CONSISTENTLY DIGITAL

THE DIGITALIZATION STRATEGY
OF THE UNIVERSITY OF GÖTTINGEN

CONTENTS

DEAR READERS,

The COVID pandemic has further accelerated the rapid digital progress of the past few years. Research institutions, schools, and many other public sectors have had to adapt quickly: increasing server capacities and bandwidths, purchasing digital devices, and redesigning technical and content-related concepts. The advancement of digital teaching and learning has long been a strength of the University of Göttingen. Thanks to this strength, we successfully shifted from classroom to remote learning in record time.

Strategic projects such as the internationalization of the curricula, the digitalization of small study programs, and the development of a framework for students' digital competencies are providing momentum for the modernization of both learning and teaching. Already in 2019 – thanks to a student-led initiative – we founded the think tank "Digitalization in Teaching and Learning". This University-wide board enabled teachers, students and staff to work together to develop solutions for the digital future, a precursor to our virtual working group "Study and Teaching".

With its wide range of disciplines, the University of Göttingen also stands for diversity in data-intensive research ranging from molecular biosciences to medical imaging, to agricultural sciences with their modern methods, to the digital reconstruction of historical artifacts and archaeological sites. Applied and basic research is being coordinated and supported by the Campus Institute Data Science (CIDAS), where our Data Science study programs and the promotion of data competencies converge. At the same time, the CIDAS forms a hub for cooperation with industry, as demonstrated by the professorship for computational cell
.

analytics that was recently funded by the Göttingen life science company Sartorius.

The impact of these projects and facilities goes far beyond Göttingen as a center of science. In Lower Saxony, we are involved in four out of six labs at the Center for Digital Innovation. Together with the University of Applied Sciences and Arts (Hochschule für angewandte Wissenschaft und Kunst, HAWK), we attracted funding for eleven new digitalization professorships from the state of Lower Saxony in 2019. The following year, we became one of eight new centers for national high-performance computing in a nationwide competition, together with the Gesellschaft für wissenschaftliche Datenverarbeitung Göttingen (GWDG). In this booklet, we present to you examples from a broad range of topics, stakeholders, and projects related to digital progress. I hope you enjoy the read.

Prof. Dr. Metin Tolan

PRESIDENT OF THE UNIVERSITY OF GÖTTINGEN

CONSISTENTLY RELYING ON DIGITALIZATION

FOR THE PAST 20 YEARS, THE UNIVERSITY OF GÖTTINGEN HAS BEEN SYSTEMATICALLY EXPANDING ITS ACTIVITIES IN THE FIELD OF DIGITALIZATION. A REVIEW

More than 20 years have passed since the foundation was laid for today's position of the University of Göttingen, with its nationally recognized success in digitalization and research infrastructures. At the end of the 1990s, two competence centers for academic libraries were established in Germany: one in Munich and the Göttingen Digitalization Center. In 2002, when the Göttingen Gutenberg Bible was included in the UNESCO register "Memory of the World", after being fully digitalized and made freely accessible online, the Göttingen Digitalization Center became even more visible. The founding of additional institutions followed, such as the Bernstein Center for Computational Neuroscience, the Göttingen Grid Resources Center (GoeGrid), and the Göttingen Centre for Digital Humanities (GCDH), which is one of the first centers for the digital humanities in Germany.

Since then, the University has systematically expanded its activities in the field of digitalization. In computer science, we have established seven new professorships since 2015, ranging from digital humanities and computer security to data science and machine learning. Additionally, in 2019, we attracted funding for digitalization professorships (Digitalisierungsprofessuren) from the state jointly with the University of Applied Sciences and Arts (Hochschule für angewandte Wissenschaft und Kunst, HAWK).

The University and the University Medical Center (UMG) jointly develop digital research and digital information infrastructures with a national and international reach. The key players are the Göttingen State and University Library (SUB), the Gesellschaft für wissenschaftliche Datenverarbeitung Göttingen (GWDG), and the Institute for Medical Informatics. Our University is currently participating in several consortia of the federal/state program for national research data infrastructures (NFDI) and is a partner in developing the European Open Science Cloud (EOSC). Together with other universities in Lower Saxony, the University of Göttingen plays an active role in the "Hochschule.digital Niedersachsen" initiative.

