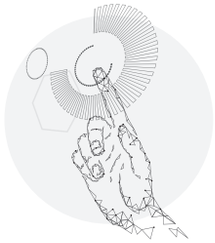
Sano is a new nonprofit research institute dedicated to the advancement of computational medicine, developing sophisticated computer methods for the prevention, diagnosis and treatment of disease, to meet the overarching worldwide need for efficient, effective and streamlined healthcare.

The mission of Sano:

Development of new computational methods, algorithms, models and technologies for personalized medicine



Introducing new diagnostic and therapeutic solutions based on computerized simulations into clinical practice

Fostering creation and growth of enterprises which develop cutting-edge diagnostic and therapeutic technologies

Contributing to novel training and education curricula which meet the needs of modern personalised medicine

Our Centre is co-created with:

The National Centre for Research and Development

CYFRONET

AGH

The University Of Sheffield.

INSIGNEO Institute for *in silico* Medicine

Klaster LifeScience Kraków

JÜLICH FORSCHUNGSZENTRUM

Fraunhofer ISI

Sano
Centre for Computational Personalised Medicine
International Research Foundation

Nawojki 11
30-072 Kraków
Poland

European Funds Smart Growth

Republic of Poland

FNP Foundation for Polish Science

European Union European Regional Development Fund

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857533 and is implemented as part of the International Research Agendas programme of the Foundation for Polish Science co-financed by the European Union under the European Regional Development Fund.

sano

Centre for Computational Medicine

We create computational technologies for optimised healthcare

Clinical Data Science

conducts research into improvements in decision making at all stages of patient interaction with the healthcare systems: analysis of data to provide differential diagnoses, data-driven estimation of risks of future morbidity, usage of patient data to determine the optimal treatment with predictions of its side effects, optimising risks and benefits of hospitalizations, and treatment monitoring. Working with the Personal Health research group will bring advances in real-time treatment data analysis to provide the likelihood of success based on patient-specific data.

Computer Vision Data Science

improves upon current advancements of computer-aided interpretation and analysis of visual information in medicine. Convolutional neural networks and deep learning have revolutionized computer vision applications and are positively impacting medical practice. AI-interpretation of radiologic images improves patient-specific accuracy, reduces radiologist burnout both as support to reach accurate and consistent expert-level decisions and a second opinion. Applications also include image interpretation during procedures such as endoscopy, AI-assisted surgery, automatic interpretation of digital pathology.

Personal Health Data Science's

research aims at shifting healthcare philosophy from reactive to proactive, as a part of the Healthcare 2050. People's tendency to be "online" generate growing amounts of data also health related. This presents a potential for creating a positive change in how people manage and influence their health. The long-term goal of this effort is to create a personal health tracker that collects health information and provides prediction of our future wellbeing.

Modelling & Simulation expands

research from the Virtual Physiological Human initiative. Unlike fully data-driven machine learning data science approaches a rich assortment of complementary modelling approaches will be utilized, including 3D, 1D and 0D models of fluid mechanics, Finite Element Analysis, Growth and Remodelling frameworks and Agent-Based Models of structural mechanics etc. This research area concentrates on the development of fundamental modelling tools and workflows, by simulating physiology, predicting multi-morbidity through integration with data science technologies.

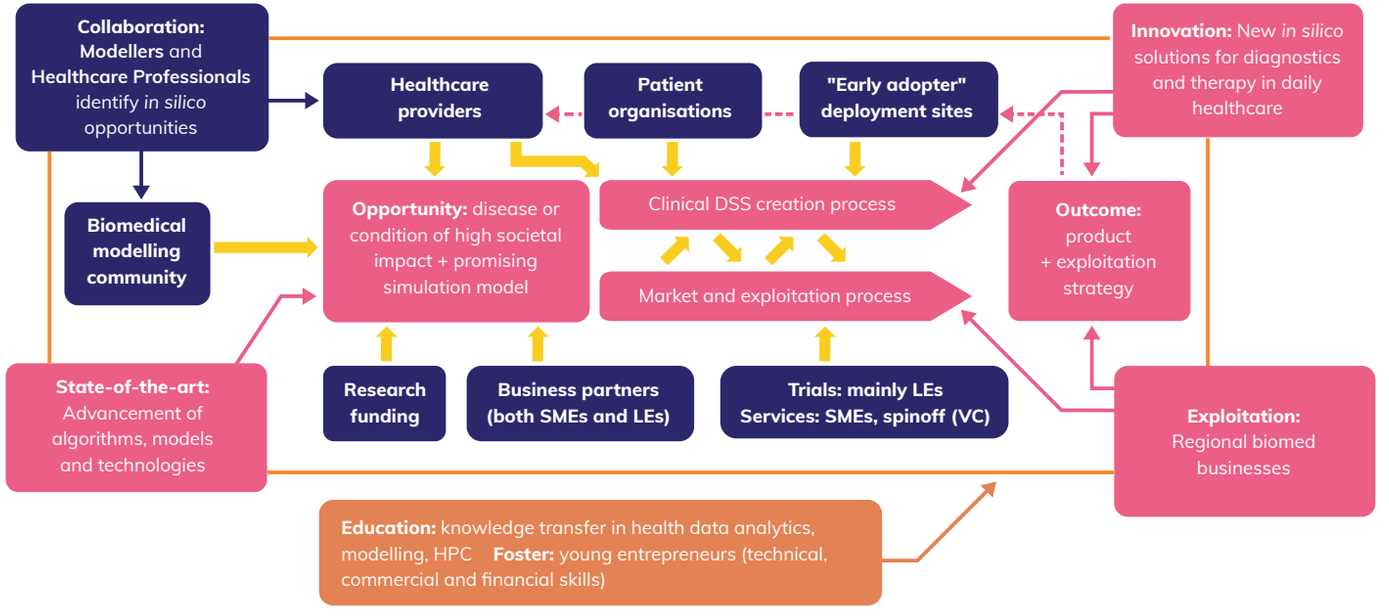
Health Informatics

manages the use of patient health data and deals with the resources, devices, and methods required to optimize acquisition, storage, retrieval, and use of information in medicine. This team concentrates on a new generation of approaches to medical communication and output incorporation of computational methods in medical workflows. Novel information exchange models between patients, their families, doctors, care teams are considered and investigated. Intuitive interfaces for improved understanding of health data and AI insights will be an important part of this effort.

Extreme-scale Data & Computing

works with new challenges for computer science and engineering, posed by the unique combination of Modelling & Simulation, Health Data Science and Health Informatics. Sano's research will push the boundaries of current state-of-the-art infrastructures for AI, HPC, big data and cloud computing. Especially the alignment of HPC with big data analytics and ML/AI workloads, using CPU, GPU, many-core, hybrid, virtualized and containerized environments with the needs of systems required to deliver patient care at timescales appropriate for clinical use. It will benefit from novel approaches in distributed computing and security research like Federated Learning, Blockchain, Differential Privacy or Encrypted Computation, which can be applied to medical data in a secure and privacy-conscious manner.

Value Chain



Expected Impacts of Computational Medicine