Bridge Rehabilitation/Replacement Using Accelerated Bridge Construction Methods
(Technical Paper)

Leadership in Project Management: Applying Organizational Behavior to the Workplace
(STS Paper)

A Thesis Prospectus Submitted to the

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Technical Topic Introduction

Problem Statement

The Virginia Department of Transportation (VDOT) intends to replace the US Route 250 bridge over Little Ivy Creek, just west of Charlottesville, Virginia. Built in 1932, the bridge currently experiences an average daily traffic of approximately 11,500 vehicles. Any rehabilitation and/or replacement activities performed on this bridge will necessarily restrict traffic along this well-travelled route from Charlottesville to Crozet, Virginia. VDOT estimates that conventional construction methods would require restricting traffic across the bridge to a one-lane, signalized passage for three months. In public meetings, VDOT has been asked to find a solution that limits traffic impacts to a maximum of 2 weeks. Our team has been asked to examine the problem in detail, and determine and design a suitable solution.

This problem is both technical and social in nature. The bridge and its foundation must be structurally sound. The design, construction methods, and construction sequencing implemented must be feasible. However, public and economic pressures also dictate a focus on minimizing the traffic impacts of construction. The effects of restricting traffic are varied; the time and money lost can have negative effects on the area's economy and resident's quality of life. These social consequences must be considered when making technical decisions. In addition, there will be social challenges internal to the project team. Leadership, teamwork, and communication among team members will be necessary for project success. How project managers can build project teams strong in these skills relates to my Sociotechnical Report, thereby connecting the two sections of my Thesis.

Project Scope

The importance of developing a project scope cannot be understated. According to a paper presented at the Project Management Institute Global Congress, the project scope helps ensure, "all of the required work and only the required work necessary to complete the project is accomplished. Any work that does not support the needs of the project is Out of Scope and should not be performed" (Burek, 2006). Using research, discussion with the project advisors, and critical analysis of the problem statement, we defined four primary areas of work (AOW) for our project. These AOW are as follows: geotechnical engineering and design, structural engineering and design, cost/benefit analyses of design and construction methods, and constructability assessments and analyses of design and construction methods. The geotechnical AOW includes examining the existing geotechnical conditions, as well as determining and designing any changes to the existing conditions that may become necessary as the project design develops. The structural AOW encompasses all substructure and superstructure engineering calculations and design work. Cost/benefit analyses will be used when making choices between design alternatives as well as construction methods. Finally, the constructability AOW will inform all cost/benefit analyses and ensure that the final design and construction methods are realistic and feasible. The project team summarized our scope with a Project Goal Statement, "To provide a structurally sound replacement / rehabilitation of Rt. 250 bridge over Little Ivy Creek with minimal time disruption to the travelling public, in a safe and cost-effective manner" (Gutridge, 2019).

Current Progress

After a project scope had been defined, the team performed initial research to familiarize ourselves with various ABC methods. The primary resource our team has used at present is the Federal Highway Administration (FHWA) *Accelerated Bridge Construction Final Manual*. The FHWA defines ABC as, "bridge construction that uses innovative planning, design, materials, and construction methods in a safe and cost-effective manner to reduce the onsite construction time that occurs when building new bridges or replacing and rehabilitating existing bridges" (FHWA, 2011). By reducing onsite construction time, ABC minimizes traffic impacts, which is an integral part of our Project Goal Statement. With approval from our technical advisors, it was decided to assume the use of ABC methods for our project. This assumption will be supported in the final Technical Report by a summary and analysis of VDOT's existing research into the decision to use ABC methods for this project. Documents regarding the existing bridge condition were also provided by our technical advisors at our request. These included bridge inspection reports, geotechnical reports, and the original bridge plans, and will be cited in the final Technical Report.

A project schedule was developed using the following process. First, work items were defined and ordered from beginning of project to final deliverable. Then, where possible, work items were scheduled to be completed simultaneously by different project sub-teams. Finally, team members were assigned to each work item. Individual work items will be scheduled in greater detail as they are encountered. The final project schedule shows an expected project completion date of April 17th, 2020 (Gutridge, 2019).