At the Göttingen Campus, the union of the University with non-university research institutions in Göttingen, we founded the Göttingen eResearch Alliance (eRA) in 2014. According to a statement from the expert commission for Research and Innovation of the German federal government in 2021, the eRA was praised as "setting an example for good research practices" at German universities.

Digitalization means much more than the use of new technologies. It also influences scientific principles, such as sharing research data to fight diseases worldwide. These practices, notably in the case of sharing genome sequencing data to fight the COVID pandemic, are part of the concept of Open Science. The University of Göttingen is recognized throughout Europe in this field and supports the demand for open and transparent research and reproducible research results – indispensable elements of good scientific practice and consistent quality assurance.

Prof. Dr. Norbert Lossau

VICE PRESIDENT FOR DIGITAL TRANSFORMATION AND INFRASTRUCTURES OF THE UNIVERSITY OF GÖTTINGEN

REACHING ALL DISCIPLINES

DIGITALIZATION OPENS UP NEW OPPORTUNITIES FOR RESEARCHERS. THE FOLLOWING PROJECTS ARE EXAMPLES OF WHAT THIS MEANS IN PRACTICE.

The latest developments in sensor technology and artificial Intelligence open unprecedented opportunities to use big and heterogeneous data to study the effects of climate change on forests."

Prof. Dr. Alexander Knohl, Department of Bioclimatology

DIGITAL FOREST:
A REAL-TIME MONITORING SYSTEM FOR CONSEQUENCES OF CLIMATE CHANGE IN FORESTS

**By Prof. Dr. Alexander Knohl,
Department of Bioclimatology**
As the drought years of 2018/2019 have shown, serious effects on the forests in Germany are associated with climate change. To better adapt forests to climate change, we need a better understanding of its consequences for important forest functions, such as carbon dioxide (CO_2) sequestration, growth, or the water cycle. In the Digital Forest project, scientists are applying state-of-the-art developments in sensor technology, satellite products, data integration, and artificial intelligence (AI) in forest climate research.

In a mixed beech forest in the Hainich National Park in Thuringia, researchers are continuously measuring the forest's "breath", i.e., the exchange of CO_2 and water vapor between the forest and the atmosphere, using high-resolution tree growth and water flux sensors and eddy covariance measurements for CO_2 and water vapor fluxes to create a real-time observation system of climate impacts. By combining these data, time series of CO_2-exchange and growth, with point clouds from airborne and terrestrial laser scans as well as satellite images, an early warning system for drought stress will be developed. The research and results will be communicated to the public via a virtual reality installation at the Forum Wissen science museum in Göttingen. The project Digital Forest is funded by the state of Lower Saxony, and the cooperation partner is the University of Leipzig.

DIGITALIZATION FOR THE IMPROVEMENT OF ANIMAL WELFARE IN LIVESTOCK FARMING

**By Prof. Dr. Imke Traulsen, Group of
Livestock Management Systems**
In research on the advancement of husbandry systems for farm animals, such as dairy cows and pigs, evaluating the potential of digital technologies is currently of high relevance. Precision livestock farming, the automation of recurring work

steps, monitoring and early detection systems, and assistance systems for animal observation help to improve animal welfare and, at the same time, meet the demands of caretakers and consumers.

In the group of livestock systems, the development of assistance systems based on automated image analysis to support animal management and observation is a primary research focus. One example is the interdisciplinary project DigiSchwein (DigiPig), which is funded by the German Federal Ministry of for Food and Agriculture. In this project, scientists plan to use automated image analysis to make predictions on behavioral deviations such as tail biting or physiological processes such as births. In addition to scientific findings on digitalization, projects like this one help establish these technologies in practical agriculture.

