



**Fraunhofer**  
MEVIS

INSTITUTE FOR MEDICAL IMAGE COMPUTING

# ANNUAL REPORT 2017





# FRAUNHOFER MEVIS

## ANNUAL REPORT 2017

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*Visualization of Fraunhofer MEVIS' own new institute building located on the campus of the University of Bremen and planned to be ready in winter 2020/21.* © HKP



European Union  
Investing in Bremen's Future  
European Regional  
Development Fund



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# FRAUNHOFER MEVIS AT A GLANCE

## BRIEF PROFILE

The mission of the Fraunhofer Institute for Medical Image Computing MEVIS (short: Fraunhofer MEVIS) is to advance health care by researching and bringing to market solutions for computer-aided medicine, bridging between medical imaging, image-guided therapy, and healthcare informatics.

Our focus is to make an impact in clinical routine use. We work closely with clinical and industrial partners to ensure the relevance of our work, to select research topics based on the expected impact on medical care, and to translate our R&D results into viable innovations.

### Clinical Commitment

Research and development at Fraunhofer MEVIS pursue a clinical direction instead of technological or methodological orientations. 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 our partners. Fraunhofer MEVIS maintains an international network of over 100 clinical partners. This clinical network is an essential source to understand user needs and to evaluate the potential clinical value and feasibility of developed solutions.

### Industrial Collaboration

True innovation, the successful launch of solutions onto the market with tangible impact, 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 fuel technological advancement 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, pharmaceuticals, 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) or the approval guidelines of the United States Food and Drug Administration (FDA). Fraunhofer MEVIS is one of a small group of research facilities that, in Bremen since 2005 and in Lübeck since 2012, has operated 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 these quality management systems with the scope on design, development and production of software for medical products 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. In addition, Fraunhofer MEVIS also has experience with CE and FDA approval of software solutions for clinical environments.

### Software Platform

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 and accelerates development. This supports the tight technological integration of clinics, research, and industry. MeVisLab provides an 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 multiple operating systems and extensible via plugins for adding algorithms and applications.



## Business Areas

In order to strengthen the focus on commercialization, the Fraunhofer MEVIS business areas have been redefined in 2016. While the previous business area »Clinical Software Systems« summarized the application-specific software solutions for a large part of the project business, the four new business areas are tailored to market segments and related industrial customers. The range of services can therefore be specifically defined and developed for these customer groups.

The business area »*Diagnostic Software*« is centered around the clinical challenge to ensure optimal therapeutic decisions incorporating the constantly growing amount of 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.

The planning and support of surgical and minimally invasive procedures, a key topic 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 all relevant information in the intervention room. Customers are mainly hardware vendors that span a wide range of products from implants like valves and stents to catheters and needles, treatment devices like robots or linear accelerators (linacs), and navigation devices.

The former business area »Pharmacology and Studies« will continue as business area »*Clinical Trials and Pharma*«. The services so far, especially in the field of analysis software for image-based studies, are being expanded in this business area to a comprehensive range of services for the industry. Customers are pharmacological companies, contract research organizations (CROs), service and software providers for image analysis as well as researchers in hospitals, laboratories, and companies.

»*Quantitative Pathology*« as a field with special potential for growth and considerable technological development. Customers are manufacturers and providers of digital pathology equipment as well as healthcare IT integrators. Our key focus is in modular pattern analysis and virtual multi-staining

techniques, building on existing digital pathology platforms. Quantitative Pathology is pursued as a separate business area, since it addresses its own customer group.

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 other areas of competence for the customer group of equipment manufacturers for medical imaging. 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*«. This spans from improving image acquisition and creating new physiological information to automated motion tracking and quality assessment. The goal is to integrate image acquisition and post-processing to an optimized image analysis pipeline.

The core competences »*Cognitive Medical Computing*« and »*Clinical Decision Support*« revolve around the extraction of information from medical images and other medical data. The previous technological focus of image processing has been extended to non-imaging data and, therefore, to the challenge of incorporating all relevant information. The main goals are to maintain and expand competence in automatic extraction of quantitative image information and in efficient interactive solutions for decision support systems, for planning and support systems for image-guided therapy, and for extracting quantitative information in big data scenarios.

In »*Image Registration*«, the goal is to harmonize 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 efficient solutions.

