



Fraunhofer

MEVIS

INSTITUTE FOR MEDICAL IMAGE COMPUTING



ANNUAL REPORT

2015

FRAUNHOFER MEVIS

ANNUAL REPORT 2015

Deep learning algorithms autonomously find interesting spots in new digital images of tissue samples based on an automated analysis. Starting with the highest resolution, these neuronal networks compress the data until information and image interpretations emerge. They help doctors perform faster and safer diagnoses. When doctors correct the computer diagnosis, new knowledge flows in the self-learning algorithm.



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FRAUNHOFER MEVIS AT A GLANCE

BRIEF PROFILE

The Fraunhofer Institute for Medical Image Computing MEVIS (short: Fraunhofer MEVIS) adheres to a clear philosophy: To achieve significant improvements in medical diagnosis and therapy in relevant fields of disease using image-based computer support. At the heart of all research and projects at Fraunhofer MEVIS lie relevant clinical questions, which are addressed by developing and using the technological equipment in the field of medical image computing.

Research at Fraunhofer MEVIS does not merely focus on answering questions that appear interesting on a scientific level; it aims to achieve solutions that reach industrial partners and directly benefit patients involved in clinical routines. The objective of Fraunhofer MEVIS is to attain long-term, substantial improvements in medical treatment.

Clinical Commitment

Research and development at Fraunhofer MEVIS pursue a clinical direction instead of technological or methodological orientations. Work focuses on developing innovative solutions for image-based 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 over 100 clinical partners. This clinical network is an essential source of user feedback for evaluating the clinical relevance and feasibility of developed solutions.

Industrial Collaboration

True innovation, the successful launch of solutions onto the market, is only possible through close collaboration with industrial partners with 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 to establish solutions for clinical use. Transferring applied research to the industry is a pillar of the institute and a requirement for future research. Partners for cooperation and clients for industrial

research and development include large firms and small- or medium-sized ventures in medical technology or related fields such as pharmaceuticals.

Certification

Successful introduction of innovative approaches onto the market requires adherence to specific regulations, such as the German Act on Medical Devices (MPG) or the approval guidelines of the United States Food and Drug Administration (FDA). Fraunhofer MEVIS is one of only a select group of research facilities that, in Bremen since 2005 and in Lübeck since 2012, has been certified according to the EN ISO 9001 and EN ISO 13485 quality standards for medical products. This certification lays out well-defined steps for industrial cooperation. In addition, Fraunhofer MEVIS also has experience with CE and FDA approval for clinical environments.

A Complete Innovation Cycle

Together with industrial partners, Fraunhofer MEVIS has established a quality-controlled innovation cycle that spans across applied research and development, clinical prototypes, and certified medical products, which were awarded the German Business Founder Award (Deutscher Gründerpreis) in 2006. A network of clinical partners and numerous research alliances fuels this innovation cycle. Industry partners market the software solutions developed by Fraunhofer MEVIS, whose contribution can range from the delivery of single components to the development of a complete application. This process has generated a number of medical products that are market leaders. Prime examples of this leadership include products for digital screening mammography evaluation, MR mammography, liver operation planning, and tumor progress control.

The MeVisLab Software Platform

The need for an integrated research and development platform for clinical software solutions was recognized at an early stage.

The MeVisLab development platform by Fraunhofer MEVIS and MeVis Medical Solutions AG is a tool equally suited for highly flexible development of clinical software solutions and 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 and accelerates development, ensuring engagement between the links of the chain of innovation. This supports the tight technological integration of clinics, research, and industry.

Field of Activity

Work at Fraunhofer MEVIS deals with epidemiologically significant diseases, such as tumors (especially in the breast, liver, prostate, and brain), cardiovascular diseases, neurological diseases, and lung disease. Clinical partnerships have led to numerous patient-specific image-based software solutions to support early detection, diagnosis, and therapy. Many of these software solutions have entered clinical use as research prototypes or medical products. Major focuses of research at Fraunhofer MEVIS include developing algorithms (for quantitative analysis of image data, tumor size measurement, or evaluation of the form and function of an organ, for instance), as well as comprehensive clinical software for applications such as preoperative planning and intraoperative support for therapeutic interventions. Further important fields of activity include visualization, human-computer interaction (HCI), multimodal support, and workflow optimization.

Core Expertise

The future development of medical image computing must address how to bridge the gap between information extracted from medical images beyond the naked eye and the individual clinical reality for each patient. The emerging trends from this investigation are reflected in the core expertise of Fraunhofer MEVIS. The tight integration of classical medical image processing, imaging physics, and biophysical modeling and simulation

is unique on the global stage and gives Fraunhofer MEVIS a clear advantage over competitors. This is further enhanced by close clinical partnerships taking place internationally.

Imaging physics: Fraunhofer MEVIS's expertise in imaging physics facilitates analysis and optimization of the complete process, ranging from image acquisition to therapy support. Fraunhofer MEVIS boasts unique expertise and intensive partnerships with industrial partners in developing and optimizing magnetic resonance imaging (MRI) protocols, in particular for perfusion measurement without using contrast agents.

