Federal Emergency Management Agency's Response to Hurricane Maria in Puerto Rico

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction

In September 2017, Hurricane Maria struck Puerto Rico. Just two weeks after Hurricane Irma had ravaged the island, Maria swept through, knocking out the power for almost the entire island and marking the beginning of the longest power outage in American history ("The Longest Blackout", 2022). Current analyses cite several factors as the cause for the Federal Emergency Management Agency's (FEMA) disastrous response, from the Puerto Rican supply chain breakdown to the political relationship between Puerto Rico and the mainland United States (Kunkel, 2020; Farber, 2018). However, these scholars all fail to recognize the interaction between the factors, missing an essential understanding of how single actions and seemingly small components of a system can greatly impact decisions and actions made by people far away. I will argue that the catastrophic response to Hurricane Maria was due to the interaction between social, technical, and conceptual actors, specifically how the underlying biases held by the continental United States perpetuated the misuse of the FEMA's Logistics Supply Chain Management System. This argument will draw upon the framework of actor-network theory (ANT), developed by STS scholars Michel Callon, Bruno Latour, and John Law. ANT maintains that technical projects or systems can only be truly understood when all of the relationships between the system's components are understood (Cressman, 2009). Throughout my argument, I will draw upon evidence from government analyses of FEMA's failure, such as from the Office of the Inspector General, as well as news articles, first-hand accounts, and academic research analyses of the catastrophe.

Literature Review

The outpouring of analyses following FEMA's embarrassing response to Hurricane Maria attributed several factors as the cause, from the Puerto Rican supply chain breakdown to the political relationship between Puerto Rico and the mainland United States. For example, Matthew Kunkel (2020) wrote extensively about the Puertican supply chain failures and both the direct and indirect causes of those failures. Kunkel lists the shortage of essential workers, the breakdown of the medical supply chain, and the overall lack of food as the most direct causes for the supply chain breakdown. These failures ultimately lead to an inability to "produce goods, move goods, and to communicate," keeping victims from "attain[ing] critical supplies or services" (p. 12). Kunkel (2020) goes on to discuss how a FEMA's "leadership vacuum" (p. 21), conflicting messages from the US president about the state of the country, and a lack of urgency, capacity, or prioritization from the US government and FEMA were all indirect factors that exacerbated the disaster, leading to the catastrophe that occurred. While all of these factors are crucial for understanding Hurricane Maria, Kunkel fails to recognize the underlying biases and prejudice that the American leadership had towards Puerto Rico.

In regards to biases and ethics, lawyer Daniel Farber highlights the legality and the ethical misgivings behind the American response to Hurricane Maria. He focuses on the origins and the effects of both Puerto Rico's economic state and the US - Puerto Rico political relationship. Farber (2018) discusses the extremely high rates of poverty, low median household income, and high rates of homes built without permits, each of which made Puerto Rico vulnerable even before Hurricane Maria struck. Despite the poor economic conditions, the US Government delayed "the release of 4.7 billion in disaster funding" (Farber, 2018, p. 764) for months after the Puerto Rican government refused to prioritize repaying the relief money over

"essential government services" (Farber, 2018, p. 765), a requirement that was not imposed on Texas or Florida who were receiving aid at the same time. Farber (2018) acknowledges that this is legal and likely occurred because the Puerto Rican government does not have a Senator or Congresspeople to fight for them in Washington DC. The discrepancy between the aid and the ultimate impact in Texas versus Puerto Rico can be seen in housing units destroyed, the number of deaths, and number of those without power or water (Farber, 2018). Farber, however, also fails to recognize the true interactions between all of the technological, social, and conceptual factors.

In summary, current scholars do thorough jobs analyzing the various factors that lead up to the horrendous response to Hurricane Maria on Puerto Rico, however they all fail to recognize the effect of the interaction between these factors. These scholars, Kunkel and Farber, analyze some of the actors that I plan to discuss, but fail to combine their work to create a more complete understanding of the causes of the disaster. My goal in this paper is to remedy this issue by providing an explanation of the hurricane's response with regards to the underlying biases toward the territory of Puerto Rico and their influence on the improper use of FEMA's Logistics Supply Chain Management System (LSCMS).