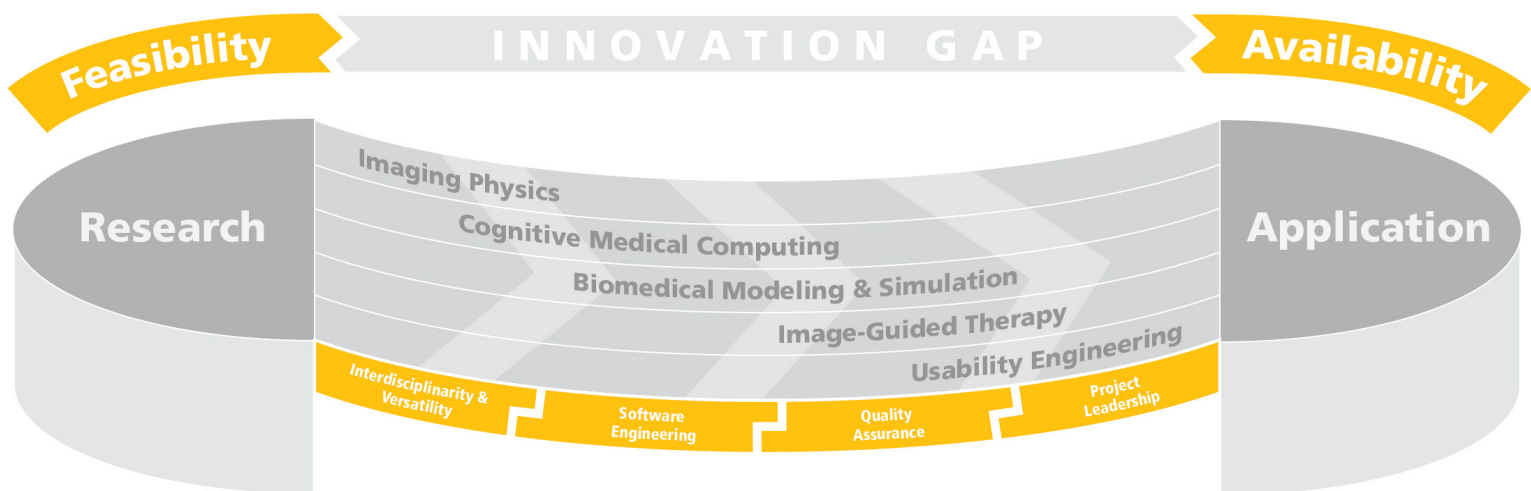
Our core competence »*Modeling and Simulation*« enables us to incorporate knowledge of biophysical and biomedical



## Fraunhofer MEVIS – Partner in Translation FROM FEASIBILITY TO AVAILABILITY

Research worldwide generates novel solution concepts, algorithms, and ideas with great innovation potential. These concepts demonstrate feasibility, but only a very small number reach actual clinical use.

To make novel ideas and concepts available in the clinical routine, the innovation gap must be bridged. Fraunhofer MEVIS is a key partner in this complex translational process.



### Interdisciplinarity & Versatility

Fraunhofer MEVIS has a deep understanding of medical needs, academic research, and industrial challenges, the three key areas of innovation.

### Software Engineering

Professional software development teams at Fraunhofer MEVIS offer short innovation cycles based on MeVisLab, RegLib, and Histology Toolkit, rapid prototyping and productization platforms.

### Quality Assurance

Fraunhofer MEVIS's expertise in quality management and regulatory processes, including stringent testing and documentation, brings prototypes closer to becoming certified medical products.

### Project Leadership

The project management competence at Fraunhofer MEVIS is a crucial ingredient to successful interdisciplinary and international research collaborations.

processes to enhance the information within medical images. In addition to application driven developments, we also perform basic research to enhance the technological capabilities. A particular focus for the next years will lie on validation of the results, in order to gain acceptance by industrial partners and physicians.

The capability of providing high quality, modular, reusable software components, efficient and well-integrated software applications and flexible deployment is managed and developed in the core competence »*Custom Software Solutions*«.

The anchoring of Fraunhofer MEVIS in digital medical technology and the focus of its research activities on the clinical benefits are cultivated by the core competence »*Clinical Expertise*« and will be further developed as a long term USP.

A goal of our »*Science Communication*« is to create projects, exhibits, movies and workshops in which scientists contextualize their expertise and research in a broader sense and become inspired to relate facts, empirical data, and science to 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. Currently, Fraunhofer MEVIS is connected with seven universities in Germany, the Netherlands, and the United States through nine professorships:

- University of Bremen: Prof. Kikinis, Prof. Günther
- Jacobs University Bremen: Prof. Hahn, Prof. Preusser
- University of Applied Sciences Bremerhaven:  
Prof. Rascher-Friesenhausen
- University of Lübeck: Prof. Modersitzki
- Charité, TU Berlin: Prof. Hennemuth
- Radboud University Nijmegen: Prof. van Ginneken
- Harvard Medical School, Brigham and Women's Hospital:  
Prof. Kikinis

From the very beginning, Fraunhofer MEVIS maintains strong ties to the universities in the State of Bremen. The directors of the institute hold professorships at the University of Bremen

and the Jacobs University Bremen. Further close cooperation exists through professorships in the fields Imaging Physics, Modeling and Simulation, and Medical Technology.

