



**Fraunhofer**

**MEVIS**

INSTITUTE FOR MEDICAL IMAGE COMPUTING



**ANNUAL REPORT**

**2016**



**FRAUNHOFER MEVIS**  
**ANNUAL REPORT 2016**

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*Deep learning methods help discover bone metastases, which can be overlooked in clinical routine. CT dataset courtesy of Radboud UMC, Nijmegen, NL.*



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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. 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 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 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 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« (*DSW*) 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« (*IGT*). 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« (*CTP*). 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« (*QP*) 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.

## Core Competences

Four scientific and two supporting core competences form the pillars of our work in research and translation.

The process of creating medical images is addressed by our core competence »Imaging Physics« (*IP*). 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 competence »Image and Data Analysis« (*IDA*) revolves 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 IGT, and for extracting quantitative information in big data scenarios.

In »Image Registration« (*IR*), 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« (*MS*) enables us to incorporate knowledge of biophysical and bio-



medical 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 »Software Development« (SWD).

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« (CE) and will be further developed as a long term USP.

### **Strategic Partnerships**

In addition to the network of clinical partners, Fraunhofer MEVIS maintains a strong network of technological partners. Currently, Fraunhofer MEVIS is connected with six universities in Germany, the Netherlands, and the United States through seven professors:

- University of Bremen: Prof. Kikinis, Prof. Günther
- Jacobs University Bremen: Prof. Hahn, Prof. Preusser
- University of Lübeck: Prof. Modersitzki,
- Radboud University Nijmegen: Prof. van Ginneken
- Harvard Medical School: Prof. Kikinis
- TU Berlin, Prof. Hennemuth (starting in 2017)

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 recently started project on automation in medical imaging supported by Fraunhofer's international cooperation program ICON.

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 direc-

tion of mathematician Prof. Dr. Bernd Fischer at the University of Lübeck in April 2010. The internationally renowned group addresses the core competence medical image registration in close cooperation with the Institute of Mathematics and Image Computing (MIC) at the University of Lübeck. In July 2013, Prof. Dr. Bernd 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. Since July 2015, the project group is part of the Fraunhofer MEVIS mother institute in Bremen.

### **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.

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*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' 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 employee representatives 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
- 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

