

## **Thesis Portfolio**

### **Developing a Reliable and Economical Web Portal for Meals on Wheels**

(Technical Report)

### **An Analysis of Actors in the Nutrition Policy-Making Process**

(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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## **Sociotechnical Synthesis**

### **The relationship between “Developing a Reliable and Economical Web Portal for Meals on Wheels” and “An Analysis of Actors in the Nutrition Policy-Making Process”**

Over the course of this year, there were two projects in the following portfolio, one technical, and one sociotechnical, that both addressed aspects of the same subject matter; the necessity to consume healthy, satisfying food in order to live. My STS Research Paper focuses extensively on the development of nutrition policy, in order to best educate the consumer on the various influences in policy development. My Capstone Project entailed developing a new meal delivery system to aid Meals on Wheels (MOW) mission to pack, label, and distribute food to needy citizens. While both projects focus on different aspects of food in people’s lives, they are related by the engineering necessity to understand how both systems work.

In both of these projects, I was required to analyze the different components of each system in order to either inform the common citizen or improve the system itself. In the case of “An Analysis Of Actors In The Nutrition Policy-Making Process,” the primary research focus was to determine the extent of different actors in policy, through the Actor-Network Theory framework, which relies on exploring relationships between different components in hopes of better understanding how the overall system works. Like in my STS research, in “Developing a Reliable and Economical Web Portal for Meals on Wheels,” I investigated the different components and actors in the current MOW portal system, in order to fully address the current portal’s problems and to better design our replacement for future use. By focusing on the previous design decisions that had left the portal in this opaque, cumbersome state, my team was able to ultimately improve the meal-distribution process. The similar relationship analysis

between both projects is a clear example of how engineering development can be performed like research analysis.

### **“Developing a Reliable and Economical Web Portal for Meals on Wheels” Summary**

Meals on Wheels is America’s oldest and largest organization dedicated to mitigating this issue through community chapters. The non-profit’s local chapter delivers meals to disabled or elderly people in the Charlottesville-Albemarle area who cannot cook or buy food themselves. With the help of volunteers, the organization packs, labels, and distributes meals to customers via various delivery routes. The staff managed volunteers, customers, and routes by hand until approximately three years ago, when a University of Virginia computer science capstone team created a web portal for them.

The slowness, disorganization, and cluttered build-up of data of the application called for a complete rewrite of the application. Over the course of the year, our capstone team worked in two-week sprints developing the features necessary to carry out MOW’s needs. As developers, we wrote code to manage assignments, jobs, and volunteers, create and edit a number of book-keeping reports, and assign delivery routes and volunteers to customers based upon meal recurrences. To sustain long-term operations, we used state-of-the-art modularity via Docker, normalized database models, and cost-effective cloud deployment via Amazon Web Services. By redesigning and modernizing from the ground up, our project enabled Meals on Wheels to operate at lower costs and function more quickly; the organization should have more time and money to help customers in need.

## **“An Analysis of Actors in the Nutrition Policy-Making Process” Summary**

For my STS topic, I sought to explore the many factors that go into developing nationwide nutritional guidelines. These actors and their relationships are often a strong source of confusion and effect on the consumers perception of physical, mental, and emotional health. Specifically, I focused on investigating the factors that affect nutrition policy-making in order to discover how the research-to-guidelines process can be better understood by everyday citizens.

Using the actor-network theory framework, this paper studied several different actors in the policy-development process and communicated their effects with the process and each other to the consumer. Information gathered through documentary resource methods is organized using network analysis, to best determine the extent of the actors’ relationships. Through this relationship-oriented lens, this paper found that analyzing the actors’ interactions revealed key insights and stories about the nutrition policy-making process and the spread of its recommendations through mainstream media in the United States. Furthermore, its existence serves as an example of analyses that other policy-oriented investigations can model in order to better inform consumers of policy development, a key cornerstone in the engineers’ role as a translator of technologies.

## **Personal Reflection**

By working on two different projects, I was able to mold theoretical ideas with practical development. This well-rounded approach offered me greater insight and capability when I ran into problems during each of these projects. From the STS portion, I was able to learn about the theoretical relationship between elements of a system, and apply that directly to improve the internal mechanics of a web application. From the Capstone portion, I learned the skills and

communication required to work on a team that directly translated to working on projects that affect society. Working on both at the same time allowed me to apply each discipline-specific lessons to their counterparts, allowing for a better understanding of how engineers can best serve society.