An analysis of existing bridge conditions was performed by the structural sub-team. This analysis resulted in loading estimates for the bridge and foundation, and a decision to replace rather than rehabilitate the bridge. While the structure could potentially be rehabilitated, this would only extend its lifespan a short time. The structure would still need replaced in the near future, necessitating traffic disruption once again. The project team considers preventing these future traffic impacts to be sufficient justification to replace the bridge at this time. Loading estimates were calculated only for use in development of structurally sound design alternatives. More accurate load calculations will be performed at a later time, and included in the final Technical Report. Simultaneously, our geotechnical sub-team used the provided geotechnical boring logs and reference materials to summarize the soil bearing capacity on-site at various soil depths. This information will later be used in determining suitable substructure foundation alternatives. In addition, the constructability sub-team has determined that a construction yard at the project site is not feasible due to the limited land availability, and impacts to the local community; namely shops, a country club, and a church. Therefore, all ABC modules must come to the site pre-fabricated. The availability of high quality precast concrete modules was found to outweigh the availability of prefabricated steel modules in the nearby Virginia area, and was therefore the material of choice.

Future Work

The project team is currently developing structurally sound design alternatives, and performing cost/benefit analyses on these alternatives. Cost, constructability, environmental effects, traffic impacts, and other factors will be considered during these analyses. A final conceptual design will be chosen by the end of fall semester, and will be developed into a “ready for construction” design and construction sequence in Spring 2020.

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STS Topic

Acknowledgements, Peer Review, and Comments

I would like to take the time to acknowledge the project managers, leaders, and mentors I have encountered in my life, specifically Alan Kush and Matt Weider. While they have not directly contributed to this work, their example and the example of those like them has led to my interest in the topic of this prospectus.

I did not receive any peer review on this work. However, I would like to thank my entire STS 4500 class for their prospectus presentations and the resulting discussions. From these, I was reminded of the concept of tacit knowledge, and therefore decided to research its potential implications for my prospectus.

I am very appreciative of the comments I received from Prof. Michael Gorman on my initial draft of this paper. I will respond to these comments in the paragraphs below.

Prof. Gorman suggested that I explain further how the STS framework of organizational behavior helps with my STS project itself. This led to several changes within my prospectus. Firstly, it changed my thought process to focus on organizational behavior as an STS framework in and of itself, instead of a part of my topic that had to be framed within what some might consider a more “traditional” STS framework. I therefore chose to increase my focus on organizational behavior, and remove actor-network theory from the scope of my prospectus. I also added additional information regarding organizational behavior itself.

Prof. Gorman questioned whether a project manager supervising multiple teams on a single project would need to be the leader of an individual team, and if this would cause a

conflict of interest with regards to distribution of project resources. I would suggest that a project manager in this situation should do their best to act as a leader in equal measure for all of the teams under their management. Effectively, they should endeavor to lead the larger "team" created by the smaller "sub-teams". While this is an excellent question, I do not consider discussion of this specific situation to be within the intended scope of my Sociotechnical Report.

Whether knowledge and implementation of organizational behavior is necessary and sufficient for project managers to become team leaders is a significant question posed by my prospectus, and will be fully researched in my final STS report. I have chosen to continue using the term "necessary and sufficient" instead of "obligatory point of passage" or "inevitable point of passage" in relation to this point. The intent of this decision is to remove any possible confusion with these terms slightly more complicated meanings in the context of actor-network theory.

After discussion with Prof. Gorman regarding IRBs, I have elected not to include the use of direct interviews in my prospectus or STS report. Their inclusion would not add enough substance to my work to justify the time they would require. This time will instead be spent researching other case studies of leadership.

Introduction

According to the Project Management Institute, a project possesses two defining features; a project is both temporary and unique. Project management is the "application of knowledge, skills, tools, and techniques to project activities to meet the project requirements" (PMI, 2019). Project managers are then simply defined as individuals who perform project management. Project managers bring projects to life, driving change and progress in an increasingly fast paced

world. As the rate of change increases due to technology and global connectivity, so too does the focus on projects over day-to-day routine operations.

