

**Hurricane Florence and disaster preparedness: Investigating risk through the intersections
of technical communication and user experience**

by

Samantha Jo Cosgrove

A dissertation submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Co-majors: Rhetoric and Professional Communication; Human-Computer Interaction

Program of Study Committee:
Geoffrey Sauer, Co-major Professor
Prashant Rajan, Co-major Professor
Jonathan Kelly
Charles Kostelnick
Stacy Tye-Williams

The student author, whose presentation of the scholarship herein was approved by the program of study committee, is solely responsible for the content of this dissertation. The Graduate College will ensure this dissertation is globally accessible and will not permit alterations after a degree is conferred.

Iowa State University

Ames, Iowa

2020

Copyright © Samantha Jo Cosgrove, 2020. All rights reserved.

DEDICATION

To family, who helped me become who I am today. My two brothers, Christopher Hugh and Justin Mitchell. Chris, in some ways we are polar opposites, but in more we are interchangeable. Justin, I see so much of myself in you, and I hope you keep all the best parts. I could not be any prouder to have you both as my brothers, nor could I be more grateful to be your sister. My biggest desire in this world is that you are both safe and happy. To my mom, Silvia, you instilled a belief in myself that has never left me and I hope, never will. And finally, to my Dad, Jerome, who left this world before this project was complete, I made it, Dad. You taught me how to work hard and strive for excellence. I just wish you were here to see it.

TABLE OF CONTENTS

	Page
LIST OF FIGURES	v
LIST OF TABLES	vi
NOMENCLATURE	vii
ACKNOWLEDGMENTS	viii
ABSTRACT.....	x
CHAPTER 1. INTRODUCTION	1
A Brief History of Risk in the US	5
Emergency Manager as Technical Communicator.....	7
Technical Communication as an Interdisciplinary Field.....	9
Research Goals and Contributions	10
Research Questions	11
Research Methods	12
Overview of Project.....	13
CHAPTER 2. LITERATURE REVIEW	14
Emerging Disciplines	15
Technical Communication	15
Risk Communication.....	16
User Experience	18
Intersecting Trends	19
Models of Communication and Expertise	20
Power and Ethics	23
Transparency and Participatory Culture.....	26
Summary of Chapter.....	31
CHAPTER 3. METHODOLOGY	32
Choosing a Disaster	33
Part I: NC Emergency Management (NCEM)	34
Choosing <i>Topsight</i>	34
Achieving <i>Topsight</i>	35
Data Collection.....	37
Data Analysis	41
Part II: NC Residents.....	45
User Interviews.....	46
Constructivist Grounded Theory	47
Data Collection.....	48
Thematic Analysis.....	50
Summary of Methodology.....	51

CHAPTER 4. RESULTS	53
Part I: NC Emergency Management (NCEM)	54
History and Culture	55
EOC Structure	59
Responsibilities of an Emergency Manager	64
Hurricane Florence	68
Part II: NC Residents	74
Emerging Themes	75
Chapter 4 Summary	86
CHAPTER 5. DISCUSSION AND CONCLUSION	87
Summary of Results and Interpretations	87
Part I: NC Emergency Management (NCEM)	88
Part II: NC Residents	90
Wicked Problems and Implications	93
Well-defined and Wicked Problems	94
Implications for Emergency Managers	98
Implications for Technical Communication	99
Implications for Risk Communication and User Experience	100
Limitations	101
Future Research	104
Conclusion	105
REFERENCES	106
APPENDIX A. IRB APPROVAL	113
APPENDIX B. PART I INTERVIEW PROTOCOL	114
APPENDIX C. PART II INTERVIEW PROTOCOL	115

LIST OF FIGURES

	Page
Figure 1. FEMA map of NC counties that required assistance during Hurricane Florence	3
Figure 2. The three regions of North Carolina. Located at NC Forest Service website.	39
Figure 3. Example of a handoff chain.....	45
Figure 4. Area of North Carolina that participants either resided or were employed in.....	54
Figure 5. North Carolina regions, branches, and counties. Located in 2017 NCEOP.....	57
Figure 6. ICS or ICS-like EOC Structure from IS-700.....	59
Figure 7. Incident Support Model (ISM) EOC Structure from IS-700.....	60
Figure 8. Departmental EOC Structure from IS-700	61
Figure 9. Example of a county EM employee structure	64
Figure 10. Handoff Chain showing how public releases are created by an EM PIO	66
Figure 11. Types of problems users face	95

LIST OF TABLES

	Page
Table 1. CAUSE model for local emergency managers	22
Table 2. Six thematic points of tension from a survey of emergency managers	28
Table 3. Spinuzzi's three levels of activity	36
Table 4. Starter codes for employee coding.....	43
Table 5. Example of breakdown table	44
Table 6. Initial codes used to help identify emerging themes.....	51
Table 7. North Carolina's EOC Activation Levels.....	58
Table 8. Breakdown table for emergency management in North Carolina	63

NOMENCLATURE

EM	Emergency Management or Manager
EOC	Emergency Operations Center
PIO	Public Information Officer
ISM	Incident Support Model
NCEM	North Carolina Emergency Management
UX	User Experience

ACKNOWLEDGMENTS

I am endlessly grateful for those who supported me over during my time in Ames and at Iowa State University. From professors and classmates, to neighbors at home and in Ross, I have been fortunate enough to receive mentorship, friendship, and helpful guidance from so many people over the past four years. I would like to start by thanking my committee, who even through a pandemic, remained enthusiastic and eager to share their perspectives and time with me. I met both my co-major professors, Dr. Geoffrey Sauer and Dr. Prashant Rajan, as I was first starting in the RPC program, and their support has been constant and invaluable. Geoff, thank you for challenging my ideas and helping me find confidence in my abilities as a scholar. Prashant, thank you for your constant enthusiasm about my work and sharing your insights with me. My committee members, Dr. Jonathan Kelly, Dr. Charles Kostelnick, and Dr. Stacy Tye-Williams have also been crucial to my success during this process. Jonathan, thank you for your thoughtful feedback and interest in my project. Charlie, your research helped start my journey into risk communication, and your encouragement got me to where I am today. Stacy, your approachable demeanor and thoughtful scholarship has made working with you one of my favorite parts of coming to this program.

