

Key technologies at work in Saxony-Anhalt

Success stories, examples and applications from Saxony-Anhalt

Big Data, Cloud Computing, IT-Safety, Virtual and Augmented Reality, 3D-Printing and Artificial Intelligence - key technologies that generate innovative products and solutions in all industries and along the entire value chain.

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Industry 4.0

HERE is where advanced progress comes into play.

In Saxony-Anhalt, production is interlinked with state-of-the-art information and communication technology. The driving force behind this development is the rapidly increasing digitisation of the economy and society.

> [find out more about Industry 4.0 in Saxony-Anhalt \(home page on Industry 4.0\)](#)

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E-Health

When computer scientists step in and help doctors

The best medicine is the doctor – so say both studies and life experience. But what if there is no doctor – because no successor was found for the family practice in a sparsely populated region, or because an aging population needs more medical care than the current capacity is able to provide? This is where telemedicine – an example of E-health – can step in. Computer scientists in Saxony-Anhalt are collaborating closely with doctors, transforming measured data into images, helping to transfer data, and therefore improving medical care.

> [more about E-Health](#)

Med-Tech: New diagnostic possibilities

Data for good "is the current motto of the Nielsen company, which works worldwide in the fields of marketing and advertising research. Under the name Nielsen Tele Medical GmbH, it has established itself in Magdeburg and is testing a groundbreaking EEG headset together with neurologists from the University Hospital: The brain activity of high-risk patients can be measured using dry electrodes in the home environment. This opens up completely new possibilities for monitoring and diagnosis. MediGlove: Diagnostics tool, magic glove, hand laying instrument - the "MediGlove" already had many names in the media - and all of them are somehow correct. With the medical glove that combines heart rate monitor, stethoscope and thermometer. New ways for diabetics: Intelligent sole measures pressure and temperature. The company Thorsis Technologies thus links research and users. This sole can make life easier for diabetics and give them back their quality of life. Because this sole is "smart". It continuously determines pressure and temperature distribution at the foot and helps to detect incorrect loads and warn wearers.

Great value basic research

While telemedicine is easing the burden during daily life and reducing the time needed to travel to the doctor and for waiting, Saxony-Anhalt researchers are also addressing fundamental questions in the field of medicine, in which data processing plays a key role. In this context, Prof. Dr. eng. Bernhard Preim and Dr. eng. Benjamin Köhler, a computer visualist at the Institute for Simulation and Graphics in the Faculty of Computer Science at Otto-von-Guericke University, Magdeburg, have developed a software package known as "Bloodline", which analyses the blood turbulence on the walls of the coronary arteries. Both are computer scientists. Bernhard Preim admits to being personally "infected" with the subject of medicine: he is married to Dr. Uta Preim, who is a radiologist. "The project was initiated by my wife, who worked as a radiologist for a year at the Cardiology Centre in Leipzig and naturally knew that we, as computer scientists, could contribute to the evaluation of blood flow data." The development of the algorithms and software has been managed almost entirely by Benjamin Köhler. "Professor Preim is proud of his "extremely proficient doctoral student". The topic as a whole is as relevant in the world of medical research as it is in computer science research. Taking third place in the area of basic research as part of the Hugo Junkers Prize 2016 was an additional reward for their work – in addition to the recognition that they have gained at the professional level.

What will become of Bloodline? "The software is a prototype for research purposes only. The 4D PC-MRI measurement technology, which is the official name of Bloodline, is still a long way from being suitable for use in everyday clinical practice," explains Benjamin Köhler. The software is, however, currently being used for studies and further research at the University Hospital in Magdeburg and in the Cardiology Centre in Leipzig. Both Uta Preim and PhD students work with the software, and regularly give their feedback to Benjamin Köhler. The ultimate purpose of the software is to provide predictive – and therefore better – treatment options for diseases of the coronary arteries.

