



Ph.D. DISSERTATION DEFENSE

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School/Department	School of Systems Engineering and Enterprises
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Title	Advancing Resilience and Adaptability in Healthcare: Systems Thinking, Human-Technology Interactions, and Governance
Chairperson	Dr. Onur Asan, School of Systems Engineering and Enterprises, Stevens Institute of Technology Dr. Mo Mansouri, School of Systems Engineering and Enterprises, Stevens Institute of Technology
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ABSTRACT

As the world faces ongoing rapid changes and unforeseen crises, it is crucial to develop a comprehensive understanding of the interconnectedness of systems and the critical role of human-technology-governance interactions in shaping the resilience of complex systems. In addressing these challenges, this dissertation adopts systems thinking as its foundational approach, guiding the examination of intricate relationships and their implications to expedite digital transformation in complex healthcare systems.

First, this dissertation proposes a qualitative system dynamics model in the form of a causal loop diagram to emphasize the spread of COVID-19 under the interaction and interconnectedness of socio-technical systems, human activities, and governance systems. This model enables a thorough understanding of factors influencing the pandemic's dynamics and emphasizes the need for adaptive policies and advanced technologies to address the evolving crisis. Building upon the increased reliance on digital solutions, this dissertation further explores the factors affecting telemedicine adoption using a nationwide survey, revealing that ease of use, utilization, tools, facilitating conditions, technology access, and quality of care significantly influence adoption from physicians' perspectives.

Second, as digital transformation encompasses various aspects of the healthcare ecosystem, the role of artificial intelligence (AI) becomes increasingly important. This dissertation further investigates the patients' perceptions towards clinical AI-driven healthcare solutions by a moderated mediation model. This dissertation highlights the importance of addressing concerns about AI misuse and abuse, as well as building trust in clinical AI systems to improve patient outcomes and ensure the successful implementation of AI in healthcare.

Recognizing the growing application of home-based AI solutions and the fact that chronic patients are one of the primary users of such systems, the third part of this dissertation explores factors influencing chronic patients' motivation to adopt home-based AI care systems using a mixed-



methods approach. It emphasizes addressing privacy concerns and establishing accountability to encourage adoption. Results show that patients desire personalized, accessible, and multi-functional AI care within a collaborative and ethical ecosystem. Integrating these insights can help fill the research gap and develop patient-centered AI systems to improve chronic care, reduce resource shortages, and benefit numerous patients.