Algorithms and applications: Critical for the development of clinically applicable solutions is the exploration of problem-specific algorithms that meet the demands of daily clinical routines. Fraunhofer MEVIS has gained great international recognition and developed many commercial algorithms for segmentation and image registration. Such algorithms have been applied in various clinical software systems.

Modeling and simulation: Modeling and simulating biophysical processes form a central pillar of medical image computing. To support diagnosis and therapy planning, the information visible in acquired image data can be complemented with patient physiology models. Fraunhofer MEVIS has a globally unique, recognized expertise in modeling and simulating thermal ablation processes.

Visualization, interaction, and user experience engineering: A fundamental advantage that Fraunhofer MEVIS holds over competitors is the tight clinical integration and expertise in visualization, interaction, and user experience engineering (UXE). When developing demonstrators and prototypes, special attention is paid to integration into the clinical workflow, so that any generated application smoothly integrates into the clinical workflow and can be recognized and appreciated by clinicians as helpful.

Computing and software technology: The MeVisLab rapid-prototyping platform is Fraunhofer MEVIS's central tool for developing algorithms, modules, application prototypes, and complete software assistants for clinical applications. The platform, which has been developed by Fraunhofer MEVIS and MeVis Medical Solutions AG for over 15 years, is the key to

efficient software development at Fraunhofer MEVIS and is globally recognized and employed. MeVisLab contains modern image-processing and visualization algorithms and is ready for most modern technologies, such as thin clients and cloud computing.

Intraoperative and intrainterventional support: To implement computer-supported planning data for surgeries and interventions, Fraunhofer MEVIS researches efficient, innovative navigation and interaction processes for the operating room. Augmented reality methods, gesture-based control, and audiovisual communication are being investigated with the aim of minimizing the cognitive demands of the surgeons with the computer.

Image registration: A fundamental shortcoming of current multimodal imaging is the registration of image data on a shared-reference coordinate system. An equally challenging task is registering unimodal image data of an organ during different states of deformation. Fraunhofer MEVIS's Project Group in Lübeck is a global leader in the field of registration. The group has greatly shaped the field over many years and has established remarkable expertise.

Computer-aided detection and diagnosis: Computer-aided detection and diagnosis (CAD) provides software for early diagnosis and decision-making for diagnosis and therapy to support radiologists in interpreting multimodal, multidimensional, and dynamic data. At Fraunhofer MEVIS, intensive work on CAD systems for lung and breast tumor diagnosis has been undertaken in recent years. Object-based image analysis (OBIA), used in CAD, ranks among the primary techniques of Fraunhofer MEVIS's core expertise.

Project Group for Image Registration

Through the financial support of the State of Schleswig-Holstein and the European Union, the Fraunhofer MEVIS Project Group for Image Registration was established under the direction of mathematician Prof. Dr. Bernd Fischer at the University of Lübeck in April 2010. The internationally renowned project group addresses medical image registration, a key skill in medi-

cal image computing, in close cooperation with the Institute of Mathematics and Image Computing (MIC) at the University of Lübeck. The goal of registration is to harmonize medical imagery gathered from different processes (modalities), capture times, or patients, so that this information may be evaluated together.

In July 2013, Prof. Dr. Bernd Fischer passed away following a short severe illness. The director of the MIC, Prof. Dr. Jan Moldersitzki, was appointed new director of the Fraunhofer MEVIS Project Group for Image Registration in October 2014. Since July 2015, the project group is part of the Fraunhofer MEVIS mother institute in Bremen.

Connections with Universities

Since its founding as an institute associated with the University of Bremen, Fraunhofer MEVIS has maintained close ties with academia. In 2015, Fraunhofer MEVIS was connected with five universities in Germany, the Netherlands, and the United States through six professors.

University of Bremen: The support of the Stiftung Bremer Wertpapierbörse helped create an endowed professorship in Department 1 (physics/electrotechnology) in imaging physics to focus on magnetic resonance tomography imaging and spectroscopy. In November 2009, this position was filled by MEVIS physicist Prof. Dr. Matthias Günther. Since April 2011, Fraunhofer MEVIS has operated its own 3-tesla MRI scanner at the Technology Park Bremen with Fraunhofer ITWM and the University of Bremen. In January 2014, the renowned scientist and pioneer in the field of medical image computing, Prof. Dr. med. Ron Kikinis, was appointed as director of Fraunhofer MEVIS and successor to Professor Peitgen. Associated with this is a professorship in Department 3 (mathematics /computer science) in medical image computing.

Jacobs University Bremen: Institute director and physicist Prof. Dr. Horst K. Hahn, who is leading Fraunhofer MEVIS together with Prof. Kikinis since 2014, was adjunct professor of medical visualization since 2007 and is full professor of medical imaging at the School of Engineering and Science since 2011. With the support of a private donation by honorary Bremen citizens

Conrad and Lotti Naber, another endowed professorship was created in the School of Engineering and Science in mathematical modeling of medical processes. Since the beginning of 2009, this position has been held by MEVIS mathematician Prof. Dr. Tobias Preußner.

