Research on Clinical Decision Support Systems in Karlsruhe, Germany

Position Paper for the CHI'23 Workshop on Intelligent Data-Driven Health Interfaces

Henrik Mucha, Marie Bommersheim, Kai Westerkamp

Fraunhofer Institute of Optronics, System Technologies and Image Exploitation IOSB, Karlsruhe
firstname.lastname@iosb.fraunhofer.de

Arno Appenzeller

Karlsruhe Institute of Technology KIT, arno.appenzeller@kit.edu

Our research group works on clinical decision support systems (CDSS) for different clinical use cases. These are two focus areas and two projects relevant for this workshop:

(1) Human-centered and participatory design (PD) of CDSS: A central research question is how the actual interface design of CDSS can be better informed through evidence-based (interaction) design methods. We run experiments and workshops with actual users of CDSS to establish and validate user touchpoints in CDSS technology development. Henrik currently works on finishing his dissertation developing a design investigation methodology that seeks to facilitate systematically externalizing expert knowledge and making it accessible for grounding CDSS interface design decisions.

(2) Privacy and Data Standardization in CDSS: Privacy is a crucial area for CDSS when working with personal medical data. Besides several regulations that enforce a special treatment for medical data like GDPR or HIPAA, privacy is also a strong factor in terms of acceptance of patients. Arno currently works on finishing his PhD with the topic of technical ways for patient empowerment in those research areas.

(P1) MED²ICIN: We just finished working on this four-year Fraunhofer flagship project. A consortium of seven Fraunhofer Institutes developed a CDSS in close partnership with mainly the University Hospital of Frankfurt. The goal was to produce a proof-of-concept software system that can consolidate medical data on two use cases (chronic inflammatory bowel diseases and colorectal cancer) and provide analysis and decision support functionalities using this data.

(P2) DATACARE: Currently we are working on a consortium project to develop a concept for data sovereignty and informed consent for clinical research, integrating legal, clinical, economic and technical research expertise together with clinicians and patient representatives. The concept will be implemented into a proof-of-concept software application. Special attention is paid to stakeholder and especially patient participation and involvement.

Publications

Appenzeller A., Rode E., Krempel E., and Beyerer J. 2020. Enabling data sovereignty for patients through digital consent enforcement. In Proceedings of the 13th ACM International Conference on PErvasive Technologies Related to Assistive Environments (PETRA '20). Association for Computing Machinery, New York, NY, USA, Article 33, 1–4. https://doi.org/10.1145/3389189.3393745

Appenzeller A, Terzer N., Krempel E., and Beyerer J. 2022. Towards Private Medical Data Donations by Using Privacy Preserving Technologies. In Proceedings of the 15th International Conference on PErvasive Technologies Related to Assistive Environments (PETRA '22). Association for Computing Machinery, New York, NY, USA, 446–454. https://doi.org/10.1145/3529190.3534768

Appenzeller, A.; Hornung, M.; Kadow, T.; Krempel, E.; Beyerer, J. Sovereign Digital Consent through Privacy Impact Quantification and Dynamic Consent. Technologies 2022, 10, 35. https://doi.org/10.3390/technologies10010035

MED²ICIN Project Website (German) https://websites.fraunhofer.de/med2icin/ueber-das-projekt/

Mucha, H., Robert, S., Breitschwerdt, R., & Fellmann, M. 2022. Usability of Clinical Decision Support Systems. *Zeitschrift für Arbeitswissenschaft*, 1-10.

Mucha, H., Robert, S., Breitschwerdt, R., & Fellmann, M. (2021, May). Interfaces for Explanations in Human-AI Interaction: Proposing a Design Evaluation Approach. In *Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems* (pp. 1-6).

Mucha H., et al. 2022. How To Do The Right Thing? Participatory Design Past, Present & Futures: A Collaborative Paper by the German Participatory Design Community. iCom - Journal of Interactive Media. De Gruyter.