There are many members of the English department that have also had an impact on my progress. I would like to thank our amazing staff, Teresa Smiley, Deanna Stumbo, Deanna Ward, Stacie Schafer, Bret Larwick, and many others who help us on a daily basis. Without them, we would be lost. I would also like to thank Dr. Tina Coffelt for modeling excellent scholarship and ensuring me I was capable of achieving the same. And of course, I would like to thank all other members of the department and the RPC faculty who took the time to give me advice, include me in discussion, or just ask me how I was doing. I am beyond grateful for the support I have

received from the department and know I could write for pages about all the positive moments I have had with you all since I began here. I would also like to thank the English department for receiving the Graduate Student Research Grant that helped make my project possible.

To all the friends I have made along the way, past and present, I appreciate every interesting conversation, chance to commiserate, shared laugh, and meaningful interaction we had. My life has twisted and turned so much over our time together, and you all helped me remember who I was and what value I bring to the world, in and outside of academia. To name just a few because I cannot possibly name you all, I would like to thank Katlynne Davis, Daniel Henke, Carrie Ann Johnson, Dr. Raeann Ritland, and Kristin Terrill. To my dissertation companions, Dr. Phil Gallagher, Dr. Lauren Malone, and Dr. Bremen Vance, I could not have done it without you all. We did it! I look forward to keeping in touch with all of you as we continue through the next stages of our lives.

Finally, I would like to thank my participants for sharing their stories. Your experiences informed my project but also kept me motivated to continue this research. I am so sorry for the losses you have faced, but I am grateful to know you and hear your stories. Thank you.

ABSTRACT

This dissertation investigates the relationship between government emergency agencies and the communities they serve by analyzing risk communication strategies between groups. The goal of this research is to ensure the needs of communities are reflected in government communications channels, and that emergency managers (EMs) and agencies are supported by current scholarship and practice in disciplines that study risk. In this two-part study, theories and methods from technical communication, risk communication, and user experience were used to understand the relationship between and the experiences of North Carolina Emergency Management (NCEM) and the public during Hurricane Florence in 2018. Part I of the study relied on Spinuzzi's *Topsight* as a modified framework to conduct an organizational analysis of NCEM during Hurricane Florence. Part II of the study relied on methods of user experience and grounded theory to conduct qualitative user interviews of NC residents who experienced Hurricane Florence. Results of Part I indicate a need for standardized, on-site EM training, but Part II calls for localized user testing to determine the needs of individual communities. Scholars in technical communication can bridge the gap between theory and practice by involving EMs in research and user testing. Collaboration with EMs can, in turn, improve pedagogical practices in technical communication programs as graduates can apply real-life scenarios to their courses in user experience. For researchers outside of technical communication, the study offers an interdisciplinary framework for studying risk and relationships between stakeholders. Finally, this study supports the relevance of remote user testing in a post-COVID world. Future research suggestions include use of the framework with modified interview protocols and inclusion of other usability testing along with user interviews.

CHAPTER 1. INTRODUCTION

It was Labor Day weekend, 2018, when Karen first heard about Hurricane Florence—a Category 4 hurricane projected to head in her direction. No stranger to hurricanes, she'd been living on an island on the NC coast for years and knew that a storm of that measure could cause substantial damage. But Florence would be her first major storm to date. She and her husband watched the Weather Channel and followed their weather phone apps as the week went on, wondering if they should stay on the island or leave. She wanted to assurance that her pets would be safe, and that she would be able to come back home as quickly and easily as possible. As Florence got closer, Karen began anxiously checking her town's website and Facebook page, not knowing where to find the most up-to-date or accurate information.

On Wednesday, September 12, Karen received an email from her town announcing that a mandatory evacuation would begin at noon that day. She needed someplace for her husband to be able to work that would also permit her two dogs. She didn't receive any information on where to go, so the family drove about 3 hours northwest to a long-stay hotel where they remained for a week as the storm passed through their home. She felt the experience was bizarre. She was from the Midwest, where you get a blizzard, but the snow eventually melts. How long would this flooding last?

In her hotel, 150 miles from her home, Karen and her husband didn't know what was happening on the island. Over the next few days, they became desperate for information, wondering what had happened to their house. She understood she was forbidden to return home yet, but she didn't fully understand why. She wanted updates, wanted to see what was happening. It wasn't until next Tuesday, September 17th, that they would see their home again through the view of a news helicopter flying over the area.

As I interviewed Karen over a year later, she still remembered sitting with her husband in the hotel room, watching the TV footage and holding her breath, hoping to catch a glimpse of their house near the shore. Through tears, she told me about that moment:

It was a feeling of relief to just finally see it. I mean, it was...we cried. I mean it was hard, because you saw your neighbors, and you saw how much devastation they had. And you saw other areas that were good. And when we saw our house, like I said, it was still there. And we were like, "okay." [...] After that we could say, "Okay, we know what we're dealing with. We saw what the beach looks like." You know, the island isn't flattened.

A few days later, Karen was able to return home and begin the recovery process. She was grateful to secure a trustworthy contractor, after getting recommendations from a community Facebook group that warned people of unsavory characters on the island trying to scam homeowners out of money for promised repairs. Now, her home is renovated, and her family has decided to stay on the island. They will stay despite the emotional toll they felt during the storm, still feel over a year and a half later, and will likely feel for years to come.

Unfortunately, there are many other stories like Karen's. During Hurricane Florence, at least seven coastal counties faced voluntary or mandatory evacuation, over 22,000 people were sheltered through the state, and 51 North Carolina counties (Figure 1) received FEMA assistance for recovery (NCEM, 2019; Porter, 2018). With emergency management agencies existing at every level of government (Covello, 2009), determining what is the most accurate and up-to-date information for your home can be overwhelming. In addition to a complicated infrastructure of emergency management officials, the rise in technology dependence leads to an overload of mental noise and increased risk for misinformation (Hallahan, 2009).