University of Lübeck: Prof. Dr. Jan Modersitzki, a recognized expert in the field of image registration, is professor of mathematics and director of the university's Institute of Mathematics and Image Computing. He was appointed as director of the Fraunhofer MEVIS Project Group for Image Registration and successor of Professor Bernd Fischer in October 2014.

Radboud University Nijmegen: Since December 2012, Prof. Dr. Bram van Ginneken from the Diagnostic Image Analysis Group (DIAG) is tied within a strategic partnership to Fraunhofer MEVIS. The DIAG is an internationally renowned center of excellence in the field of computer-aided detection and diagnosis (CAD) of breast cancer and lung cancer.

Harvard University: In addition to the obligations in Bremen, Professor Kikinis continues his professorship at the Harvard Medical School and the direction of the Surgical Planning Laboratory (SPL) in Boston on a reduced scale.

Development of the Institute (1995-2008)

The current Fraunhofer MEVIS institute was founded in August 1995 as MeVis – Center for Medical Diagnostic Systems and Visualization, a non-profit limited liability company (gGmbH). To expand the institute, MeVis received yearly funding from the State of Bremen. Prof. Dr. Heinz-Otto Peitgen was appointed executive director, and an international scientific advisory board oversaw research. 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 in 2007 into MeVis Medical Solutions AG, a publicly traded company that employs about 150 people. Aside from a few temporary declines in staff due to changes in personnel caused by the founding of a new company, the number of employees steadily increased between the founding in August 1995 and

integration into the Fraunhofer-Gesellschaft in January 2009. During this time, the number of employees has increased from 10 to 51 full-time positions.

Affiliation with the Fraunhofer-Gesellschaft

On January 1, 2009, MeVis Research was incorporated into the Fraunhofer-Gesellschaft and renamed Fraunhofer MEVIS, Institute for Medical Image Computing (Institut für Bildgestützte Medizin). Prof. Dr. Heinz-Otto Peitgen was appointed Institute Director. The Advisory Board (Kuratorium) of Fraunhofer MEVIS convened on June 4, 2009, headed by Prof. Dr.-Ing. Erich. R. Reinhardt, at the time, the head of medical technology on the board of Siemens AG. Since early 2009, Fraunhofer MEVIS has been a member of the Fraunhofer Group for Information and Communication Technology (Fraunhofer-Verbund IuK).

In October 2012, Prof. Peitgen left Fraunhofer MEVIS and the former Deputy Institute Director Prof. Hahn took over as Interim Institute Director. Prof. Dr. Ron Kikinis and Prof. Dr. Horst K. Hahn were appointed new directors of Fraunhofer MEVIS in January 2014 and April 2014, respectively. Since then Fraunhofer MEVIS is under dual leadership. On June 5, 2014, Prof. Dr. Gabor Székely from ETH Zurich was elected new chairman of the Fraunhofer MEVIS Advisory Board and Walter Märzendorfer from Siemens Healthcare its vice chairman.

During the transition phase of five years, the parent institute in Bremen and the project group in Lübeck have received funding from the States of Bremen and Schleswig-Holstein and have been co-financed by the European Regional Development Fund (ERDF). The mother institute in Bremen and the project group in Lübeck were positively evaluated by international review boards in May 2013 and 2014. They are under regular basic funding of the Fraunhofer-Gesellschaft since January 2014 and July 2015, respectively.

The CAFUR software developed by Fraunhofer MEVIS automatically identifies the breathing and heart contraction phases in the data independent of the ECG information. This allows for a fast and easy examination of heart patients.



OPERATING AND ORGANIZATIONAL STRUCTURES

Fraunhofer MEVIS's interdisciplinary focus incorporates medicine, science, and industry, reflecting the institute's operating principles and organizational structure. Researchers are not bound to strict, hierarchically organized work groups; they function in a flexible work environment that consists of medically defined domains and technologically oriented focuses which together dynamically adapt to the demands of research and development.

This matrix of domains and focuses is the basis for the creation of project teams. According to the demands and affiliation of each project, Fraunhofer MEVIS researchers may belong to multiple domains, focuses, or project teams. This form of collaboration promotes cooperation between researchers for current projects and facilitates putting synergies into practice. This fosters the exchange of application-specific expertise and allows researchers to introduce their own multidisciplinary expertise for the benefit of the institute as a whole.

