MIRACUM brings together 16 institutions at 8 locations within 4 states of Germany, including university medical faculties, universities of applied sciences, university hospitals, hospitals from a private German hospital chain, and a non-academic research institution.

Together we form a body of 16 partners representing more than 11 million patients with billions of facts has the potential to significantly promote Medical Informatics in Healthcare and Research.

Those partners have agreed to share data, based on interoperable data integration centres, develop common and interoperable tools and services, realize the power of such data and tools in innovative IT solutions, which shall enhance patient-centred collaborative research as well as clinical care processes, and finally to strengthen biomedical informatics in research, teaching and continued education.
# The German Delegation

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<tr>
<th>UME</th>
<th>Prof. Dr. Hans-Ulrich Prokosch</th>
<th>Chair of Medical Informatics, University Erlangen-Nürnberg, CIO of University Hospital Erlangen</th>
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<tr>
<td></td>
<td>Dr. Thomas Ganslandt</td>
<td>Senior Researcher, Medical Informatics</td>
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<td>Dr. Martin Sedlmayr</td>
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<td>DKFZ</td>
<td>Prof. Dr. Frank Ückert</td>
<td>Head of Department of Medical Informatics in the Translational Oncology, German Cancer Research Center</td>
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<td>Dr. Martin Lablans</td>
<td>IT Coordinator: German Cancer Consortium (DKTK)</td>
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<td>GUF</td>
<td>Martin Overath</td>
<td>CIO of University Hospital, Goethe University Frankfurt</td>
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<td>Dr. Holger Storf</td>
<td>Head of Medical Informatics Group (MIG) University Hospital, Goethe University Frankfurt</td>
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<td>Dr. Sebastian Wagner</td>
<td>Department of Haematology/Oncology University Hospital, Goethe University Frankfurt</td>
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<td>UKFr</td>
<td>Dr. Martin Boeker</td>
<td>Center for Medical Biometry and Medical Informatics, Medical Center - University of Freiburg</td>
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<td>Dr. Christian Haverkamp</td>
<td>Clinic for Neurology and Neurophysiology, University Hospital Freiburg</td>
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<td>UKGi</td>
<td>Prof. Dr. Till Acker</td>
<td>Chair of Neuropathology, Vice Dean of Research, Faculty of Medicine, Justus-Liebig-University Gießen</td>
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<td>Julian Laufer</td>
<td>Central IT Rhön Hospital group</td>
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<td>UMCMz</td>
<td>Prof. Dr. Harald Binder</td>
<td>Head of Biostatistics and Bioinformatics, University Medical Center Mainz</td>
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<td>Prof. Dr. Jürgen Hesser</td>
<td>Professor for Experimental Radiation Oncology Director, Institute for Clinical Chemistry, Vice Dean</td>
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<td>Prof. Dr. Michael Neumaier</td>
<td>Medical Faculty Mannheim, Ruprecht-Karls-University Heidelberg</td>
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<td>UMR</td>
<td>Prof. Dr. Harald Renz</td>
<td>Medical Director University Hospital Marburg</td>
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The MIRACUM Locations

UME
- Medical faculty of the Friedrich-Alexander-University Erlangen-Nuremberg
- University Hospital Erlangen

UKGi
- Faculty of Medicine of the Justus-Liebig-University Gießen
- University Hospital Gießen and Marburg GmbH, Gießen
- Faculty of Health Sciences, University of Applied Sciences Gießen

DKFZ
German Cancer Research Center, Heidelberg

GUF
- Medical Faculty of the Goethe University Frankfurt
- University Hospital Frankfurt

UMCMz
University Medical Center Johannes Gutenberg University Mainz

UME
- Medical Faculty Mannheim of the Ruprecht-Karls-University Heidelberg
- University Medical Center Mannheim
- University of Applied Sciences Mannheim, Institute for Medical Informatics

UKFr
- Medical Faculty of the University of Freiburg
- Medical Center - University of Freiburg

UMM
- Medical Faculty Mannheim of the Ruprecht-Karls-University Heidelberg
- University Medical Center Mannheim
- University of Applied Sciences Mannheim, Institute for Medical Informatics

UMR
- Medical Faculty of the Philipps-University Marburg
- University Hospital Gießen- Marburg, Department Marburg
Ulli Prokosch has studied mathematics and received his PhD in Medical Informatics at Gießen Medical Faculty (1988). After his habilitation (Gießen University, 1995) he got an appointment as Professor of Medical Informatics at Münster University and was also responsible for the Münster University Hospital IT system as head of the "clinical information systems group" (1995-2003). In 2003, he got appointed as the Endowed Chair of Medical Informatics at Erlangen University. Since then he is also responsible as the Chief Information Officer (CIO) for the operational and strategic IT management/planning of Erlangen University Hospital.