DIGITALIZATION IN PATHOLOGY FOR IMPROVED CANCER MEDICINE

By Prof. Dr. Philipp Ströbel, Institute of Pathology, University Medical Center Göttingen

Pathology is at the center of diagnosis and treatment for cancer diseases. Here, the identification of molecular changes plays an important role. In addition to improved safety in handling tumor samples, digitalization also opens the possibility of using artificial intelligence (AI). Today, highly advanced and approved AIs for use in pathology are commercially available to assist in detecting cancerous tissue sections or evaluating immunohistochemical stains. In the CancerScout project, scientists at the University of Göttingen and the Siemens Healthineers AG are investigating the possibility of predicting molecular changes in tumors by image analysis using AI.
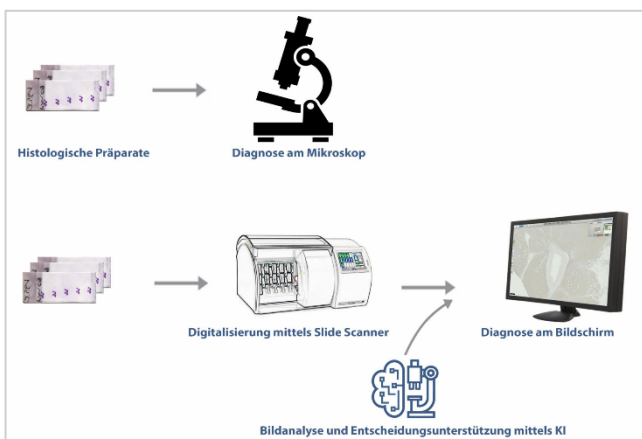

For the training data set, the researchers first collect comprehensive proteomic and genomic data from 3,000 types of tumors (colon, lung, pancreas), and then identify

clinically relevant molecular subgroups. Subsequently, the researchers aim to develop an AI algorithm to identify these molecular groups based on image analysis of a histological tumor section. The (molecular) pathological diagnosis of tumor diseases could become more cost-efficient and more effective in the future through such "digital biopsies". The project is funded by the German Federal Ministry of Education and Research (BMBF).

DIGITAL GAME-BASED LEARNING IN CIVIC EDUCATION AND UNIVERSITY TEACHING

By Prof. Dr. Monika Oberle, Department of Political Science
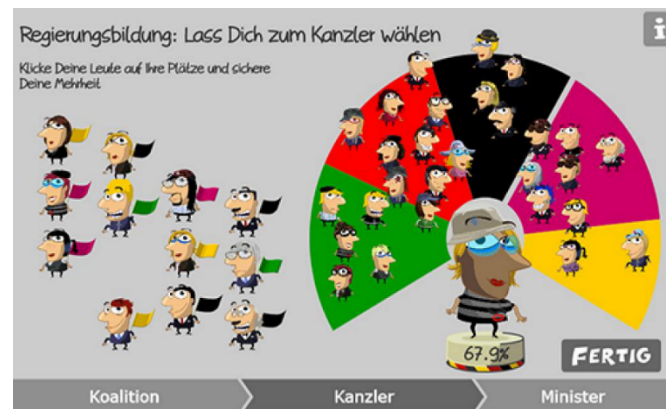
In the field of civic education, digital game-based learning approaches already exist, but there is still a profound lack of empirical research on this topic. At the chair of Political Science and Didactics of Civic Education, researchers systematically investigate subject-specific approaches to game-based learning, such as online simulation games and so-called "serious games". The mixed-method studies focus on the effects of these digital teaching-learning arrangements and the conditions under which they can succeed, for example, regarding changes in the participants' political knowledge, attitudes, and motivations. In particular, the scientists focus on using digital games about the European Parliament, in which a political decision-making process on the topics of asylum policy, data protection, or environmental policy is simulated in schools. Studies also examine the serious game "The Chancellor Simulator" as well as a hybrid simulation game on the implementation of the new EU Fertilizer Regulation, which was developed at the

Faculty of Agricultural Sciences. In the area of political science teaching, they are evaluating online simulation games on lobbyism in the EU in a cooperation with the University of Antwerp, with Göttingen University students and international students. In the DAAD project Focus Balkans Online, an international simulation seminar is currently being developed for students from Belgrade, Budapest, and Göttingen.