With financial support of the State of Schleswig-Holstein and the European Union, the Fraunhofer MEVIS Project Group for Image Registration was established at the University of Lübeck in April 2010. The internationally renowned group addresses the core competence of state-of-the-art medical image registration in close cooperation with the Institute of Mathematics and Image Computing (MIC) at the University of Lübeck. Since July 2015, the project group is part of the Fraunhofer MEVIS mother institute in Bremen.

Since 2012, Fraunhofer MEVIS pursues a strategic partnership with the Diagnostic Image Analysis Group (DIAG) at the Radboud University Medical Center in Nijmegen, the Netherlands, an internationally renowned center of excellence for Computer-Aided Diagnosis (CAD). The partnership is backed up by a project on automation in medical imaging supported by Fraunhofer's international cooperation program ICON.

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. Fraunhofer MEVIS researcher Anja Hennemuth was appointed professor for image-based therapy support at the Institute for Imaging Science and Computational Modelling in Cardiovascular Medicine.

### **Brief History**

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) at the University of Bremen. The founder Prof. Dr. Heinz-Otto Peitgen was appointed executive director, and an international scientific advisory board oversaw research. To expand the institute scientifically and economically, MeVis received a fixed basic funding from the State of Bremen. 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 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 and renamed Fraunhofer MEVIS, Institute for Medical Image Computing (Institut für Bildgestützte Medizin MEVIS). 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 that time CEO of the Healthcare Sector 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 April 2010, 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 July 2013, Professor Fischer passed away following a short severe illness. The director of the MIC, Prof. Dr. Jan Modersitzki, was appointed new director of the Fraunhofer MEVIS Project Group for Image Registration in October 2014.

In October 2012, MEVIS founder Professor Peitgen retired after heading the institute for 17 years and his former deputy Prof. Dr. Horst K. Hahn succeeded as Interim Institute Director. Professor Hahn and Prof. Dr. med. Ron Kikinis were appointed new directors of Fraunhofer MEVIS in January and April 2014, respectively. Since then Fraunhofer MEVIS is under dual leadership. On June 5, 2014, Prof. Dr. Gabor Székely, Head of the Medical Image Analysis and Visualization Group at ETH Zurich, was elected new chair of the Fraunhofer MEVIS Advisory Board with co-chair Walter Märzendorfer, President Diagnostic Imaging of Siemens Healthcare.

During the transition phase of five years, the parent institute in Bremen (2009–2013) and the project group 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). 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.

In September 2016 started the planning of a new building for Fraunhofer MEVIS funded in equal parts by the Federal Republic of Germany, the Federal State of Bremen, and the European Commission. The building located on the campus of the University Bremen is planned to be ready in winter 2020/21.

# 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 both to the individuals and to 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 current work assignment is highly encouraged.

To improve management, organization, and staff development, Fraunhofer MEVIS established a new mentoring system in August 2014. Management responsibility was extended to a group of experienced staff members who act as mentors or co-mentors for mentees. Responsibilities of the mentors include professional development of the mentee, coordination between institute and mentee's goals, as well as identifying and addressing of potential conflicts and problems.

Two male and two female persons of trust are elected from the staff to function as liaisons and mediators when needed.

As a result of the strategy process 2015/16, Fraunhofer MEVIS introduced a new structure of organizational units (OEs) each with a responsible OE manager (OEV) as of April 2017.

The main objectives of the new OE structure are:

- clear allocation of responsibilities,
- more efficient budget planning, and

- strengthening of strategic focus.

The OEVs are by default mentor for the respective OE members. The mentees can freely choose their OE as well as the co-mentor. OEVs as well as other OE members 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.