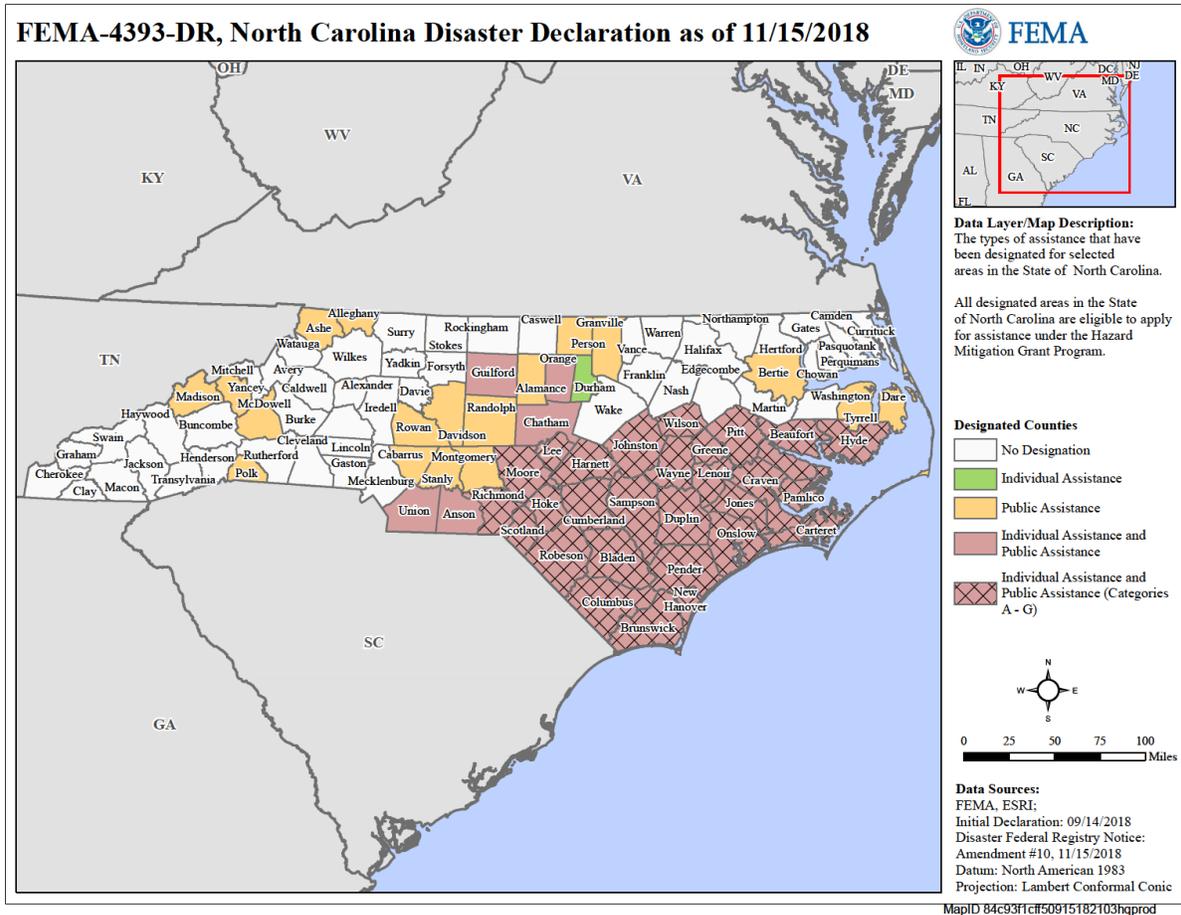


Figure 1. FEMA map of NC counties that required assistance during Hurricane Florence

The concerns associated with disaster communication surrounding government organizations are further problematized by fiascos such as FEMA's infamous response to Hurricane Katrina in 2005, and their staged press conference during the California wildfires in 2007. These incidents, along with other political factors, have fueled many citizens' innate mistrust of government from US residents, resulting in critical messages about safety during a disaster being questioned (Cook & Gronke, 2005; Covello, 2009; Willis, 2002). In some cases, residents may believe that the government prioritizes reducing financial loss over citizen safety, citing the government cost that goes into the state calculation of calling a voluntary or mandatory

evacuation (Whitehead, 2003). This distrust further complicates residents' decisions to evacuate, decisions that are already impacted by the personal burden and risk of abandoning their possessions for an uncertain amount of time for what seems like an unknowable outcome.

The complexities emergency managers face when communicating to and with the public about disasters has a myriad of factors. These factors, such as location and amount of resources, can mean diverse day-to-day job expectations across a region. In addition, daily tasks such as managing handbooks, meeting with other stakeholders, emergency managers are generally responsible for safety messages to potentially thousands of people in their country or region. These varied responsibilities, along with a complex media network of systems, can result in an uninformed or dissatisfied public who may face unnecessary risk to their property, or worse, their lives. Though it can be extremely difficult to determine an accurate estimation, the National Oceanic and Atmospheric Association (NOAA) reported a total of 15 deaths directly related to Hurricane Florence in North Carolina, with an additional 25 due to indirect cause (Stewart & Berg, 2019).

Although there is no way to determine whether any of these losses are directly related to communication failures, there is an urgent need to improve risk communication between official government agencies and the public. Unfortunately, this has become even more pressing in our current state of affairs. The coronavirus disease 2019 (also known as COVID-19) first emerged in Wuhan, China in late December. Over the past four months, it has spread across the world and into the United States, with all 50 states reporting cases to the CDC. Despite warnings and recommendations of social distancing, US residents continue to travel for non-essential occasions. Although there may be other reasons why some residents are disregarding safety suggestions, such as work or familial obligations, mixed risk communication messages from

organizations and government leaders are apparent and can certainly be attributed to a variance in response to the pandemic. Developing stronger communication strategies between the government and the public is a priority that cannot be ignored.

Situated within the large issue of communicating risk to the public, my dissertation focuses on the 2018 communication between North Carolina Emergency Management and North Carolina residents during Hurricane Florence to determine where interventions can occur to improve future public risk/disaster communication scenarios. In the following chapter, I provide a brief history of risk assessment in the United States and how emergency management has evolved since 1986 with the introduction of Local Emergency Planning Committees (LEPCs). Then, I position the role of emergency manager as a tactical technical communicator, emphasizing the interdisciplinary nature of technical communication industry and research practices. I follow by introducing user experience (UX) and its overlap with risk and technical communication, arguing for the application of UX methods to each discipline. Finally, I present my dissertation project, focusing on its contributions to the field of technical communication and the emergency management industry. The chapter ends with an overview of the dissertation structure, which follows the traditional five-chapter model.