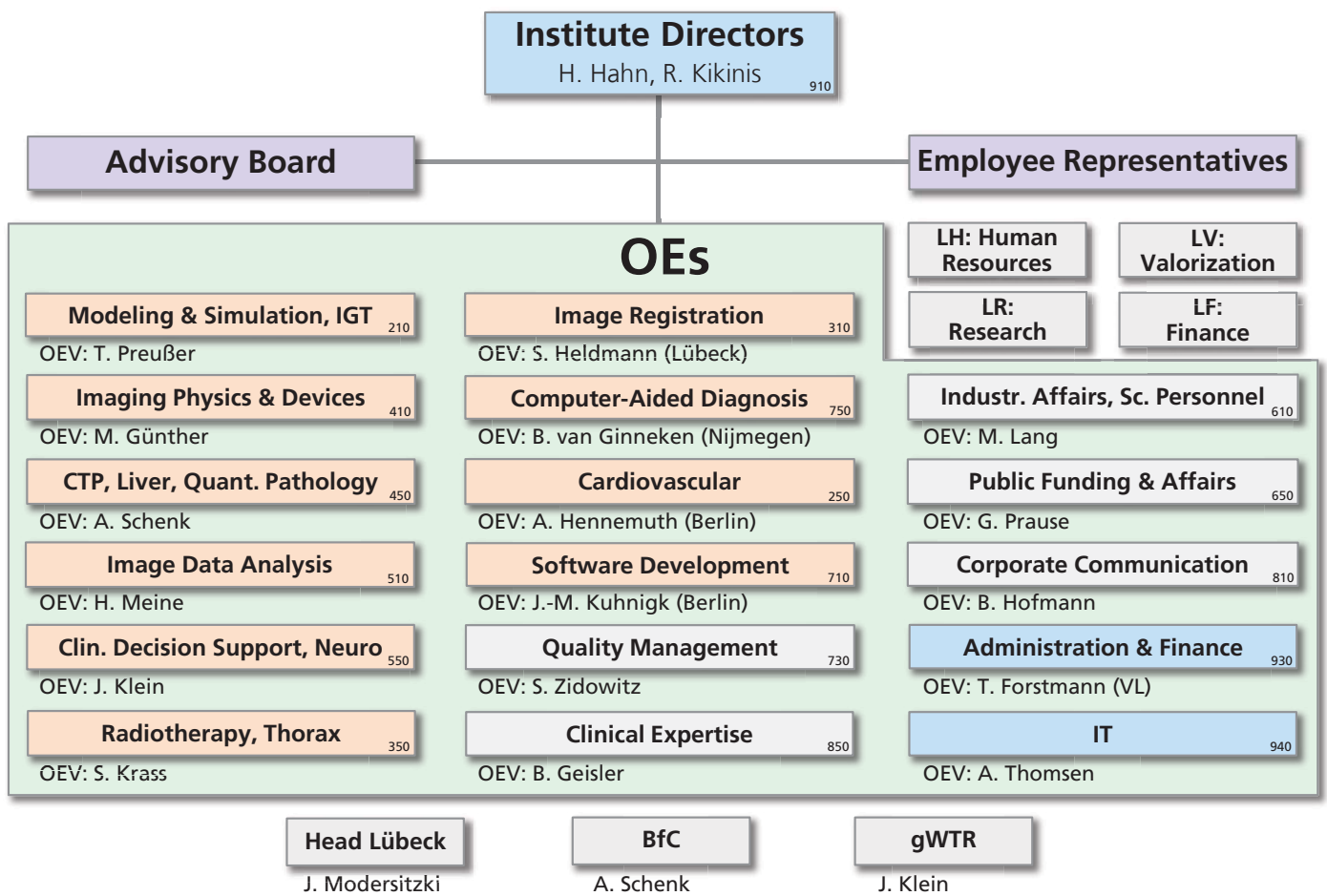
- Prof. Dr.-Ing. Horst K. Hahn (Institute Director)
- Prof. Dr. Ron Kikinis (Institute Director)
- Dipl.-Betw. Thomas Forstmann (Head of Administration)

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

The Advisory Board of Fraunhofer MEVIS is composed of sixteen 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).

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*Organizational chart of Fraunhofer MEVIS with the organizational units (OEs) and responsible OE managers (OEVs), as well as the elected representatives for equal rights (BfC) and the scientific and technical council (gWTR).*



## ADVISORY BOARD

In Bremen on June 2, 2016, the Fraunhofer MEVIS Advisory Board met for the seventh time. Dr. Hans-Otto Feldhütter, Head of the main department Business Models 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 image-guided therapies and machine learning.

During the reporting period, the Fraunhofer MEVIS Advisory Board consisted of sixteen 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

*PD Dr. med. Christian Meisel*  
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. med. Dipl.-Phys. Heinz-Peter Schlemmer*  
Department of Radiology  
German Cancer Research Center, Heidelberg

### 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



## 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

*Image Caption:*

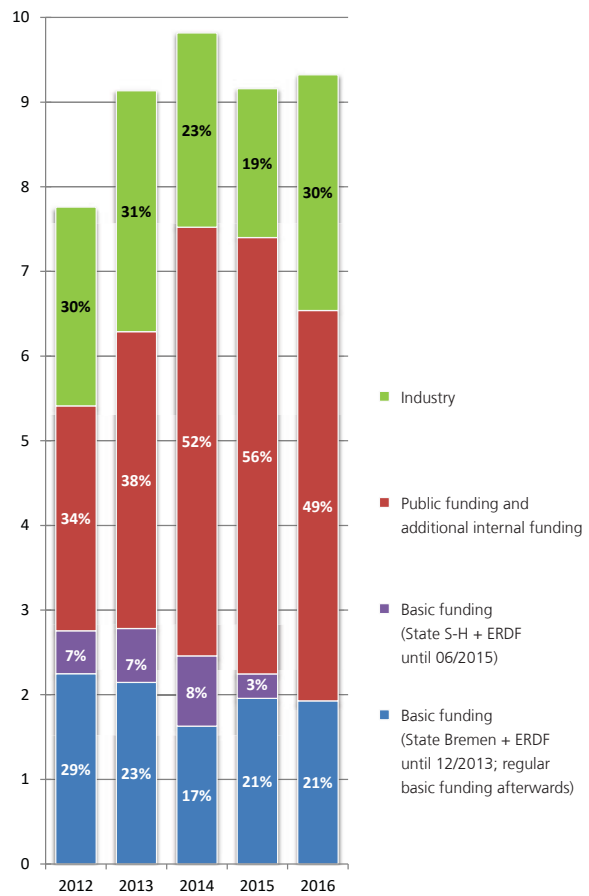
*Attendees of the eighth assembly of the Fraunhofer MEVIS Advisory Board in Bremen on June 2, 2016*

