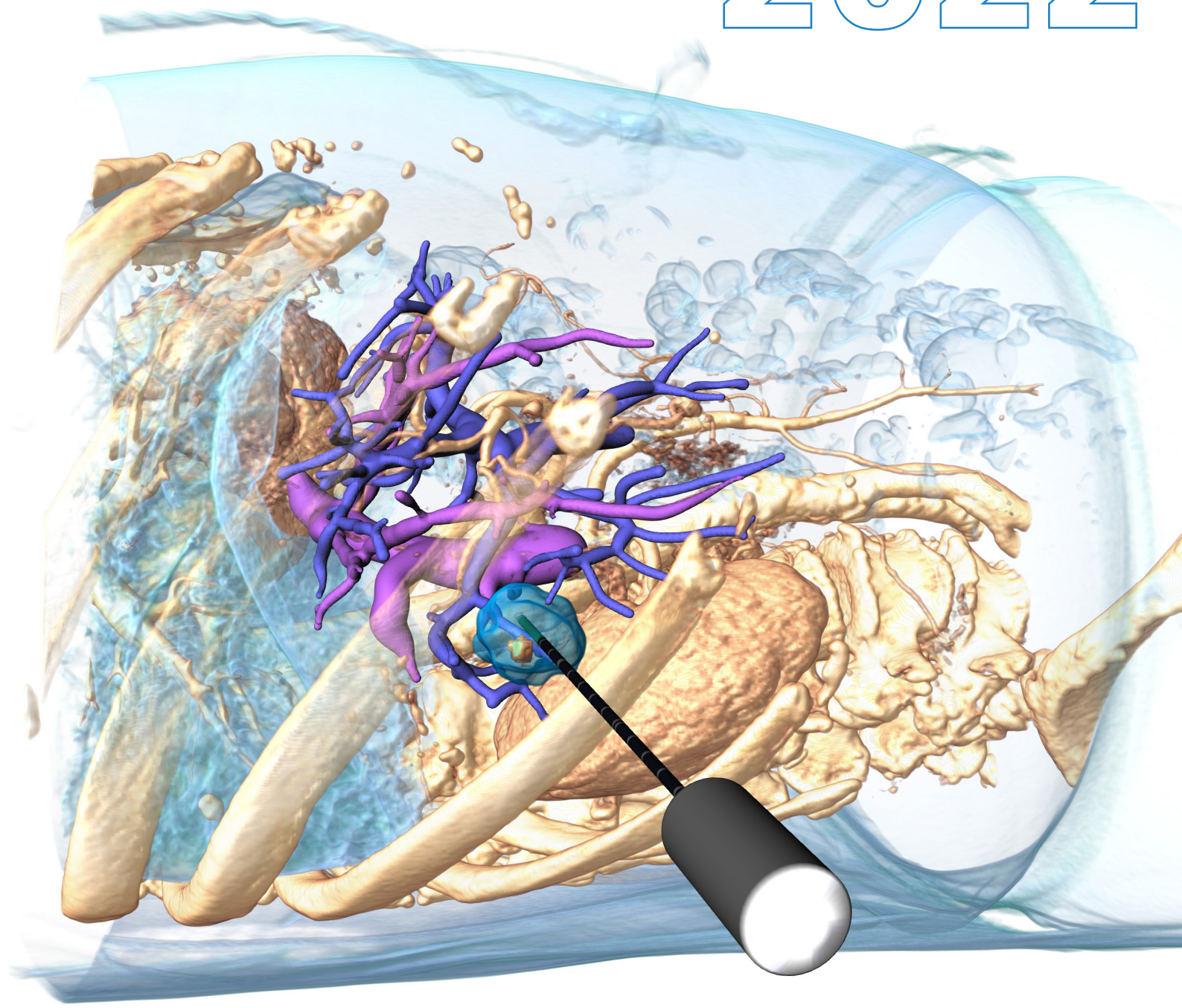
Fraunhofer
MEVIS

FRAUNHOFER INSTITUTE FOR DIGITAL MEDICINE

ANNUAL REPORT 2022



FRAUNHOFER MEVIS

INSTITUTE FOR DIGITAL MEDICINE

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The cover image shows the planning of a tumor ablation in the liver. A complete image-guided thermal ablation system for a more targeted and effective therapy is the goal of a research partnership between Israeli medical technology company TechsoMed Ltd. and Fraunhofer MEVIS, from which the subsidiary TechsoMed GmbH in Bremen emerged in 2022.

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FRAUNHOFER MEVIS AT A GLANCE

BRIEF PROFILE

The Fraunhofer Institute for Digital Medicine MEVIS, in short Fraunhofer MEVIS, is dedicated to the development of software and IT solutions to overcome the rapidly growing complexity in healthcare. This will eventually lead to higher efficiency, fewer risks and side effects, and therefore better outcomes for patients. The institute's mission is focused on the areas Precision Diagnostics, Precision Interventions and Collaborative Health Data Research. The commitment to responsible research and innovation as well as transdisciplinary lifelong learning runs through all scientific fields of activity.

Clinical Commitment

Research and development at Fraunhofer MEVIS is primarily guided by clinical needs instead of being technologically or methodologically driven. Our work focuses on developing innovative solutions for computer-assisted medical processes and their industrial implementation for clinical use. Identifying and analyzing clinical issues demands a deep understanding of medical research and calls for close cooperation with clinical partners. Fraunhofer MEVIS maintains an international network of more than 100 clinical partners. This clinical network is an essential source to understand user needs and to evaluate the clinical value and feasibility of developed solutions.