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

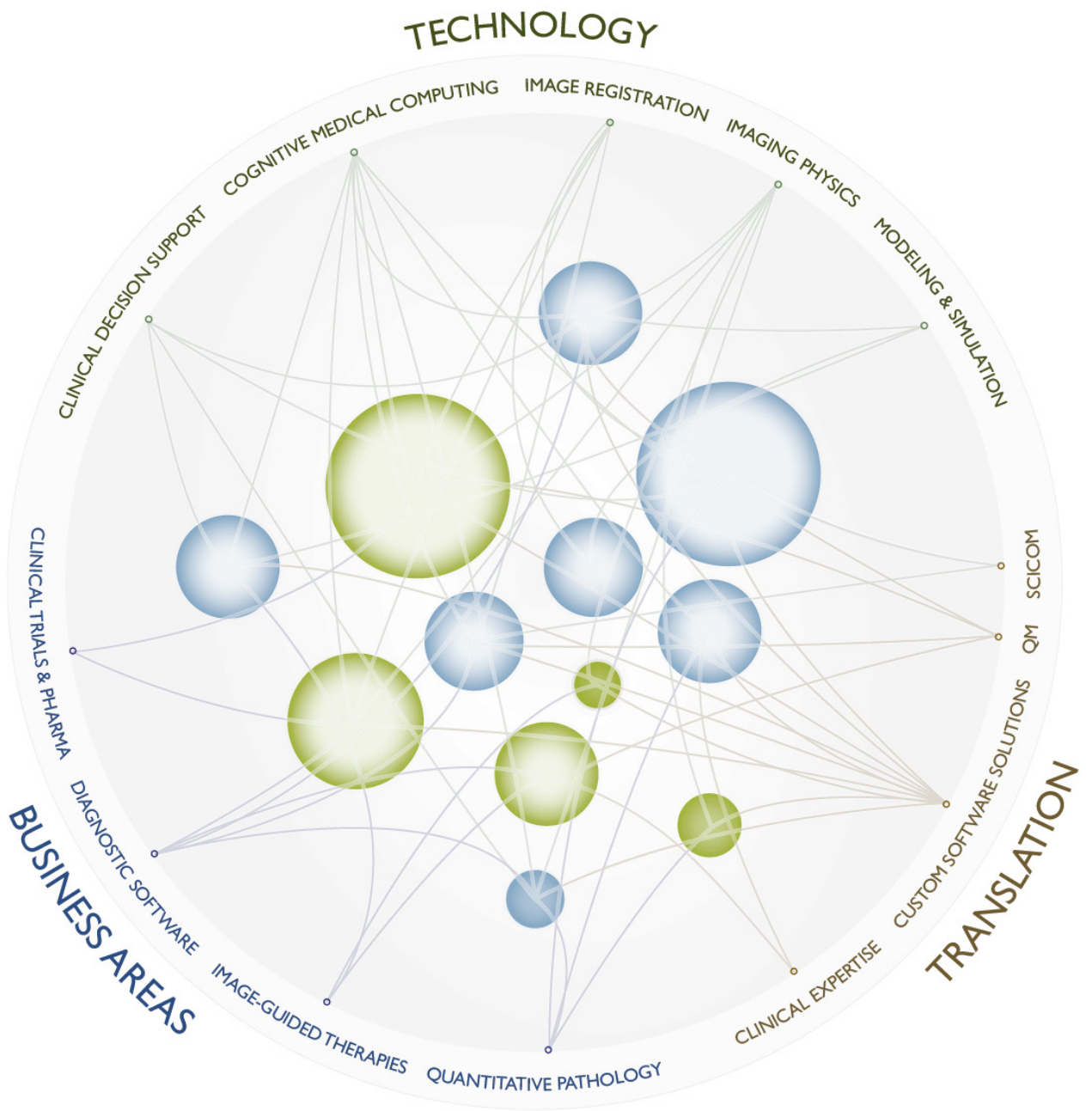
- Prof. Dr.-Ing. Horst K. Hahn (Institute Director),
- Prof. Dr. med. Ron Kikinis (Institute Director), and
- Dipl.-Betw. Thomas Forstmann (Head of Administration)

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

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

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*Illustration of the institute's operating principle and organizational structure. Project teams are dynamically put together with team members from different technological and clinical credentials.*



## ADVISORY BOARD

In Bremen on June 21, 2017, the Fraunhofer MEVIS Advisory Board (Kuratorium) met for the ninth time. Andreas Meuer, head of the main department Finance, Accounting, and Economic Plan 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 prospects and strategic plans.

Scientific personnel of Fraunhofer MEVIS presented the Advisory Board demonstrations of current research to relay the latest developments, inter alia, in machine learning in medicine and in quantitative pathology. The members of the Advisory Board praised the developments at Fraunhofer MEVIS and articulated their appreciation and thanks to the institute's personnel.

In 2017, the two renowned scientists Prof. Dr. Craig Garner und Prof. Dr. med. Fabian Kießling were appointed as new members to the Advisory Board. For three members – Prof. Dr. med. Jörg F. Debatin, Dr. Bernd Gewiese and Prof. Dr. med. Dipl.-Phys. Heinz-Peter Schlemmer – ended the membership in the Advisory Board. The president of the Fraunhofer-Gesellschaft and the directors of Fraunhofer MEVIS thanked them for their great effort and dedication.

