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Conclusion of the Fraunhofer MED²ICIN lighthouse project

Digital patient model supports treating physicians in making decisions and reducing costs

New perspectives for the healthcare sector: The support system for decision-making developed as part of the MED²ICIN project should increase the treatment success rate. It supports physicians in their decision-making process by pooling all of the information on an individual patient and comparing this to that of cohorts made up of similar individuals. As well as helping to select the best option for therapy, this solution reduces treatment time and costs. Seven institutes participated in the four-year-long Fraunhofer lighthouse project, which will end on July 17 when the prototype will be presented in Frankfurt.

The digital patient model enables personalized and cost-effective treatment, opening up new opportunities for the healthcare sector. It will be used to merge existing patient data from different systems to form a digital twin. "It offers advantages for the specific treatment of individual patients as well as for the use of healthcare funds for society as a whole," says Dr. Stefan Wesarg, Head of the Competence Center Visual Healthcare Technologies at the Fraunhofer Institute for Computer Graphics Research IGD and coordinator of MED²ICIN. "Aggregating an individual's health and sickness records and intelligently analyzing this data in a way that complies with data protection regulations will result in a completely new solution for more effective prevention, diagnostics, treatment and care."

Reducing costs and the burden on medical experts

Effectively controlling healthcare expenditures — i.e., avoiding multiple requests for expensive MRI scans or minimizing the amount of manual work involved in evaluating imaging data — means taking into account the biggest economic challenges that we are currently facing in the healthcare sector. These include rising costs and the enormous skills shortage and the resulting bottleneck for care.

Wesarg and his team worked alongside six other Fraunhofer institutes to develop the digital twin. While the information and recommendations are summarized in an interactive dashboard, a more detailed overview is offered through a variety of modules. Here, physicians can access AI-based analyses (e.g., of medical specialist publications) and check the guidelines for treatment as well as the costs of each treatment option. In the cohort module, the individual patient records are matched up to data from similar disease patterns. As such, the treating physicians can identify which treatments would

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be most effective in each specific case. Patients can upload their own lifestyle data via an app.

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Decision model showed promising results in practical testing

An online survey of almost 50 gastroenterologists who tested the web-based system at hospitals and medical practices showed that the patient model was able to fulfil the set objectives. While 23% of those surveyed praised the cost savings, 35% pointed out the decrease in treatment times that resulted from using the model. So far, the digital patient model has been used for chronic inflammatory bowel diseases (CIBD); in the future, it will be used for other disorders.

Dr. Irina Blumenstein, a senior physician at Frankfurt University Hospital, was involved in the development process right from the start as a CIBD expert. "The tool provides excellent support to both experts and less experienced gastroenterologists in day-to-day treatment," says the specialist in internal medicine, gastroenterology and nutritional medicine.

Further development will lay the foundation for wide-scale use

Wesarg and his team will continue to advance their research at European level with the help of partners from Finland. Using 10,000 sets of patient data, they will continue to develop the model so that it can be incorporated into commercial systems and used in day-to-day medical care. "Ultimately, it is a human being who makes the decision — by using our patient model with its AI-supported modules, they will have the optimum data basis at their disposal to do so," explains Wesarg.

On July 17, the project participants will present the inner workings of the data model, with its interactive dashboard and individual modules, at the Westend Campus of Goethe University Frankfurt. Interested parties from clinical and industrial environments, medical engineering, health IT and the pharmaceutical industry, as well as media representatives, are invited to attend.

You can register on the [MED²ICIN-Symposium](#) page.

Further information:
[MED²ICIN lighthouse project](#)

Journalists can register by contacting presse@igd.fraunhofer.de.

Background information

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The project consortium comprises the following Fraunhofer Institutes:

Fraunhofer Institute for Computer Graphics Research IGD

PROJECT MANAGERS

Project focus areas: cohort analysis, intelligent image analysis, longitudinal modeling

An AI-based analysis process and interactive visualization technologies combine medical imaging data with patient-specific clinical data and cohort knowledge bases. They form the basis for data-driven, personalized medicine and provide intuitive decision-making aids to support physicians.

Fraunhofer Center for International Management and Knowledge Economy IMW

Project focus areas: health economics, strategic framework conditions, market analysis and application strategy

Fraunhofer IMW incorporates socioeconomic aspects of research into the lighthouse project, develops exploitation strategies for the entire project at an early stage and models the interrelationships between health and economics.

Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS

Project focus areas: knowledge graphs and ontologies, knowledge extraction, longitudinal modeling

Hybrid AI methods and semantic technologies allow specialist and expert knowledge to be integrated into the analysis of clinical data. This forms an essential prerequisite for developing AI-supported medical recommendation systems.

Fraunhofer Institute for Digital Medicine MEVIS

Project focus areas: digital patient model, temporal modeling of disease progression, intelligent, data-driven support for diagnosis and therapeutic decisions

The Fraunhofer MEVIS mission is to harness intelligent computer support to advance the digital, integrated precision medicine of tomorrow. Patient-specific data are used to improve diagnosis and treatment.

Fraunhofer Institute for Optronics, System Technologies and Image Exploitation IOSB

Project focus areas: data protection and data ownership, explainability of AI processes, UX/UI design, guideline-based decision support

Innovative approaches in human-machine interaction combined with AI-driven analysis models support experts with data and knowledge, to map user requirements in the user interfaces and to maintain data ownership through the transparent presentation of data usage.

Fraunhofer Institute for Integrated Circuits IIS

Project focus areas: analysis methods for digital pathology, processes for evaluating biosignals, expertise in creating communication protocols

Fraunhofer IIS develops customized solutions for recording, curating, preparing, processing and analyzing multimodal medical imaging data and biosignals to provide computer-assisted support for decision-making in applications for care and home care as well as the operating room and the laboratory.

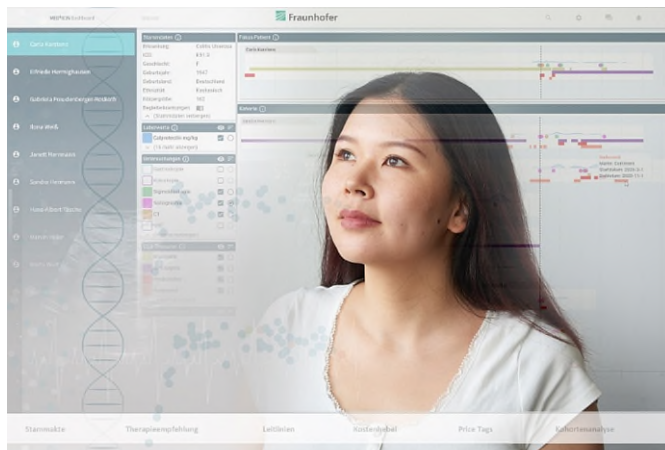
Fraunhofer Institute for Translational Medicine and Pharmacology ITMP

Project focus areas: medical expertise in harnessing data and knowledge

Fraunhofer ITMP contributes to the project by interpreting medical issues for developers and programmers, conducting evaluations and making the service usable for physicians. Objectives also include data acquisition management in line with the regulatory framework and data protection law, and the transformation of this data into readily available knowledge for day-to-day clinical practice with the help of our technological and logical data processing solutions.

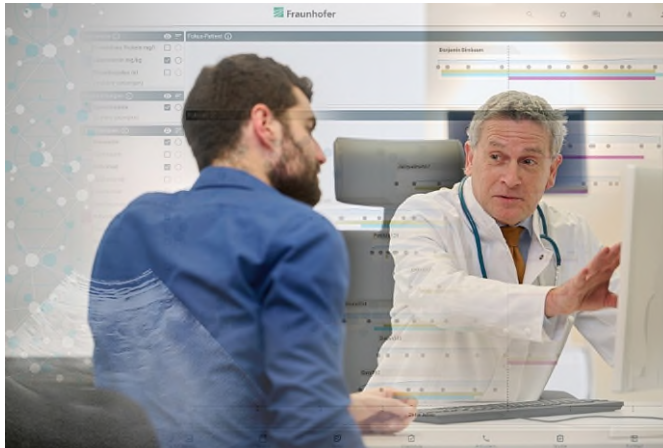
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Picture 1: The digital patient model developed as part of the Fraunhofer MED²ICIN lighthouse project showed promising results in practical testing. In July, the project participants will present the prototype in Frankfurt.

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Picture 2: The digital patient model from Fraunhofer's MED²ICIN lighthouse project enables personalized and cost-effective treatment, opening up new opportunities for the healthcare sector.

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