

**Emergency Management and Underserved Communities: Using Big Data to Improve  
Emergency Management Preparedness, Response and Resilience**  
(Technical Report)

**A Care Ethics Analysis of the Response to Hurricane Katrina by the Local, State, and  
Federal Government**  
(STS Research Paper)

An Undergraduate Thesis Portfolio

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By

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## Socio-technical Synthesis: Evacuation Orders and Hurricane Katrina

In my technical report, I explore the key question of “how can emergency managers make evacuation orders more effective in order to better handle natural disasters?” My STS research explores the aftermath of Hurricane Katrina, specifically looking at how emergency managers and public officials responded to the disaster. My technical project and STS research are two connected analyses that both address the social-technical challenges officials can face both pre- and post-event. The two work together to create a solution to the current issues seen in the processes surrounding evacuations and a better understanding of the factors that can impact an evacuation. While these two projects approach this topic from different angles, the combination of the two encompasses the whole process that officials go through when there is a natural disaster. Instead of working on these two projects separately, I work on the following technical solution and socio-technical research simultaneously. In what follows, I explain each of these two projects as well as explain the benefits I found from working on them concurrently.

To solve the technical problem posed by my question, I completed a statistical and geographical analysis within Python, a programming language, that the Virginia Department of Emergency Management (VDEM) can use to understand evacuation orders. Before, VDEM used a uniform plan and did not include any demographic information in any of their considerations for evacuation orders. My team and I built a model to determine which demographic factors impact a person's decision to evacuate in a natural disaster. This model incorporated demographic information from the U.S. Census Bureau to see what social groups are more likely to evacuate and where these groups typically moved to before, during, and after a hurricane. This analysis was presented to VDEM and will be available to help them create better evacuation strategies so they can assist more sectors of the population that might have been ignored prior.

My STS research also explores natural disasters, but rather than looking at how to prepare for one beforehand, it focuses on how to respond to one afterwards. My research focuses on how public officials responded to the destruction left by Hurricane Katrina and explores the impact that such officials can have when they do not handle such a situation carefully. Carol Gilligan's theory of care ethics is used to question whether several officials in different levels of the government acted in an ethical manner. My claim is that these government officials failed to fulfill the duty of care owed to their constituents using three attributes included in care ethics. The paper explores some of the actions taken by key government officials in charge of the Katrina response and discusses how these actions lacked one of the attributes. The goal of my research is to show that such attributes are necessary for not just those in public office but also anyone in a role where they are responsible for the lives of others.

By analyzing these two projects at the same time, I was able to gain more insight into hurricane evacuations to help answer my key research question. By working on my technical project, I could see all the data that could be included when understanding evacuation patterns. For example, not only could demographic information from the U.S. Census Bureau be used, but also geolocation data from social media websites like Twitter. Through my STS research, I could see how decisions made post-hurricane can have a harmful impact on others if they are not made under careful considerations. These two projects illustrated the complexities that emergency managers and public officials face when dealing with a natural disaster and when recovering from such disasters. Additionally, it showed me that the technologies engineers develop are incredibly impactful on the communities using them, as they can either help or hurt these communities; and therefore, engineers must be coming from a place of care when creating such technologies.

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