DIGITALIZATION AND RADICALIZATION

By Prof. Dr. Katrin Höffler, Department of Criminology, Juvenile Criminal Law and Penal System
The Internet, particularly social media, plays an important role in radicalization processes. People with an extremist background spread their propaganda online and try to recruit new supporters. In doing so, they profit from the fact that the Internet allows the uncontrolled, fast, and inexpensive dissemination of information to a large audience and covering large distances. Additionally, they are often protected by anonymity, which eases networking, interaction, and communication. In this context, it is also significant that the Internet offers a space where extreme views can become "normalized," because contradiction and social control by external supervisory bodies do not take place to the usual extent. As part of the nationwide joint project Radicalization in the Digital Age - Risks, Progressions and Strategies of prevention (RadigZ), researchers at the

Department of Criminal Law and Criminology have been investigating the biographies of radicalized individuals, e.g., with network analysis, and the role that the internet plays in individual radicalization processes.

"Digitization is increasingly contributing to a faster deciphering of disease mechanisms and the faster development of drugs, and thus to medical progress. It can also accelerate the transfer of new research findings into innovative, commercially viable technologies. An important factor for the future competitiveness of science and industry in Germany in this field is the excellent training of young professionals with competencies in the fields of data science and artificial intelligence (AI) and an equally high level of understanding of medical, biological and biotechnological application areas."
Dr. Joachim Kreuzburg,
Chairman of the Executive Board Sartorius AG

A RELEARNING PROCESS FOR BOTH SIDES

DIGITALIZATION PERMEATES ALL AREAS OF LEARNING AND TEACHING. FOR STUDENTS AND TEACHERS ALIKE, THIS IS BOTH A CHALLENGE AND AN OPPORTUNITY.

DATA SCIENCE STUDY PROGRAMMES IN GÖTTINGEN

The increasing digitalization of society, economy and science offers companies, universities, and research institutions a great opportunity: The availability of big data and the use of artificial intelligence are opening new avenues of research. On the other hand, we are all facing the same challenge: where do we get well-educated young talents with the necessary skills to use these opportunities? In addition, new opportunities also come with new risks: How do we ensure that data is used for the benefit of all and that our privacy remains protected? The data science study programs at the University of Göttingen contribute to answering these questions and overcoming the challenges.
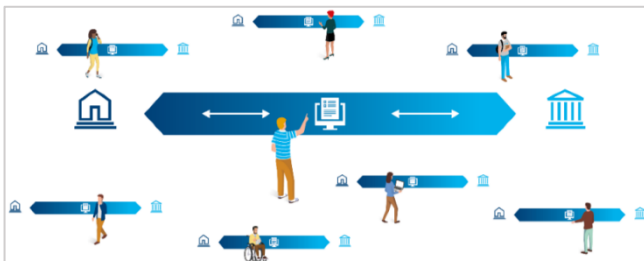
The application fields of data science are growing exponentially. To educate tomorrow's specialists, we already established two undergraduate bachelor's degree programs in data science in 2018, as one of the first universities in Germany. The "Applied Data Science" study program focuses on the development and application of data science methods in the sciences, humanities, and social sciences. The "Mathematical Data Science" program focuses on the mathematical foundations of data science methods. This shows that data science has become a distinct discipline in recent years.

Based on the bachelor's degree programs, the new master's program "Applied Data Science" started in the winter semester of 2021. On the one hand, the program is a continuation of the bachelor's programs, but at the same time, it offers graduates from domains such as biology, medicine, economics, or the digital humanities the opportunity to specialize in data science and acquire the necessary data skills for their domain.

Topics such as artificial intelligence and machine learning play a central role in the study programs. Our students learn not only how to apply these methods but also their mathematical foundations. As a result, they are well-equipped to help shape digital change in business and science.

The data science programs in Göttingen are optimally integrated into the existing bachelor's and master's programs of the related disciplines. For example, the mathematics and applied computer science programs each offer a data science profile. To us, it is also important that the subject of data science and digitalization is not limited to the fields of the natural sciences or mathematics. That is why we have developed more programs, such as the bachelor's and master's degree programs in "Digital Humanities" at the Faculty of Humanities, or the master's degree program "Work in Business and Society" at the Faculty of Social Sciences. This means that the subject area of data science is covered very broadly at Göttingen University. Students are given a wide range of options to choose their specific focus.

CROSS-CUTTING FUNCTIONS AND KEY COMPETENCIES; DATA LITERACY

Digital literacy and data literacy for all students are an important topic for the future at the University of Göttingen. Therefore, many course instructors have made their courses on relevant digital topics, such as spatial information, accessible to all students as self-study material from the beginning. These offerings are complemented by introductory courses from the State and University Library (SUB) in Göttingen - for example, on digital basics such as data security, visualization, and Open Educational Resources (OER).

