of the MERGE project, we combine materials from various technologies in order to save on resources, costs and pollutants', Prof Kroll explains. This will be particularly crucial for the future of electromobility.

'Most high-performance components in lightweight construction are hybrids, so it's not just the materials that need to fit well together, but also the different specialist fields', Prof Kroll adds. As spatial proximity is a pivotal factor here, the MERGE technology centre in Chemnitz is being expanded. Backed by some 14 million euros from the European Regional Development Fund, a laboratory facility is being built as part of a second construction phase. Work began in June 2018, with the new building set to be directly adjacent to the southern façade of the existing hall complex. It will provide scientists with faster access, and enable them to cross-link their work even more closely. 'At our laboratory facility any expert – from chemists to mechanical engineers – can clarify fundamental issues of lightweight-construction research along the entire value chain – from molecule to finished component – and test out production at the technology centre', Prof Kroll explains.

Project:
Construction of a new laboratory facility for the MERGE Technology Centre for Multifunctional Lightweight Structures

Grantee:
TU Chemnitz

Financing period:
September 2015 – June 2020

Funding amount:
14,095,000 euros (of which 11,276,000 euros have been provided by the EU)

Funding guideline:
VwV EFRE Infra

The centrepiece is the MERGE machine, a system enabling combined processing of plastic and metal-based materials.

14.1m
euros

'Julius' the robot makes his way through the 'Reiche Zeche' educational and research mine.
©TU Bergakademie Freiberg

'Julius' digitising mining

ESF junior research group at the TU Bergakademie Freiberg testing robot usage in underground mines

Researchers from the 'ARIDuA' junior researcher group spring into action whenever 'Julius' the robot is out and about in the 'Reiche Zeche' educational and research mine. The team from the TU Bergakademie Freiberg is teaching the robot to navigate its way through the mine autonomously and collect data. 'Julius' the research robot is named after Julius Ludwig Weisbach, a German mathematician and engineer. 'With his gripping arm, "Julius" can distribute speakers equipped with sensors in the mine and create a radio network', says Sebastian Varga, spokesperson for the junior researcher group. 'This enables us to map the site much more precisely, and take samples, e.g. of the mine water, in some areas.' Mine efficiency is increased by automating the geological mapping process using a hyperspectral camera. 'Julius' could also be used to explore old mining sites or to assist the mine rescue brigade during dangerous rescue missions after fires or gas outbursts. The work performed by the junior researcher group is financed by the European Social Fund (ESF).

'Julius' the mine robot was actually created as part of the predecessor 'Mining-RoX' project, says Sebastian Varga: 'The robot is so robustly designed, he can also navigate impassable, risky terrain.' The robot's route can be tracked on the computer. The sensor data is also collected and analysed. 'This enables us to create the ideal setting for a qualitative leap in mining technology, e.g. in "autonomous" operation of underground mines', says Sebastian Varga. The project plays a key role in the TU Bergakademie Freiberg's university-wide research focus on 'smart mining'.

Project:
Autonomous robots and the Internet of Things in underground mines (ARIDuA)

Grantee:
TU Bergakademie Freiberg

Financing period:
March 2017 – October 2020

Funding amount:
1,380,700 euros (of which 1,104,500 euros are provided by the EU)

Funding guideline:
RL ESF Hochschule und Forschung

The robot's task is to create a separate radio network in the mine.
©Eckardt Mildner

904k
euros

Screenshot of the 'Material Hub' user interface.

'Material Hub'

A new digital materials research portal at the SLUB Dresden

Novel materials play a key role in innovation processes and in manufacturing new products. Materials research helps scientists and users from industry, art, crafts and trades to find materials suitable for their purposes. But it is often laborious and time-consuming, because a number of different data sources generally need to be trawled through. A group of researchers at the Saxon State and University Library (SLUB) in Dresden has now developed a central research portal providing simultaneous access to all kinds of databases. The 'Material Hub' sees material data from a variety of data sets standardised and pooled in a single portal, so that users can find important material properties in a compact search mask.