Time is health

Otto-von-Guericke-University is also committed to the practice of telemedical research, however, so as to enable stroke patients to receive the rapid help that they require when no specialist hospital care is available in their immediate vicinity. "With our Telemedical Acute Stroke Care, or TASC, we have been able to ensure that patients who suffer a stroke receive the medicine they need as quickly as possible in the immediate aftermath – so that they benefit from significantly improved chances of recovery," highlights Peter Knüppel. The University has founded a network in which several clinics in the northern part of Saxony-Anhalt have participated. The patient data has been evaluated at Magdeburg University Hospital and the treatment has been provided on-site. Short decision-making paths, rapid help, better recovery. "We have now reached a point at which the research potential has been exhausted, so we have stepped down from our role of medical technicians. The TASC is still going strong, however." Computer scientist Knüppel is happy with the project's sustainability. The ASTER project has emerged as something of a follow-up development. In this project, businesses and the university have joined forces to optimise the equipment available in ambulances for the optimal care of stroke patients.

The proximity between the physicians, computer scientists, computer visualists and other specialists in Saxony-Anhalt helps experts to apply their knowledge in networks on a focused basis. It is on this basis that they have succeeded in developing Bloodline and TASC, and are inviting participants to join the "Living 4.0" project. Saxony-Anhalt can be seen to punch above its weight – thanks to its well-educated and ambitious young researchers who want to invent "something which is useful".

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Chemicals 4.0

Successful into the future

With annual sales of around 7 billion euros, the chemical and plastics industry is one of the strongest economic sectors in Saxony-Anhalt. Modern facilities, innovative chemical parks and close cooperation between industry, universities and research institutes ensure a clear location advantage. Rapidly advancing developments and requirements, especially in the field of digitization, present companies with new challenges. The industry in Saxony-Anhalt is well prepared for this.

> [more about Chemicals 4.0](#)

Chemicals parks: High degree of competitiveness

Dr. Norbert Malanowski from the company VDI Technologiezentrum GmbH attributes a high degree of competitiveness to the chemicals parks in both Saxony-Anhalt and throughout Germany. As a project manager, he follows developments in the chemicals industry very closely. A short research paper entitled "Innovations- und Effizienzsprünge in der chemischen Industrie? Wirkungen und Herausforderungen von Industrie 4.0 und Co." (Gains in innovation and efficiency in the chemicals industry? The impact and challenges of industry 4.0, etc.) was published in 2014, and the results of the major research project are set to be published by the end of this year. While the manufacturing industry has been the focus of previous projects, Malanowski has focused on the process industry, which is increasingly referred to with the term "Chemicals 4.0". "The digitisation of the process industry is the current topic and is set to be of decisive importance for the future viability of companies which operate in the chemical and plastics industries," explains Malanowski. "In this respect, the spotlight is on the topics of networking, digital intelligence and autonomy."

Solutions for these topics are undergoing intensive research at the scientific institutions in Saxony-Anhalt and being put into practice in partnership with an innovative ICT sector. This is an area in which the Otto-von-Guericke-University Magdeburg, the Fraunhofer Institute for Factory Operation and Automation (IFF) and Tarakos GmbH, a specialist company for simulation software and 3D simulation, all stand as examples.

While just a few years ago, the necessity for digitisation was still being questioned, the processes are long since under way and being implemented at different speeds. "It is particularly important to get people on board," explains Malanowski. He views the trio of man, technology and organisation as the key to success for the future of the chemical industry – another area in which chemical parks offer great advantages due to their synergies and the active transfer of knowledge between both large global players and small-scale specialists.

Networked since 1996

The concept of the chemical park was invented in Saxony-Anhalt. The first parks were set up in 1996 at the locations of Zeitz/Elsteraue and Leuna, and provide for close networking between companies, technological synergies and the efficient use of the available resources. Further settlements have since followed in Bitterfeld-Wolfen, Schkopau and Piesteritz. Their sophisticated infrastructure and efficient networks make the sites attractive in the competitive international environment. Chief Operating Officer Daniel Böke of CBW Chemie GmbH, which is based in Bitterfeld-Wolfen, describes the advantages offered by the parks as being their structure which supports fair, market-oriented business, the support provided by the IT infrastructure, the on-site supply systems, the feeling of joint security, as well as advantages in the area of personnel costs.

