Employing Predictive Trend Analysis to Decrease Construction Schedule Delay
(Technical Report)

Actor-Network Theory & Punctualization in Boston's "Big Dig"
(STS Research Paper)

An Undergraduate Thesis Portfolio

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By

Zachary McLane

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Zachary McLane

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Socio-technical Synthesis: Reducing Construction Delay and Boston's "Big Dig"

My technical work and my STS research are related in that they both focus on analyzing delays experienced in construction projects. Delays during construction projects can have significant consequences, mostly monetary. This is the main topic of both of my works, but they differ in the exploratory approach. My technical work focuses on three smaller-scale projects, analyzing data that was gleaned from project schedules to generate recommendations for reducing delays and their impact. My research, however, explores a large-scale construction project and several factors that contributed to its severe delay and cost overrun. While both works focus on the same topic, the way in which it is explored differs.

My technical work explores three smaller-scale projects overseen by a local construction firm, Hourigan. The capstone team was provided with project schedule data, contract data, and other relevant items for analysis. The capstone team also conducted interviews with various project managers and superintendents for anecdotal evidence. For each project, a spreadsheet was created with every delayed activity present in the project schedules and these delays were categorized by their cause, determined through anecdotal evidence gained from the interviews. Statistical analysis, mainly analysis of variance (ANOVA), was conducted to identify which factors or causes stood out or were the most influential. The three most impactful factors were found to be the subcontractor, the designer, and the owner. By comparing the main causes of delay for each project, the capstone team then generated recommendations to help Hourigan stop similar delays from occurring or reduce the severity of these delays in future projects.

My STS research explores the Central Artery/Tunnel (CA/T) Project in Boston, also known as the "Big Dig." It was one of the largest highway projects in the history of the United States and its completion was delayed almost nine years, with its final cost nearly tripling the initial estimate, when adjusted for inflation. Unlike my technical project, my research on this case did not use project schedule data, as it is not available to the public. My research explores three factors that helped contribute to the severe time and cost overrun of the CA/T Project: quality of life mitigation, subsurface conditions, and the presence of rats. By using the science, technology, and society (STS) framework of actor-network theory and Cressman's concept of punctualization, I sequestered each factor into individual micro-networks for exploration. I used the case of the CA/T Project to claim that the failure to consider all heterogeneous actors within a network may cause that network to destabilize and have critical consequences, seen in the form of time and cost overruns.

I have found that working on each project helped me on the other. From collaborating with my capstone team on the technical work, I gained a lot of insight and knowledge into the construction industry that I did not have previously, as I am a Systems Engineering major. This newfound knowledge helped better inform my STS research. Similarly, from exploring how networks are built and sustained on construction projects, especially in the case of the CA/T Project, I was able to transfer that knowledge into my technical work and recommendations. Working on both of these projects simultaneously helped me better each work, explore a new field, and learn how I can apply systems thinking to different topics.

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