A Brief History of Risk in the US

Risk scenarios where people may face natural disasters, such as floods caused by hurricanes, are both unavoidable and inevitable. However, advances in technology have allowed scientists to more accurately determine when and where a hurricane-level storm might happen, meaning the public can be warned of potential danger more quickly. Even when disasters are manmade, there is still a need to prepare the public for what will happen to ensure their safety. Risk assessment within the United States government can officially be traced back to 1970 with the creation of the Environmental Protection Agency (EPA). Before the EPA began, however,

there were undoubtedly communications of risk to the public concerning disasters. One early and memorable moment in risk communication happened in the 1950's during the Cold War, when the US government produced the short film, *Duck and Cover*. The film featured Bert the Turtle, a cartoon who would hide in his shell in the event of a nuclear explosion. People were encouraged to duck and cover, like Bert, to ensure their safety if a nuclear attack happened.

As risk assessment improved, philosophies about "risk" and its meaning flourished around the world and in the United States. The study of risk began as a strictly scientific endeavor, focusing on searching for a quantifiable, positivistic measures for disasters. This method of research resulted in models of risk communication that were linear in nature, drawing a direct line of knowledge from scientists to the public (Palenchar, 2009). Further, risk was informed by empirical (or quasi-empirical) work from the early 20th century insurance companies' actuarial tables. In these measures, according to Rob Rechar (1999), "risk is the expected value of the consequence (e.g., probability times consequence based on average values) as used in simple annuity analysis as far back as 1660" (p. 764). Over time, however, philosophies that categorized risk as purely scientific were challenged by theories of social construction in which risk is a concept understood through shared knowledge-making. By the 1980's, the Society for Risk Analysis was founded, and in 1986 the Emergency Planning and Community Right to Know Act (EPCRA) was signed, requiring the establishment of Local Emergency Planning Committees (LEPCs) across the country (Rowan, et al, 2009). This meant that the public could more easily engage with risk-oriented government decision making, and researchers were able to get a closer look at government policies. It also solidified the role of the emergency manager within local government, opening opportunities for training and more explicit expectations for the position moving forward.

Emergency Manager as Technical Communicator

The work of emergency managers is complex and crucial to the communities they serve, and the position of emergency manager can contain different responsibilities depending on where employment is held, and within which structure the agency is located. State emergency management agencies across the US have dramatically different internal structures depending on factors such as the region of the country, the types of disasters they may face, and the resources available for support. In addition, staffing within the agencies is dependent upon the needs and budget of each area. These differences between federal and state, from state to region, and from region to county, create inconsistencies in information and interface design among communities vulnerable to damage to property or their lives. What remains consistent, however, are the similarities between emergency management and technical communication. And with the need for these positions becoming more explicit over time, there is space for collaboration between industry and research practices for both fields of study.

Negotiation and workflow management, facilitating interpersonal communication, knowledge management and community development, and articulating and preserving knowledge are all aspects of the role of the emergency manager. These skills are more clearly present during times of disaster when they work closely with subject matter experts (SMEs) such as firefighters, police, or public works employees to prepare reports, providing concise and accurate information across diverse media. With these responsibilities, the emergency manager becomes the technical communicator as researcher, meeting the communities' knowledge demands (Hart-Davidson 2013; Swarts, 2018). However, technical communicator is seldom the primary role for these positions, depending on their location, number of staff, time of year, and other factors that impact their day-to-day activities. In addition, they often receive little training related to effective communication (Rowan, et. al, 2009).

Throughout the year, emergency management staff may share information with the public about public events, providing warnings and other necessary or important information to navigate scenarios. In the event of a disaster, they partner with an Incident Command System (ICS), and work with other departments and agencies to ensure the safety of their communities. At this point, the emergency manager may take on the responsibilities of a public information officer (PIO) for their branch or will begin working closely with a separate PIO to quickly provide accurate and up-to-date information to the public through outlets such as social media, news channels, and radio stations. This shift in responsibilities can lead to confusion amongst public safety employees, especially if there are significant differences between normal day-to-day tasks and emergency duties.

Along with committing to serving the public during a disaster, sometimes living in their Emergency Operations Center (EOC) for extended periods of time, emergency managers are a part of the community they serve. When preparing the public for a disaster, they also take on the emotional labor of wondering what damage they might come home to after an incident has ended, or how their decision making impacts the people they know. The amount of commitment these employees have, both professionally and personally, leaves little time or energy for additional training or reaching out to the community for feedback. This can lead to a lack of improvement in communication design, possibly resulting in harm to the public. Carolyn R. Miller (1979) called for a more humanistic perspective in such reports through self-examination, which is nearly impossible in this scenario. Conversely, researchers are in a unique position to study communication, training, and public participation to improve how emergency managers share information. Scholars in technical communication can support their industry partners by exploring these roles and providing meaningful strategies for practitioners and users to consider.

Technical Communication as an Interdisciplinary Field

The field of technical communication has a rich history, with its origins highly debatable, depending on how one defines technical writing (Henning & Bemer, 2016; Pringle & Williams, 2005). Regardless of its inception, scholars have consistently associated technical writing with advancements in technology, exploring their interdependent relationship (Bimber, 1990; Longo, 2000). Consequently, moments in US history such as World War II increased the need for proficiency in technical writing amongst industrial positions. Over the next 80 years, technical communication has become a necessary skill in a variety of professions, leading to other disciplines working in conjunction with technical writers.

Miller's call for a more humanistic rationale for technical communication sparked change within the discipline, moving away from positivism in exchange for the social construction of knowledge that still exists in scholarship today (St. Amant & Graham, 2019). One of the current trends that has been interwoven with technical communication since at least the 1980s is usability studies, which, according to some scholars, has been incorporated into the broader field of user experience (UX) (Redish, 2010). Consequently, recent studies have found that technical communication graduates are finding positions in user experience careers, further emphasizing the complementary nature of these disciplines (Lauer & Brumberger, 2016). User experience, an area that prioritizes the user into design and communication decisions, heavily relies on principles of technical communication. However, UX is rarely applied to current risk communication within the discipline, even though online capabilities for risk communicators such as emergency managers require increased expertise in social media, interface affordances, and communication strategies (Potts, 2013). By continuing to explore possible interventions for disaster scenarios through collaborations between technical communication, risk, and user

experience, a multidisciplinary framework can be modeled to improve humanistic approaches to these fields individually and technical communication by and large.

