Thesis Project Portfolio

Increasing Efficiency through Package Deployment Automation

(Technical Report)

Analyzing Approaches to Engineering Education

(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

My technical and STS research projects are connected by the sociotechnical framework of "imaginaries". In my research, I analyze the imaginaries involved in the education of engineers and consider what material is best suited for engineers' learning. My analysis maintains the education of engineers as the sociotechnical order and the differing views of what engineers should learn in school as the collective assumptions. My technical thesis describes my automation work at SES Satellites and explores the recent move towards automation and Agile by software and other tech companies. My STS thesis discusses alternative curriculums that could be taught to engineers to better prepare them for the workforce, the advantages and disadvantages of each curriculum, and their respective stakeholders. Both my projects are necessary for my argument because they contextualize my viewpoint, the automation movement, and stakeholders which all help the reader consider all (even social) factors before coming to a decision for their preferred engineering curriculum.

My technical project aimed to automate the deployment process for the SES's products using automation tools like Bamboo, Nexus, Ansible, and Docker. My project resulted in a pipeline that automatically pushes products from the development stage, through the testing and simulation stages, and to the production stage. This automation saves SES time and manual labor. Through this work, I learned that many other software and tech companies are using the same tools to automate their systems. However, I never learned these tools in my higher education courses, creating a steep learning curve. I began to wonder if it would have been more beneficial for my engineering education to teach me how to use these popular tools instead of focusing on developing my fundamental and/or holistic knowledge.

My STS thesis debates which engineering curriculum is best suited for engineering students enrolled in institutions of higher education, mainly considering engineering curriculums centering around problem-solving, holistic learning, corporate software and methodologies (like my new perspective gained from SES), and individually-tailored learning. This discussion considers the long-term and short-term impacts of each approach and their respective stakeholders. I largely focus on the Accreditation Board for Engineering and Technology (ABET) as a stakeholder since this organization provides engineering curriculum guidelines that affect all engineering schools. I also explore disruptive, untraditional engineering curriculums that work well like those implemented at Northeastern University and Purdue University. The goal of this research is to provide readers with enough context on the issue of engineering education to be able to make their own decision about which curriculum is best for engineers.

By exploring these 2 projects, I was able to broaden my perspective of engineering education and provide enough data to form an opinion about the engineering curriculum best-suited for engineers. I experienced first-hand the shortcomings of a deficient engineering curriculum and researched the impacts of alternative curriculums that could be used to fix the problems I encountered. Many stakeholders assume what engineers want and need but, ultimately, it may be best just to ask the students, themselves, what they need.