In 2014 Fraunhofer MEVIS introduced a new leadership model for scientific colleagues („Mentees“). All experienced members of MEVIS are now entitled to act as „Mentor“ or „Co-Mentor“, i.e., to take over direct leadership responsibilities. After a restructuring process in 2015, Fraunhofer MEVIS is organized as follows:

The Heads of the Institute are:

- Prof. Dr.-Ing. Horst K. Hahn (Institute Director)
- Prof. Dr. Ron Kikinis (Institute Director)
- Dipl.-Betw. Thomas Forstmann (Head of Administration)

The Institute Directors are assisted in operational tasks by four leadership committees for human resources (LH), valorization (LV), research (LR), and finance (LF), which together build the extended leadership committee LX. The committees LH, LV and LR elect their (co-)chairs on a yearly basis, LF is chaired by the Head of Administration. Currently, the leadership committees have the following members:

- LH: Dr. Stefan Kraß, Dr. Markus Lang, Prof. Dr. Jan Modersitzki, Prof. Dr. Tobias Preußer
- LV: Dr. Stefan Braunewell, Prof. Dr. Matthias Günther, Dr. Stefan Heldmann, Dr. Stefan Kraß, Dr. Markus Lang, Dr. Andrea Schenk

- LR: Prof. Dr. Matthias Günther, Dr. Anja Hennemuth, Dr. Jan Klein, Prof. Dr. Jan Modersitzki, Dr. Guido Prause, Prof. Dr. Tobias Preußer plus the elected representative of the Scientific and Technical Council (WTR)
- LF: Thomas Forstmann, Dr. Nils Papenberg, Dr. Guido Prause

In addition to the leadership committees, the large committee (Großes Gremium) meets once a month to exchange and discuss topics across the committees. It consists of the chairs of the four leadership committees and the following members:

- Employee representative (see below)
- Equal opportunity representative (Dr. Andrea Schenk)
- Elected representative of the WTR (Dr. Jan Klein)
- Bianka Hofmann (Corporate Communication)
- Dr. Jan-Martin Kuhnigk (Software, IT)
- Dr. Stephan Zidowitz (Certification, QM)

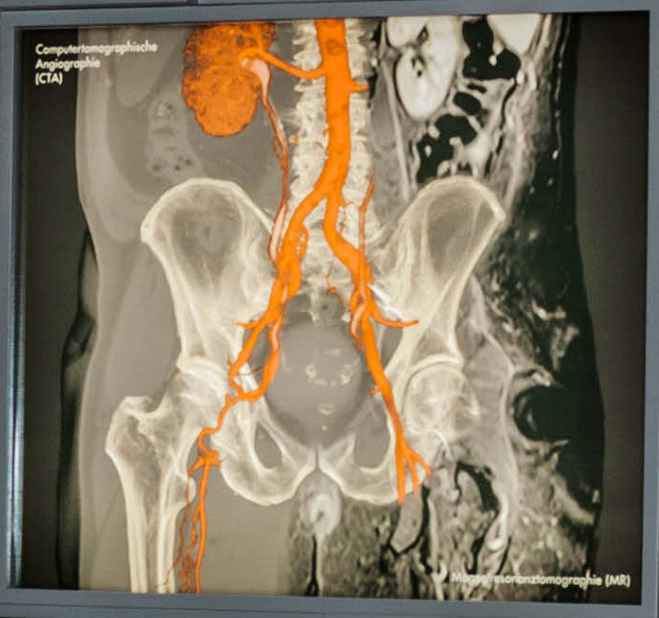
Office management tasks (IT, personnel, accounting, etc.) are undertaken by the administration, which also make up the secretary's office:

- Roswitha Hornung, Karin Entelmann (Bremen)
- Anja Pawlowski, Kerstin Sietas (Lübeck)

Two male and two female employee representatives are elected from the staff, excluding LX, to function as liaisons and mediators when needed.

The Advisory Board of Fraunhofer MEVIS is composed of seventeen members with backgrounds in research funding, business, science, and medicine and advises the management in issues of scientific focus and industrial application (see next section).

Fraunhofer MEVIS' interactive exhibit »Image Man« that showcases the capabilities of modern medical imaging methods at the Science Center Universum® Bremen.



ADVISORY BOARD

In Bremen on June 4, 2015, the Fraunhofer MEVIS Advisory Board met for the seventh time. Kuno Blank, Head of the main department IuK Management of the Fraunhofer headquarters in Munich, gave a talk concerning the current state of affairs of the Fraunhofer-Gesellschaft. The institute directors Prof. Dr. Horst Hahn and Prof. Dr. Ron Kikinis reported on developments in the focus and structure of the institute and outlined medium-term plans and prospects. A special focus was placed on the ongoing strategy process at Fraunhofer MEVIS.

The Advisory Board was presented with demonstrations of current practical research by scientific personnel to relay the latest developments of Fraunhofer MEVIS in the fields of digital pathology and web-based solutions.

During the reporting period, the Fraunhofer MEVIS Advisory Board consisted of seventeen individuals.

