Smart Medical Information Technology for Healthcare

Medical care generates a lot of data that is collected during the treatment of patients and used for prognoses and diagnoses. Patients' data is also needed in research in order to carry out and evaluate new therapies and research methods. The Medical Informatics Initiative (MI-I), which was founded by the German Federal Ministry of Education and Research, creates the conditions for research and medical care to move closer together. To this end, four projects have been launched as part of MI-I: DIFUTURE, HiGHmed, MIRACUM and SMITH. Within each project, specific use cases are addressed in order to demonstrate and develop the possibilities of modern digital services and infrastructures in the healthcare sector. RWTH Aachen University is part of the SMITH project.

The aim of the project

Within the SMITH project, innovative IT solutions are being developed to improve medical patient care. With the help of data integration centres (DIZ) and a marketplace developed in the project, the interoperable use of data and patient-oriented research is made possible. Three use cases will be used to demonstrate the added value of this interoperability of data. In the first methodological use case “Phenotype pipeline” (PheP), innovative data analytical methods and tools are developed, which make medical data accessible.

Two clinical use cases are used to demonstrate the approach underlying the main objective. In the use case ASIC (Algorithmic Surveillance of ICU Patients), the data generated in intensive care units is continuously analysed in order to automatically monitor the condition of patients to enable rapid therapeutic intervention. The main focus is on Acute Respiratory Distress Syndrome (ARDS). ARDS has a very high mortality rate, which is mainly due to the fact that the disease is often detected too late. Automated monitoring is intended to enable early diagnosis and to consequently improve patient treatment.

The clinical use case HELP focuses on the goal-oriented use of antibiotics to combat bacterial infections at an early stage. Innovative technologies will be used to support infectious diseases in normal and intensive care units.

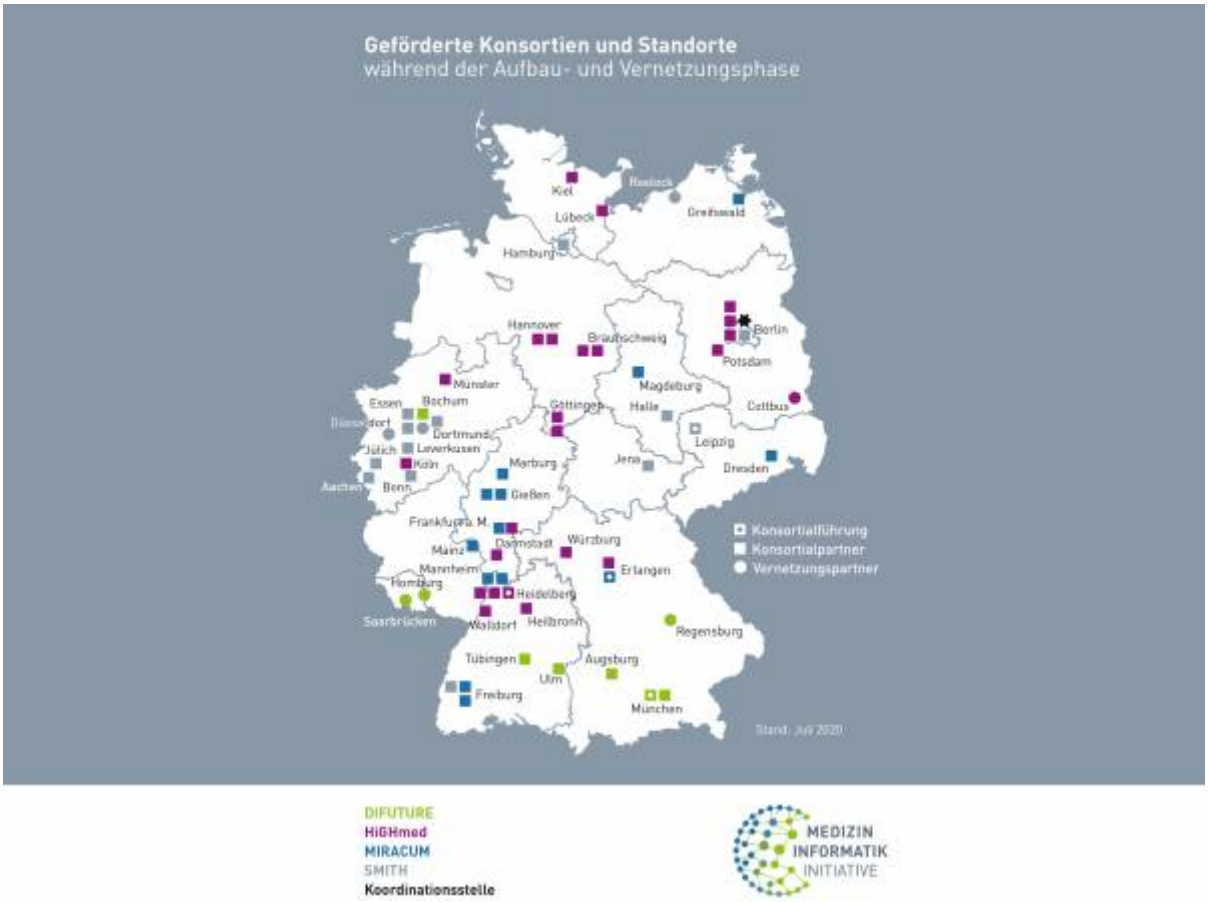
The work at the chair Informatik 11 takes place within the use case ASIC. Here you can find advertised theses.