Strategic Considerations

The roots of Fraunhofer MEVIS lie in the creation, quantitative analysis, and interactive exploration of medical image data in their specific clinical context. We believe that medical imaging shall no longer be regarded as a field on its own. Instead, image features must be quantitatively correlated to available clinical information in order to discover new relevant knowledge. Fraunhofer MEVIS is uniquely positioned to achieve this by combining a deep understanding of clinical procedures and issues with mastery of the entire technology value chain — from imaging physics and data generation to algorithm and platform development to validation, product certification, and clinical implementation.

We have built substantial expertise and a good reputation in the deep learning and artificial intelligence (AI) arena. This enables us to successfully cope with the rapidly growing complexity in all diagnostic and therapeutic domains. While many competitors worldwide are active in the field of medical AI, Fraunhofer MEVIS is one in a few that covers the complete process of knowledge generation to eventually make AI a powerful clinical tool in hospitals and medical practices. Solutions based on our collaborative and modular software platforms are used likewise in multi-centric clinical trials and pharmaceutical research.

Industrial Collaboration

True innovation, i.e., the successful launch of solutions onto the market with tangible impact, is only possible through close collaboration with industrial partners that provide the necessary resources and market know-how to fuel the development of new technologies. Fraunhofer MEVIS functions as the link between clinicians and industry, aiming at technological advancement for clinical use. Transferring applied research to the industry is a pillar of the institute and a basis for its future research. Partners for cooperation and clients for industrial research and development include large firms and small- or medium-sized ventures in medical technology, pharmaceutics, and related fields.

Certification

Successful introduction of innovative approaches onto the market requires adherence to specific regulations, such as the German Act on Medical Devices (MPG), the European Conformity (CE), or the approval guidelines of the United States Food and Drug Administration (FDA). Since 2005, Fraunhofer MEVIS has been part of a small group of medical technology research institutions worldwide that operate a quality management system according to the EN ISO 13485 (Medical Devices) standard with a special focus on implementing a software development process in compliance with IEC 62304. The establishment of

the quality management system certified for the scope "design, development and production of software for medical products according to customer requirements" lays out well-defined steps for industrial cooperation and enables Fraunhofer MEVIS to provide market-ready solutions for commercial partners in the strongly regulated medical device market.

Software Platforms

Fraunhofer MEVIS has initiated and developed a family of versatile, modular web-based software platforms that enable our partners and ourselves to quickly build innovative solutions and to adapt to new challenges flexibly. The *MeVisLab* development platform by Fraunhofer MEVIS and MeVis Medical Solutions AG is a tool for rapid prototyping, flexible development of clinical software solutions, as well as developing products and methods for fields such as image analysis, visualization, and biophysical modeling. The joint use of MeVisLab at Fraunhofer MEVIS and partners in research, medicine, and industry promotes synergy, accelerates development and supports their tight technological integration. MeVisLab provides a modular interface to *3D Slicer*, a software platform for the analysis and visualization of medical images and for research in image-guided therapy. Slicer is a free, open source software available on several operating systems and can be extended by plugins for additional algorithms and applications.

Additional platforms and frameworks target specific application areas. Among those are *Histokat Web* serving multicentric research, development, and validation of solutions in the field of computational pathology, as well as our deformable image registration library *RegLib* used for multimodality, intraoperative, and follow-up image matching and motion correction. The modular software platform *QuantMed* supports quantitative medicine by enabling more reliable, accurate, and efficient clinical decisions. QuantMed facilitates the entire process: creating reference training data, training and validating deep learning models, and deploying the results into quantitative diagnostic software. *SATORI* is a core component of our AI collaboration toolkit and a web frontend for curating medical data. The platform for reader studies can be flexibly customized through extensions that can be quickly developed with MeVisLab. Moreover, Fraunhofer MEVIS has developed the remote deep learning framework *RedLeaf* as an extension to MeVisLab that allows for modular, distributed, and reproducible pattern recognition in large medical datasets.

Business Areas

Our four business areas align with our strategic direction as described above. They focus on specific market segments and related industrial customers. A range of services and solutions can therefore be tailored and developed for these customer groups.

The planning and support of surgical and minimally invasive procedures, which has been a key focus of Fraunhofer MEVIS since its founding, is developed in the business area *Image-Guided Therapy*. A particular challenge here is to provide the operating physician with all relevant information at the time of need. Customers are mainly hardware vendors offering a wide range of products from implants such as valves and stents, catheters, and needles, to treatment devices such as robots, focused ultrasound systems or linear accelerators (linacs), as well as navigation devices.

The business area *Diagnostic Software* centers around the clinical challenge to ensure optimal therapeutic decisions and early detection, incorporating the constantly growing amount of multidisciplinary data on the one hand and the efficiency pressure for faster processing on the other. The customers in this segment are imaging device vendors, clinical IT companies, and specialized image analysis providers.

Within the area of diagnostic software, we have defined a specific business area around *Computational Pathology* as a field with special potential for growth, considerable technological development, and not least for becoming a game-changer in the field of precision medicine due to the enormous amount of information encoded in the digitized tissue sections. Customers are manufacturers and providers of digital pathology equipment, biotech companies, laboratories, as well as healthcare

IT integrators. Building on existing digital pathology platforms, our key focus in this area is on modular pattern analysis and virtual multi-staining based on highly accurate deformable image registration.

The business area *Clinical Trials and Pharma* emerged from our efforts in the field of analysis software for image-based studies, combined with our web-based software platform developments, and is being expanded to a comprehensive range of services for the industry and larger research consortia. Customers are pharmaceutical companies, contract research organizations (CROs), service and software providers for image analysis as well as researchers in hospitals, laboratories, and industry.