### Chair

*Prof. Dr. Gábor Székely*  
Image Science Division  
ETH Zürich

### Co-Chair

*Walter Märzendorfer*  
Siemens Healthineers  
Erlangen

### Industry

*Marcus Kirchhoff*  
MeVis Medical Solutions AG  
Bremen

*Prof. Dr. Hans Maier*  
formerly Bayer Schering Pharma AG  
Berlin

*PD Dr. med. Christian Meisel*  
Roche Diagnostics GmbH  
Penzberg

### Medicine

*Prof. Dr. med. Mathias Prokop*  
Radboud University Medical Centre  
Nijmegen, The Netherlands

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

### Science

*Prof. Dr. Craig Garner*  
German Center for Neurodegenerative Diseases (DZNE)  
Charité Berlin

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

*Prof. Dr. med. Fabian Kießling*  
Experimental Molecular Imaging  
RWTH Aachen





## **University of Bremen**

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

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

## **Jacobs University Bremen**

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

## **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  
Bremen

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*Attendees of the ninth assembly of the Fraunhofer MEVIS  
Advisory Board in Bremen on June 21, 2017.*

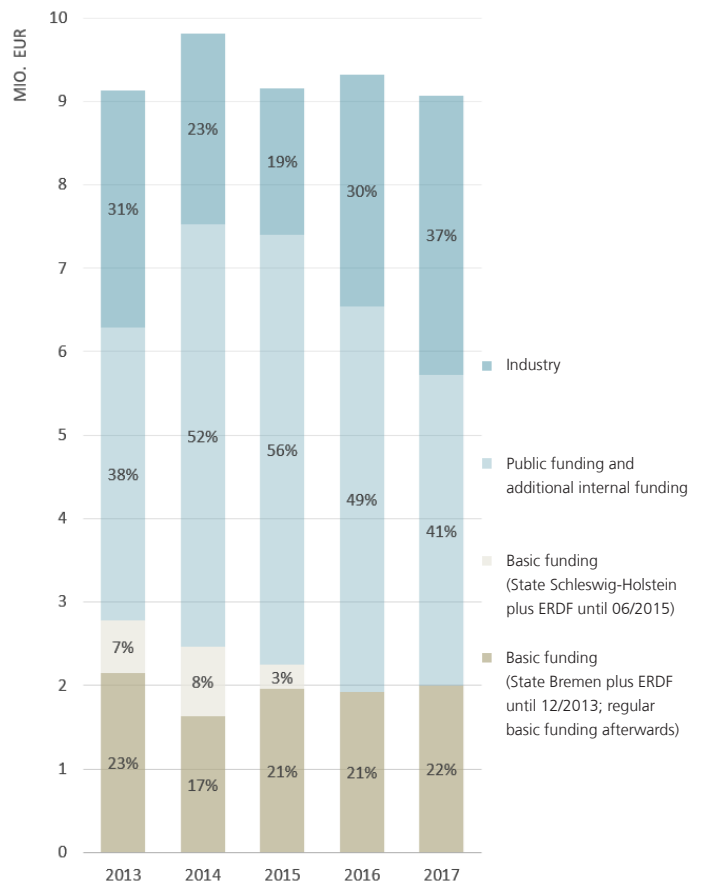


# THE INSTITUTE IN FIGURES

## Budget and Earning Trends

The overall earnings in 2017 decreased slightly by 267 T€ to 9 067 T€. The industrial earnings increased again significantly by +20% compared to the previous fiscal year (PFY). This is mainly due to our broadened customer base and due to our new strategic work base with Siemens. The basic funding rose slightly by +3% to 1 993 T€ (PFY: 1 927 T€). Earnings from public and internal sources fell by -19% compared to the previous year.

The overall budget decreased by -3%. This is mainly due to the reduction in the workforce, i.e. the operating budget (OB) decreased by -4% to 8 567 T€. To the contrary the investment budget (IB) increased by +23% to 500 T€ due to strategic investments into the machine learning infrastructure and general refurbishment issues in the IT section.