'We began developing the first prototype early on, constantly filling it with new data sets', says Dr Marc Mosch, who leads the team building the research portal. To do this, they transfer data from manufacturers and researchers into the 'Material Hub' and present it in a universal, assisting research interface. 'Researchers can present their findings in the portal, and manufacturers and suppliers can present their materials and semi-finished products', adds Dr Mosch. As such, the aim of the 'Material Hub' is not only to make Dresden more visible as a research centre, but also to encourage networks by virtue of research institutes and businesses teaming up in joint industry projects.

Project:
Material Hub. IT integration and mobilisation of key material-research competencies in Dresden and Saxony

Grantee:
Saxon State and University Library Dresden (SLUB)

Financing period:
September 2016 – December 2020

Funding amount:
904,000 euros (of which 723,000 euros have been provided by the EU)

Funding guideline:
EFRE-RL Forschung InfraPro

Social scientist Katja Knauthe.
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Katja Knauthe completed a doctorate together with Prof Monika Reichert from the Technische Universität Dortmund and Prof Andreas Hoff from the University of Applied Sciences Zittau/Görlitz, as part of a doctorate programme financed over three years by the European Social Fund (ESF). She wants her research to help raise awareness among small Saxon businesses and policymakers about the need for a balance between careers and care responsibilities.

Project:
ESF doctorate grant

Grantee:
University of Applied Sciences Zittau/Görlitz

Financing period:
October 2016 – September 2019

Funding amount:
58,000 euros (of which 46,400 euros are provided by the EU)

Funding guideline:
RL ESF Hochschule und Forschung

58k
euros

Reconciling a career and care

Katja Knauthe completing a doctorate in Görlitz and Sheffield thanks to an ESF grant

Germany has already done a lot when it comes to work-life balances. But what about reconciling work and caring for family members? 'Very few businesses take this issue into account', says Katja Knauthe, who lectures at the University of Applied Sciences Zittau/Görlitz as a research assistant, and who, together with Prof Andreas Hoff, set up the Masters in Social Gerontology course at the university. During her doctorate she worked on how Saxon businesses address the issue of reconciling careers and care responsibilities. She has received three years' worth of funding through a doctorate grant co-financed by the European Social Fund (ESF).

Katja Knauthe conducted interviews with business-owners and persons affected, gaining an overview of the state of research at the time. She spent a semester at the University of Sheffield, participating in an international research project on sustainable care work. 'This sort of doctorate can't just be completed at a desk. You need to go out and network with other researchers', she stresses.

The ESF grant helped her manage the doctorate alongside her career and family life: 'I was able to reduce my working hours to ten per week, which allowed me to concentrate more on my doctorate.' Thanks to the financial support from the ESF, Katja Knauthe was also able to keep looking after her child. After completing the doctorate, she wants to keep actively pursuing the issue: 'We need practical projects and more round tables at businesses to raise awareness of the growing importance of balancing home care with careers. And I also want to establish the issue in political consulting, so that political players are also aware of it.'

Therapies of the future

Continuous passive motion machines for hand and finger therapy being developed at the University of Applied Sciences Leipzig

Anyone who has suffered a stroke, osteoarthritis or accident trauma needs to spend time in rehabilitation gradually retraining a lot of things. Manual hand and finger therapy mobilises joints, muscles and nerves, but the treatment is often tedious and ties patients to therapists for a protracted period of time. A project being carried out by the University of Applied Sciences Leipzig (HTWK Leipzig) could make this work easier in future. The 'recovics' project group is developing a continuous passive motion machine that is controlled via a digital app during the treatment process. 'Our system aims to almost totally automate and digitise the treatment, considerably reducing working time for therapists, as well as treatment costs', says Frank Schmidt, research assistant in the engineering faculty at the HTWK Leipzig. The prototype is a glove-like exoskeleton that patients wear on their hands. 'The power units installed in the device enable selective movement of individual fingers, just like the manual therapy', says Mr Schmidt. The exercises are controlled via a mobile device, 'enabling patients to perform their exercises at home, while the therapists are still able to keep a constant eye on treatment progress through digital data logging.' Mr Schmidt's team is proud that the EU is assisting them in developing this telemedicine rehabilitation solution: 'We'd love for the prototype to eventually become a marketable product.'

