

Effective health services across borders

The healthcare systems of Germany and the Netherlands are the focus of a new research project of the Universities of Oldenburg and Groningen: An interdisciplinary consortium headed by Oldenburg health services researchers Prof. Dr. Falk Hoffmann and Prof. Dr. Lena Ansmann will investigate how structural differences in these two healthcare systems affect healthcare for patients in the Ems Dollart Region. The background of the project: In Germany and the Netherlands, healthcare is organised very differently, although both health care systems face similar challenges. However, how these structural differences in care affect treatment outcomes has hardly been systematically investigated so far. The current project aims to close this gap.

The aim is to systematically compare the peculiarities of both health systems at different levels and to lay the scientific foundations for cross-border healthcare. The rural border region in the north-east of the Netherlands and in the north-west of Germany serves as a living laboratory for the project team. The researchers plan to build a data infrastructure that identifies and brings together publicly accessible information about the organisation of healthcare systems in the Ems Dollart region on both sides of the border. The data will form a basis for future scientific research. Specifically, the research team is studying healthcare services in three different sectors: for example, the researchers want to compare how frequently antibiotic-resistant

bacteria occur in patients with urinary tract infections, what differences there are in clinical rehabilitation after hip surgery and how healthcare in nursing homes differs in the two countries.

The project "Comparison of healthcare structures, processes and outcomes in the German and Dutch cross-border region (CHARE-GD I)" will be funded by the Ministry for Science and Culture of Lower Saxony (MWK) with about one million euros over the next three years. The project is based at the Cross-Border Institute of Healthcare Systems and Prevention, a joint initiative of the University of Oldenburg's School of Medicine and Health Sciences, the University of Groningen and the University Medical Center Groningen.

Does it make a difference whether a patient receives medical treatment in Germany or in the Netherlands? The Cross-Border Institute of the Universities of Oldenburg and Groningen will research dissimilarities between the two countries in healthcare over the next few years.

Batteries of the future

A new way of producing batteries is the focus of the new research project NANO-3D-LION. Over the next five years, chemist Dr. Dmitry Momotenko will develop an innovative 3D electrochemical printing technique for manufacturing lithium-ion batteries. The goal is to boost the output power and to reduce the charging times of the batteries to just a few seconds. Portable electronic devices, electric vehicles and robotic systems all need efficient energy storage. However, the architecture of current rechargeable lithium-ion batteries limits their performance. In the new project, Momotenko is therefore investigating how to manufacture batteries in the future using a 3D printing technique on the nanoscale. The European Research Council (ERC) is funding the project with around 2.25 million euros as part of a "Starting Grant". This funding supports outstanding early career researchers who want to set up their own research group.

How is soil salinization impacting agriculture?

Climate change is negatively impacting coastal areas: soil salinity is increasing, soils are degrading and agriculture is feeling the pinch. The project Saline Agriculture as a Strategy to Adapt to Climate Change, in which the University of Oldenburg is also participating, looks at how agriculture can adapt to the changing conditions and contribute to food security. With around 1.3 million euros in EU funding, the project aims to improve the resilience of food production in saline and potentially saline agricultural areas in Mediterranean and North Sea regions and implement climate-smart solutions to help it withstand the impact of climate change.

Multiculti of microbes

Growing microorganisms and their natural communities in the lab – that's what the project "Cultivation of previously uncultivated microorganisms from different aquatic habitats" (MultiKulti) is working on. The coordinator of the joint project is the microbiologist Prof. Dr. Martin Könneke, Institute of Chemistry and Biology of the Sea (ICBM). The aim of the team of researchers from all over Germany is to develop a bioreactor. This should simulate microbes' natural living conditions in such a way that they can be cultivated permanently in the lab. In the long term, the aim is to create an automated system managed by artificial intelligence that can support different research approaches - for example, on the ecology of microbes or for biotechnological applications. The Federal Ministry of Education and Research (BMBF) is funding the project with 2.5 million euros over a period of three years.

Online experiment on vaccine allocation

What would vaccination strategies look like if the general public were allowed to decide how vaccines are distributed in a pandemic? This is the question political scientists Professor Markus Tepe, Dr. Michael Jankowski and an international team of researchers are investigating in an online experiment involving 16,000 participants from eight countries. The project "Who should get the vaccine first?" will receive just over 112,000 euros in funding from the Volkswagen Foundation over an 18-month period. The researchers aim to find out what conditions would lead to an equitable distribution of vaccines between the countries of the Global North and the Global South.