# THE INSTITUTE IN FIGURES

## Budget and Earning Trends

In 2016, the overall earnings of the institute slightly decreased by 166 T€ to 9 324 T€. The industrial earnings including other earnings increased – for the first time in three years – by +58% compared to the previous fiscal year (PFY). In particular, the new customer business and the completed organizational restructuring processes at some larger customers led to a noticeable improvement. Due to the ending of the initial funding phase of the Federal State Schleswig-Holstein for the group in Lübeck, the basic funding was 4 percentage points lower than the previous year, totaling 1 927 T€ (PFY: 2 245 T€). Earnings from publicly funded projects fell by a substantial 7% compared to the previous year.

The overall budget increased in 2016 by +2%. While the operating budget (OB) remained virtually unchanged at 8 917 T€, the investment budget (IB) almost doubled to 407 T€ compared to the previous year. One reason for this is investments was the relocation of the institute as well as strategic investments, which did not occur in the assumed amount in the previous year.



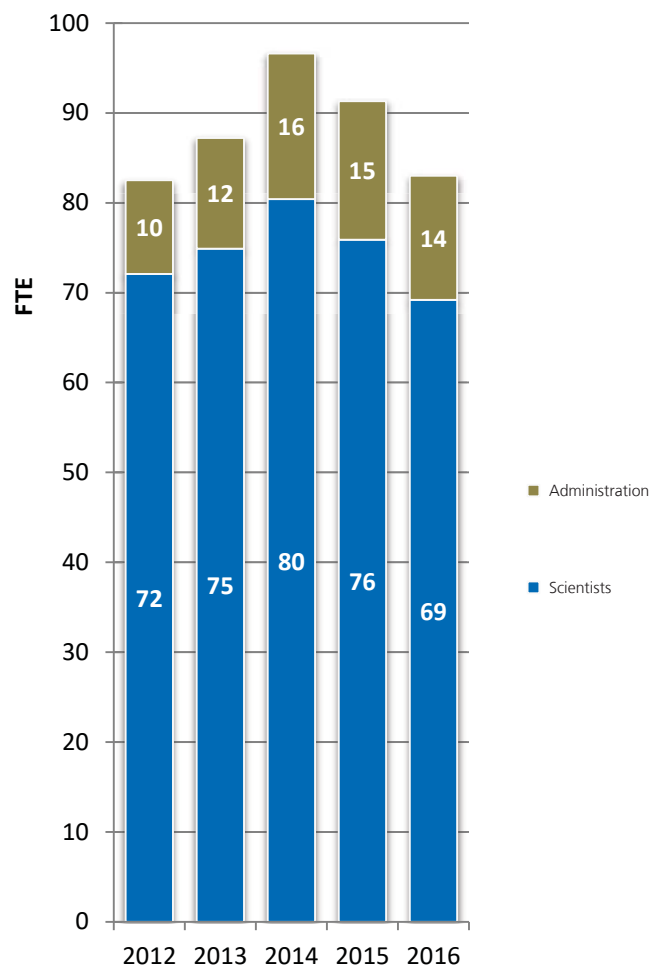
Overall Budget in T€:

	2012	2013	2014	2015	2016
<b>OB:</b>	7 401	8 357	9 404	8 951	8 917
<b>IB:</b>	360	776	414	207	407
<b>Total</b>	<b>7 761</b>	<b>9 133</b>	<b>9 818</b>	<b>9 158</b>	<b>9 324</b>



### Human Resources

Overall, the average number of persons employed by Fraunhofer MEVIS fell in 2016. The number of scientific staff members was reduced by seven full-time equivalents (FTE). The number of employees in administration (including IT) was reduced to an average of 14 FTE.