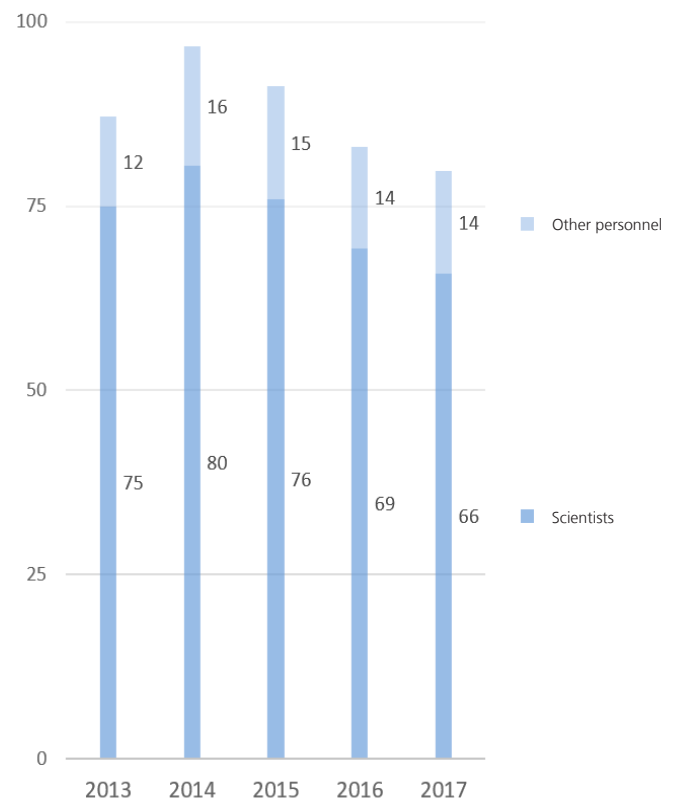
Earnings in million euros in the period from 2013 to 2017.

Overall Budget in T€:

	2013	2014	2015	2016	2017
<b>OB:</b>	8 357	9 404	8 951	8 917	8 567
<b>IB:</b>	776	414	207	407	500
	<b>9 133</b>	<b>9 818</b>	<b>9 158</b>	<b>9 324</b>	<b>9 067</b>

## Human Resources

The overall number of persons employed by Fraunhofer MEVIS fell again in 2017. This is due to several personal career decisions and, in addition, due to changes in general guidelines for employing scientific personnel within Fraunhofer. The number of scientists and the overall number of employees under contract dropped by an annual average of three full-time equivalents (FTE) in 2017.



*Personnel development (annual average of staff FTE) in the period from 2013 to 2017.*

# 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 72 institutes and research units. The majority of the more than 25,000 staff are qualified scientists and engineers, who work with an annual research budget of 2.3 billion euros. Of this sum, almost 2 billion euros is generated through contract research. Around 70 percent of the Fraunhofer-Gesellschaft's contract research revenue is derived from contracts with industry and from publicly financed research projects. Around 30 percent is contributed by the German federal and state 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.

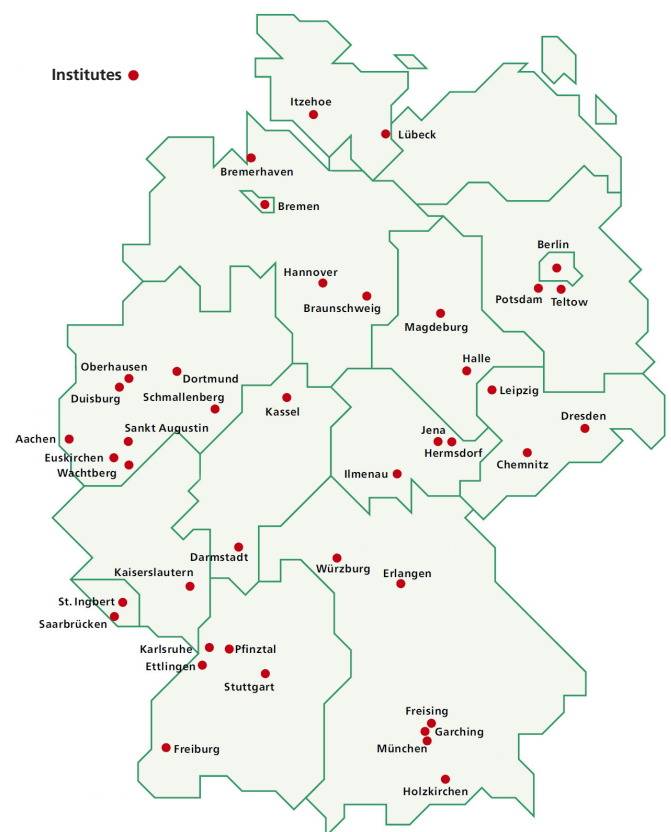
International collaborations with excellent research partners and innovative companies around the world ensure direct access to regions of the greatest importance to present and future scientific progress and economic development.

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.



*Locations of Fraunhofer Institutes in Germany. Currently, Fraunhofer MEVIS has major sites in Bremen (headquarters), Lübeck and Berlin plus additional offices in Hamburg, Heidelberg, Nijmegen and Boston.*

# THE YEAR 2017

## CHRONICLE

### **January 19, 2017**

Fraunhofer MEVIS is host of the 2nd Life Sciences Matchmaking & Business Trip with about 30 participants initiated and co-organized by the Gesundheitswirtschaft Nordwest e.V.

### **January 19, 2017**

Kick-off meeting of the BMBF-funded VIP+ project KoMBUS on the combination of MR and ultrasound imaging in Bremen.