Homing in on the smallest possible laser

At extremely low temperatures, matter often behaves differently than usual. Physical particles can give up their independence a few degrees above absolute zero temperature and merge into an object with identical properties for a short time. Such Bose-Einstein Condensates represent a special aggregate state of matter. An international team led by the Oldenburg physicists Dr. Carlos Anton-Solanas and Prof. Dr. Christian Schneider has succeeded for the first time in generating this unusual quantum state in charge carrier complexes that are closely connected to light particles and are located in ultrathin semiconductor sheets made of a single atomic layer. This produces light similar to that of a laser. The study focuses on quasi particles that consist of both matter and light. This is a coupling of excited electrons in solids and light particles. The phenomenon could be used to create the smallest possible solid-state lasers.



Ground-breaking ceremony for the new Helmholtz Institute in Oldenburg

A symbolic groundbreaking ceremony was held in July to mark the start of construction work on the new Helmholtz Institute for Functional Marine Biodiversity (HIFMB). Located in the Technology Park in the Wechloy district of Oldenburg, the building will provide 2,000 square metres of usable space with 85 office spaces and around 650 square metres of laboratory space, thus offering ideal conditions for ma-

rine biodiversity research. Ninety percent of the institute's operating costs will be covered by federal funds and ten percent by funds from the State of Lower Saxony. At the ceremony the Science and Culture Minister for Lower Saxony, Björn Thümler, handed over a funding agreement for 15 million euros. The HIFMB was founded in 2017 as an institutional collaboration between the University of Oldenburg and the

Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research in Bremerhaven to focus on changes in marine biodiversity and the consequences for human well-being and marine ecosystems. On this basis, the researchers develop sustainable conservation concepts for adaptive ecosystem management. The foundation stone ceremony is scheduled for spring 2022 and the building is due to open in 2023.

Targeted fall prevention

Improving assessment of the risk of repeated falls in older adults and providing targeted prevention: this is the aim of a new research project led by geriatrician Prof. Dr. Tania Zieschang. The Federal Ministry of Education and Research (BMBF) has approved 1.8 million euros in funding for the first three-year phase of the project. Several partners are involved

in the "SeFALLIED" project. The research team will focus on people over 60 years of age who seek medical assistance at an emergency department after receiving outpatient treatment. The study will follow about 450 participants for one to two years. In addition to a comprehensive geriatric examination, innovative tech-

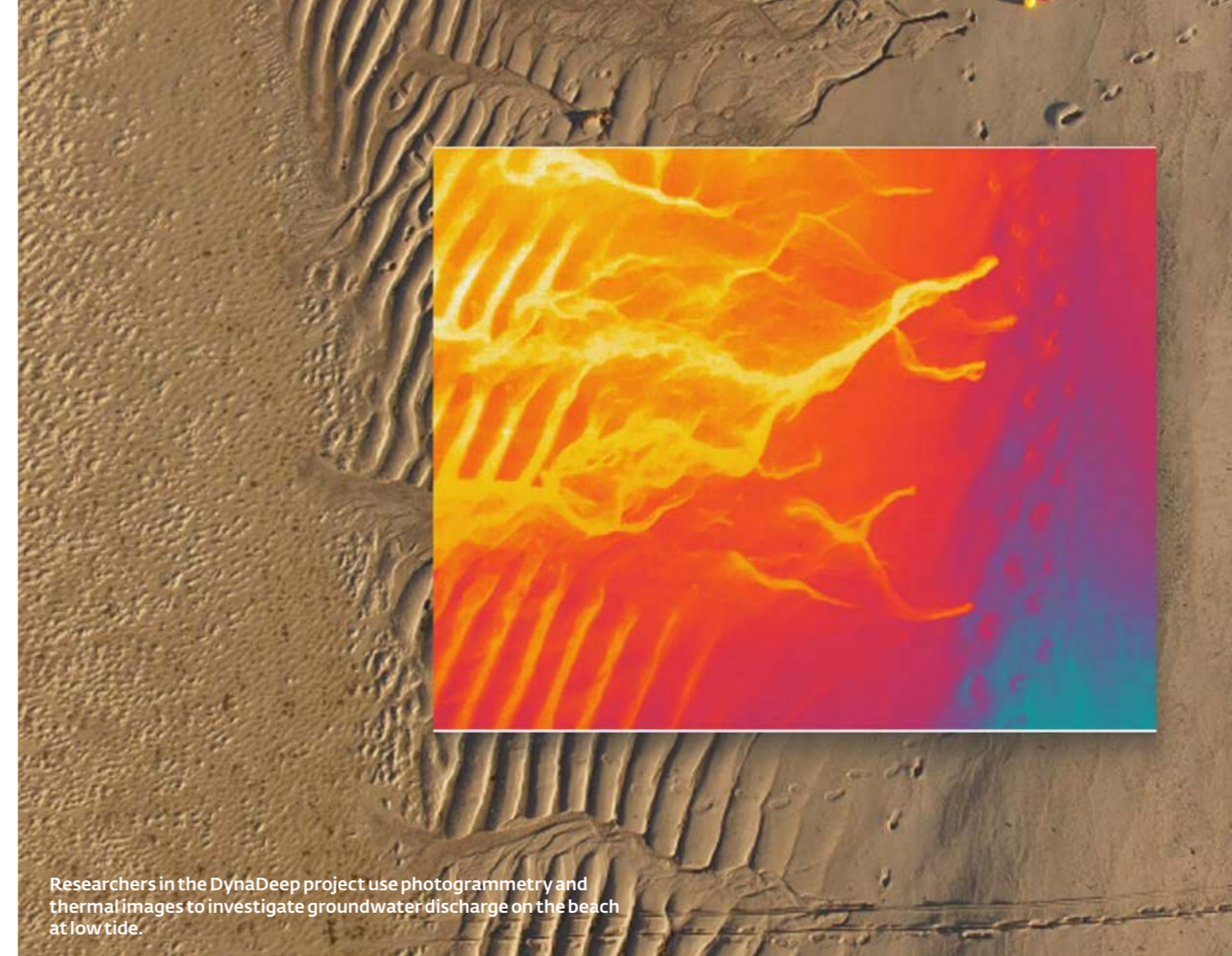
nologies will be used to analyse the risk factors for further falls. This includes gait analyses on a so-called perturbation treadmill, which simulates jerky movements. The researchers also want to record movement data, evaluate it using machine learning methods and thus recognize habitual movement patterns that make a person prone to falls.

