**Executive Summary**

The real estate industry has undergone significant digital transformation in recent years, driven by technological innovation and accelerated by the COVID-19 pandemic. As buyers, sellers, and agents increasingly interact through online platforms, the need for scalable, efficient, and transparent digital tools has grown. These changes have not only improved operational efficiency but have also introduced new challenges, from diminished roles for real estate agents to allegations of algorithmic price-fixing. This thesis portfolio explores two aspects of this transformation. The technical project addresses how enterprise systems in real estate can be modernized to better support internal operations and reduce manual workload. Meanwhile, the STS research investigates how online real estate marketplaces like Homes.com and Apartments.com have reshaped stakeholder roles and pricing dynamics, revealing broader sociotechnical impacts on market behavior. Together, these projects reflect the increasing influence of software in redefining how real estate is managed, marketed, and experienced by users across the industry.

The technical report, titled *Streamlining Internal Finance Operations: Developing a Micro-Frontend Solution in CoStar Group's Web Enterprise Application*, documents the creation of a user interface (UI) to support the migration of customer financial data from Navision to Oracle Cloud. Previously, backend teams had to manually sync updates, an inefficient and error-prone process. To address this, I designed and implemented a micro-frontend within CoStar's enterprise platform, enabling finance teams to independently initiate data syncing tasks. Following the Software Development Life Cycle (SDLC), I collaborated with stakeholders to gather requirements, created mock-ups using Figma, built the UI using React, and integrated backend endpoints. Post-deployment feedback showed immediate utility: over 50 internal users successfully used the tool within the first day, reducing the technical burden on backend developers. The project bridged the gap between technical and non-technical users, promoting operational autonomy and aligning with CoStar's digital modernization efforts. Future improvements include safeguards to prevent duplicate entries and unauthorized updates, supporting the scalability of the tool in high-traffic environments.

The STS research paper, *Digital Disruption in Real Estate: How Online Marketplaces Reshaped Stakeholder Roles and Pricing Dynamics After COVID-19*, examines how digital platforms transformed the real estate landscape, particularly in the wake of the pandemic. Using a sociotechnical lens and Actor-Network Theory (ANT), I conducted a qualitative case study of Homes.com and Apartments.com, analyzing platform updates, marketing strategies, and evolving stakeholder dynamics. I found that virtual tours, AI-powered recommendations, and algorithmic pricing tools empowered buyers with more transparent and accessible data while placing new pressures on sellers to remain competitive. Meanwhile, real estate agents adapted to reduced roles as gatekeepers, shifting toward digital consultancy and client engagement through tech platforms. Legal scrutiny surrounding pricing software, especially the DOJ's case against RealPage, highlighted concerns about algorithm-driven price-fixing, raising questions about the ethics and competitiveness of digital marketplaces. Ultimately, my research shows that while these platforms democratize access to information, they also disrupt traditional stakeholder roles and raise regulatory challenges in an increasingly data-driven market.

Together, these two projects offer insight into the broader digital transformation of real estate -- from internal enterprise modernization to external market disruptions. Both emphasize the power of software to streamline operations, improve user experience, and drive organizational change, while also surfacing ethical, legal, and structural implications. My technical project contributes a practical solution that enhances efficiency for internal finance teams, demonstrating how targeted software development can reduce manual processes and empower non-technical users. My STS research complements this by critically examining how similar technologies, when scaled to consumer-facing platforms, alter stakeholder relationships and market behaviors -- sometimes in ways that raise regulatory or ethical concerns. Taken together, these projects reflect my broader interest in the intersection of technology, business operations, and social systems. Although I achieved the primary goals I set for both projects, future work could explore how companies can design digital tools that are both operationally effective and socially responsible. For technical teams, this might involve building greater transparency into algorithms; for researchers, it may mean investigating how stakeholders adapt to rapidly shifting digital environments. Ultimately, these projects have shown me the importance of interdisciplinary thinking in technology development, where solving practical problems must go hand in hand with anticipating social consequences.

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