Additional business activities open up the potential for exploitation of the existing expertise in the field of imaging physics. We aim at bundling the offers of different areas of competence for the customer group of medical imaging device manufacturers. In magnetic resonance imaging (MRI), we offer our expertise to develop dedicated sequences for research, clinical and commercial customers.

Technology and Translation

The following scientific and supporting core competences form the pillars of our work in research, technology, and translation.

The process of creating medical images is addressed by our core competence *Imaging Physics* which spans from improving image acquisition to creating new physiological information to automated motion tracking and quality assessment. The goal is to integrate image acquisition and post-processing into an optimized image analysis pipeline. Since April 2011, Fraunhofer MEVIS is operating its own 3 Tesla MRI scanner for research and clinical studies.

The core competences *Cognitive Medical Computing* and *Clinical Decision Support* revolve around the extraction of information from medical images and other non-imaging medical data. In this context, data-driven approaches such as machine learning, especially deep learning (DL), are becoming increasingly important. At Fraunhofer MEVIS, we successfully apply machine learning not only for image segmentation and tissue or cell classification, but also for decision support and image-guided therapy.

With our core competence *Image Registration* we aim at harmonizing images from different modalities, capture times, or patients in order to evaluate the combined information. Fraunhofer MEVIS provides applicable image registration with a focus on robust, reasonable, accurate, and computationally highly efficient solutions.

Our core competence *Modeling and Simulation* enables us to incorporate knowledge of biophysical and biomedical processes to enhance the information within medical images. In addition to application-driven developments, we perform basic research to enhance the technological capabilities. A particular focus for the next years will lie on the validation of simulation results, in order to gain acceptance by industrial partners and physicians.

The core competence *Custom Software Solutions* comprises both the ability to develop efficient, modular software components of high quality and the flexible provision of comprehensive, well-integrated software applications.

The anchoring in the field of digital medicine is strengthened and secured by the core competence *Clinical Expertise*, which has been a guiding principle and important success factor of Fraunhofer MEVIS since the beginning.

We include *Science Communication* among our core competencies, as it is important to us to create audiovisual materials for exhibits and hands-on workshops in which scientists put their expertise and research into a broader context or inspire others, from scientists to artists to lay people, to connect facts, empirical data, and science with humanities, social realities, and values.

Links to Academic Institutions

In addition to the network of clinical partners, Fraunhofer MEVIS maintains a strong network of technological and academic partners. Beyond the associated professorships at local universities in the State of Bremen, bridge professorships and strategic cooperations have been established at other sites over

the years:

- In 2010, the Fraunhofer MEVIS site at the University of Lübeck was established in close cooperation with the Institute of Mathematics and Image Computing (MIC), a recognized expert in medical image registration.
- Since 2012, Fraunhofer MEVIS pursues a strategic partnership with the Diagnostic Image Analysis Group (DIAG) at Radboud University Medical Center in Nijmegen, the Netherlands, an internationally renowned center of excellence for Computer-Aided Diagnosis (CAD).
- In April 2017, Fraunhofer MEVIS opened a new site in Berlin with close links to the German Heart Center, the Charité — Universitätsmedizin, and the Technical University Berlin.
- In 2018, Fraunhofer MEVIS established a strategic cooperation with the Institute of Experimental Molecular Imaging (ExMI) at the RWTH Aachen which closely collaborates with the Comprehensive Diagnostic Center Aachen (CDCA).
- As the latest development, Fraunhofer MEVIS researcher Dr. Andrea Schenk was appointed professor for "Computer-Assisted Diagnosis and Therapy" at the Institute for Diagnostic and Interventional Radiology at Hannover Medical School in May 2022.

In 2022, Fraunhofer MEVIS was linked to eight universities in Germany and the Netherlands via a total of eleven professorships:

- University of Bremen: Prof. Horst Hahn, Prof. Matthias Günther
- Constructor University Bremen: Prof. Tobias Preußer
- University of Applied Sciences Bremerhaven: Prof. Richard Rascher-Friesenhausen
- University of Lübeck: Prof. Jan Modersitzki
- Charité / TU Berlin: Prof. Anja Hennemuth
- Hannover Medical School: Prof. Andrea Schenk
- RWTH Aachen: Prof. Fabian Kießling, Prof. Dorit Merhof, Prof. Volkmar Schulz
- Radboud University Nijmegen: Prof. van Bram Ginneken

Recent Developments

On January 1, 2019, exactly ten years after joining the Fraunhofer-Gesellschaft, the former *Fraunhofer Institute for Medical Image Computing MEVIS* changed its official name to *Fraunhofer Institute for Digital Medicine MEVIS.* The new name underscores the institute's mission to drive the transformation of tomorrow's digital, integrated precision medicine through systematic computer support.

August 2020 marked the 25th anniversary of the founding of the MEVIS research center at the University of Bremen, the forerunner of today's Fraunhofer MEVIS. In a seven-part campaign between October 2020 and May 2021, we informed our cooperation partners and the public about concrete application scenarios and key work objectives of the institute with a focus on integrated diagnostics and precision therapy.

In 2021, Fraunhofer MEVIS joined the newly established "Fraunhofer Group for Health Research" (Fraunhofer-Verbund Gesundheit) which brings together the expertise and technologies in the fields of medicine, pharmacy, medical technology, and biotechnology of six institutes.