Research Goals and Contributions

The goal of this project is to investigate the relationship and communications between the government, specifically emergency management agencies, and the public. I use an interdisciplinary methodological approach that incorporates theories of risk, technical communication, and user experience to improve disaster communication strategies. Each of these three fields of study exist together and independently, often interacting with disciplines such as human-computer interaction, design, and crisis communication. Rarely, though, are all three used together to understand both communicators and users to promote changes in knowledge production and management. The project highlights challenges of emergency management and identifies the frustrations of the public who receive their messages. By gathering and analyzing data on their experiences, I can recommend strategies that will lead to more successful communication in the future.

Some scholars in technical communication have started exploring such frameworks. Liza Potts uses Actor Network Theory (ANT) to explore how participants use social media during disasters across three case studies. She argues that the key to serving online ecosystems is to participate in them, and that these environments and practices should be a larger aspect of experience architecture. Similarly, Amber Lancaster uses Clay Spinuzzi's "integrated scope" and ethics of care to create a new framework that incorporates textual analysis and distributed usability, using a lens of ethics of care (2018). She conducts a case study of a 1999 Ford Motor Company explosion, relying on historical documentation from the accident such as reports and photos taken by Michigan Occupational Safety and Health Administration (MIOSHA). Lancaster's work effectively ties technical communication, user experience, and risk

communication together to determine how to improve future strategies. These scholars have extended research across risk, technical communication, and UX, but rely on past documentation and interviews rather than speaking to survivors themselves and determining their needs (Lancaster), and provide recommendations specifically for social media rather than risk communication overall (Potts).

My dissertation contributes to each area—technical communication, risk communication, and user experience—because it is focused on a current disaster and reports user experience testing on survivors, rather than relying solely on documents that include testing by others. My study analyzes artifacts that may represent the user but are less limited in context and information with the incorporation of first-hand user testing. In addition, I spoke to members of the organization that were responsible for communication with the public to develop a deeper understanding of the organization’s culture and how it may impact current emergency management agency structure and capabilities during future disasters. By investigating the organizational structure and speaking to users directly, I was able to collect and triangulate my data, resulting in findings that are more representative of the users involved.

Research Questions

My research questions are influenced by my experiences studying risk communication from a technical communication lens and my work to incorporate user experience concepts into methods and analysis. Based on these experiences, as well as the existing gap identified previously, I asked the following research questions for the project:

- How do risk management organizations share information about natural disasters with the public?
- How does the public find information about natural disasters emergencies?

These questions were asked to investigate how communication was utilized during Hurricane Florence by North Carolina (NC) emergency managers and NC residents to determine where improvements can be made to protect the public during a storm. Hurricane Florence and North Carolina were chosen because of the amount of devastation caused by the hurricane, my experiences during Florence and other hurricanes, and my ability to establish a rapport with participants because of my proximity to the event.

Research Methods

To address my research questions effectively, I conducted a two-part study that considered the position of emergency manager as technical communicator and beyond (Part 1) and the needs of communities who rely on emergency information for the safety of themselves and their property (Part 2). The literature used contextualizes the project as a whole. The methodology and results for each part are separated, and the implications and future studies are considered overall at the end of the dissertation.

Part 1 of the project used Spinuzzi's *Topsight* (2018) as a framework for analyzing the organization and communication strategies of an emergency management agency. Spinuzzi describes "top-sight" as the overall picture of an organization's activity systems, providing tools and measurements that can help consultants provide recommendations to improve a business's workflow. He guides the reader through types of data collection, including artifacts, observations, and interviews. Using his three levels of activity (micro, meso, and macro), I analyzed the emergency management structure and workflow within North Carolina during Hurricane Florence, that resulted in an activity system from which recommendations can be supported. This portion of the project focused on the emergency management employees, as well as artifacts representing the agency, such as websites, reports, and training materials.

Part 2 of the project used theories of user experience and constructivism to analyze the perception and needs of the public during a disaster. This data collection was done through qualitative interviews, a user experience method that produces themes related to how participants used a technology, or how they felt about those interactions. This portion of the study took a grounded theory approach and used a semi-structured interview protocol to elicit narratives from the participants about their past experiences during Florence. Along with the interviews, some participants provided artifacts in the form of photos of the aftermath of the hurricane or communication they received, such as blogs or tweets.

Overview of Project

My dissertation consists of five chapters. In this first chapter, I outlined the purpose and rationale behind my project. I provided a brief history of risk as well as the backdrop of technical communication and user experience, followed by my contribution to theories and methods each discipline; I also reviewed the methods used within the study to contextualize the project. Chapter 2 of the dissertation provides an extended explanation of the research done by scholars in technical communication, risk communication, and user experience. The gap in literature is identified along with how my study addresses this deficit. The research questions for the project are posed at the end of this chapter. Chapter 3 reviews the methods used to explore those research questions, along with information on how the data was analyzed. Chapter 4 reports on the results of both parts of the study, including visual representations of workflows and identified narrative themes. Finally, Chapter 5 discusses the implications of the research, summarizes the project, and concludes with suggested communication strategies for technical communicators who work in risk communication environments. Additional information can be found in the appendices following the main content.

CHAPTER 2. LITERATURE REVIEW

Technical communication is acknowledged as a largely interdisciplinary field, leaving graduates with skills that can be applied to an assortment of industry positions (Blakeslee & Spilka, 2004; Lauer & Brumberger, 2015). The need for cross-pollination has been clearly articulated between technical communication and user experience across journals and disciplines, sharing methods and theories to create effective designs and interfaces (Redish, 2010). These two fields also share commonalities with risk communication, and because users have an increased reliance on technology during disasters (Webler & Tuler, 2018), there is ample space for more collaboration. Although several scholars have investigated the relationships between either technical communication and risk, or technical communication and user experience, few have considered how all three disciplines intersect overall. In Chapter 1, I positioned the skills involved in emergency management as similar to that of a technical communicator and posed the following research questions:

- How do risk management organizations share information about natural disasters with the public?
- How does the public find information about natural disasters emergencies?