Hearing research with virtual reality

Many people find it difficult to hear in classrooms or near busy streets. In order to understand how acoustic perception works in complex environments, experts from Oldenburg are using virtual reality (VR). Together with partners, they are leading three projects in the new priority programme AUDICTIVE ("Auditive Cognition in Interactive Virtual Environments") of the German Research Foundation (DFG). The project of acoustician Prof. Dr. Steven van de Par is about realistically

reproducing the acoustics of rooms in a virtual environment. The second project, led by Dr. Stephan Ewert, van de Par and Munich colleague Dr. Virginia Flanagan, places test persons in different virtual environments using VR glasses. The researchers want to find out how it is possible to estimate distances and movements by hearing. The third project with Oldenburg participation is led by the neuropsychologist Prof. Dr. Stefan Debener and the acoustician Prof. Dr. Volker Hohmann.

The researchers want to understand how healthy people manage to filter out the voice of their current conversation partner from a variety of sound sources. To do this, they use mobile EEG devices and an acoustic simulation system that gives virtual characters realistic lip movements. The AUDICTIVE priority programme combines the disciplines of acoustics, cognitive psychology and computer science. The Oldenburg projects will receive a total of about 830,000 euros over three years.



Researchers in the DynaDeep project use photogrammetry and thermal images to investigate groundwater discharge on the beach at low tide.

A dynamical world underground

Beneath the surface of the North Sea's wave-battered beaches, a variety of chemical, geological and microbiological processes are taking place, about which little is known so far. This dynamic underworld is the focus of a new research group led by hydrogeologist Prof. Dr. Gudrun Massmann. The German Research Foundation is funding the project for four years with about five million euros. The scientists' primary objective is to assess the role that subsurface processes in dynamic subterranean estuaries play in coastal ecosystems and global carbon, nutrient and trace element cycling. The new research group, called DynaDeep ("The Dynamic Deep Subsurface of High-Energy Beaches"), focuses on the dynamic underground environments where saltwater and fresh groundwa-

ter mix - known as the "subterranean estuaries" in technical terminology. Because of the constantly changing conditions, this area is probably fundamentally different from any other habitat in the deeper subsurface. The project is primarily concerned with so-called high-energy beaches, like those on the northern side of the East Frisian Islands. A primary characteristic of these beaches is that they are exposed to the full force of strong waves and they have a tidal range of several metres. In their project, the researchers want to take a closer look at the biogeochemical reactions at depth, which have hardly been studied so far. In the first phase of the project, the focus is on the Spiekeroog site, where an underground sampling and monitoring network is to be set. In addition, the

team wants to install a measuring pole equipped with various instruments in the intertidal zone, which generally dries out at low tide. The permanent installations will be supplemented by regular geophysical, hydrochemical and microbiological field campaigns. In a total of six subprojects, the researchers are conducting field investigations, experiments and mathematical modelling. The team plans to subsequently test the findings from the first phase at other locations. In addition to Massmann's working group, researchers from the Institute for Chemistry and Biology of the Marine Environment as well as other partners outside the university are involved in DynaDeep. The team is supported by a network of cooperation partners and local stakeholders.