These considerations have been summarized in a multidisciplinary framework of competencies, which lists concrete topics as a basis for future projects and developments based on the fields of competence of the Conference of Culture Ministers 2016.

One example is the lecture series "Learning to Read Data", which the University of Göttingen uses to teach basic data skills. Barrier free and accessible educational videos give all students, irrespective of their subject domain, prior knowledge or requirements, the opportunity to acquire core competencies of data literacy. So-called data labs then offer faculty-specific exercises to dive deeper into the respective domain-specific applications.

CHEMISTRY TOOLS

The chemistry tools are e-learning materials that provide individual and targeted study support. In this context, cross-course tutorials for data processing (based on Jupyter Notebooks), as well as new concepts for embedding digital media in lectures and laboratory activities, are being developed. This way, students can acquire data skills in a research-oriented manner, which prepares them for the digital world of work. The project is funded by the Ministry of Science and Culture of Lower Saxony.

DATA SCIENCE SUMMER SCHOOL

The Data Science Summer School Göttingen is an international summer school to familiarize students from all over the world and from different disciplines with methods in the fields of artificial intelligence and machine learning. Researchers and lecturers from the University of Göttingen, as well as national and international experts present various data science topics based on their own current research. With participants from more than 30 nations and a broad spectrum of research topics, the Data Science Summer School offers an ideal opportunity for young scientists to network and get to know Göttingen as a research location.

OPTIMAL USAGE OF DIGITAL KNOW-HOW

IN 2019, THE UNIVERSITY OF GÖTTINGEN ESTABLISHED THE CAMPUS INSTITUTE DATA SCIENCE (CIDAS) AT THE GÖTTINGEN CAMPUS.

„The generation and development of digital image processing are mainly affected by three factors: first, the development of computation systems; second, the development of mathematics (especially discrete mathematics); third, the demand for a wide range of applications in environment, agriculture, industry, and medical science."
Dr. Fatemeh Ziaeetabar, CIDAS Fellowship, Postdoc

Data science is the key discipline of the information age combining statistics, computer science, mathematics, and numerous applications. Together with artificial intelligence (AI), data science is vital in all areas of science, the economy, and society. Research methods from data science are used, for example, in medical research, for sensors and measurement processes, in engineering, and in predictive analytics.

To combine specialist knowledge from the information-technological and statistical-mathematical core areas with the applications and to provide a space for the development of this multifaceted discipline at the University of Göttingen, the University established the Campus Institute Data Science (CIDAS) in 2019. Under this umbrella, research activities take place on the Göttingen Campus in the fields of data science and AI, and converge in teaching, research, and research transfer. In the same year, the University gave an important impulse for advancement in data science when it joined forces with the University of Applied and Arts (HAWK), achieving funding from the state of Lower Saxony for eleven additional digitalization professorships. In previous years, the university had already established five new professorships in the field of computer science and AI to expand its digital competencies in research, teaching, and applications.

## COLLABORATION AND STRUCTURES

The holistic research approach of the CIDAS is reflected in the interdisciplinary cooperation between scientists of the University and the other institutions of the Göttingen Campus, such as the Göttingen Max-Planck-Institutes, the

HAWK or the Sociological Research Institute Göttingen (SOFI), who are working together on the implementation of the digital transformation and the development of AI in a holistic manner. It is also demonstrated by the establishment of the new digitalization professorships whose focuses range from machine learning, software technology for data science, data security to digitalization at work. At the same time, the subdivision of the CIDAS into the three areas "Societal Aspects of Digitalization", "Applied Data Science and Informatics," and "Foundations of Data Science" provides an orientation. For the formation of shared interdisciplinary research topics, these transitions are, however, fluid.

„In our field, digitalization means the environment we perceive is represented using RGB data, three-dimensional coordinates, etc. Digitalization captures high-level patterns and contains accurate, detailed information.