To adequately address my research questions, the scholarly literature across technical communication, risk communication, and user experience needs to be considered. Because each of these areas are largely interdisciplinary, it is important to illustrate where each area overlaps with the others over time. In this literature review, I begin by providing an introduction to each discipline separately. Afterward, I discuss the historical trends in which the areas interact or share ideology, using technical communication as the primary area of overlap. In early iterations of technical communication, technical writers were seen as simply transmitters or translators of

scientific information. The same linear model can be seen in the beginnings of both risk communication and user experience. However, with the movement towards a user-first culture, these disciplines begin to intersect. At the end of the literature review, I highlight how technical communication and user experience can contribute to ongoing problems in risk communication and emergency management. Finally, I highlight the gap in research that my dissertation speaks to, while addressing questions on how to best serve communities in risk scenarios.

Emerging Disciplines

Technical Communication

There is a lot of conjecture about when technical writing began, from as early as the Aztecs to the start of World War II (Henning & Bemer, 2016; Pringle & Williams, 2005). Many scholars, however, align with Bernadette Longo, who traces technical communication in the United States back to the mid-1800's, with the expansion of the American railroad system and other technologies such as the typewriter (Longo, 2000). Operators needed information like manuals and timetables to keep the trains running on schedule. The typewriter allowed for a more standardized and efficient means of communicating and duplicating information for businesses with offices distributed in multiple cities. By the early 1900's, technical writing was beginning to play an active role in engineering courses, but was still aligned with other English classes, such as composition, as a "necessary evil" (Connors, 2004). For several years, technical writing remained a solitary service course, and in 1911, what many consider a first textbook in technical writing, *Theory and Practice of Technical Writing*, was published by Samuel Chandler Earle.

Despite its early inception, some argue that technical communication did not emerge as a profession until the 1940's (Kimball, 2017). Scholars in writing began to discuss technical writing in the context of composition, but it would be another 30 years before the articulation of

technical communication as a discipline was marked by the first issues of the *Journal of Technical Writing and Communication* and the creation of the Association of Teachers of Technical Writing (Connors, 2004). At the time, technical writing courses were largely seen as service, but scholars in the field began to articulate their own identity.

As a course that serves engineering students, technical writing was often identified as a topic that relied on positivism, with technical writing being a means of relaying of undebated scientific truths. One of the first influential publications to challenge this perspective was Carolyn R. Miller's "A Humanistic Rationale for Technical Writing," in which she argues:

Reality cannot be separated from our knowledge of it; knowledge cannot be separated from the knower; the knower cannot be separated from a community. Facts do not exist independently, waiting to be found and collected and systematized; facts are human constructions which presuppose theories. We bring to the world a set of innate and learned concepts which help us select, organize, and understand what we encounter.

(615)

Miller questioned the positivistic view of technical writing as dissemination of science. Instead, she argues that technical writing is rhetorical, dependent upon context, audience, and other factors (1979). She advocates studying theories of community and enculturation to better understand technical communication as a discipline within the humanities. Since publication, her article remains as a foundation of technical communication scholarship that is still used to challenge the identity of the field.

Risk Communication

As discussed in Chapter 1, the origin of risk communication also has a debated past. Before risk communication was recognized as a field of its own, researchers first studied risk assessment and management, believing risk could simply be calculated through scientific methods,

such as statistical evaluation of actuarial tables (Fischhoff, 1995). But modern-era risk communication, where perception has become an aspect of understanding, is often first associated in the United States with movements like the “Atoms for Peace” campaign of the 1950s (Palenchar, 2009). During the 1960’s, Americans were becoming increasingly concerned with pollution and seeking political change. Books like Rachel Carson’s *Silent Spring* (1962) motivated the public to join the environmental movement, and in 1970, the Environmental Protection Agency (EPA) was created. In the same year, Earth Day and the Clean Air Act were also established, showing the government’s commitment to environmental risks. While the EPA focused on environmental concerns, other government committees were responsible for other types of disasters happening in the country. In 1979, these groups were brought together to form the Federal Emergency Management Agency (FEMA) within the Department of Homeland Security. One year later, the Society for Risk Assessment (SRA) was created and broadly defined to include risk assessment, risk characterization, risk communication, risk management, and policy relating to risk.

After the Society for Risk Analysis began in 1980, the first volume of the academic journal *Risk Analysis: An International Journal*, was published, followed by other articles and journals studying risk. It wasn’t until 1986 that the United States mandated Local Emergency Planning Committees (LEPCs), influenced by Americans insisting upon their rights against government agencies and science communication (Rowan et al., 2009). Like other sciences, early understandings of risk were openly quantitative, seeing risk as a calculation rather than a social construction. Researchers relied on scientific methods to determine and manage risk and disregarded the public perception of risk. According to William Leiss (1996), this was during the first evolution of risk communication when “for scientists, perceived risk is correlated with false

understanding and is further contrasted with real risk, which is allegedly an objective—that is, ‘true’—account of reality” (p.88). This phase lasted until the mid-1980s, when communication of risk was acknowledged as persuasive, and audience involvement was increased by the Right-to-Know Act, passed in 1986. Since this time, risk communication has become multidisciplinary and is actively studied to develop more effective communication strategies with the public.

User Experience

User experience (UX) is a term often connected to human-computer interaction (HCI), a multidisciplinary field that incorporates theories and methodologies from fields such as ergonomics, computer science, psychology, and anthropology. User experience also incorporates usability methods, qualitative and quantitative research methods often used by technical communication. Because of these similarities and overlap, it can be difficult to pinpoint when UX as a proper field began, though some argue Don Norman coined the term in *The Design of Everyday Things* (1988). The history of HCI is several decades older, beginning with the creation of computer technologies and publications such as Shackel’s “Ergonomics for a computer,” in the 1950’s. Usability, however, has been attributed to the work of both technical communication and human-computer interaction. One early example from the 1980’s is Candace Soderston’s “The Usability Edit: A New Level” (1985), where she argues for usability edits in technical documentation: “Anytime [sic] a reader, subject, or ‘usability editor’ encounters a problem in performing the task, the writer should see a problem in the material. These problems can then be corrected” (p. 17). She goes on to say that usability editing can also be called usability testing, referring to “collecting data about error rates and time to complete tasks” (p. 17). Soderston’s work has been cited by numerous scholars, including studies within human-computer interaction. And over the years, scholars within both areas have continued to study usability as a method of task and document improvement (Redish, 2010).

