Optimization, Simulation and IT for Healthcare Processes and Services

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When we submitted the proposal for this minitrack, we did not know the effects the Covid pandemic would have on the world, including our research. It has put a strong emphasize on the importance of optimization, simulation and IT for healthcare processes and services. In many countries, a shortage of staff and intensive care beds on the one hand and unclear predictions about future demand has led to critical situations and high challenges for everyone involved.

Healthcare processes (e.g. patient pathways) and services in general are often very complex and can involve various parties within an organization or between organizations such as hospitals and other caregivers, as well as the patients. The design of services is often different from traditional service design – as for many healthcare services patients receive care, but insurance companies pay for it. Implementing processes in this domain should result in providing faster, safer and more effective care, necessitating organizing and sharing information among all participants involved in patient care. While the need for well-defined healthcare processes is clear, there are many obstacles and opportunities for research, including technical, behavioral, and organizational topics.

Operational Research approaches including mathematical programming and simulation modelling can help address and solve logistical challenges in designing and managing healthcare processes and services. While mathematical programming can give the optimal locations of ambulances or shift schedules for hospital doctors, simulation approaches are a crucial tool to analyze different scenarios and model complex settings like emergency departments or operating rooms.

Information technology (IT) has played an important role in enhancing productivity through coordination in many industries, such as manufacturing and services. Nowhere is this role more critical than in healthcare, where IT has the potential to improve patient health and, in many cases, save lives, through improved coordination between various parties such as hospitals, providers, and patients. However, use of IT in healthcare presents some unique challenges and issues.

This minitrack focusses on the analysis, design and optimization of healthcare processes, the use of IT to support and improve those processes as well as non-IT assets such as process changes, innovative IT artefacts, and interoperability standards.

In its third year (with slight changes in title and minitrack chairs), the minitrack again received a good number of high quality submissions of which we were able to accept four papers that show the variety of potential applications and research questions around healthcare processes and services, providing different perspectives on the role of optimization, simulation and information technology in improving these healthcare processes and services. Covered topics include Covid testing, machine learning, patient pathways, cancer care networks, workarounds in hospitals as well as emergency medical services. The minitrack comprises the following four papers:

1. *Minimizing the usage of SARS-CoV-2 lab test resources through test pooling enhanced by classification techniques* (Ana Cristina Garcia, Marcio de Oliveira Barros)
2. *Patient Pathways for Comprehensive Care Networks - A Development Method and Lessons from its Application in Oncology Care* (Peggy Richter, Hannes Schlieter)
3. *Seeing the Signs of Workarounds: A Mixed-Methods Approach to the Detection of Nurses' Process Deviations* (Iris Beerepoot, Xixi Lu, Inge van de Weerd, Hajo Alexander Reijers)
4. *Next Frontiers in Emergency Medical Services in Germany: Identifying Gaps between Academia and Practice* (Melanie Reuter-Oppermann, Clemens Wolff, Luisa Pumplun)

Due to the number of high quality submissions and the fact that the topic has gained even more interest during the pandemic, we aim to organize the minitrack again next year and we really hope to be able to organize the session in person then again in beautiful Hawaii.

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