He has initiated first projects to support clinical and translational research in 2007. In 2009 he already wrote a vision paper on “Perspectives for Medical Informatics” in reusing the electronic medical record for clinical research, identifying data warehousing and data mining, establishing IT infrastructures for clinical research at university hospitals and linking electronic medical records with clinical research databases (Prokosch & Ganslandt 2009). From 2008 to 2010, he has coordinated the TMF e.V. IT strategy project and pursued the three subprojects on analysing eligibility criteria from a random set of clinical trials concerning their availability in electronic medical records, analysing the i2b2 open source toolbox (Murphy et al. 2010) for its applicability in the German research community and on developing a requirement specification for IT support in biobanking. He subsequently founded the GMDS e.V. working group “Reusing electronic medical record data for Clinical Research” in 2009, which he chairs since then. After establishing a cooperation agreement with Prof. Isaac Kohane (i2b2 National Center for Biomedical Computing, Brigham Women’s Hospital Boston) on the further development of the i2b2 toolbox, Ulli Prokosch first initiated the German Academic i2b2 User Group (2009) and later the European Academic i2b2 User Group (2013). As illustrated by the list of project funding and his team’s related publications within the last five years his major research focus was always on integrating various heterogeneous clinical data sources and making such data available for translational research as well as clinical decision support. In this context, he always cooperated with partners from various German Universities in order to create interoperable solutions for data sharing and data reuse. Prof. Prokosch is a former member of the Commission of IT-Infrastructures of the German Research Association (DFG) and a former member of the board of directors of the German Platform for Methods and Technologies in Networked Research (TMF e.V.). He is a current member of the board of directors of the German Association for Medical Informatics, Biometry and Epidemiology (GMDS e.V.) and International Fellow of the American College of Medical Informatics.
Thomas Ganslandt currently heads the department of IT Infrastructure for Research and Management at Erlangen University Hospital. His scientific focus is the secondary use of routine clinical data for research purposes.

He studied Medicine at Münster University from 1991-1997 and finalized his MD thesis on a flexible database solution for chronic inflammatory bowel disease in 2002. He gathered clinical experience at the Departments of General Surgery and Pediatric Hematology/Oncology at Münster University Hospital between 1998 and 2003, in close project cooperation with the Department for Medical Informatics and Bioinformatics at Münster University. He worked as a senior researcher at the Chair for Medical Informatics at the University of Erlangen-Nürnberg from 2003 to 2008, coordinating the implementation of the clinical data warehouse of Erlangen University Hospital and participating in the application and coordination of BMBF-, TMF- and EU-funded projects. In his current role at Erlangen University Hospital Thomas Ganslandt oversees the implementation and provisioning of research IT infrastructure, including an integrated clinical data warehouse, biospecimen management and remote data capture platforms. He is an experienced organizer of community workshops and tutorials on a national level, including the TMF-sponsored tutorials on the Integrated Data Repository Toolkit and Anonymization Tools as well as an expert workshop on the evaluation of Docker-based container infrastructures to support biomedical research. He is a current member of the editorial boards of the Applied Clinical Informatics Journal and the Yearbook of the International Medical Informatics Association.

Martin Sedlmayr is senior researcher at the Chair of Medical Informatics and deputy of Prof. Prokosch. His interests are concepts and tools in which domain knowledge, ICT, business models, and usability requirements come together in order to best support the health care system.