In May 2021, Fraunhofer MEVIS moved into its new building on the campus of the University of Bremen. This "Workshop of Digital Medicine" is a driver of digital transformation in the healthcare sector and creative space for encounters and discussions on the topic of digital medicine.

In December 2022, Fraunhofer MEVIS commenced a cooperation with the Israeli medical technology company TechsoMed Ltd. Fraunhofer MEVIS exclusively licenses its SAFIR technology (Software Assistant for Interventional Radiology) to TechsoMed Ltd. for thermal ablation under ultrasound control. TechsoMed

Rear view of the Fraunhofer MEVIS institute building located on the campus of the University of Bremen. The "Workshop of Digital Medicine" accommodates up to 210 workplaces on a usable floor space of 2600 m². The building was funded in equal parts by the Federal Republic of Germany, the Federal State of Bremen, and the European Commission (ERDF).

GmbH, the new subsidiary in Bremen, acts as a research and development center.

History

Fraunhofer MEVIS was founded in August 1995 as *MeVis — Center for Medical Diagnostic Systems and Visualization*, a non-profit limited liability company (gGmbH) at the University of Bremen, partially funded by the State of Bremen. Its founder Prof. Heinz-Otto Peitgen was appointed Executive Director, and an international scientific advisory board oversaw the research activities. In 2006, the institute was renamed *MeVis Research GmbH, Center for Medical Image Computing*.

Since 1997, MeVis Research has produced several legally and financially independent spin-offs that were consolidated into MeVis Medical Solutions AG in 2007, a publicly traded company that employs about 150 people. Overall, the number of employees of MeVis Research increased steadily from 10 to 51 full-time positions by the end of 2008.

On January 1, 2009, MeVis Research was incorporated into the Fraunhofer-Gesellschaft as the *Fraunhofer Institute for Medical Image Computing MEVIS*. The Advisory Board (Kuratorium) of Fraunhofer MEVIS convened for the first time on June 4, 2009 and was headed by Prof. Erich. R. Reinhardt, at that time CEO of the Healthcare Sector of Siemens AG.

During a transition phase of five years, the parent institute in Bremen (2009–2013) and its site in Lübeck (2010–2014) have received funding from the States of Bremen and Schleswig-Holstein and have been co-financed by the European Regional Development Fund (ERDF).

In October 2012, MEVIS founder Prof. Peitgen retired after heading the institute for 17 years and his former deputy Prof. Horst Hahn succeeded as Interim Institute Director. From May 2014, the institute was jointly headed by Prof. Hahn and Prof. Ron Kikinis. In March 2020, Prof. Kikinis left Fraunhofer MEVIS to take up the prestigious *B. Leonard Holman Endowed Professorship of Radiology* at Harvard Medical School. Since then, Prof. Hahn has been the sole managing director of the institute with two deputies, Prof. Matthias Günther and Prof. Tobias Preußer. In 2022, Prof. Preußer stepped down from the deputy position to devote himself to the newly founded TechsoMed GmbH. In April 2023, Prof. Andrea Schenk was appointed deputy director of Fraunhofer MEVIS.

OPERATING AND ORGANIZATIONAL STRUCTURES

Fraunhofer MEVIS' interdisciplinary orientation is reflected in the institute's operating principles and organizational structure. Researchers are not bound to strict, hierarchically organized working groups, but act in a flexible network.

Three categories of strategic topics shape this network, with dedicated experts forming the nuclei of activities: organ- or disease-related clinical domains, technological core competences, and customer-oriented business areas.

Project teams are put together with team members from different technological and clinical credentials. This form of dynamic collaboration promotes cooperation and fosters cross-training, beneficial to both, the individuals and the institute as a whole.

Internal communication is governed by transparency and cooperation. Access to information is only restricted insofar as required by confidentiality agreements with customers or by legal constraints — otherwise sharing of information is encouraged and expected at all levels and is actively aided by exchange forums such as the social Wiki-based intranet (Confluence), morning meetings for all staff members, and an active information policy by the leadership. Initiative by all staff members also beyond their work assignment is highly encouraged.

To improve management, organization, and staff development, Fraunhofer MEVIS established a mentoring system. Management responsibility is extended to a group of experienced staff members who act as mentors or co-mentors to less experienced colleagues (mentees). Responsibilities of the mentors include the professional development of the mentee, the coordination between the goals of the institute and those of the mentee, as well as the identification and addressing of potential conflicts and problems.

Fraunhofer MEVIS introduced a structure of organizational entities (OEs) each with a responsible OE manager (OEV). The main objectives of the OE structure are:

- clear allocation of responsibilities,
- delegation of project budgets, and
- strengthening of strategic the focus.

OEVs as well as additional colleagues bear specific strategic responsibility to the institute, especially for business areas and core competences. Allocated budgets must be explicitly used for appropriate strategic objectives. Objectives and budgets are coordinated by the OEVs in consultation with the institute directors and the financial management. OEVs are by default mentors for their respective OE members. Mentees can freely choose their OE as well as the co-mentor.

Overall responsibility for the institute is organized in a central leadership and administration structure. The heads of the institute are:

- Prof. Horst K. Hahn (Managing Institute Director)
- Prof. Matthias Günther (Deputy)
- Prof. Tobias Preußer (Deputy, until 2022)
- Prof. Andrea Schenk (Deputy, since 2023)
- Thomas Forstmann (Head of Administration)

They are assisted in operational and strategic tasks by the OEVs and six leadership committees for human resources (LH), valorization (LV), research (LR), finance (LF), quality management (LQ), and IT security (LS).