### **February 17 – April 17, 2017**

Fraunhofer MEVIS takes part in the exhibition »Einfach Wissenschaft: Gesundheitswissenschaften« in »Haus der Wissenschaft Bremen«.

### **February 24, 2017**

Delegation from India is visiting Fraunhofer MEVIS at the invitation of the »Ostasiatischer Verein Bremen e.V.« (OAV).

### **March 1, 2017**

Fraunhofer MEVIS co-organizes »Satellite Symposium on Focused Ultrasound« at European Congress of Radiology in Vienna.

### **March 20-31, 2017**

Media artist Yen Tzu Chang at Fraunhofer MEVIS within the artist-in-residency project »STEAM Imaging« jointly hosted by Fraunhofer MEVIS and Ars Electronica.

### **April 1, 2017**

The new Fraunhofer MEVIS site in Berlin and the new OEV organizational structure come into effect.

### **April 26, 2017**

Kick-off meeting of the Fraunhofer WISA project »Softwareunterstützung und Assistenzsysteme für minimal-invasive neurovaskuläre Eingriffe« (SAFE).

### **April 27, 2017**

Girls' Day activities offered by Fraunhofer MEVIS in Bremen and Lübeck.

### **May 1, 2017**

Anja Hennemuth appointed professor at the Technical University Berlin and the Institute for Cardiovascular Computer-Assisted Medicine (ICM).

### **May 15-19, 2017**

Workshop for the BMBF-funded project PANTHER on patient-oriented oncological therapy support in Bremen.

### **June 21, 2017**

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

### **June 21-23, 2017**

MR Lecture on »Measurement of perfusion and capillary exchange« of the European Society for MR in Medicine and Biology (ESMRMB) with 60 participants at Fraunhofer MEVIS in Bremen.

### **July 4, 2017**

The Chamber of Commerce and Industry (IHK) Lübeck organizes in cooperation with Fraunhofer MEVIS the »5th Lübeck Summer Academy« (LSA) on Medical Technology in Lübeck.

### **August 14-16, 2017**

Twentieth Informatica Feminale of the University Bremen at Fraunhofer MEVIS in Bremen.

### **September 6, 2017**

Fraunhofer MEVIS director Prof. Hahn holds a workshop on »Künstliche Intelligenz in der Medizin« at the 8th regional conference of the Gesundheitswirtschaft Nordwest e.V. in Bremen.

### **September 7, 2017**

First milestone meeting of the project QuantMed on cognitive medical computing at Fraunhofer MEVIS in Bremen.

### **September 7-8, 2017**

Fraunhofer MEVIS organizes and hosts 7th Eurographics Workshop on Visual Computing for Biology and Medicine.

**September 23, 2017**

Hartmut Jürgens, co-founder of Fraunhofer MEVIS' predecessor MeVis Research, dies at the age of 62 years after a serious illness.

**November 6, 2017**

Inaugural meeting of »Arbeitskreis Künstliche Intelligenz« initiated by the Chamber of Commerce and Industry (IHK), the University of Lübeck and Fraunhofer MEVIS in Lübeck.

**November 20, 2017**

Kick-off meeting of the EC-funded »Translational Brain Imaging Training Network« (TRABIT) in Copenhagen.

**November 21-23, 2017**

Successful quality management monitoring audit by DEKRA at Fraunhofer MEVIS in Bremen and Lübeck.

**November 22, 2017**

Kick-off event for the BMBF-funded project Nav EVAR for the development of novel navigation systems for the treatment of vascular diseases.

**November 29, 2017**

Fraunhofer MEVIS actively contributes to the »Fraunhofer-Tag der Künstlichen Intelligenz (KI)« at Fraunhofer-Forum in Berlin.

**November 26 – December 1, 2017**

Fraunhofer MEVIS presents itself at the »103rd Scientific Assembly and Annual Meeting of the RSNA« in Chicago, USA.

**December 8, 2017**

Workshop with Prof. Craig Garner on »The Game of Entrepreneurship« at Fraunhofer MEVIS in Bremen.

## HIGHLIGHTS 2017

### **New Fraunhofer MEVIS site in Berlin**

In April 2017, Fraunhofer MEVIS opened a new site with about eight scientists in direct proximity to the Charité – Universitätsmedizin in Berlin. On May 1, Anja Hennemuth, head of cardiovascular research and development at Fraunhofer MEVIS since 2007, was appointed professor at the Technical University Berlin and the Institute for Cardiovascular Computer-Assisted Medicine (ICM), a recently founded joint institution of the Charité and the German Heart Center Berlin. Her group is working on new technological approaches that support the diagnosis and treatment planning of cardiovascular diseases.