Personnel development (annual average of staff FTE) in the period from 2012 to 2016

# 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 69 institutes and research units. The majority of the nearly 24,500 staff are qualified scientists and engineers, who work with an annual research budget of more than 2.1 billion euros. Of this sum, 1.9 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.

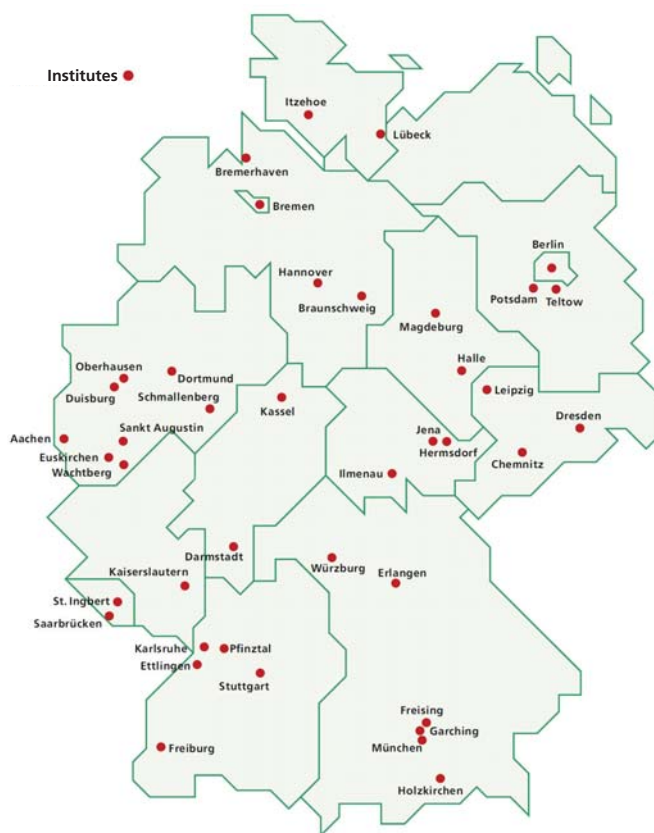
International collaborations with excellent research partners and innovative companies around the world ensure direct access to regions of the greatest importance to present and future scientific progress and economic development.

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 2016

## CHRONICLE

### **January 27, 2016**

Kick-off meeting of the project »Automation in Medical Imaging (AMI)« co-funded by Fraunhofer within the ICON program.

### **March 7-10, 2016**

»Fraunhofer Wissenschaftscampus« for female MINT students organized and hosted by Fraunhofer institutes IFAM, IWES and MEVIS in Bremen.

### **March 29 – April 1, 2016**

Deep Learning Workshop at Diagnostic Image Analysis Group (DIAG) in Nijmegen.

### **May 26, 2016**

Invited plenary lecture at European Congress of Digital Pathology in Berlin.

### **May 26-27, 2016**

Symposium on cooperation between the DIAG and Fraunhofer MEVIS in Bremen.

### **June 2, 2016**

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

### **June 9-10, 2016**

Audit of the Fraunhofer MEVIS strategy process in Bremen.

### **June 14-17, 2016**

Workshop »Radiomics for Radiologists« organized by Fraunhofer MEVIS at »Haus der Wissenschaft« in Bremen.

### **July 21, 2016**

Kick-off meeting for the BMBF-funded project MS-Atrophie at Fraunhofer MEVIS in Bremen.

### **August 19-20, 2016**

Fraunhofer MEVIS is moving into new premises in the Technical Academy Bremen (TAB) at the University of Bremen.

### **September 9-10, 2016**

Fraunhofer MEVIS director Prof. Horst Hahn gives two talks in the Deep Space 8k at the Ars Electronica Festival in Linz, Austria.

### **September 14, 2016**

Kick-off for the planning of the new Fraunhofer MEVIS building in Bremen.

### **October 1, 2016**

Fraunhofer MEVIS is presenting a new innovative interactive exhibit and the »Meta-realistic Medical Moving Images« during the Long Night of Museums at the AUDIOVERSUM Science Center in Innsbruck, Austria.

### **October 10-12, 2016**

Fraunhofer Talent School for pupils organized and hosted by Fraunhofer institutes IFAM and MEVIS in Bremen.