Shishan Yang, CIDAS Fellowship, Postdoc
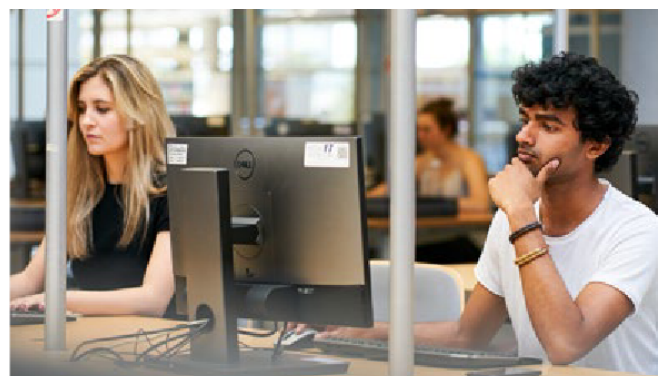
TRAINING AND PROMOTION OF YOUNG TALENT

To advance the knowledge of data science and AI in development and applications in a sustainable and forward-looking manner, and to meet the increased demand for skilled specialists due to the digital transformation, the

University has created training programs for the whole spectrum of data science and AI in Göttingen. Students can choose from various study programs in applied data science, mathematical sciences, applied statistics, and digital humanities. The CIDAS acts, on the one hand, as an exchange platform between teachers and students. On the other hand, it provides offers such as statistical consulting services to ensure the quality of data handling in theses and doctoral dissertations in all disciplines. Offers such as the international Summer School Data Science teach not only data skills but also enable exchange between students and doctoral candidates at the international level.

Since 2021, the CIDAS has been awarding fellowships to support outstanding young scientists in their implementation or initiation of their own innovative research questions in the data science and AI field. This offer enables young scientists to pursue their own ideas independently at an early stage, and through exchange with the other members of the CIDAS to build a network with contacts on a national and international level, thus laying the foundation for a successful scientific career.

TRANSFER AND COOPERATION

In order to promote data science and AI applications, the CIDAS serves as an interface for collaboration between the University and industry. Currently, through the sponsorship of the company Sartorius, a new lab for AI-based cell analytics and an endowed professorship for computational cell analytics are being established at the CIDAS. At the same time, through cooperation with the Life Science Factory, the CIDAS also raises awareness about possibilities of outsourcing and entrepreneurship for innovations in AI applications. The CIDAS is complemented by the infrastructures of the State and University Library in Göttingen (SUB), the GWDG, the service for data management and consulting services for research data, and open data of the eResearch Alliance (eRA), as well as the comprehensive computing capacities and infrastructures for data processing (GPU and HPC).

"We use digitalization in many different ways, for example for strategy development, in robotics, but also in our largest research focus on the generation of intelligent plasmas, a project funded by the German Federal Ministry for Education and Research as part of the Plasma for Life partnership."

Prof. Dr. Wolfgang Viöl,
Vice President for Research and Transfer, HAWK

TAILORING STRUCTURES

A CENTRAL BUILDING BLOCK FOR A SUCCESSFUL DIGITALIZATION PROCESS IS AN ADEQUATE TECHNICAL INFRASTRUCTURE

DIGITAL RESEARCH AND TEACHING INFRASTRUCTURES

Scientists, teachers and students at the Göttingen Campus can rely on a modern infrastructure that is digitalized in all areas for their research, teaching and learning activities. This is reflected by the provision of high-performance computers and IT/data services for both Lower Saxony as well as for individual disciplines.

GÖTTINGEN ERESEARCH ALLIANCE

Since 2014, the eResearch Alliance (eRA) has been supporting researchers actively in the planning and implementation of research data management in accordance with the research data guideline of the University of Göttingen. The eRA achieves this by offering campus services and software, best-practice training, and individual consulting. It is jointly run by the Göttingen State and University Library (SUB), the Göttingen Society for Scientific Data Processing (GWDG), and by the Medical Informatics, in cooperation with the Research Department.

TEXT+, DIGITAL PALAEOGRAPHY AND IMAGING SCIENCE

The SUB Göttingen is co-applicant of the project Text+ within the framework of the DFG-funded nationwide initiative for national research data infrastructure (NFDI). This initiative aims at the acquisition of language- and text-based research data, such as digital collections and corpora, lexical resources and dictionaries, as well as editions for scientific work in language- and text-based sciences. The Digital Palaeography and Imaging Science project aims to enable researchers to use the latest digital technologies for the recovery and automated recognition of handwritten text. The research project with participants from the Faculty of Philosophy and

the SUB will be funded by the Volkswagen Foundation for six years starting in October 2021.