The Advisory Board (Kuratorium, cf. next section) advises the management of Fraunhofer MEVIS in issues of scientific focus, strategic orientation, and clinical as well as industrial translation.

Three male and three female persons of trust are elected by the staff to function as liaisons and mediators when needed. In addition, two female equal opportunity officers are elected to promote and ensure balanced participation and diversity.

The guiding principle of Fraunhofer MEVIS is to value the diversity of all employees. Our diversity management aims to create a working environment in which all employees have fair opportunities for participation and development — irrespective of their ethnic origin, gender, religion and ideology, disability, age or sexual identity.

ADVISORY BOARD

Fraunhofer MEVIS is actively supported by its Advisory Board (Kuratorium) which is composed of persons with backgrounds in medicine, science, industry, and research funding. It advises the management of Fraunhofer MEVIS in issues of scientific focus, strategic orientation, and clinical as well as industrial translation.

Due to the Corona pandemic, annual Advisory Board meetings between 2020 and 2022 were held online rather than in person. Beyond their usual role as advisors, the members of the Advisory Board have been actively involved in the strategy process of Fraunhofer MEVIS in several workshops and interviews.

In 2022, four Advisory Board members (Prof. Falta, Prof. Knüchel-Clarke, Dr. Ziegler-Jöns, Dr. Zindel) retired by rotation and three (Hartung, Dr. Muylkens, Prof. Pigeot) were newly appointed. The President of the Fraunhofer-Gesellschaft and the Directors of Fraunhofer MEVIS thanked the retiring members for their great commitment and warmly welcomed the new appointees. In 2022, the Advisory Board consisted of the following persons:

Chairs

Prof. Hans Maier (since 2009)
BGM Associates
Berlin

Prof. Mathias Prokop (since 2014)
Radboud University Medical Center, Nijmegen
University Medical Center, Groningen
The Netherlands

Medicine

Prof. Ruth Knüchel-Clarke (2019-2022)
Institute for Pathology
RWTH Aachen

Science

Prof. Iris Pigeot (since 2022)
Leibniz Institute for Prevention Research and Epidemiology — BIPS
Bremen

Industry

André Hartung (since 2022)
Siemens Healthineers, Forchheim

Stefan Widensohler (since 2019)
Krauth Invest GmbH & Co. KG, Hamburg

Dr. Christoph Zindel (2019-2022)
Siemens Healthineers, Forchheim

Universities

Prof. Jens Falta (2010-2022)
University of Bremen

Prof. Kerstin Schill (since 2014)
Hanse-Wissenschaftskolleg, Delmenhorst
University of Bremen

Dr. Alexander Ziegler-Jöns (2010-2022)
Jacobs University Bremen

Research Funding

Dr. Michaela Muylkens (2022-2023)
Bremen Senator of Science and Ports, Bremen

Dr. Bernd Roß (since 2019)
Ministry of Education, Science and Culture, Kiel

Guests

Prof. Ron Kikinis
Former Institute Co-Director (2014-2020)
Boston/USA

Prof. Heinz-Otto Peitgen
Founder and former Institute Director (1995-2012)
Bremen

Participants of the 15th meeting of the Fraunhofer MEVIS Advisory Board on June 12, 2023 in Bremen — the first face-to-face meeting after the Corona pandemic.

THE INSTITUTE IN FIGURES

Budget and Earning Trends

In retrospect, Fraunhofer MEVIS was able to increase earnings in the years of the Corona pandemic after a slight decline in 2020 and grew more strongly than expected. Thus, earnings in 2022 were the highest in MEVIS history so far with over 13.2 million euros. Main contributors were publicly funded earnings with 6.1 million euros (46%), followed by industry and other third-party funding with 4.5 million euros (33%). Our regular basic funding remained stable at 2.7 million euros (21%). Thanks to the successful results in the years 2018 to 2022, the institute's reserve could be increased once again.

Earnings in million euros in the period from 2018 to 2022.

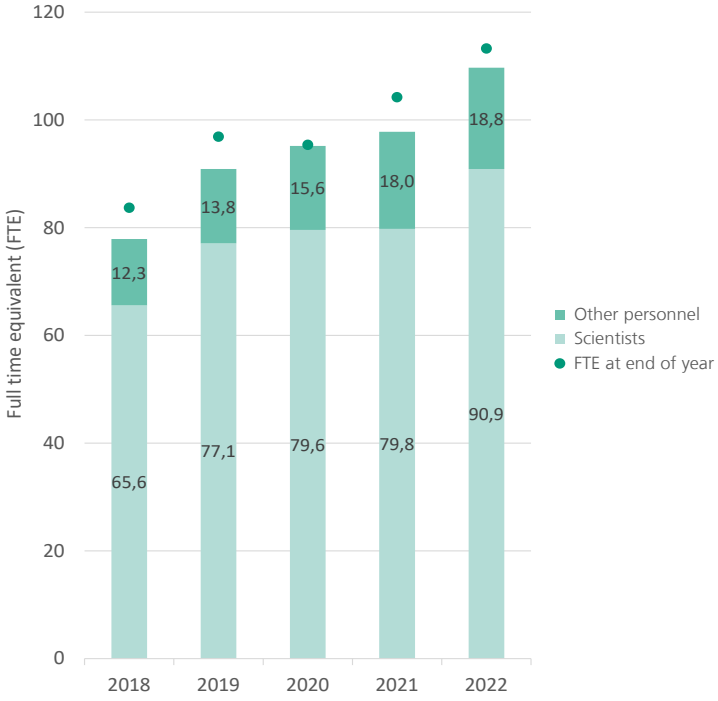
Operating Budget (OB), Investment Budget (IB) and Total Budget in thousand euros:

	2018	2019	2020	2021	2022
OB:	9,577	11,126	11,306	11,448	12,946
IB:	251	587	122	947	220
Total:	**9,828**	**11,713**	**11,428**	**12,395**	**13,166**

Human Resources

The overall average number of persons employed by Fraunhofer MEVIS has increased significantly by almost 12 full-time equivalents (FTE) in 2022 (+12%). This is due to a high project workload and corresponding efforts in personnel acquisition. The vast majority of these positions are for scientific personnel (+11 FTE).