Conceptual Framework

My argument draws on the framework of actor-network theory (ANT), developed by STS scholars Michel Callon, Bruno Latour, and John Law. ANT is built around the concept that by "tracing the complex relationships that exist between governments, technologies, knowledge, texts, money and people" (Cressman, 2009, p.3), a true understanding of technology and society will develop. ANT claims that all technical projects or programs are assembled by a network builder and are composed of a network of human and non-human actors to accomplish a

particular goal. While the idea of an actor-network can seem contradictory, the theory relies on the idea that all technologies can be seen as both an actor and a network, depending on the perspective selected. Actors can fall into five separate categories: social, technical, natural, conceptual, and economic. A main component of ANT is that the various actors of the system can only be fully understood when considered in respect to their overall system; ANT focuses on the connections between actors, successful and unsuccessful, to understand a network (Cressman, 2009). Michel Callon's translation, which describes the process of forming and maintaining an actor network, will also be incorporated into my analysis to explain the introduction of rogue actors, their pervasiveness within the system, and the damage that they can cause (Callon, 1986). In the following analysis, I will break down the network that was built to support Puerto Rico in a catastrophe, explaining how the interactions between the various technical, conceptual, and social actors were the key to the results that followed. I will illustrate how two specific actors lead to the collapse of this network and to the year long recovery experienced by the island.

Analysis

Background

The response to Hurricane Maria was the result of many different social, conceptual, technical, economic, and natural actors. The network builder is the connecting actor within the entire system, serving to coordinate, influence, and be influenced by other actors. In this case it was the Federal Emergency Management Agency (FEMA) whose goal is to "help[...] people before, during and after disasters" (Federal Emergency Management Agency, n.d.). This, due to the influence of the network builder, is the entire network's goal. Other influential social actors

include the United States Government, the American public, FEMA's employed shipping companies, the first responders in Puerto Rico, and the victims or people of Puerto Rico. The main technical actors include FEMA's Logistics Supply Chain Management System (LSCMS), social media, the news outlets, shipping containers, life-saving supplies, and GPS transponders. The main conceptual actors are bias, fear, and FEMA's standard operating procedures (SOPs). Economic and environmental actors won't be discussed thoroughly below but these include FEMA's budget, the cost of life-saving materials, the storm itself, the geography of Puerto Rico and the ocean surrounding it (Cuffari 2020).

Inherent Bias from the Continental United States

The interactions between multiple social and conceptual actors culminated in an inherent bias possessed by the continental United States and was largely influential in the failure of the emergency response system. Puerto Rico is a territory of the United States. As a territory, it does not possess the same rights as a state: they have no representatives in the House or in the Senate and they cannot vote for presidential candidates (U.S. House Committee on Natural Resources, n.d.). This inherently leads to a greater separation between the government stationed in Washington DC and the people of Puerto Rico, who are reliant on the care and support of the US Government. Without direct representation in the government, the people of Puerto Rico must rely on other government officials to speak up for them. Whereas Texas and Florida had Senators and members of the House demanding more aid be sent to their constituents, Puerto Rico had no one (Vinik, 2018). Beyond just lack of representation, Puerto Ricans also received blatant disrespect from President Donald J Trump after he stated "that he did not want a single dollar going to Puerto Rico" and "[i]nstead… wanted more of the money to go to Texas and Florida"

(Maddow, 2019). Note that the President of the United States is a massive figurehead, viewed by many as a role model and is a major social actor. When the leader of the government explicitly expresses an opinion it can be dangerous to disagree, especially for political officials. By declaring his dislike for Puerto Rico so publicly, Trump made it much more difficult and unlikely that a government official might attempt to request more aid for the island. This introduces the conceptual actors of fear and submission, as well as continues the history of bias - these officials feel no need to put themselves at risk for constituents that they do not represent and that do not vote for them. These conceptual actors interact with the political social actors; this interaction ultimately results in little to no public support for Puerto Rico. Another crucial idea to note here is that Trump states he would like the money to instead "go to Texas and Florida," clearly illustrating his preference, or bias, towards the continental United States. Here, the interaction between Trump and the regions in need of assistance - all prominent social actors - result in a clear display and strengthening of the conceptual actor bias. Even though the storms that hit Texas and Florida did not produce nearly the same amount of damage, the President expresses his desire to reroute millions of dollars (National Oceanic and Atmospheric Administration, 2025). With the head of the United States of America voicing his dislike for the American territory, it's not surprising that the American public followed suit.

It is commonplace to see the public writing and posting frequently on social media. In the world today, it is a standard practice to analyze the public's interest regarding a topic based on their interaction with it on social media; the same can be done with Hurricane Maria. This type of analysis studies the interaction between social actor the American public and technical actor X (formerly Twitter). Below, three charts are shown - the leftmost is the media presence in reference to Hurricane Harvey which struck Texas, the middle is for Hurricane Irma which struck

Florida, and the rightmost is for Hurricane Maria which struck Puerto Rico and the US Virgin Islands.