### **November 14-17, 2016**

Fraunhofer institutes IPA and MEVIS present the results of their cooperation on robotic assistance for the positioning of interventional needles at the MEDICA trade fair in Düsseldorf.

### **November 14-17, 2016**

Certification audit by DEKRA at Fraunhofer MEVIS in Bremen and Lübeck.

### **November 21, 2016**

Kick-off meeting for the Fraunhofer-funded project »Quant-Med« on quantitative medicine and cognitive medical computing in Bremen.

### **November 27 – December 2, 2016**

Fraunhofer MEVIS presents itself at the »102nd Scientific Assembly and Annual Meeting of the Radiological Society of North America (RSNA)« in Chicago, USA.

**December 1, 2016**

Kick-off meeting for the BMBF-funded project »Panther« on patient-oriented oncologic therapy support at Ludwig Maximilian University of Munich.

**December 13, 2016**

Invited talk by Prof. Andy Miah from the University of Salford, Manchester, UK on Engineering Ethics in an Age of Intelligent Machines.

# HIGHLIGHTS

## **Workshop »Radiomics for Radiologists«**

Between June 14 and 17, 2016 the first workshop »Radiomics for Radiologists« took place at the »Haus der Wissenschaft« in the city center of Bremen. The workshop was co-organized by Fraunhofer MEVIS director Prof. Ron Kikinis and the radiologists Prof. Gabriele Krombach, Gießen and Prof. Stefan Schönberg, Mannheim. About 30 directors and leading researchers from university clinics and research institutes across Germany attended the workshop. The results of the Workshop formed the basis for the White Paper »Mehr Qualität in der personalisierten Medizin mit Radiomics«. Radiomics aims at the collective characterization and quantification of pools of image features. and clinics.

## **New Home for Fraunhofer MEVIS**

On August 20, 2016 Fraunhofer MEVIS has moved into new premises in the Technical Academy Bremen (TAB) adjacent to the distinctive drop tower at the University of Bremen after having stayed for 20 years in the building in the Universitätsallee 29. In its new building with address »Am Fallturm 1«, Fraunhofer MEVIS is still connected with the airport and the central station via tram no. 6. On September 14, the kick-off for Fraunhofer MEVIS' new own building took place in Bremen. The new institute building on the campus of the University Bremen is planned to be ready in fall 2020.

## **Fraunhofer MEVIS at Ars Electronica Festival 2016**

Institute Director Prof. Horst Hahn gave two talks in the Deep Space 8k at the Ars Electronica Festival in Linz, Austria, on September 9 and 10, 2016. In his talks, Horst Hahn followed the track of machine learning in medicine and looked for answers to questions about future role models, the influence of digitization and how emerging human-computer teams achieve a far superior performance while overcoming technical and spatial limits – with effects even in the most remote countries.

## **Project »QuantMed« funded by Fraunhofer-Gesellschaft**

The proposal for the QuantMed project has been accepted by the Fraunhofer-Gesellschaft. QuantMed gives Fraunhofer MEVIS the chance and opportunity to explore the new field of quantitative medicine by establishing the area of cognitive medical computing within the next upcoming three years. It has a budget of 3 Mio. € in total given that the milestones after 10 and after 22 months are fulfilled. The QuantMed kick-off meeting took place on November 21, 2016.

## **Funding from VolkswagenStiftung**

In December 2016, Prof. Matthias Günther from the Department of Physics & Electrical Engineering at the University of Bremen and head of MR Imaging at Fraunhofer MEVIS received 100,000 Euro within the funding initiative Experiment! by the VolkswagenStiftung for a period of three years. The funded research project »Direct Magnetic Resonance Imaging Using a Magneto-Inductive Lens and Microcoils« aims to provide a high-resolution image of the body tissue to be examined in a few milliseconds instead of seconds, and thus revolutionize magnetic resonance imaging.

