

Thesis Project Portfolio

**Optimization of Patient Flow and Process for a Primary Care Clinic During the COVID-19
Pandemic**

(Technical Report)

The Impacts of Data and Informational Privacy on Consumer Trust and Behavior

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Spring, 2022

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Sociotechnical Synthesis

Design principles employed in all platforms, services, and products directly influence society's social interactions with technologies while simultaneously defining the user experience. As technologies continuously evolve over time, there is no single design postulate adherence that would reduce, or even eliminate, the need for designers and engineers to consider the complex needs of users. Thus, user-centered design, a practice that places users' needs at the core of product or service objectives and goals, provides the best framework to approach development of any system. Within this portfolio, there is one technical and one sociotechnical project that are united together with notions of user-centered design. The technical project investigates how healthcare system design and optimization influences patient flow and experiences within the Suite 2100 Clinics at the University of Virginia, or UVA, Health System while the sociotechnical work involves understanding how digital data privacy practices of online platforms influences consumer trust and behavior. Within the UVA Health clinics, the ongoing challenges afforded by the COVID-19 pandemic brought renewed focus to how the setup and process that patients follow can fundamentally change one's care experience; the technical report contains analysis regarding the current clinic state and metrics quantifying such state in the context of theoretical expectations. The sociotechnical aspect of the portfolio is described in an analysis structured by actor-network theory.

Many patient throughput inefficiencies in healthcare result from poor communication practices, inadequate understanding of optimizing healthcare systems to maximize efficiency, and long-term complications caused by the COVID-19 pandemic. The challenges precipitated by the pandemic, combined with the need to provide safe, high-quality care to patients, have further exacerbated existing patient flow and throughput issues. As these issues are not entirely unique

to UVA Health, the technical project aims to improve the patient experience in primary care clinic settings and reduce the stress placed on providers, nurses, and staff. The authors implemented a two-phased approach that combined qualitative observations with quantitative data analysis, developed a robust methodology for understanding the University Physicians of Charlottesville (UPC) Clinic's processes, and produced structured insights for stakeholders.

The researchers established what components comprised a typical patient's journey through the primary care clinic system intake through qualitative clinic observations: pre-registration, check-in, and rooming. In contrast to the qualitative observations, the quantitative analysis encompassed the complete patient experience, outscoping to include appointment durations and check-out. All quantitative analyses relied on data from the University of Virginia (UVA) Health's electronic medical record (EMR) system, Epic. In addition to the qualitative analyses, the authors utilized Cadence reports and appointment scheduling data to understand patient flow through the UPC Clinic. Primarily, the data are utilized to understand the distributions between the different patient flow milestones of registration, clinic check-in, rooming, and check-out and what factors, if any, were statistically significant. This approach enables modeling and visualizations of patient arrival times, wait times between arrival and rooming, and other relevant bottlenecks in the flow process.

Throughout the twenty-first century, personal technologies have and continue to develop and expand in adoption at an exponential rate. These technologies, such as social media and other online-based platforms, often rely upon a trove of personal user data for targeted recommendations and advertisements. Although these services have privacy policies and notices, their complexities often lead consumers to blind acceptance with limited to no awareness of the terms. As society continues to shift towards an ecosystem of big data, it is imperative to analyze

the research question of what implications data privacy practices, whether in actuality or perception, have on consumer trust and behavior within the United States. This understanding through a sociotechnical analysis will enable services to be designed from a user-centric methodology to ensure that consumers retain control of their personal data. The extensive entanglement of consumers, companies, government policies, and other actors leads to the use of actor-network theory, or ANT. Comprehensive analysis with ANT unearths the power imbalance that favors producers over consumers, a lack of governmental regulation and oversight, and how consumer behavior is influenced by privacy practices. This sociotechnical analysis regarding data privacy will support structural changes in the future to provide increased transparency and autonomy over one's own private information.

Although healthcare and digital technologies are often thought to be two separate entities, they both are rooted in the mission to provide a service to their target customers. As healthcare and digital platforms are uniquely complex by nature, the design choices made, whether with regards to patient flow or digital technology privacy practices, shape the user experience and lead to impacts on their respective behavior. Studying both topics in tandem reinforces the idea of how user-centered design should not be limited to only certain fields, such as user interface design, but rather become widespread across all industries that aim to serve end-users. In addition, the sociotechnical analysis inspired thoughtful consideration of how defined goals and curated recommendations for the Suite 2100 clinics have a significant sociotechnical impact in addition to the underlying business motivations. This culmination of knowledge further enhances the literature available to scholars, researchers, and industry professionals concerning a holistic approach to user-centered system design.