Project:
Study of the effectiveness and performance of automated, digitised rehabilitation compared to classic manual therapy ('recovics')

Grantee:
University of Applied Sciences (HTWK) Leipzig

Financing period:
March 2020 – December 2021

Funding amount:
1,250,000 euros (of which 1,000,000 euros have been provided by the EU)

Funding guideline:
EFRE-RL Forschung InfraPro

The glove-like exoskeleton is designed to automate and digitise hand and finger therapy.

1.3m
euros

A state-of-the-art complex is being built on the site of a former printing press.
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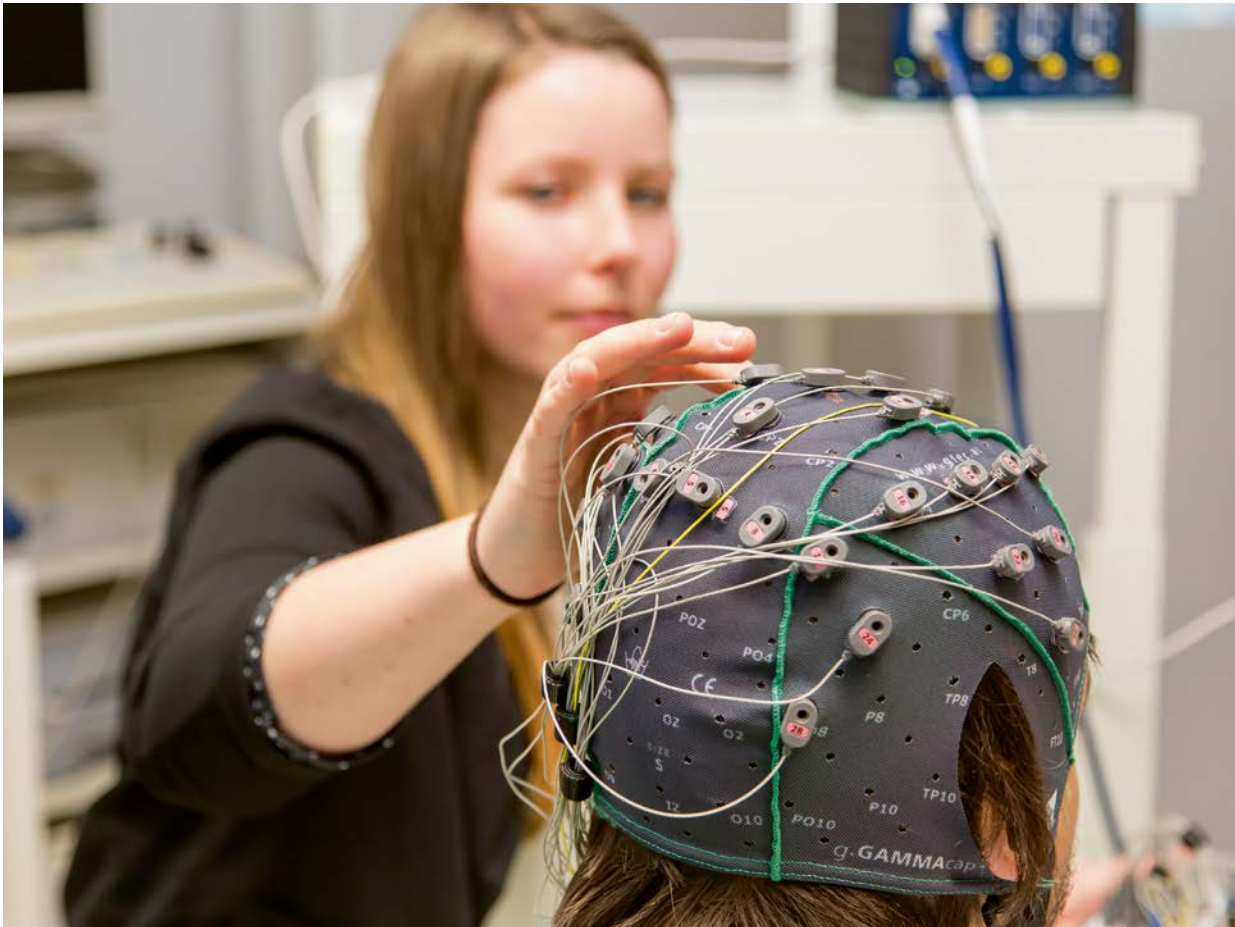