SFB 990: ECOLOGICAL AND SOCIO-ECONOMIC FUNCTIONS OF TROPICAL LOWLAND RAINFOREST TRANSFORMATION SYSTEMS (EFFORTS)

In recent decades, the lowlands of the Jambi province in Sumatra (Indonesia) have been transformed from dense forests into a landscape of rubber and oil palm plantations dominated by monocrops. EFForTS is a DFG-funded Collaborative Research Center, which is investigating the ecological and socio-economic impacts of this change. Research data management and integrative statistical data analysis are carried out as an infrastructure project by the Faculty of Economic Sciences, the SUB, and the GWDG.

IBEETLE-BASE

iBeetle-Base makes phenotypic data such as RNA interference (RNAi) available online, along with other tools for developmental biology research, such as genome browsers, sequence data, and links to orthologous genes of the fruit fly Drosophila melanogaster. In a cooperation of the Faculty of Biology and Psychology, as well as with the GWDG and SUB, the iBeetle-Base is being migrated from a project system to a new IT-architecture to become accessible to the community long term. This project also hopes to enable further cross-species research.

"The digitalization of studies and teaching enables all students to gain international experiences. At the same time, it enriches teaching by facilitating access to new perspectives, new knowledge and research and teaching methods from other scientific cultures. The University of Göttingen is a nationwide pioneer with the concept of internationalization and digitalization of the curricula and the research-oriented virtual exchange programs."

Prof. Dr. Hiltraud Casper-Hehne,
Department of Intercultural German Studies,
University of Göttingen

GEOROC

In the DFG-funded project Digital Geochemical Data Infrastructure (DIGIS), a collaboration consisting of geochemistry at the University of Göttingen and the SUB, the rock database GEOROC (Geochemistry of Rocks of the Oceans and Continents) with more than nine million analytical values for approximately 340,000 samples is being migrated to Göttingen. The GEOROC database will be operated and further developed there together with the GWDG.

HIGH-PERFORMANCE AND SUPERCOMPUTING AS NATIONWIDE RESEARCH INFRASTRUCTURE

High Performance Computing (HPC) has become an indispensable tool in most scientific disciplines. The GWDG and the University operate supra-regionally used high-performance computers, namely as the Göttingen location of the North German High Performance Computing Network (HLRN), in cooperation with the Zuse Institute Berlin (ZIB). With the approval by the Joint Science Conference (GWK) of the German federal and state governments in 2020, the HLRN will become one of eight nationwide centers for national High-Performance Computing (NHR centers). The GWDG and the University will also become the second HPC site of the German Aerospace Center (DLR) next to Dresden. The goal is closer cooperation between DLR and GWDG in computational and data-intensive research.

IT/DATA-SERVICES FOR LOWER SAXONY

The GWDG provides IT and data services for universities and research institutions in Lower Saxony, in close coordination with the working circle for information technology / university data centers (LANIT). This includes the Academic Cloud, which already offers storage and backup services and can also host research and teaching infrastructures

STUDY ADMINISTRATION: PAPER IS (ALMOST) OUTDATED

The University of Göttingen is pursuing the goal of offering all student administration needs and services completely digitally – from paperless application and enrollment to the issuing of digital versions of transcripts. Today, processes are recorded digitally as early as possible to avoid generating paper in the first place. The focus is on the management of documents, workflows, forms, and the electronic student file (ESA). Advice and assistance in all study matters is still done by personal interaction but is digitally supported. Today, many services are available in person as well as via video consultation. With this strategy, the University sets a signal that goes far beyond Göttingen. Even cross-university processes could be integrated on the platform for international student mobility, which is funded by the ministry for education and research and are planned to be further expanded in the European university network ENLIGHT.

AS OPEN AS POSSIBLE

THE UNIVERSITY OF GÖTTINGEN HAS CREATED AN OVERARCHING FRAMEWORK TO ENABLE OPEN SCIENCE.

Transparency and comprehensibility are central pillars of good scientific practice both in scientific work and in the communication of research results. Open science aims to make all scientific results and products, such as publications and data, freely accessible and (re)usable by third parties.