He studied computer science at the University of Ulm. Following his diploma on process-adequate visualization for an integrated anesthesiology workplace in 1999 he worked at the Research Institute for Applied Knowledge Processing (FAW, Ulm) until 2002 and at the Fraunhofer-Institute for Applied Information Processing (FIT, Sankt Augustin) until 2008 when he joined the Chair of Medical Informatics at the FAU Erlangen-Nürnberg. For more than 15 years, he applied research as a developer, solution architect and technical coordinator in various European and national multidisciplinary projects - not only in the medical domain. Dr. Sedlmayr’s expertise includes Web Architectures, Big Data and NoSQL technologies for the integration and the analytics of complex and heterogeneous data reflected in recent projects such as cloud4health (BMWi Trusted Cloud) and Clinical Data Intelligence (BMWi Smart Data).
Frank Ueckert, MD PhD, born 1975, is working at the German Cancer Research Center (DKFZ) in Heidelberg as head of the department of “Medical Informatics in Translational Oncology”; until December 2015 he worked at the University Medical Center of the Johannes Gutenberg University Mainz in Germany as Professor for Medical Informatics.

After studying medicine and mathematics at the Westphalian Wilhelms-University Muenster, Germany, he practised medicine at the clinic for children’s oncology. In Muenster and at the University Hospital in Erlangen, Germany, he specialised in Medical Informatics early. His dissertation in 2001 was graded with an outstanding “summa cum laude”. Between 1995 and 2005 he managed several medical IT-projects and established a spin-off IT-company with colleagues in 2003. In June 2005, he was appointed as Juniorprofessor for Medical Informatics in Muenster and is now head of the department for medical informatics in Mainz. So far his work was awarded several times, e.g. with the “Peter L. Reichertz Memorial Prize” 2002 of the European Federation for Medical Informatics and the “GMDS-Förderpreis” 2003 of the German Association of Medical Informatics, Biometry und Epidemiology e.V.

From 2009 to 2014 he was elected as Board Member of the TMF e.V. and from 2009 to 2010 he was president of the TMF-School. He is a member of NIH/NCATS GRDR® Program Steering Committee since 2015 and member of the evaluation council in the German National Action League for People with Rare Diseases since 2010. In 2016, he was appointed as national representative for the „Advisory Technical Group for the European Platform on Rare Diseases Registration in ISPRA“.
Martin Lablans is a diploma informatician and Prof. Ückert’s deputy, especially leading the main site in Heidelberg – the group has different sites located at universities in Germany. He is responsible for IT-networking all eleven sites of the German Consortium for Translational Cancer Research (DKTK), one of the six German centers of health research (DZG). Before his move to Heidelberg in 01/2016, he headed the research group behind OSSE, the open-source registry solution for rare diseases funded by the German Federal Ministry of Health to comply with the EUCERD recommendations. He is also well-experienced in the routine operation of medical data services as he established an online service for the fast and reliable transmission of high-volume image data in the routine clinical studies funded by the “Deutsche Kinderkrebsstiftung” (German children cancer foundation; over 2,500 transmissions per year originating from more than 40 connected hospitals). A strong advocate of free and open-source software (FOSS), Martin Lablans has co-created the "Mainzelliste", an open-source, web-based first-level pseudonymization service. Its RESTful web interface has already been implemented into several academic and commercial software systems. His doctoral thesis in computer science established the "decentral search", a method to federate data repositories while preserving each owner's data sovereignty. The later concept is better known in Germany as “bridgehead” concept.
Martin Overath

Martin Overath studied Computer Science, Philosophy and Medical Informatics (Prof. PL Reichertz) in Brunswick. From 1990 to 2005 he gathered wide experiences of software engineering and developing hospital information systems at the University Hospital Marburg (Prof. O Rienhoff, Prof. K Kuhn). Since 2006 he is CIO at the University Hospital Frankfurt.

Holger Storf

Holger Storf heads the Medical Informatics Group (MiG) at University Hospital Frankfurt since November 2015; this group is focused on designing and developing innovative software solutions in the fields of oncology and rare diseases. The research activities are based on a strong cooperation with the department of “Medical Informatics in Translational Oncology” at DKFZ. Additionally, he is the project leader of two German RD-Projects (se-atlas, ZIPSE) and continues coordinating the activities of the OSSE-project (Open Source Registry System for Rare Diseases).