# AWARDS

## **Medical App Award 2016**

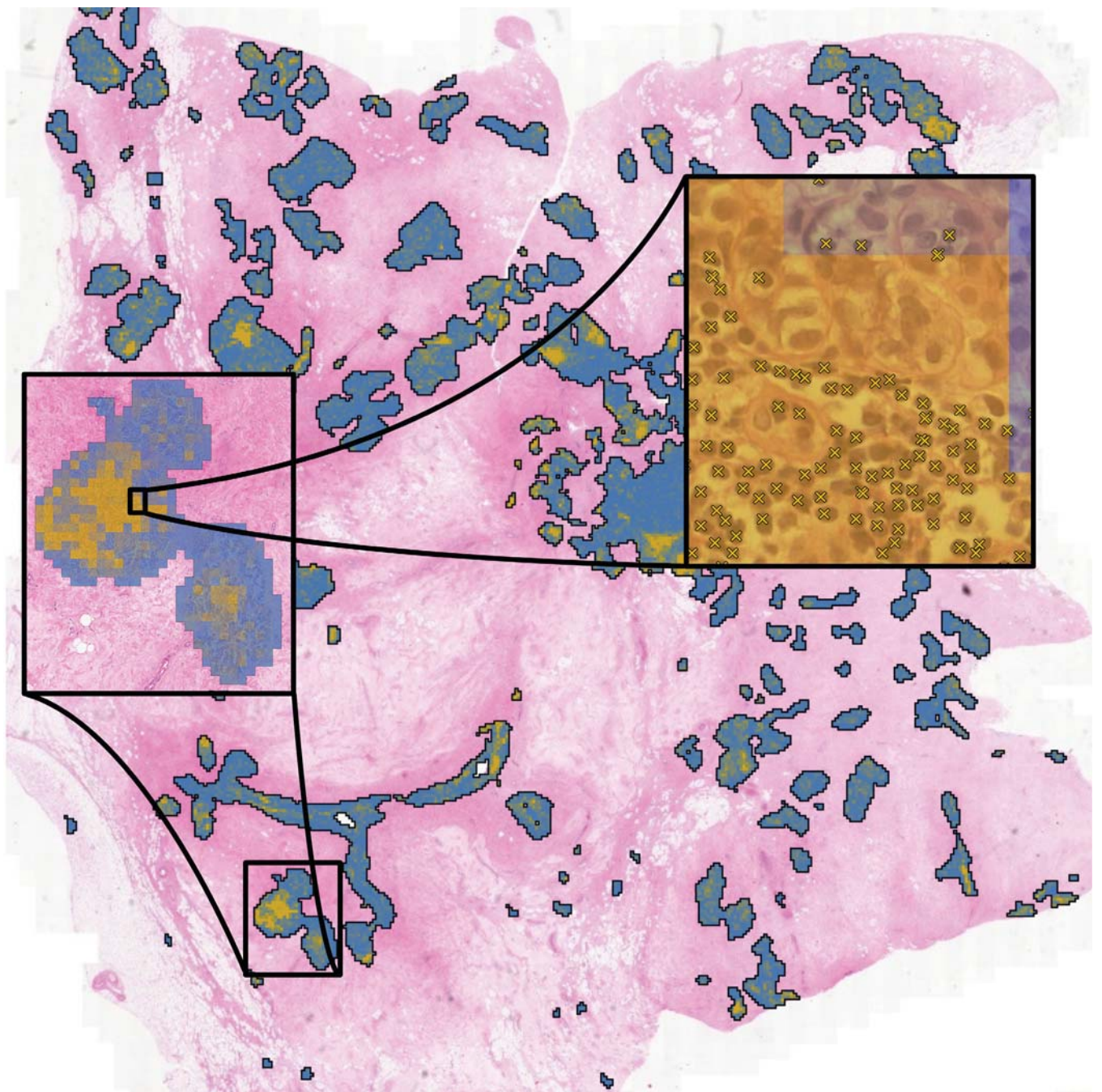
»Mobile Liver Explorer« was among the nine nominees for the first »Medical App Award 2016« offered by the Life Science Nord e.V.

## **SPIE Best Student Paper Award 2016**

Teodora Chitiboi among finalists for the Robert F. Wagner Best Student Paper Award of the »Image Processing« conference at »SPIE Medical Imaging«, held from February 27 to March 3 in San Diego.

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*Automated detection and evaluation of lymphocytes in breast tissue images*



## SCIENTIFIC PUBLICATIONS 2016

### Journal Articles

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## Master Theses

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# IMPRESSUM

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