Regarding research data, the principle of "as open as possible, as closed as necessary" has gained momentum in recent years, promoting at the same time scientific progress and innovation. To this end, data must be made accessible according to the so-called FAIR principles (findable, accessible, interoperable, reusable) for subsequent use via globally networked infrastructures.

With its guidelines on open access to publications (Open Access Policy 2005, updated in 2016), the responsible management of research data (Research Data Policy 2014), as well as its regulations for safeguarding good scientific practice (updated in 2021), the University of Göttingen has established an overarching framework to promote and advance open science in Göttingen. The responsibility for the practical implementation lies with the respective researchers, who are supported by central services and consulting services of the University.

Throughout the entire research cycle, the Göttingen eResearch Alliance (eRA) supports researchers in the planning and conducting of research data management in accordance with the guidelines mentioned above. In the eRA, founded in 2014, the GWDG, the Göttingen State and University Library (SUB) and the University Medical Center Göttingen (UMG) are collaborating as the point of contact for researchers, research groups, and faculties.

Open access at the Göttingen research campus is promoted in many ways: Various publication services address all disciplines, and a central fund can finance publications on a pro-rata basis. In particular, Göttingen University Press, founded in 2003, publishes about 60 new publications annually and consults with authors and journal editors. In addition, the SUB is involved in national consortia which negotiate with publishers to promote the open access transformation.

Göttingen Research Online (GRO) bundles various services under one roof: innovative and networked publication management, a central database for research data, a tool for creating data management plans, and a booking portal for scientific instruments.

The Open Science Göttingen Meet-ups focus on networking and promoting competencies around open science, in which researchers, librarians, and other interested people at the Göttingen Campus can explore diverse topics, such as publishing research data, preprints or open peer reviews and how these workflows can be implemented.

Infrastructures and services based in Göttingen also contribute directly to the development of the National Research Data Infrastructure (NFDI) and to international consortia (e.g., DARIAH or OpenAIRE), which in turn contribute to the development and expansion of the European Open Science Cloud (EOSC). The EOSC is intended to enable all scientists and scholars to work together on data across disciplinary and geographic geographical boundaries and to combine, store and share research data and outputs.

PUBLISHING INFORMATION

IMPRESSIONS OF DIGITALIZATION IN GÖTTINGEN

"The AI algorithms open great new possibilities for research. AI has already revolutionized image processing in electron microscopy. AI can also be used to identify patterns in large genomic datasets that cannot be found by other means."

Prof. Dr. Patrick Cramer, director at the Max Planck Institute for Multidisciplinary Sciences

"To develop technology for the human good such that it also strengthens society and democracy, we need a strong link between technological expertise and ethical competence. With my work, I would like to contribute to making Göttingen a pioneer in this field.

Prof. Dr. Catrin Misselhorn, Department of Philosophy, University of Göttingen

"Especially in times of digitalization, digital skills are becoming increasingly important for students' employability. It is therefore even more crucial that these skills are fundamentally anchored and taught in the study programs."

Anika Bittner, Student Senator, University of Göttingen

"Digital transformation in communications not only opens up great new opportunities to transfer scientific findings into our society. It also enables an exchange between science and society in greater breadth and depth than was previously possible."

Thomas Richter, Department of Public Relations, University of Göttingen

"Digitalization, data science and artificial intelligence are no longer topics for the future in the university medicine in Göttingen but are already present-day issues. Digitalization in university medicine must be thought through and implemented holistically in an integrative manner from the start. The use of coordinated digital formats, especially for translational purposes, for data exchange in patient care, and for clinical research and medical teaching, is a core element for cross-sector networking. The close coordination of Göttingen's scientific institutions, visible in the new joint computing center, is a key to a networked and competitive digitalization strategy at the Göttingen Campus."

Prof. Dr. Wolfgang Brück, Chairman of the Executive Board, resp. for Research and Teaching, University Medical Center Göttingen

"The SARS-CoV-2 pandemic has shown that digitalization offers a wide range of possibilities for making teaching more flexible. Students can decide individually how they want to acquire knowledge, timewise and method-wise. This is particularly beneficial for medically vulnerable students."

Alexandra Werner, Student senator, University of Göttingen