Holger Storf graduated from the University of Heidelberg in 2007 with a "Diplom" in Medical Informatics and finished his PhD in 2013. Before establishing the Medical Informatics Group he worked at the Institute for Medical Biometry, Epidemiology and Informatics (IMBEI) in Mainz since 2013. Previously he worked for 6 years at the Fraunhofer Institute for Experimental Software Engineering (IESE) as a member of the Data Management & Ambient Technologies department in applied research projects.

Sebastian Wagner

Sebastian Wagner graduated with a degree in medicine from Goethe University Frankfurt and works as resident physician at the Department of Internal Medicine – Hematology/Oncology.

From 2010 to 2013 he performed postdoctoral work at the Center for Protein Research in Copenhagen Denmark. Since 2014 he is leading a research group focused on cancer systems biology and bioinformatics. In 2015 he established the Cancer Genomics Core Unit Frankfurt that is funded by the German Cancer Consortium (DKTK) and provides various services related to next-generation sequencing and bioinformatics.
Martin Boeker

Martin Boeker has been trained in Medicine, Informatics and Medical Education. He received his medical approbation in 1992 at the Medical School Hannover (MHH) and habilitated in Medical Informatics in Freiburg. He is head of the Medical Informatics working group in the Center of Medical Biometry and Medical Informatics and leads the section for Tumor Documentation and Information Technology in the Comprehensive Cancer Center Freiburg. The main research areas of Martin Boeker are Medical Education and Medical Informatics. In Medical Informatics he focusses on e-Learning, structured literature retrieval, mHealth, medical information models and biomedical ontology.

Christian Haverkamp

Christian Haverkamp studied medicine at the University of Essen and the RWTH Aachen. He finished 2013 his training as a neurologist at the Department of Neurology of the Medical Center - University of Freiburg. In addition, he obtained the qualification of the neurological intensive care and medical computer science. Since 2013 he heads the staff unit IT processes. Christian Haverkamp advises the Medical Computer Department in medical contexts and collaborates with this in the working group HIS 2020 defining the next generation architecture. He is a member of the IT Commission, which advises the Board of Directors of the Medical Center - University of Freiburg.
Till Acker studied medicine in Freiburg, London (UK), San Diego (US) and Cape Town (SA) (1990-1996). He was trained as a neuropathologist in Freiburg, Erlangen and Frankfurt and completed his medical board exam in Neuropathology in 2003. From 2003-2005 he worked as a postdoctoral fellow on glioma stem cells at the Karolinska Institute, Stockholm. In 2006 he received a Max-Eder-Junior Research Group grant from the German Cancer Aid. Since 2008 he is full professor and director of the institute of neuropathology in Giessen.

At present he is Vice Dean of research at the faculty of medicine in Giessen. Prof. Acker serves as a reviewer and advisor for several national and international funding agencies as well as various scientific journals including Nature, Nature Cell Biology, JEM, JNCI. His research focus lies in the molecular, cellular and functional mapping of the role of the microenvironment in various disease processes including cancer and neurodegeneration. Ongoing work focuses on the understanding of how oxygen sensing mechanisms shape the aggressive tumor phenotype and regulate therapy resistance. Clinically, his group is particularly interested in the discovery and application of biomarkers through next generation sequencing techniques for the differential diagnosis and the prediction of therapy responses in brain tumors.

Julian Laufer, computer scientist, is currently leading the IT section of business clinical service processes including the areas human resources, finance and controlling, data warehousing and procurement at the RHÖN-KLINIKUM AG. In addition to his specific focuses, Laufer is also responsible for developing an intersectoral allianceplatform and the web-based electronic patient record. Further he coordinates the IT based research projects at the group. (The University Hospital Giessen and Marburg GmbH are part of the RHÖN-KLINIKUM group). His research interests concentrates on big data architectures, eHealth and intersectoral networking in medicine. He was involved in the cloud4health project (BMWi Trusted Cloud), which enables cloud services for the secondary use of healthcare data and the semanticVOICE project that develops semantic speech recognition for healthcare (BMBF).
Harald Binder studied psychology and mathematical behavioral sciences in Regensburg and at the University of California, Irvine, subsequently obtaining a PhD in statistics from the University of Munich. Following his postdoc time in Freiburg, he now is heading the Division Biostatistics and Bioinformatics at UMCMZ. He is an expert in joint analyses of clinical data and high-dimensional molecular measurements using Big Data techniques. The techniques developed by the group of Prof. Binder are currently used by and further developed for several consortia, e.g. the BMBF-funded projects ISIBELa (requiring integration of whole genome sequencing, experimental, and clinical data) and AgeGain (requiring integration of imaging and genomic data from healthy elderly) or the EU-funded PanCareLIFE consortium (integrating clinical and genomic data from a large number of European childhood cancer cohorts). Prof. Binder has expertise on complex time structures, as found e.g. in clinical registries and routine data.