Human-computer interaction also grew in the 1980's when conferences such as Interact, CHI, British CHI and Vienna HCI were formed (Dix, 2017). Scholars in technical communication continued to advocate for collaboration in usability studies. In Patricia Sullivan's "Beyond a Narrow Conception of Usability Testing," she emphasizes the contributions technical communicators can make in usability testing and research. Acknowledging the range of expertise within human-computer interaction, she encourages further exploration of multidisciplinary usability testing, including technical communicators, to improve user experience and documentation (1989). According to Redish, the evolution of usability studies within technical communication continued into the 1990's, moving from lab-based testing (usability) to user-centered design where there was more emphasis on the design process, onto the encompassing concept of user experience (2010). And according to Norman and Nielsen, user experience considers the interaction between user and product, encompasses other terms such as usability, how easy the product is to use, and user-centered design—a focus on user instead of designer when developing products (2019).

Intersecting Trends

During the late 1980's, technical communication scholars were studying disasters like Challenger explosion in 1986, and how communication factored into the malfunction and loss of seven lives (Windsor, 1988; Moore, 1992). Others reflected back further to the consequences of risk and expediency (Katz, 1992), while Bev Sauer studied coal mine disasters to discuss the role of expertise in the understanding of risk (1993). In her work, she describes a coal mining disaster that could have potentially been avoided if the wives of the miners' practical experiences had been factored into decision making. Because these women were not seen as experts, their voices were ignored, and valuable information was therefore lost. The following sections of the chapter

introduce these historical trends and underline moments of collaboration or shared principles across disciplines.

Models of Communication and Expertise

Early researchers in science communication relied on the deficit model. The deficit model, defined as the “assumption that ignorance is the basis of a lack of societal support for various issues in science and technology,” had significant impact amongst science communities and is arguably still prevalent today (Simis, et al., 2016). Evidence of this model can be found in risk communication, where risk was originally assessed and therefore determined by scientists. The deficit model has been continuously challenged in risk communication for a more inclusive model that acknowledges the beliefs and perceptions of others.

Over time, scholars have challenged such linear models of communication between stakeholders. In technical communication, the role of the technical communicator was first seen as a translator of information from scientist to the public, but this changed over time. Scholars such as Slack, Miller, and Doak (1993) argue for the technical communicator as the author of a text rather than a passive translator of information. In their work, they describe three views of communication concerning knowledge-making and power structures: transmission, translation, and articulation, which are informed by a range of epistemologies from positivism to social constructivism. They also express the value of technical communicators by asserting that with a lack of authorship “possible contributions are severely constricted. [...] Again, whether they desire it or not, they are always implicated in relations of power. Their work is at least complicit in the production, reproduction, or subversion of relations of power” (p. 31). Technical communicators have an influential position to the contribution of knowledge, but each view interprets the amount of power differently. In the end, the view of communication by articulation

is used to advocate authorship for technical communicators, meaning they are given power and therefore the ability to participate in the creation of knowledge.

Grabill and Simmons extended the role of the technical communicator into risk communication in “Toward a Critical Rhetoric of Risk Communication: Producing Citizens and the Role of Technical Communicators” (1998). In their article, the authors acknowledge the model of risk commonly used by scientists and instead advocate for the humanistic understanding of risk, as in Miller’s rationale for technical communication broadly. According to Grabill and Simmons, some researchers claim risk communication follows a linear, technocratic model of communication in which experts disseminate information to the public through the technical communicator. Instead, they argue, there should be repeated communication between groups, and communication should not happen in a linear, top-down path. The study of risk and how non-experts can be included in decision-making continued with scholars advocating different types of expertise rather than the expert/non-expert paradigm, which does not consider tactical or experiential knowledge (Dragga & Gong, 2014; Frost, 2013; Sauer, 2003). By involving users with knowledge-making, we move away from the positivist model of risk into a socially constructed one.

Since Grabill and Simmons’ model, scholars in risk communication have explored alternate models that attempt to alleviate the confusion and distrust the public has for emergency management by incorporating them into knowledge and decision making. In Reynold & Seeger’s Crisis and Emergency Risk Communication model (CERC), for example, five stages are introduced: pre-crisis, initial event, maintenance, resolution, and evaluation. The CERC model allows for emergency organizations to account for a disaster’s unpredictability as well as the public’s perception of how the incident was addressed by the organization. Rowan et al.,

provides a model for the education and training that emphasizes communication skills, something that emergency managers are often lacking based on their preparation for their complicated positions (2009). The CAUSE model, they argue, can be used in health, risk, and emergency contexts by establishing goals with the community (Table 1). Other models like Houston’s Disaster Communication Intervention Framework (DCIF) help communities understand how to manage a disaster and seek resources for recovery (Houston, 2012). While these models focus on how information can be provided for communities, models such as the Protective Action Decision Model (PADM) focus on organizational campaigns that lead to decision-making by participants (Heath et al., 2018). These models, while innovative, focus on how to persuade the public rather than actively incorporating them into the decision-making process.

Table 1. CAUSE model for local emergency managers

CAUSE model	Strategies
Confidence	Ensuring the public feels confident in the abilities of the emergency manager
Awareness	Enhance risk message awareness through strategic, research-based messaging
Understanding	Clarify confusing processes and provide visualizations
Satisfaction	Address concerns about cost, efficacy, etc. surrounding proposed solutions
Enactment	Encourage attendance to information sessions and provide opportunities for interaction before the emergency

Power and Ethics

As risk and communication models become more inclusive to different types of expertise and perceptions of the public, the power dynamic between stakeholders becomes more apparent. The ethical responsibilities of people in these power positions is explored in technical communication concerning both user experience and risk communication, with scholars arguing for the empowerment of users and ethical practices amongst designers and communicators across disciplines. Speaking specifically to emergency management, Shannon Bowen considers the real-life consequences of irresponsible communication practices:

There is little doubt that risk management and the communication surrounding risk plays a valuable role in society. Risk management helps to inform and educate about risk, to create an acceptable level of risk tolerance for those who bear the risk. It also serves a positive social role by building understanding of risk and knowledge of response strategies for crises. Finally, risk management helps to resolve social problems by engaging in a public dialogue about levels of risk, helping to determine what type and amount of risk is and is not acceptable to publics. (2009)

Bowen acknowledges that roles in risk management are complex and are dependent upon issue management and growing relationships with the public. The unpredictability further complicates strategies used by emergency organizations. Ultimately, she argues that risk management is a complex but necessary position, as ethically responsible and socially-aware risk communication will benefit the community involved as well as society.