The high level of FTE at the end of 2022 (113.3 FTE or +9.1 FTE compared to 2021) indicates a dynamic increase in staff, due in part to the new institute building and the introduction of a new ERP system. For 2023, we expect a further increase in personnel.



Development of employment figures for scientists and other personnel shown as annual average FTE between 2018 and 2022. The dots indicate the staff FTE at the end of the year.

Full-time equivalents as annual average (avg FTE) and at the end of the year (eoy FTE):

	2018	2019	2020	2021	2022
avg FTE:	77.9	90.9	95.2	97.8	109.7
eoy FTE:	83.7	96.9	95.4	104.2	113.3

THE FRAUNHOFER-GESELLSCHAFT

The Fraunhofer-Gesellschaft, based in Germany, is the world's leading applied research organization. Prioritizing key future-relevant technologies and commercializing its findings in business and industry, it plays a major role in the innovation process. A trailblazer and trendsetter in innovative developments and research excellence, the Fraunhofer-Gesellschaft supports science and industry with inspiring ideas and sustainable scientific and technological solutions and is helping shape our society and our future.

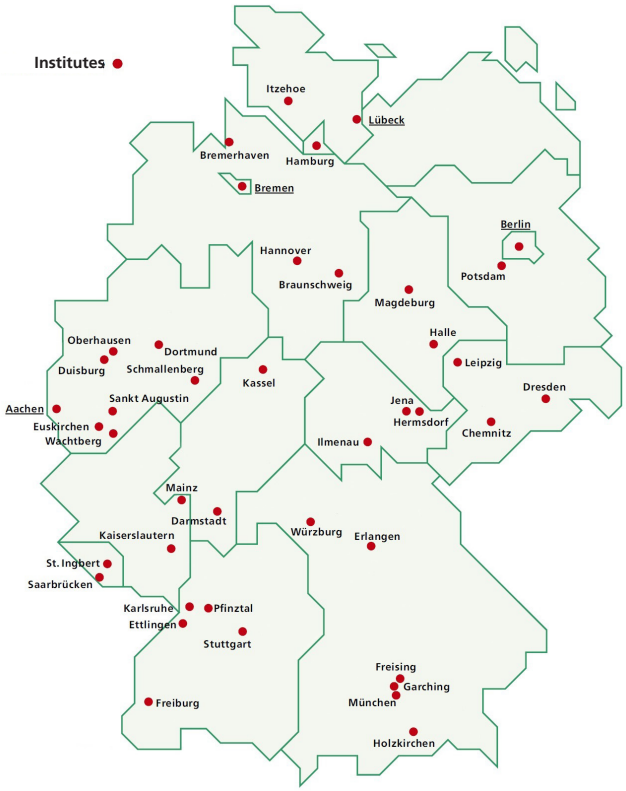
At the Fraunhofer-Gesellschaft, interdisciplinary research teams work with partners from industry and government to turn pioneering ideas into innovative technologies, coordinate and implement system-relevant research projects and strengthen the German and European economies with a commitment to value creation that is based on ethical values. International collaboration with outstanding research partners and companies from around the world brings the Fraunhofer-Gesellschaft into direct contact with the most prominent scientific communities and most influential economic regions.

Founded in 1949, the Fraunhofer-Gesellschaft now operates 76 institutes and research units throughout Germany. Currently around 30,800 employees, predominantly scientists and engineers, work with an annual research budget of about 3.0 billion euros, 2.6 billion euros of which is designated as contract research. Around two thirds of Fraunhofer contract research revenue is generated from industry contracts and publicly funded research projects. The German federal and state governments contribute around another third as base funding, enabling the Fraunhofer institutes to develop solutions now to problems that will drastically impact industry and society in the near future.

The impact of applied research goes far beyond the direct benefits to the client. Fraunhofer institutes strengthen companies' performance and efficiency and promote the acceptance of new technologies within society while also training the future generation of scientists and engineers that the economy so urgently requires.

As a scientific organization, the key to our success is highly motivated employees engaged in cutting-edge research. Fraunhofer therefore offers its researchers the opportunity to undertake independent, creative and, at the same time, targeted work. We help our employees develop professional and personal skills that will enable them to take up positions of responsibility within Fraunhofer itself or at universities, within industry and in society at large. Students involved in projects at Fraunhofer institutes have excellent career prospects on account of the practical vocational training they enjoy and the opportunity to interact with contract partners at an early stage in their career.

The Fraunhofer-Gesellschaft is a recognized non-profit organization named after Joseph von Fraunhofer (1787–1826), an illustrious researcher, inventor and entrepreneur hailing from Munich.



Locations of Fraunhofer Institutes in Germany. In 2022, Fraunhofer MEVIS had major sites in Bremen (headquaters), Lübeck, Berlin and Aachen plus additional offices in Hamburg, Hanover, Heidelberg and Nijmegen/NL.