Dennis Kadioglu works for the Division of Medical Informatics at the Institute of Medical Biostatistics, Epidemiology and Informatics (IMBEI) at the University Medical Center of the Johannes Gutenberg University Mainz since 2012. He graduated from the University of Applied Sciences and Arts of Dortmund in 2013 with a Master’s Degree in Medical Informatics. His research activity focuses on the development of methods to ease and support data sharing across research networks, especially regarding the necessary data integration. The emphasis is on fostering the establishment and usage of metadata to enable third parties to correctly use and interpret shared data.
Jürgen Hesser studied physics and received his PhD at Heidelberg University (1992). He habilitated in mathematics and computer science at the University of Mannheim (1999) with a focus on Computer Graphics in Medicine. He was professor for medical Technology at the University of Mannheim (2001) before he switched to Heidelberg University (2007) for a chair Experimental Radiation Oncology. Professor Hesser is member of the Interdisciplinary Center for Scientific Computing (IWR) and the Central Institute for Computer Engineering (ZITI), both central institutes of the University of Heidelberg.

His research focus is on inverse problems for medical image analysis, after having contributed to the field of medical visualization and bioinformatics. He developed diverse medical planning systems and medical simulators. Efficient methods for deburring microscopy and tomography were developed. Very recently, he joined a large BMBF-project (LSDMA) where he focused on research data management for life-science where the potential of big data management for research is explored.

Michael Neumaier

Michael Neumaier is a laboratory physician and clinical chemist. He holds the chair for Clinical Chemistry at the University Heidelberg. Since 2002, he is director of the Institute for Clinical Chemistry at the University Hospital Mannheim and deputy dean of his faculty since 2015. He is a member of the German National Gene Diagnostics Commission (GEKO) at the Robert-Koch-Institute, director of the National Quality Assessment programs of the Reference Institute for Bioanalytics (RfB) in Bonn as appointed by the German Medical Council. He is active in different committees within the International Federation for Clinical Chemistry (IFCC) including bioinformatics. Since 2012 he has acted as vice president and president of the German society for Clinical Chemistry (DGKL).

Currently, his research focusses on 1) cloning and functional characterization of variable immune receptors expressed in myeloid cells, 2) proteomic and molecular profiling of tumors in bodily fluids using mass spectrometry and massive parallel sequencing, respectively and 3) preanalytical factors influencing biomolecular quality in specimens from bioarchives.
Harald Renz

Harald Renz is medical director of the University Hospital Giessen and Marburg since October 2015 and he heads the Institute of Laboratory Medicine and Pathobiochemistry, Molecular Diagnostics, University Hospital Giessen and Marburg GmbH since 2010. In 1999, Harald Renz was appointed the chairman of the Department of Clinical Chemistry and Molecular Diagnostics – Central Laboratory, Hospital of the Philipps-University Marburg; 2006 he founded the start-up company sterna biologicals, from 2011 to 2013 he was Visiting Professor at Harvard Medical School.

Today, Harald Renz acts in various fields: he is elected panel member of the German Science Foundation (2012-2016), associate editor of the “Journal of Allergy and Clinical Immunology”, vice speaker of the LOEWE Excellence Centre UGMLC (Universities of Gießen and Marburg Lung Centre) and president of the German Society of Allergy and Clinical Immunology. He is a member of the senate of the Philipps-University Marburg and coordinates the EU Tempus Programme “New Medical Curriculum at Syrian Universities”.

Hans-Walter Fritsch

Head of the IT-Systems (ZIV) of the University hospital Giessen and Marburg, department Marburg since 2007; From 1999 to 2007 he worked in the Institute for Medical Informatics Marburg (Director: Prof. K. Kuhn).