Chairman

Prof. Dr. Gábor Székely
Image Science Division
ETH Zürich

Vice Chairman

Walter Märzendorfer
Siemens AG, Erlangen

Industry

Prof. Dr. med. Jörg F. Debatin
GE Healthcare, Chalfont St Giles, UK

Dr. Bernd Gewiese
Bruker BioSpin GmbH, Rheinstetten

Marcus Kirchhoff
MeVis Medical Solutions AG, Bremen

Prof. Dr. Hans Maier
BGM Associates, Berlin

Dr. Ralf Schumacher
Roche Diagnostics GmbH, Penzberg

Medicine

Prof. Dr. med. Mathias Prokop
Radboud University Medical Centre
Nijmegen, NL

Prof. Dr. med. Ulrich Sure
Department of Neurosurgery
Essen University Hospital

Science

Prof. Dr. Jürgen Hennig
Division of Diagnostic Radiation,
University Medical Center Freiburg

Prof. Dr. Willi A. Kalender, Ph.D.
Institute of Medical Physics,
University of Erlangen-Nürnberg

Prof. Dr. med. Dipl.-Phys. Heinz-Peter Schlemmer
Department of Radiology
German Cancer Research Center, Heidelberg

Research Funding

Dr. Steffen Lüsse
Ministry of Science, Economy, and Traffic
State of Schleswig-Holstein, Kiel

Dr. Ursula Niebling
Bremen Senator of Science, Health and Consumer Protection
Department of Scientific Planning and Research Promotion



University of Bremen / Jacobs University

Prof. Dr. Jens Falta
Institute of Solid State Physics,
University of Bremen

Prof. Dr. Kerstin Schill
Faculty of Mathematics / Computer Science
University of Bremen

Dr. Alexander Ziegler-Jöns
Science & Technology Transfer
Jacobs University Bremen

Image Caption:

Attendees of the seventh assembly of the Fraunhofer MEVIS Advisory Board in Bremen on June 4, 2015.

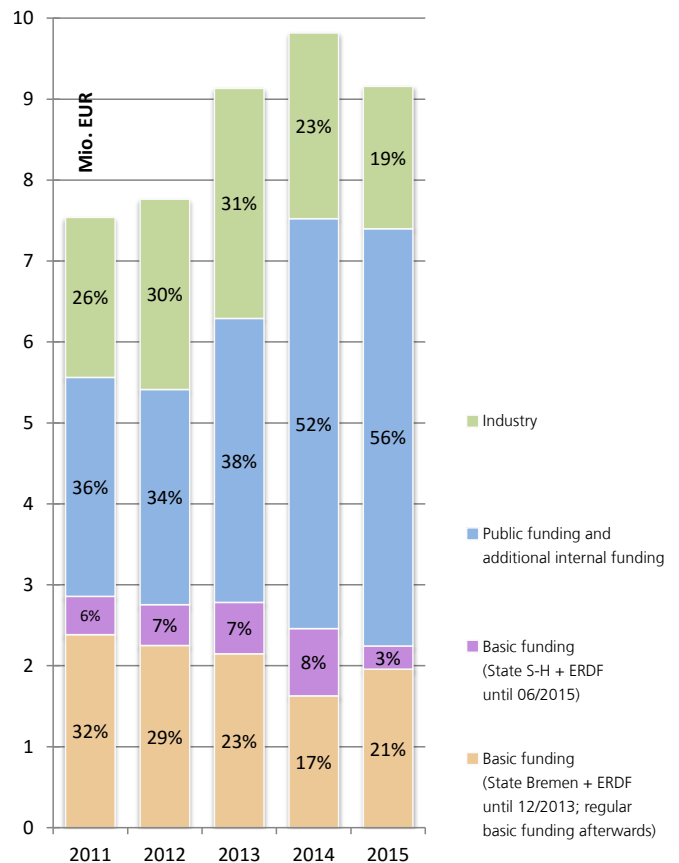
THE INSTITUTE IN FIGURES

Budget and Earning Trends

In 2015, the initial funding phase of the Federal State Schleswig-Holstein ended. Since mid-2015, the institute is now completely in Fraunhofer's so-called 90:10 financing provided by the Federal Republic and the Federal States of Germany.

Already at the end of 2014 it became clear that 2015 would be difficult on the earnings side. The total earnings fell from 9 818 T€ in 2014 by 660 T€ to 9 158 T€. The industrial earnings, including other earnings from third party dropped again by -23% compared to -19% the previous fiscal year (PFY). Particularly the organizational restructuring at several major customers resulted in noticeable losses. The earnings of the basic funding decreased by -9% (PFY -19%) to a total amount of 2 245 T€. Earnings from publicly funded projects and additional internal funding increased by +2% (PFY +50%).

The operating budget (OB) decreased in 2015 by -5% (PFY +13%). The investment budget (IB) is also by -50% smaller compared to the previous year (PFY -47%).