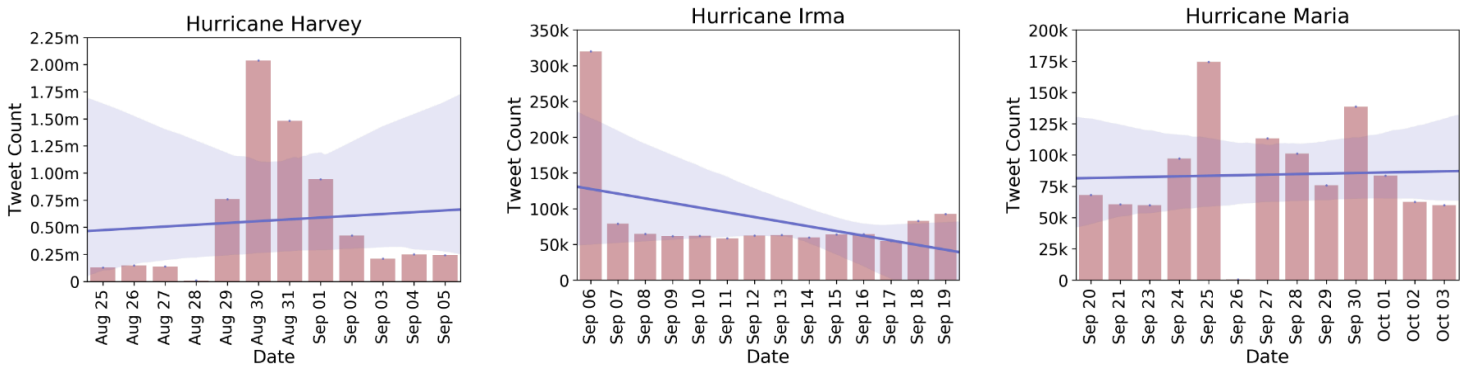

Figure 1. The total number of tweets collected for each event per day

(Alam et al., 2018, p. 6)

Each column is the total number of tweets collected per day for each event. The purple lines indicate trends in the daily tweet data volume. The first piece of data to acknowledge here is the average consistency over the course of the two weeks after Hurricane Maria hit on September 16, 2017. While taking into account potential errors in the collection of tweets, it can be seen that concern for Puerto Rico stayed constant despite the outpouring of information regarding the state of the island and its inhabitants. A small peak can be seen in the center with tweets going from around 60,000 to 175,000 over the course of three days which can correspond to the earliest updates regarding the lack of essential goods on the island. However, the interest quickly dropped back down to 75,000 over the next few days, ultimately resulting in the consistent average. Another noticeable quality of the graphs is the great disparity between the volume of tweets in regards to Harvey and Irma versus Maria, especially when compared to the relative destruction caused by each of the storms. The average number of tweets in reference to Hurricane Harvey went from roughly 500k to 650k over the first two weeks after storm impact.

When compared to Hurricane Maria which averaged around 80k tweets, the difference is astounding. Hurricane Harvey received nearly 625% more attention from the American public than Hurricane Maria. While it can be acknowledged that the relative proximity of the storm and the concurrence of both Irma and Maria could have exacerbated the difference in interest, the statistics still indicate that the American public is much more interested in the lands recognized as states, rather than all the lands controlled by the American government. This preference again illustrates the influence of the conceptual actor bias on the social actor of the American public. This disinterest allowed the disastrous emergency response system to continue to exist, as the spotlight was not focused on Puerto Rico. Without government and public support, the island of Puerto Rico suffered significantly more than the American states that were going through similar catastrophes.

Misuse of FEMA's Logistics Supply Chain Management System

The interaction between the social and technical actors perpetuated FEMA's misuse of its Logistics Supply Chain Management System (LSCMS) and its blatant disregard for normal procedure, a key factor in the decomposition of Hurricane Maria's emergency response network. The LSCMS is a crucial tool and technical actor used to track commodities and property shipments from initial order to final distribution. Commodities being sent to Puerto Rico included items such as water, food, radios, and medical equipment. Like most essential tools, the LSCMS has a strict user manual or standard operating procedures (SOPs) in order to ensure efficient and correct disaster response. In a post disaster analysis, the Office of Inspector General (Cuffari, 2020) stated the following:

> FEMA… had limited knowledge about the location of the commodity shipments. LSCMS technicians had to manually monitor commodity movements and update LSCMS well after the movements had occurred and without proof of delivery as required by LSCMS policies. (p. 12)

The first thing to notice here is the use of "manual" logging of all shipments that came onto the island. Not only were they manually checking the arrival of the shipments, FEMA employees and volunteers also had to open and search through the shipments in order to determine what was inside. These processes are extraordinarily slow and inefficient, not to mention they introduced extreme room for error through stealing or through not logging a delivery. Another thing to note is that all manual logging was done without proof of delivery from the shipping company. Instead, the FEMA team was notified that the shipment had arrived and they automatically logged the delivery. While this could be thought of as expediting the process in order to compensate for the manual logging, this once again introduced error to the system and enabled the shipping company to lie about deliveries. The final piece of evidence to acknowledge here is the blatant disregard for the "LSCMS policies," which, as described above, was a crucial piece of equipment and an essential conceptual actor. This suggests the FEMA employees were aware of the proper procedures and instead chose to ignore them, resulting in an unique social-technical interaction between the users and the LSCMS. Ultimately, this disregard for efficiency and policies led to the loss of about 38% of life sustaining shipments, 98% of which included food and water (Cuffari, 2020).