Above all else, Böke views the "Chemicals 4.0" in terms of digitalisation, which has been actively realised at CBW Chemie GmbH over the last two years with the implementation of an ECM (Enterprise Custom Management) tool, for example. "Over the medium term, the use of all the data available in our company – the keyword being big data – will yield considerable potential for added efficiency," explains Böke. "This represents a key part of the task of securing the future of Germany as a chemicals location over the long term and maintaining its competitive advantages."

To be well equipped for the future, Malanowski also believes there is a need for funding programmes which not only take technical developments into account, but also human resources. "It is immensely important for employees to understand how digitised production works and the benefits that the changes are bringing," explains Malanowski. In particular, he expects innovations to take place in the area of new business models. "Who knows, in the near future it may even be possible to print drugs such as painkillers directly at pharmacy stores," he says, highlighting one possible development.

A leader thanks to a German-American tour-de-force

The phrase "Chemicals 4.0" describes a lively, long standing process which encompasses both product developments and organisational structures. In this area, a best practice example can be seen to exist in Saxony-Anhalt in the form of the company PURAGLOBE Germany GmbH, which is located at the Zeitz Chemical and Industry Park in Elsteraue. This 100% subsidiary company of an American corporation has now been operating facilities for the production of base oils in Elsteraue since 2004. Each year, the company converts some 150,000 tonnes of used oils into high quality group II+ (API) base oils. In addition to other areas, the base oils find use in the high performance lubricants of many German manufacturers, including ones in Saxony-Anhalt. Puraglobe is the only company to offer the patented HyLube™ and HyLubeSAT™ processes for the recycling of used oils.

Its latest technological development is the HyLubeSAT™ process, with which used oils are being used to manufacture group III base oils at a production plant in Saxony-Anhalt for the first time. The higher performance of these oils results in low levels of friction in engines, and reduces their fuel consumption and therefore their CO₂ emissions. This makes Puraglobe the only supplier of sustainable group III base oils manufactured from used oil which also has CFP (carbon footprint) certification from NSF International. With an investment of approximately 15 million Euros and the creation of another 30 jobs, the American company is clearly committed to its location in the heart of Germany.

That is just the start, however. "It is in Saxony-Anhalt that we are developing the American and international markets," explains the Managing Director of Puraglobe Andreas Schüppel. "Following from our success in Germany, we are now advancing international projects. Over the medium term, we intend to use the success of our production facilities in Zeitz as a springboard for setting up plants along the same lines in Tampa, Florida, for example". In this respect, identical plants are planned with completely uniform designations, the technical management of which will take place in Elsteraue, where one to two engineers will be appointed for each installation. They will also ensure the optimum production sequences and take charge of the quality assurance at the international locations. Data packages will be exchanged on a digital basis, while the actual settings on the systems will be completed on site, independently of the internet, for safety reasons. The IT consultants Baumgarten GmbH, which is based nearby at Zeitz Industry Park, is responsible for the data security.

"We need to ensure that our products are always of the same quality, irrespective of where they are manufactured," says Schüppel, describing the sophisticated process. For Schüppel, the Chemicals 4.0 has long since been part of everyday life. "We took the 2008 economic crisis as an opportunity for change, and in 2009, we convinced our shareholders of the need for the new investments and developments." With the commissioning of the new facility in Elsteraue, an initial milestone has now been passed. The intensive preparations and plans have made the ultramodern and efficient company fit for the future. Puraglobe represents several innovative companies and businesses in Saxony-Anhalt, which are looking to the future well prepared.

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Logistics 4.0

Logistics processes in transition

The market for innovative Logistics 4.0 technologies is diverse and the range of products and services expands almost daily with new solutions. In particular, the technology-driven nature of the market presents companies with great challenges to develop concrete applications and solutions for their own companies.

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Software for 3D visualization



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