Thesis Project Portfolio

Modernizing Existing In-Store Legacy Stipulation Document Approval System

(Technical Report)

Evaluating the Importance of Legacy System Platform Modernization

(STS Research Paper)

An Undergraduate Thesis

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Introduction

My technical project and STS research project relate to each other as they both involve legacy system platforms and their modernization within the context of organizations that utilize them. My technical project involved modernizing an existing legacy system that was in use by CarMax that handles the submission and approval of stipulation documents. For my STS research, I evaluated the importance of organizations developing plans to modernize their legacy systems. I became interested in this topic after my modernization efforts at CarMax and thought that researching it for the STS portion of my thesis would be helpful by allowing me to gain a deeper understanding of the topic.

Project Summaries

The objective of my technical project was to design and develop a microsite and service that would allow customers to submit stipulation documents required by CarMax and its lenders when they are interested in purchasing a vehicle and would also allow CarMax sales employees and managers to review and approve these documents. This would allow CarMax to replace their existing legacy system platform, which is expensive to maintain, inefficient, and incompatible with other systems, and this would have the same functionality as the existing legacy system. The project was completed as a team of 11 people, which included software engineers, quality engineers, designers, product managers, and delivery managers. During my internship at CarMax, my team worked to develop a minimum viable product (MVP) of this site that consisted of multiple components: the stipulation card stepper page, which lists the customer's information, the required stipulation documents for a particular customer, and the review/approval status of each document; the document viewer, which shows each customer-submitted stipulation document and provides the employees and managers a dropdown menu to

approve the document, decline the document, or request additional documents; the final confirmation modal, which asks the employee or manager whether they are sure they would like to submit the stipulation documents to the business office; and the submission confirmation page. My team utilized various web frameworks, programming languages, and tools to achieve this, including the ReactJS web framework for the microsite front-end, the ASP.NET Core framework and the C# programming language for the microservice back-end, and Microsoft Azure App Services for hosting the web application. This tool is undergoing testing in select CarMax retail stores before it is released to all stores nationwide. This allows for a feedback loop in which the sales managers and associates provide feedback on the tool and the CarMax Technology team(s) iterate on and improve the product, which will ultimately provide a more efficient document approval process, both for the customer and for sales managers and associates.

In my STS research, I examined at the importance of organizations taking the time to modernize their existing legacy system platforms. Since most businesses still rely on these systems for their essential business processes, I thought it would be important to learn more about what legacy systems are, why organizations still use them, the importance of modernizing legacy systems, and some of the methods that organizations can use to modernize their legacy systems. In my research, I focused on two main areas pertaining to this topic. The first is the various methods that businesses can utilize to modernize their legacy system platforms. Since most businesses modernize their existing systems by developing applications that feature the microservices architecture, I decided to start this section by defining the microservices architecture, including its purpose, its defining characteristics, and its advantages and disadvantages, before exploring the many ways in which organizations can take advantage of this architecture to modernize their existing systems. The second area that I focused on in my

research was the differing perceptions of legacy systems and their modernization between people in academia and practitioners in the industry. I utilized a study in which the researcher surveyed people in academia and in the industry by asking them about their definition of a legacy system, perceived benefits of legacy systems, reasons for modernization, and challenges of modernization. Although there has been a lot of research and work done in the area of legacy system modernization, it is clear that there is a lot of work to be done and many differing perceptions and opinions that need to be reconciled.

Conclusion

I believe that I have learned a lot from both my technical project and my STS research project. My technical project was an invaluable experience since I was exposed to a plethora of web frameworks, programming languages, and technical tools and since I learned how to work on and communicate with a cross-functional team of engineers, designers, project managers, and delivery managers. My STS research provided me with a greater understanding of what legacy systems are, why organizations still use them, the importance of modernizing a legacy system, and some of the methods that organizations can use to modernize their legacy systems. Additionally, it allowed me to learn more about the disconnect between people in academia and practitioners in the industry when it came to the perception of legacy system platforms and their modernization. Prior to my research, the only knowledge that I had of legacy system platforms and their modernization was through my internship experience at CarMax. I had never previously considered how many businesses still use legacy systems today and how much debate there is around the modernization of these critical systems. My STS research enlightened me on the topic of legacy system modernization as well as the importance of organizations modernizing their systems to keep up with the ever-changing demands of their business.