Contact person: Simon Fonck, M.Sc. RWTH

Project Partners

- University Hospital Leipzig

- University Hospital RWTH Aachen
- List of all project partners in the consortium



Publications

Publications produced as part of the SMITH project:

[FFN+23]
PDFBIB

Fonck, S. A. M., Fritsch, S., Nottenkämper, G., and Stollenwerk, A., "Implementation of ResNet-50 for the Detection of ARDS in Chest X-Rays using transfer-learning", *Proceedings on automation in medical engineering*, vol. 2, iss. 1, p. 2, 2023

Implementation of ResNet-50 for the Detection of ARDS in Chest X-Rays using transfer-learning

Bibtex entry :

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@article {  FFN+23,
    author = { Fonck, Simon Ansgar Martin and Fritsch, Sebastian and
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PDFBIB

Fonck, S., Fritsch, S. J., Kowalewski, S., Hensen, R., and Stollenwerk, A., "Algorithmic distinction of ARDS and Heart Failure in ICU data from medical embedded systems by using a computer model", *IFAC-PapersOnLine*, vol. 54, iss. 4, pp. 135-140, 2021

Algorithmic distinction of ARDS and Heart Failure in ICU data from medical embedded systems by using a computer model

Bibtex entry :

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@article {  FFK+21,
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PDFBIB

Marx, G., Bickenbach, J., Fritsch, S. J., Kunze, J. B., Maassen, O., Deffge, S., Kistermann, J., Haferkamp, S. D., Lutz, I., Voellm, N. K., Lowitsch, V., Polzin, R., Sharafutdinov, K., Mayer, H., Kuepfer, L., Burghaus, R., Schmitt, W., Lippert, J., Riedel, M., Barakat, C., Stollenwerk, A., Fonck, S., Putensen, C., Zenker, S., Erdfelder, F., Grigutsch, D., Kram, R., Beyer, S., Kampe, K., Gewehr, J. E., Salman, F., Juers, P., Kluge, S., Tiller, D., Wisotzki, E., Gross, S., Homeister, L., Bloos, F., Scherag, A., Ammon, D., Mueller, S., Palm, J., Simon, P., Jahn, N., Loeffler, M., Wendt, T., Schuerholz, T., Groeber, P., and Schuppert, A., "Algorithmic surveillance of ICU patients with acute respiratory distress syndrome (ASIC) : protocol for a multicentre stepped-wedge cluster randomised quality improvement strategy", *BMJ open*, vol. 11, iss. 4, pp. 1-7, 2021

Algorithmic surveillance of ICU patients with acute respiratory distress syndrome (ASIC) : protocol for a multicentre stepped-wedge cluster randomised quality improvement strategy

Bibtex entry :

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[FD17]
PDFBIB

Fonck, S. A. M. and Deserno, T., "Modeling an IT Support for Handling Serious Adverse Events in Clinical Trials", in *Proc. MEDINFO 2017 : precision healthcare through informatics : proceedings of the 16th World Congress on Medical and Health Informatics / edited by Adi V. Gundlapalli (University of Utah/VA Salt Lake City Health Care System), Marie-Christine Jaulent (DR Inserm) and Dongsheng Zhao (Academy of Military Medical Science of China)*, Amsterdam, 2017 in Studies in health technology and informatics, IOS Press, pp. 1262-1262.

Modeling an IT Support for Handling Serious Adverse Events in Clinical Trials

Bibtex entry :

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@inproceedings {  FD17,
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[WSA+18]
PDFBIB

Winter, A., Stäubert, S., Ammon, D., Aiche, S., Beyan, O. D., Bischoff, V., Daumke, P., Decker, S. J., Funkat, G., Gewehr, J. E., de Greiff, A., Haferkamp, S. D., Hahn, U., Henkel, A., Kirsten, T., Klöss, T., Lippert, J., Löbe, M., Lowitsch, V., Maassen, O., Maschmann, J., Meister, S., Mikolajczyk, R., Nüchter, M., Pletz, M. W., Rahm, E., Riedel, M., Saleh, K., Schuppert, A., Smers, S., Stollenwerk, A., Uhlig, S., Wendt, T., Zenker, S., Fleig, W., Marx, G., Scherag, A., and Löffler, M., "Smart Medical Information Technology for Healthcare (SMITH) : Data Integration based on Interoperability Standards", *Methods of information in medicine*, vol. 57, iss. S 01, p. e92-e105, 2018

Smart Medical Information Technology for Healthcare (SMITH) : Data Integration based on Interoperability Standards

Bibtex entry :

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@article {  WSA+18,
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