THE YEAR 2022

CHRONICLE

February 1, 2022
Managing Institute Director Horst Hahn appointed full professor for "Digital Medicine" at the University of Bremen, Department of Mathematics and Computer Science.

March 1–3, 2022
Monitoring audit of the Fraunhofer MEVIS Quality Management System by DEKRA.

April 26–28, 2022
Fraunhofer MEVIS presents innovative research for the lead market of digital healthcare at DMEA 2022 in Berlin.

April 28, 2022
Digital Girls' Day activities offered by Fraunhofer MEVIS.

May 1, 2022
Dr. Andrea Schenk appointed professor for "Computer-Assisted Diagnosis and Therapy" at the Institute for Diagnostic and Interventional Radiology at Hannover Medical School.

May 13, 2022
"The Tides Within Us," a joint project between Marshmallow Laser Feast and Fraunhofer MEVIS, is part UK's first permanent immersive digital art gallery in Coventry.

May 17–18, 2022
Diversity Workshop for employees of Fraunhofer MEVIS in Bremen.

May 20, 2022
Network meeting "NFDI-Konsortien im Bremer Forschungsdaten-Management-Ökosystem" at Fraunhofer MEVIS in Bremen.

June 9–19, 2022
World premiere of "EVOLVER," a free-roaming, immersive journey through the breathing body, at the 2022 Tribeca Festival on Broadway in New York.

June 13, 2022
Symposium of the NFDI4Health Task Force COVID-19 takes place at Fraunhofer MEVIS in Bremen.

June 17–18, 2022
Fraunhofer MEVIS invited to expert rounds at 5th edition of the SILBERSALZ Science & Media Forum at the Leopoldina — National Academy of Sciences, in Halle (Saale), Germany.

June 19, 2022
Cooperation meeting on prostate cancer with representatives of the Martini-Klinik Hamburg-Eppendorf.

June 26, 2022
The new institute building of Fraunhofer MEVIS in Bremen opens its doors to the public on the "Day of Architecture 2022."

July 7, 2022
Fraunhofer MEVIS exhibits AI-based R&D at kick-off event for "Transferzentrum für Künstliche Intelligenz BREMEN.AI" in Bremen.

July 25–29, 2022
Fraunhofer MEVIS holds a one-week virtual workshop on medical imaging within the 25th Informatica Feminale of the University of Bremen.

August 1, 2022
The U Bremen Research Alliance (UBRA), a cooperation of local research institutes including Fraunhofer MEVIS, successfully applied to host the International Joint Conference on Artificial Intelligence (IJCAI) 2026 in Bremen.

August 31, 2022
The third evening of a series for family and friends on topics around digital medicine, jointly organized by students of the Schulzentrum Walle, Bremen, the media artist Zeynep Abes, and MEVIS scientists, took place at the Institute.

September 7–11, 2022
In the residency program "STEAM Imaging IV," Turkish artist Zeynep Abes traced the secrets of memory; she presented the outcome "Moments Within: Forgotten Feelings and False Memories" at Ars Electronica Festival 2022 online exhibition.

September 14, 2022
14th annual meeting of the Fraunhofer MEVIS Advisory Board as an online event.

September 21, 2022
Conference and networking event "AI in Health" of the U Bremen Research Alliance in Bremen.

October 10–11, 2022
Mini-Symposium between Diagnostic Image Analysis Group Nijmegen and Fraunhofer MEVIS at the Radboud University Medical Center.

October 13, 2022
Fraunhofer MEVIS Bremen hosts the 28th "Technologiepark-Frühstück" with more than 100 participants.

November 4–13, 2022
Marshmallow Laser Feast's virtual reality experience "EVOLVER," created with key scientific collaborator Fraunhofer MEVIS, narrated by Cate Blanchett, premiered at the 2022 Geneva International Film Festival.

November 7–16, 2022
Zeynep Abes presents her video installation "Moments Within: Forgotten Feelings and False Memories," the outcome of her residency "STEAM Imaging IV" at Fraunhofer MEVIS, at UCLA Art Sci Center in Los Angeles.

November 21 to December 1, 2022
Fraunhofer MEVIS presents its latest developments in AI-based digital medicine at RSNA 2022 in Chicago.

November 22, 2022
Meeting of the University of Bremen Alumni at Fraunhofer MEVIS in Bremen.

November 25, 2022
Workshop with students from the "Hochschule für Künste Bremen" and Jens Kruse, architect of Fraunhofer MEVIS' new institute building.

November 30, 2022
Virtual Autumn Academy 2022 on Medical Imaging with Deep Learning (MIDL) co-organized by Fraunhofer MEVIS.

December 1–2, 2022
Workshop of the EU-funded EMPAIA consortium for promotion of AI-based digital pathology takes place at Fraunhofer MEVIS in Bremen.

December 15, 2022
Visit of Israeli medical technology company TechsoMed Ltd. and its newly founded German subsidiary TechsoMed GmbH at Fraunhofer MEVIS in Bremen.

December 20, 2022
Media artist Eli Joteva provides her AR work "IntraBeing Expanded View" as permanent exhibit to the Fraunhofer MEVIS building in Bremen.

AWARDS 2022

Best Poster Award at SPIE 2022
Annika Gerken (formerly Hänsch) and colleagues received the Best Poster Award for their work on "Deep learning-assisted fully automatic fiber tracking for tremor treatment using transcranial focused ultrasound" at the SPIE Medical Imaging conference in San Diego, February 20 to 24.

Third Place at ISBI 2022 Challenge
The Fraunhofer MEVIS team around Luca Canalini won third place in the "Brain Tumor Sequence Registration Challenge" (BraTS-Reg) at the International Symposium on Biomedical Imaging (ISBI) in Kolkata/India, March 28 to 31.