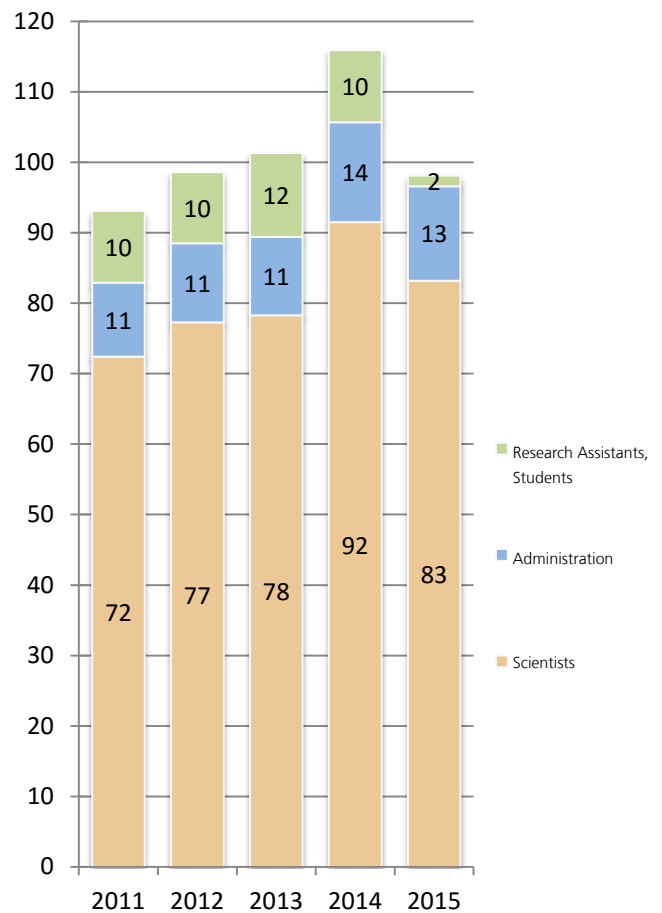
Total earnings for the period 2011 to 2015.

Overall Budget in T€:

	2011	2012	2013	2014	2015
OB:	6 981	7 401	8 357	9 404	8 951
IB:	559	360	776	414	207
Total	7 540	7 761	9 133	9 818	9 158

Human Resources

Similar to the overall development in 2015, the number of employees declined at Fraunhofer MEVIS. The number of scientists decreased by 8 rounded full-time equivalents (FTE) compared to the previous fiscal year (PFY +13 FTE). The number of administrative staff was reduced by 1 FTE (PFY +3 FTE) and the number of research assistants fell sharply by 9 FTEs (PFY -2 FTE).



Human resources development (full-time equivalent positions at year's end) in the period 2011 to 2015.

THE FRAUNHOFER-GESELLSCHAFT

Research of practical utility lies at the heart of all activities pursued by the Fraunhofer-Gesellschaft. Founded in 1949, the research organization undertakes applied research that drives economic development and serves the wider benefit of society. Its services are solicited by customers and contractual partners in industry, the service sector and public administration.

At present, the Fraunhofer-Gesellschaft maintains 67 institutes and research units. The majority of the nearly 24,000 staff are qualified scientists and engineers, who work with an annual research budget of more than 2.1 billion euros. Of this sum, around 1.8 billion euros is generated through contract research. More than 70 percent of the Fraunhofer-Gesellschaft's contract research revenue is derived from contracts with industry and from publicly financed research projects. Almost 30 percent is contributed by the German federal and Länder governments in the form of base funding, enabling the institutes to work ahead on solutions to problems that will not become acutely relevant to industry and society until five or ten years from now.

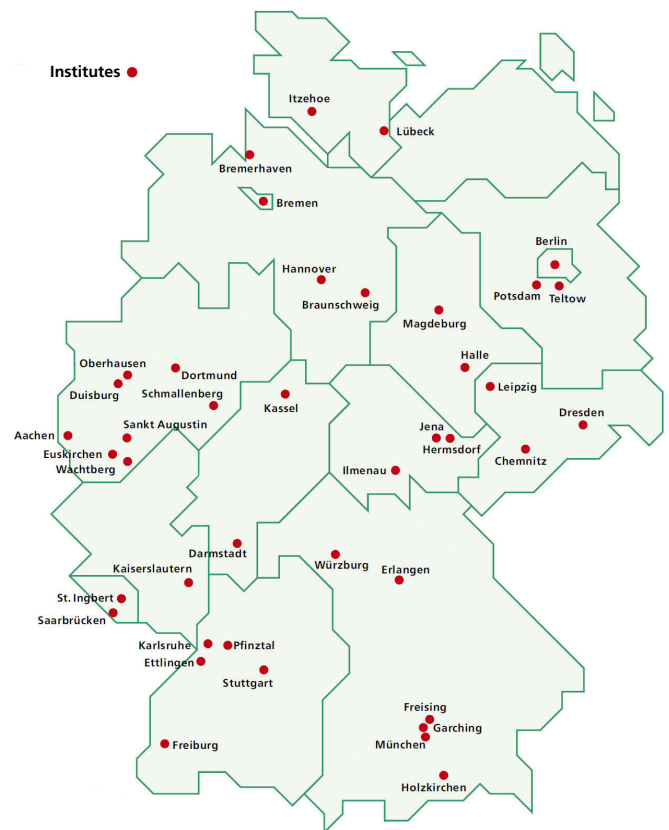
International collaborations with excellent research partners and innovative companies around the world ensure direct access to regions of the greatest importance to present and future scientific progress and economic development.

