# Operation Digital

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**A unique research project involving one hundred scientists and industry partners is set to revolutionize the way cancer is treated. While artificial intelligence and digitalization will provide help, the individual will take center stage.**

A doctor's appointment at nine in the morning at the University Medical Center Mannheim. The diagnosis: an oligometastatic tumor. This is a cancer with minor, isolated scattering of the tumor, referred to as metastases. The treatment room is full of technology. An x-ray robot scans every millimeter of the man lying on the treatment table. High-resolution images are ready thirty minutes later. A robotic assistance system, into which the precision data that was only just collected is input, moves a biopsy needle to the position identified with pinpoint accuracy. The medical specialist now takes over. Immediately afterwards, the tissue removed undergoes a fully automated analysis. The members of the "tumor board," a committee of doctors from different disciplines, discuss the results and arrive at a unanimous decision on which therapy to pursue for each individual metastasis: radiotherapy, thermal therapy, or chemotherapy? The doctor performs the treatment with the assistance of the robot, fitted with the appropriate instrument. By 3 p.m., just six hours later, the patient has completed treatment.

What sounds like science fiction is actually more of a reality than anyone might suspect. An interdisciplinary project comprised of doctors, scientists, entrepreneurs, and consultants is systematically working on turning treatments like this into reality within the foreseeable future.

Globally, one out of every five men and one in every six women will receive a cancer diagnosis. For around 20 percent of those affected, the primary tumor will metastasize. For cases that are this severe, palliative treatment is frequently the only option at present. And this is the case for around 320,000 people in Germany every year. Fortunately, artificial intelligence and state-of-the-art robot technology are opening up new perspectives for the treatment of these patients. Professor Stefan Schönberg, Director of the Institute of Clinical Radiology and Nuclear Medicine at the University Medical Center Mannheim, is one of the specialists responsible for the research project. "We intend to extend the period for which cancer patients survive for many years using innovative therapeutic methods," he says. "Instead of being a terminal illness, cancer will become a chronic illness."

In order to edge closer to achieving this worthy objective, a hitherto unparalleled initiative has been launched. Almost one hundred scientists—including doctors, engineers, and data scientists—are developing new procedures for imaging, diagnostics, and therapy. Their insights are being combined in the experimental innovation space called M²OLIE (Mannheim Molecular Intervention Environment) at the University Medical Center Mannheim. This is also where the world's most advanced robotic x-ray system can be found, a system that utilizes a large variety of image data to screen and identify any suspicious changes in bodily tissue at an early stage. It is currently being trialed on a model of a human upper body at the research campus. Artificial intelligence is being used to analyze and evaluate the patient data. This allows a procedure to be carried out that is much more precise than previously conceivable. In the medium to long term, the treatment will be able to be calibrated exactly to the individual patient's pathology. State-of-the-art robotic assistance systems will assist with treatment. The examination of tissue samples serves as an example: even an experienced doctor often needs half an hour just to place a needle in the suspicious tissue precisely. In the future, a manipulator, guided and controlled by a specialist, will be able to complete this step in five minutes. "This will allow the time needed to treat the patients to be reduced, while at the same time making the therapy significantly more effective," says Schönberg. Twenty-four partners from industry and research have joined forces to work on the highly promising project, with funding provided by the Federal Ministry of Education and Research. Along with the universities of Mannheim and Heidelberg, the partners also include the Fraunhofer-Gesellschaft, the German Cancer Research Center, Carl Zeiss Meditec, KUKA robots, Maquet, and Siemens Healthineers. Consultants from Porsche Consulting are helping to introduce new process chains that will make fast diagnoses and treatment possible in one location.

"M²OLIE is turning specialists into team players. Our success is based on seamless cooperation between the individual areas of expertise under one roof," Schönberg notes. To ensure that the pilot project leads to functioning centers being set up all over Germany, the consultants are working on an agile organization and a positioning strategy. Schönberg formulates the principle that will guide this work as follows: "The individual always comes first."

## OUT OF THE PORSCHE CONSULTANTS' TOOLBOX

### Use Cases

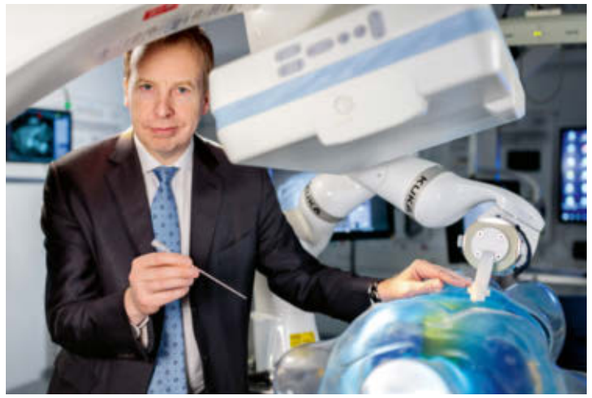
**Digital technologies will be used to reduce the patient turnover time from days to just a few hours. To do this, the Porsche consultants are identifying use cases, or specific opportunities to employ software-based solutions. For example, a digital planning tool that can illustrate and interlink all patient-based processes. In doing so, artificial intelligence will be used to optimize procedures and reduce waiting times.**

### Rapid Prototyping

**The rapid prototyping method originates in software development. The Porsche consultants are using it within the M²OLIE project to conduct rapid tests of how the previously identified usage cases function. What is known as a minimum viable product with basic functions can be programmed and tested within a short period of time.**

### Closed Loop

**Along with the procedures in the treatment room, a large number of other activities contribute to a patient's health. The consultants are therefore working on a holistic process model for what is referred to as the patient journey. This starts with recording and processing medical data using smart technology, involves data-based and automatic appointment organization in hospitals, and extends through to predictive maintenance of the technical equipment.**



A person's intuition and the precision of technology: Professor Stefan Schönberg *(left)* wants to see doctors and robot-based assistants working even closer together in the future, for example when a biopsy needle needs to be positioned.

**Video**
Operation Digital:
next25.de/EN/m2olie

**"Instead of being a terminal illness, cancer could become a chronic illness."**

**PROFESSOR STEFAN SCHÖNBERG**
Director of the Institute of Clinical Radiology and Nuclear Medicine, University Medical Center Mannheim