The new building will provide excellent research conditions for instance, for the ESF junior research group 'The spinal cross-section'.
© University of Applied Sciences Zwickau

36.6m
euros

Showcasing of the science

A modern high-technology centre for the University of Applied Sciences Zwickau

Project:
Inner-city Campus, high-technology centre, new building and renovation

Grantee:
University of Applied Sciences Zwickau

Financing period:
April 2014 – March 2023

Funding amount:
36,554,000 euros (of which 29,243,000 euros have been provided by the EU)

Funding guideline:
VwV EFRE-Infra

The 'Inner-city campus' of the University of Applied Sciences Zwickau is currently being expanded to include a new platform for teaching and research. The site of a former printing press and vacant school building is being transformed into a high-tech complex costing approx. 40.3 million euros, of which some 36.6 million euros are being provided by the European Regional Development Fund. Shared use of the new high-tech centre will see a pooling of fields such as micro and nanostructuring, optical technology, biomedical engineering and engineering physics, making it easier for the various disciplines to co-operate. The building's centrepiece will be an approx. 900-square-metres vibration-cushioned high-technology platform with clean-room requirements, protecting the internal research systems from electromagnetic waves, and guaranteeing zero vibration.

According to university dean Prof Hans-Dieter Schnabel, the high-tech centre will also be a flagship for the highest teaching and research standards in Zwickau. 'The new facility will have a public passageway, enabling passers-by to take a look through the large glass windows and see inside the clean rooms and high-tech physics laboratories on their way into the city.' He is also very proud of the fact that the high-tech centre will additionally house a modern experimental operating theatre. 'It will enable students to learn about medical technology based on the very latest standards, which is pretty special. No other university in Saxony or even Germany has this sort of facility', says Prof Schnabel.

Further information and references

Further information on EU Structural Funds in Saxony, including a list of all funded projects is available on:

www.strukturfonds.sachsen.de
www.facebook.com/EUfoerdertSachsen

For further information on the Saxon Ministry for Science please visit:

www.smwk.sachsen.de

The Saxon Development Bank (SAB) is the granting agency for the funding guidelines EFRE Forschung InfraPro and ESF Hochschule und Forschung:

www.sab.sachsen.de

For further questions on the programmes presented, please contact us on:

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Abbreviations:

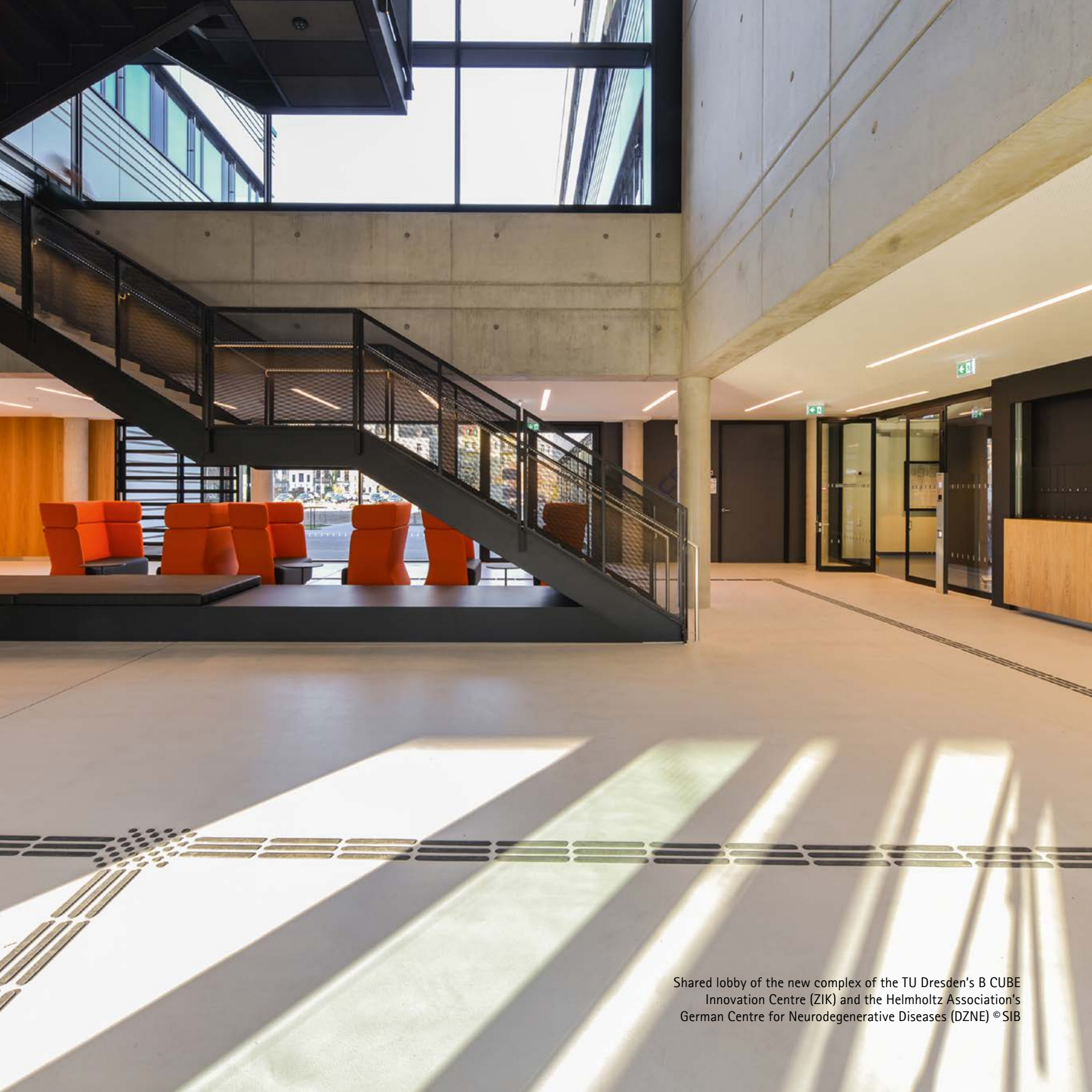
EFRE-RL Forschung InfraPro: Guideline of the Saxon State Ministry for Science, Culture and Tourism on the provision of grants for research infrastructure and research projects in the field of applied public research dated 9 February 2015, amended on 9 March 2020

VwV EFRE-Infra: Administrative regulation of the Saxon State Ministry for Higher Education, Research and the Arts on the implementation of measures to improve infrastructure at universities for research with an application-oriented focus dated 22 April 2015

RL ESF Hochschule und Forschung: Guideline of the Saxon State Ministry for Higher Education, Research and the Arts on the funding of projects co-financed by the European Social Fund in the field of universities and sciences in the Free State of Saxony for the funding period 2014 to 2020 dated 13 April 2018

TU Dresden: Dresden University of Technology
TU Chemnitz: Chemnitz University of Technology
TU Bergakademie Freiberg: Freiberg University of Technology

Reference cover photo: University of Applied Sciences Zwickau



Shared lobby of the new complex of the TU Dresden's B CUBE Innovation Centre (ZIK) and the Helmholtz Association's German Centre for Neurodegenerative Diseases (DZNE) © SIB

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