Special Jury Mention for Storyscapes Award 2022
The free-roaming, immersive journey through the breathing body "EVOLVER," developed by Marshmallow Laser Feast with key scientific partner Fraunhofer MEVIS, received a Special Jury Mention for Storyscapes Award at Tribeca Festival 2022 in New York, June 8 to 19.

Outstanding Reviewer Award at MIDL 2022
Dr. Hans Meine received an Outstanding Reviewer Award at the Medical Imaging with Deep Learning (MIDL) conference in Zurich, July 6 to 8.

Barbers Bursary Award 2022
Dr. Susanne Diekmann, medical expert at Fraunhofer MEVIS and medical art student at the Medical Artists' Education Trust (MAET) in London, was awarded the 2022 Barbers Bursary Award for designing a breast imaging education app.

Third Place at MICCAI 2022 Challenge
The Fraunhofer MEVIS team around Dr. Alessa Hering won third place in the "Medical Image Registration Challenge" (Learn2Reg) at the International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI) in Singapore, September 18 to 22.

Industry Award for Best New Media 2022
"The Tides Within Us," created by Marshmallow Laser Feast in cooperation with Fraunhofer MEVIS' R&D engagement team, received the Industry Award for Best New Media by the Raw Science Film Festival 2022. The cross-sectoral project was an exploration into the world beyond the limits of our senses at the intersection of art, science, and technology.

Highly Cited Researcher 2022
Prof. Fabian Kiessling, affiliated with Fraunhofer MEVIS as part of a strategic cooperation with RWTH Aachen, was recognized by Clarivate as a Highly Cited Researcher 2022 in the Pharmacology and Toxicology category.

HIGHLIGHTS 2022

COVID-19 pandemic: Back to normal

The COVID-19 pandemic brought tightened restriction for about two years starting in March 2020, such as the temporary home office obligation and no in-person events. Since March 2022, life at Fraunhofer MEVIS could gradually return to normal. Fraunhofer MEVIS presented innovative research and development for the lead healthcare market at several on-site events, including the Digital Medical Expertise & Applications (DMEA 2022) conference in Berlin, April 26 to 28, and the Scientific Assembly and Annual Meeting of the Radiological Society of North America (RSNA 2002) in Chicago, November 27 to December 1.

Founding of TechsoMed GmbH, Bremen

Image-guided thermal ablation therapy is a patient-friendly, minimally invasive, and cost-effective tumor treatment method. Fraunhofer MEVIS exclusively licensed its SAFIR technology (Software Assistant for Interventional Radiology), based on years of development, to the Israeli medical technology company TechsoMed Ltd. for thermal ablation under ultrasound control. The aim of this research partnership is to develop a certified complete system for a more targeted and thus more effective tumor treatment. In December 2022, the new subsidiary TechsoMed GmbH was founded in Bremen. It acts as a research and development center and is headed by former deputy institute director of Fraunhofer MEVIS Prof. Tobias Preußer.

"EVOLVER" at Film Festivals in New York and Geneva

Following its world premiere at the 2022 Tribeca Festival on Broadway in New York from June 9 to 19, London-based art collective Marshmallow Laser Feast brought "EVOLVER," their extraordinary, collaborative virtual reality experience, to Europe. Narrated by Cate Blanchett, "EVOLVER" was produced by Edward. R. Pressman, Terrence Malick, Dirty Films, and the famous French studio Atlas V, supported by Nicole Shanahan's Bia-Echo Foundation, Fraunhofer MEVIS and Orange. The auspiciously conceived installation — a free-roaming, immersive journey through the breathing body — appeared exclusively at the 2022 Geneva International Film Festival from November 4 to 13, 2022. As scientific collaborator, Fraunhofer MEVIS provided data sets and bodily scanning techniques that have informed every aspect of the project.

Personalia

The managing director of the Fraunhofer MEVIS, Prof. Horst Hahn, has been appointed full professor for "Digital Medicine" at the University of Bremen, Department of Mathematics and Computer Science, effective February 1, 2022. With this appointment, his professorship at Jacobs University Bremen, which he had held since 2007, ended. Effective May 1, 2022, Fraunhofer MEVIS head of liver research Andrea Schenk has been appointed professor for "Computer-Assisted Diagnosis and Therapy" at the Institute for Diagnostic and Interventional Radiology at Hannover Medical School. Since the start of TALENTA, a Fraunhofer program aimed at increasing the number of female scientists, MEVIS has filled all available slots in the talent development program. In 2022, Stephanie Häger and Farina Kock were funded under TALENTA *start* and Dr. Sonja Jäckle and Dr. Annika Gerken under TALENTA *speed up*.

Illustration of minimally invasive interventions in the liver and kidneys. Fraunhofer MEVIS develops software to make interventions safer and less complex. Central tools are patient-individual therapy planning and assessment, navigation systems for interventional devices, and solutions to compensate patient motion. Our motion compensation as well as our catheter navigation combine a patient model with real-time sensor data to assess the therapy situation.

SCIENTIFIC PUBLICATIONS 2022

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IMPRESSUM

Authors

Thomas Forstmann
Matthias Günther
Horst Hahn
Guido Prause

Translation

David Black

Editing & Layout

Guido Prause

Images

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Publisher

Fraunhofer MEVIS
Max-von-Laue-Str. 2
28359 Bremen
Germany
+49 421 218 59112
office@mevis.fraunhofer.de
www.mevis.fraunhofer.de