Thesis Project Portfolio

Chesterfield Public Services Development

(Technical Report)

Water Resource Distribution in the Deschutes River Basin

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

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In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Department of Civil and Environmental Engineering

Table of Contents

Sociotechnical Synthesis

(Executive Summary)

All Systems are Fundamentally Related

Empathy is an antidote to righteousness, although it is very difficult to empathize across a moral divide. – Jonathan Haidt, The Righteous Mind p. 58

Designing a fire station and parks and recreation land development project in Chesterfield, VA. has given me the opportunity to develop software and design skills beyond what I could in classes. In addition to skill development, I thought it is an interesting project as it is an unusual land use combination – parks and recreation facilities and fire stations are not, to my knowledge, often combined on one plot of land. I was taking STS 4500 over the summer while at my grandma's house in Tanzania and was struck by the potential for solid waste management in the village I was in. I had also just taken a class in solid waste management at UVA the prior spring. I combined my interests in protecting the environment with a desire to serve my family's community, leading me to write my prospectus on solid waste issues in developing settings. Unfortunately, there was not sufficient literature to continue this into a full sociotechnical project. My STS Research paper topic is water resource distribution in the Deschutes River Basin of Oregon. I am especially interested in water usage because I grew up in Central Oregon and my family's property is directly affected by water for irrigation purposes in this area. I also research water treatment methods at UVA and am interested in continuing to study water systems from varied perspectives. In all of these projects I was primarily driven by my own interests in learning more and developing my skill set in both design and research.

Though my technical project has little surface level relation to my STS research topic, or even to my prospectus topic, STS research ties in a broader understanding and empathy for other people's experiences with technology. Understanding this in the water system I examined allows me to put myself in others' shoes (such as a resident of Chesterfield) and try to design public facilities that best meet their various needs.

My technical project is a land development project designing a fire station and parks and recreation facility in Chesterfield, VA. My team is responsible for designing two parking lots, bathroom facilities, a fire station, entrances and exits, and a trail connection. All must be ADA compliant, meet VDOT standards, and follow local ordinances. We chose to focus on stormwater management, while also creating a general layout of the parcel, a sediment and erosion control plan, a grading plan, a utilities plan, and a stormwater management plan.

In my STS research, I focused on the motivations behind large scale, public resource system development concerning water use and distribution in Central Oregon, a region that is arid and faces growing potential for water shortages. I found that there is a clear gap between what the system was intended to do and what it could be. The current system risks failure if all stakeholders are not included in planning, with devastating impacts on the local residents and ecosystems as water supply becomes more uncertain.

An STS perspective adds a critical and often missed dimension to research: it takes it beyond the technical and puts engineers in a position to comprehend the lasting effects they can have on society – for better or worse. Ethical responsibility, especially if developed early in a career, supports this goal of STS research and gives engineers the tools they need to both have a rewarding career and ensure that the technology they create supports healthy societies.