

Digitization of Perioperative Surgical Flowsheets
(Technical Report)

Implementation of Electronic Medical Record Systems: The Factors that Lead to Failure
(STS Research Paper)

An Undergraduate Thesis Portfolio

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Bachelor of Science in Systems and Information Engineering

By

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Due April 24th, 2020

STS 4600: The Engineer, Ethics, and Professional Responsibility

Professor Laugelli

Socio-Technical Synthesis

My technical work and my STS research are both on systems that aim to transform the medical field with technology and digitize medical records. However, the two cases are quite different. The system built in my technical project does not make a big change to doctors' everyday work, whereas the case studied in the STS research completely changes the way that doctors collect medical data. Although the two systems do not operate in a similar way, they both have the same goal of improving healthcare systems with technology.

My technical project built a system which aids in digitizing the information contained in surgical flowsheets used at the University Teaching Hospital of Kigali (CHUK) in Rwanda. The system designed and developed by my capstone team consisted of a wooden scanning structure; a web application to upload images and securely transfer them to UVA for processing; image processing programs to digitize medication, blood pressure, heart rate and logistical data; and a PostgreSQL database system to store the digitized flowsheet data. This system allows doctors at CHUK to maintain their current workflow by providing them a simple method for scanning and uploading the flowsheets to be processed. It is more affordable than a fully automated system and does not drastically change their everyday routine. The digitization methods implemented in this project can also be employed for flowsheets in other hospitals in low- and middle-income countries (LMICs) in the future.

My STS research looked at the case of electronic medical records systems implemented at the Kilimanjaro Christian Medical Centre (KCMC) in Tanzania. My research focuses on how the implemented systems were designed without the real users in mind. The concept of User Configuration is employed to explain the difference between the ideal, configured user and the real, actual user. My claim is that failing to understand the actual users' values, needs, abilities, and demographics is the reason why the systems did not ultimately succeed. The goal of my research is to emphasize the importance of a user-centered approach when designing and developing a system.

Working on these two projects in tandem greatly added value to both. My technical work gave me a better understanding of how medical records are collected in hospitals and why it is important to digitize these data. This helped me provide accurate context and background for my research paper. Similarly, the research I conducted for my STS paper helped me see how important it is to understand the real users of the system. This led to the decision of us building a system that digitizes manually collected flowsheet data, instead of a fully automated system that completely abandons the part where doctors hand collect surgery data in operation rooms. In summary, working on both my STS research paper and my technical project together this past year has allowed me to understand the medical field better, and each work contributed to transformation in the field that we believe will happen in the near future.