With its clearly defined mission of application-oriented research and its focus on key technologies of relevance to the future, the Fraunhofer-Gesellschaft plays a prominent role in the German and European innovation process. Applied research has a knock-on effect that extends beyond the direct benefits perceived by the customer: Through their research and development work, the Fraunhofer Institutes help to reinforce the competitive strength of the economy in their local region, and throughout Germany and Europe. They do so by promoting innovation, strengthening the technological base, improving the acceptance of new technologies, and helping to train the urgently needed future generation of scientists and engineers.

As an employer, the Fraunhofer-Gesellschaft offers its staff the opportunity to develop the professional and personal skills that will allow them to take up positions of responsibility within their institute, at universities, in industry and in society. Students who choose to work on projects at the Fraunhofer Institutes

have excellent prospects of starting and developing a career in industry by virtue of the practical training and experience they have acquired.

The Fraunhofer-Gesellschaft is a recognized non-profit organization that takes its name from Joseph von Fraunhofer (1787–1826), the illustrious Munich researcher, inventor, and entrepreneur.



THE YEAR 2015

CHRONICLE

February 24, 2015

The Science Committee of the Bremen Parliament unanimously agreed on budget for a new Fraunhofer MEVIS building.

March 7, 2015

Fraunhofer MEVIS provides the interactive exhibit »Image Man« for the Science Center Universum@ Bremen that showcases the capabilities of modern medical imaging methods.

March 15, 2015

Fraunhofer MEVIS gives tutorial on image registration at conference »Bildverarbeitung für die Medizin (BVM 2015)« in Lübeck.

March 25, 2015

Bremen's Senator for Education and Science Prof. Dr. Eva Quante-Brandt is visiting Fraunhofer MEVIS in Bremen.

May 6, 2015

Invited plenary lecture at World Congress of Pathology Informatics in Pittsburgh.

June 6, 2015

Seventh meeting of the Fraunhofer MEVIS Advisory Board (Kuratorium) in Bremen.

June 5, 2015

Opening of the permanent exhibition »Vintage Computing and the Roots of MEVIS« at Fraunhofer MEVIS in Bremen.

August 7, 2015

Fraunhofer MEVIS provides 3-D video sequence of the human heart for the »Deep Space« of the Ars Electronica Center in Linz, Austria.

September 14-15, 2015

Celebration of the »20th Anniversary of MEVIS« with an official ceremony and symposium in Bremen's City Hall and an Open House at Fraunhofer MEVIS.

September 17-19, 2015

Fourteenth Annual Conference of the »German Society of Computer and Robot Assisted Surgery (CURAC)« organized and hosted by Fraunhofer MEVIS in Bremen.

November 2-3, 2015

Fraunhofer MEVIS strategy workshop with Prof. Hans Maier and Prof. Fabian Kießling in Bremen.

November 29 – December 4, 2015

Fraunhofer MEVIS presents itself in the »Germany Presents Pavilion« at the 101st Annual Meeting of the RSNA in Chicago.

December 14-15, 2015

Final workshop of the EC-funded project VPH-PRISM on personalised predictive breast cancer therapy at Fraunhofer MEVIS in Bremen.

HIGHLIGHTS

20th Anniversary of MEVIS

In recent decades, medicine has undergone a fundamental change. The computer has entered medical practices and clinics. X-ray and ultrasound images are now digitally recorded. Today, MRI and CT scanners deliver three-dimensional images and videos of the inside of the body. The Fraunhofer Institute for Medical Image Computing MEVIS in Bremen has contributed significantly to the field and developed a range of innovative software methods. Founded as a nonprofit Ltd in 1995, it became part of the Fraunhofer-Gesellschaft in 2009. Today, it is one of the leading institutes for computer support in image-based medicine worldwide. In celebration of the anniversary, a senate reception and gala took place in the Bremen City Hall on September 14, 2015. Prof. Dr. Eva Quante-Brandt, the Bremen Senator for Science, Health, and Consumer Protection, and Prof. Dr. Georg Rosenfeld, the Division Director Research of the Fraunhofer-Gesellschaft, paid tribute to the Institute's achievements. On the following day, Fraunhofer MEVIS opened its doors for media representatives and visitors interested in the field to present a cross section of its research.

14th Annual Conference of CURAC

Fraunhofer MEVIS organized and hosted the 14th Annual Conference of the »German Society of Computer and Robot Assisted Surgery (CURAC)« which was held from September 17 to 19, 2015 in Bremen under the presidency of institute director Prof. Dr. Horst Hahn. Since 2002, the CURAC is the central German-speaking conference in this field bringing together clinicians, engineers, and scientists. More than 130 persons attended the CURAC 2015 conference. 38 full presentations, 15 short talks and 12 posters were accepted out of 74 submissions for the scientific program. In addition, two special sessions focused on technological assistance in urology and the transfer of research results into medical products. A special highlight was the social event in the theater of the »bremen shakespear company«.