This massive loss of goods did not go unnoticed. After FEMA began to recognize the large discrepancy as the result of their mistakes and they began to compensate.

> For supply chain accounting purposes, FEMA made adjustments to LSCMS to account for the lost visibility of commodity shipments. According to FEMA officials, they adjusted LSCMS records for these shipments by changing the last known locations in LSCMS to "unknown FSAs" or "unknown points of distribution." FEMA officials advised us that they used "unknown" as a destination as they believed the shipments were delivered throughout Puerto Rico but could not specifically identify the delivery locations. (Cuffari, 2020, p. 7)

FEMA's decision to manually make "adjustments" to the system for their missing shipments clearly illustrates their attempt to reconcile their mistakes with the logbook. The LSCMS was a witness to their mistakes. This reconciliation attempt is further drawn out by the FEMA officials who state that these changes were made because they "believed the shipments were delivered throughout Puerto Rico." The use of the word "believe" here perfectly demonstrates the root of the problem: the LSCMS is a system of numbers and science, it has no belief principles so the FEMA employees had to create a substitute. The LSCMS is used for exact distribution facts; had it been used properly, it would have previously logged the correct and exact delivery location of all shipments and there would be no belief involved. The social actor FEMA imposed the conceptual actors of fear and misaligned priorities onto the LSCMS, an emotionless technical actor. This imposition ultimately led to the misuse and proliferation of errors within the system. These oversights and mistakes resulted in approximately $257 million in lost life-sustaining commodities sent to Puerto Rico (Cuffari, 2020).

The Influence of Bias on the LSCMS

The relationship between the various conceptual, social, and technical actors are the ultimate cause of the continued misuse of FEMA's LSCMS when Puerto Rico needed it the most. As described above, the American public and government had little continued interest in the impacts of Hurricane Maria, especially when compared with Hurricane Harvey and Irma. Because of this overall lack of interest and attention on FEMA's aid to Puerto Rico, no outrage resulted from the hundreds of millions of dollars of life saving materials that was lost. The American public had little to say when the entire island of Puerto Rico lost power for a year, but when a region of Texas lost power for a few weeks several lawmakers demanded change (Alam et al., 2018; Vinik, 2018). In the end, it was the unique combination of the American indifference and bias against Puerto Rico that allowed FEMA to continue to misuse equipment and ignore procedure, leading to the catastrophe that is now known as Hurricane Maria.

The ultimate elongated destruction and poor management of Puerto Rico was caused by the interactions between the conceptual, social, and technical factors just discussed. However, an argument could be made that the errors from the LSCMS were purely technical in nature and not the result of any interactions between social or conceptual actors. This argument can be made by referencing the malfunction of many GPS transponders placed within shipping containers (Cuffari, 2020). These malfunctions were purely technical in nature and mostly as a result of loss of battery life. In some cases, the layers of metal from the shipping containers prevented the GPS transponder from receiving location information or sending arrival notifications. While this is correct, it ignores the influence of the FEMA and shipping container employees. One of the standard operating procedures for FEMA includes checking the functionality of all GPS transponders before the container is closed, however "FEMA did not ensure GPS transponders

worked properly or record GPS numbers in LSCMS" (Cuffari, 2020, p.11). This once again illustrates the interaction between social and technical actors, as well as the influence of negligence and bias on the social actors. Had FEMA been more thorough in their equipment checks, the GPS transponders might have been in more advantageous positions on the containers or had new batteries. Instead, hundreds of containers were lost in transit.

Conclusion

In this paper, I maintained that the disastrous response to Hurricane Maria in 2017 was a result of the interactions between several social, technical, and conceptual actors. My argument specifically highlighted how the underlying biases held by the continental United States perpetuated the misuse of FEMA's Logistics Supply Chain Management System. Through understanding the influence of each actor on the other, one can be more aware of how small actions - such as not speaking up on social media for overseas catastrophes - can affect other people. Recognizing and appreciating the power of their own voice is essential to making change in this world, a change that society desperately needs.

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