Kevin Kruse, writing for Forbes, defines leadership as, “a process of social influence, which maximizes the efforts of others, towards the achievement of a goal” (Kruse, 2013). A leader uses their influence with others to maximize their individual and collaborative efforts to reach a goal. This report will only discuss leadership as it relates to project management. Within the confines of that scope, leadership is the social side of project management. Leaders leverage project teams to improve project outcomes. To provide clarity within this prospectus and my Sociotechical Report, we will make the following separation; project managers only manage project’s technical aspects, while project leaders also influence people to improve project outcomes.

Organizational behavior is the study of human behavior within an organization at the individual, group, and organizational level, with the intention to explain and predict behavior (College of St. Scholastica, 2016). Organizational behavior examines how people affect organization’s development and success, and vice versa. It is both an academic and professional discipline, often intertwined with the subject fields of management and leadership.

Organizational behavior as a unique discipline had its beginnings in the early 20th century. During this time, the focus of managers and managerial science was on “Command and Control” style management. Workers were assumed to naturally dislike work, be prone to laziness, and only be motivated by financial gain. Frederick Taylor, the father of scientific management, stressed the importance of employees obeying the orders of management

immediately and without question. While social factors at work were not considered, this early work paved the way for future research into workplace behavior (Nahavandi, et al. 2015).

The importance of humanistic and social factors in the workplace was shown in the 1927 Hawthorne studies. Performed by Harvard researchers, these studies explored the effects of different lighting on worker efficiency. Their results showed that, so long as workers could see to work, all lighting changes increased productivity. Follow-up interviews with the employees over several years led researchers to make two conclusions. First, people change their behavior when they are aware they are being observed; this is called the Hawthorne effect. Second, that relationships could affect the behavior of workers. The Hawthorne studies, "showed that human behavior and motivation are complex, and are influenced by attitudes and feelings, the meaning people assign to their work, and their relationships at work" (Nahavandi, et al. 2015).

The following decades confirmed and built upon the findings of the Hawthorne studies, while also drawing from work performed in other social sciences, such as sociology and psychology. Douglas McGregor developed the "Theory X" and "Theory Y" models of management. "Theory X" was the "Command and Control" model popular in the early 20th century. "Theory Y" modeled individuals as active and interested in their organizations. This model allowed for consideration of social factors when considering motivation, efficiency, and productivity. In addition, models such as Maslow's Hierarchy of Needs were imported from other disciplines to help examine the social factors considered in "Theory Y" (Nahavandi, et al. 2015).

The humanistic approach to organizational behavior has flourished in the modern era. Since the 1990s, a significant focus has been placed on positive organizational behavior.

Building organizations of happy, fulfilled employees trusting each other and working together is the goal of positive organizational behavior, which focuses on the strengths and positive qualities of the "human condition" within organizations. While financial motivations and the existence of what could be considered "negative" emotions within organizations are not ignored, the goal is to "accentuate the positive" in order to maximize organization and individual outcomes (Nahavandi, et al. 2015).

Scope of Research

My Sociotechnical Report will examine the relationships between organizational behavior, project management, and leadership. Specifically, my report will investigate and seek to answer where possible the questions posed below.

Is organizational behavior a tool project managers can use to become leaders? Is the application of organizational behavior necessary, sufficient, or both, for project managers to lead project teams? If this is not the case, what other factors are involved in developing the capability to lead project teams?

I also intend to research the difference between the codified, explicit knowledge of organizational behavior, and the tacit knowledge gained only through experience as an employee, manager, and attempting to lead project teams. To what degree are both types of knowledge necessary for the development of leadership skills in project managers?

Future Research

Future research will be performed using the following methodology. Case studies of project management and/or leadership will be presented. These case studies will be sourced from

the book *Tribal Leadership* (Logan et al., 2011), and other sources to be determined in the future. These case studies will then be analyzed using the framework of organizational behavior. Example sources for organizational behavior scholarship and application are *Organizational Behavior: Essential theories of motivation and leadership* (Miner, 2005) and Organizational Behavior (Nahavandi, et al. 2015). This analysis will be performed with the intention of answering the questions proposed in the above paragraphs. A summary of findings will then be presented, along with suggestions for future research.

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