Fraunhofer Innovator Program

The internal program »Fraunhofer-Innovator« supports project teams financially and through business coaching to develop new technologies until market readiness. The Fraunhofer MEVIS project CAFUR (Cardiac Function in Realtime) submitted by Dr. Stefan Braunewell, Markus Hüllebrand and Dr. Anja Hennemuth is one of currently four supported project teams from initially ten teams in the first round. The CAFUR software emerged from a cooperation between the Max Planck Institute for Biophysical Chemistry in Göttingen and Fraunhofer MEVIS on real-time magnetic resonance imaging (MRI) of the beating heart. The software developed by Fraunhofer MEVIS automatically identifies the breathing and heart contraction phases in the data independent of the ECG information which allows for a fast and easy examination of heart patients. The method has the potential to establish MRI as a standard in cardiac diagnosis and to replace risky catheterization procedures.

Automation in Medical Imaging

Together with the Diagnostic Image Analysis Group (DIAG) of Prof. Dr. Bram van Ginneken and participating clinical workgroups at the Radboud University Medical Center in Nijmegen, Fraunhofer MEVIS started the project »Automation in Medical Imaging (AMI)« in which computers recognize suspicious abnormalities in medical image data. Doctors have to consider medical image data – increasing in both amount and complexity – to perform diagnoses and monitor therapy. The AMI project is following a new approach to provide effective assistance. Self-learning computer algorithms will automatically trawl large volumes of data and search for abnormalities to improve the accuracy of computer-generated diagnoses. The project, planned for three years, commenced in October 2015 with a project volume of two million euro. AMI is an undertaking of the ICON initiative, in which the Fraunhofer-Gesellschaft promotes close collaboration between its institutes and foreign research facilities.

3D-Movie at Ars Electronica Center

Fraunhofer MEVIS produced a three-dimensional movie, showing the human heart in full action. The organ beats and pumps, and special techniques visualize the dynamic flow of blood in the vessels. The sequence is part of a new interactive three-dimensional experience presented by the »Ars Electronica Center« in the »Deep Space 8K« experience in Linz on August 7, 2015. The Ars Electronica Center and its annual festival belong to the leading showrooms and exhibition centers for digital culture worldwide. As a museum of the future, it shows the visitors how nascent technologies, still in development, could shape the daily life of the future. The Deep Space projection hall is a part of the Center and can display three-dimensional images, movies, and animations in extremely high resolution. Deep Space has been refitted with new 8K technology that improves image sharpness and color intensity. Moderators accompany the experience with live expert commentary.

AWARDS

Prof. Dr. Werner Petersen-Preis

Nick Weiss from Fraunhofer MEVIS in Lübeck has been awarded with »Prof. Dr. Werner Petersen-Preis der Technik« the highest endowed technology prize for students in Northern Germany.

Three Awards at BVM 2015

Dr. Frank Heckel, Florian Tramnitzke and Nick Weiss have been awarded at the workshop »Bildverarbeitung für die Medizin (BVM 2015)« held from March 15 to 17 in Lübeck. They received the BVM Awards for their dissertation, master's thesis, and best scientific presentation, respectively.

Three Merit Awards and Poster Award at ISMRM 2015

Ina Nora Kompan and Federico von Samson-Himmelstjerna received a total of three ISMRM Merit Awards and a Poster Award at the »23rd Joint Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM)« held from May 30 to June 5 in Toronto, Canada.

CARS Best Paper Award 2015

Dr.-Ing. Mathias Neugebauer was awarded with the Best Paper Award (1st Prize) at the 29th International Congress for Computer Assisted Radiology and Surgery (CARS), held from June 24 to 27 in Barcelona, Spain.

Fraunhofer ICT Dissertation Award

Dr. Christian Rieder received the first »Fraunhofer ICT Dissertation Award« for his dissertation »Interactive Visualization for Assistance of Needle-Based Interventions« submitted to the Jacobs University Bremen.

Nominee for Deutscher Zukunftspreis 2015

The project »Innovative Bildanalysemethoden für mehr Sicherheit in der Chirurgie« submitted by Dr. Andrea Schenk together with Siemens Healthcare and MeVis Medical Solutions was among the 25 nominees for »Deutscher Zukunftspreis für Technik und Innovation« awarded by the Federal President of Germany (Bundespräsident).

Fraunhofer InnovatorProgram

The project CAFUR (Cardiac Function in Realtime) submitted by Dr. Stefan Braunewell, Markus Hüllebrand and Dr. Anja Hennemuth was ranked best among all submissions within the Fraunhofer Innovator program and will be coached to gain market readiness.

Journal Articles

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