### **Training course on perfusion MR**

Fraunhofer MEVIS organized and hosted a workshop about 60 participants entitled »Measurement of Perfusion and Capillary Exchange« from June 21 to 23, 2017. The event provided information about its applications and the current state of research to promote adoption of the method. The training course was initiated by Fraunhofer MEVIS researcher Matthias Günther. The chief organizer was the European Society for Magnetic Resonance in Medicine and Biology (ESMRMB).

### **VCBM 2017 at Fraunhofer MEVIS**

The 7<sup>th</sup> Eurographics Workshop on Visual Computing for Biology and Medicine (EG VCBM) was organized and hosted by Fraunhofer MEVIS. The workshop with about 40 participants opened its doors for two days of interdisciplinary exchange in Bremen on September 7 and 8. The EG VCBM is an annual event addressing the state of the art in visual computing research with a strong focus on applications in biology and medicine. It provides an interdisciplinary forum for researchers and practitioners from visualization, visual analytics, computer graphics, image processing, computer vision, human computer interfaces as well as experts from biology and medicine, jointly working on next generation visual computing solutions for medicine, healthcare and the biotechnology sector.

### **Performance at Ars Electronica Festival 2017**

Yen Tzu Chang, the recipient of the artist residency jointly hosted by Fraunhofer MEVIS and Ars Electronica in the framework of the »European Digital Art and Science Network« presented the results of her work during the performance of »Whose Scalpel« at the Ars Electronica Festival in Linz from September 7 to 11. The unique art project »Whose Scalpel« addresses the future of the human-machine relationship in surgery. Ars Electronica created the international initiative to enable artists to participate in residencies at prestigious research institutes to connect science with digital art approaches.

### **Start of BMBF-funded project NAV EVAR**

A kick-off event on November 22, 2017 launched a joint project for the development of novel navigation systems for the treatment of vascular diseases, co-funded by the German Federal Ministry of Education and Research (BMBF). In the three-year research project at the Lübeck site, vascular surgeons, radiologists, computer scientists, mathematicians, and physicists are working together with state-of-the-art methods on innovative procedures for »Combined navigation for endovascular therapy of the main artery« (Nav EVAR). The focus of the development is a procedure that significantly reduces the burden on the patient and the practitioner through X-rays and contrast agents. The total funding volume of the project is 4.2 Mio €.

## AWARDS 2017

### **NVIDIA Demo Contest**

Jennifer Nitsch and Hans Meine win the NVIDIA Demo Contest at the 24<sup>th</sup> Project Week of the National Alliance for Medical Image Computing (NA-MIC), held at the Massachusetts Institute of Technology (MIT) in Boston during the week of January 9-13, 2017.

### **SPIE Medical Imaging 2017 Live Demos**

The »Multimodal Workstation for Analysis of Retinal Images« is selected as the winning demonstration at the Live Demonstrations Workshop of the SPIE Medical Imaging 2017 which took place in Orlando, Florida, USA February 11-16, 2017.

### **ISBI 2017 Grand Challenge**

The deep learning based algorithm developed by Grzegorz Chlebus and Hans Meine wins the 2<sup>nd</sup> place at the Liver Tumor Segmentation Challenge (LiTS) of the IEEE International Symposium on Biomedical Imaging in Melbourne on April 18-21, 2017.

### **FIMH 2017 Best Paper Award**

Best Paper Award for »Multi-cycle Reconstruction of Cardiac MRI for the Analysis of Inter-ventricular Septum Motion During Free Breathing« submitted by Teodora Chitiboi to the Conference on Functional Imaging and Modeling of the Heart in Toronto on June 11-13, 2017.

### **Fraunhofer ICT Dissertation Award 2017**

Federico von Samson-Himmelstjerna wins 2<sup>nd</sup> place at Fraunhofer ICT Dissertation Award 2017 for his dissertation »Robust and time-efficient determination of perfusion parameters using time-encoded arterial spin labeling MRI«.

### **RSNA 2017 Image Contest**

The image »Individual Dose of Color« submitted by Fraunhofer MEVIS researcher Nadine Spahr wins 4<sup>th</sup> place at the RSNA 2017 Image Contest in the category »Radiology Art: Medical images altered into works of art«.

### **Industry Award for Best Immersive Media at Raw Science Film Festival 2017**

Fraunhofer MEVIS receives the »Industry Award for Best Immersive Media« for the movie »The Beauty of Blood Flow Analysis« submitted by Bianka Hofmann, Alexander Köhn, Mathias Neugebauer, Anja Hennemuth, and David Black to the 4<sup>th</sup> »Raw Science Film Festival: The Bridge between Science and Media« in Santa Barbara, California.



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# IMPRESSUM

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