There is also power in visuals such as maps and charts which are being used to represent risk in various documents and platforms, such as preparation brochures or post-disaster reports. Katz's "The Ethic of Expediency: Classical Rhetoric, Technology, and the Holocaust" (1992) and Barton and Barton's "Modes of Power in Technical and Professional Visuals" (1993) both

consider the ethical implications of disregarding necessary humanization of risk in documents and communication amongst stakeholders. In Katz's article, he uses a memorandum from WWII to illustrate the power technical communicators have and warns against misusing their authority for the sake of expediency. Ultimately, he argues that the genre of technical communication lends itself to the exclusion of humanity over persuasion and that technical communicators need to be aware of their position.

Barton and Baron (1993) make a similar argument concerning visuals with documentation, calling them "instruments of power." They refer to the power structures that underlie representations of data and compare visuals to Foucault's use of the panopticon, separating them into "synoptic" and "analytic" strategies of power (p. 138). The synoptic mode is global, including visuals such as maps. The reader can consider society and thus compare themselves in relation to what societal expectations are. In the analytical mode, the reader or viewer sees individuals within the system, allowing them to compare themselves to others. Only allowing individuals a partial view of their society and themselves gives them an unbalanced perspective of their lives. The most powerful, they argue, are visuals that can utilize both synoptic and analytic strategies simultaneously, such as control displays for nuclear power plants. The purpose of these examples is to challenge the ethical and persuasive nature of visuals with the goal of introducing these concepts to technical communication scholars, practitioners, and students to design more ethically responsible future documents.

The call for ethical representations of data continued to grow and can be seen in other articles such as Donna S. Kienzler's "Visual Ethics" (1997). Kienzler suggests personal accountability to combat the misrepresentation of information, saying "when these personal ethical commitments are negotiated and combined in a corporate, collaborative effort, the results

may be more ethical visuals” (n.p.). In this example, a technical communicator could work towards eliminating some of the fear they may instill in a user by altering color schemes and considering the effect of other design elements like proximity, typography, and interactions with the visualization.

As each experienced individual and intersectional growth, the introduction of Web 2.0 allowed for more comprehensive representations of data and rigorous methodologies. But with increased capabilities comes additional complexities. Visuals started to come under scrutiny because of the ethical implications of their design. Dragga and Voss apply this reasoning to visuals, articulating the dehumanization of data that often occurs in technical documents, particularly concerning fatalities (2001). Visuals can represent different types of data, but always elicit an emotional response from an audience—something that can be controlled by the designer. For example, color has been shown to stir emotions perceptually and culturally. In addition, pictorial elements can create personalized data, making it appear more interesting to readers (Kostelnick, 2016). According to Dragga and Voss, a “genuine sensitivity to the human implications of the statistical graphics created and used every day under ordinary circumstances” should be developed to ensure ethics are addressed effectively (p. 266). This can be difficult to measure objectively, as it involves technical communicators internal evaluation of the visuals they are designing for their audience. In Kostelnick’s “Re-emergence of Emotional Appeals in Interaction Data Visualization,” rhetorical appeals, particularly pathos, are still relevant in online risk environments. The solution he suggests is increasing interaction between user and designer, arguing that “affording users opportunities for feedback and discussion invests them emotionally in the design by building community and enhancing interest and understanding (2016).” As technical communicators in a Web 2.0 world, we have even more opportunities to interact with

users because of what we can accomplish online. Weather visualization maps, for example, can influence users to action if they feel personally impacted by what they see (Kostelnick & Kostelnick, 2016). They warn that data visualizations can be used unethically if created carelessly or purposefully inaccurate.

Transparency and Participatory Culture

Concerns about the effectiveness of risk communication from government agencies are often tied to issues of trust from the public (Gray and Ropeik, 2002; Webler & Tuler, 2018). Research shows confidence in the government has declined over the past 50 years and can be attributed to a collection of factors, such as mass media, systematic experiences, policy dissatisfaction, and persona (Citrin & Stoker, 2018). Because of a lack of trust, some communities have resisted government influence and called for public involvement in policy making (Stratman et al., 1995). Some members of the public tie this distrust back to a lack of transparency and accountability with various committees or agencies as they make decisions for communities rather than with them. In one instance of government failure in North Carolina, Steven Katz and Carolyn Miller (1996) argue that the government was unsuccessful because of their closed philosophy of communication and call for an open, rhetorical understanding of communication:

What is missing from public participation programs and from risk communication in general is an underlying conception of decision making as egalitarian, interactive, and truly dialogic, and of communication and consensus making as rhetorical processes, that is, as historically situated, persuasive, and open-ended. The philosophy of communication we advocate, based on equal participation, partnership, and mutual respect, is as much an ideal as the engineering model. (134)

Technical communicators are often situated in positions to address public participation and support the public's rights and needs. Susan Youngblood (2012) addresses these concerns in "Balancing the rhetorical tension between right to know and security in risk communication: Ambiguity and avoidance," where she compares two government websites that approach communication with citizens differently. She finds that distrust occurs when misinformation is provided, or citizens feel as though technical communicators or scientists are being deceitful. Dragga and Gong note a similar phenomenon in the historical relationship between the military at Port Chicago and neighboring communities, where they argue more could have been done to grow trust with civilians (2014).

Attempts to increase public participation have been made, but with many people using social media to find emergency information, emergency management agencies have been pressured to increase their online presence. Despite this call, many emergency managers remain hesitant to use social media. In a study involving 100 public safety practitioners, six points of tension were identified concerning using social media (Table 2) and underline the concerns they feel unequipped to address. The authors of the study recommend future research that adopts action research methods to work with practitioners to provide solutions (Elbanna, Bunker, Levine, & Sleight, 2019). Technical communication scholars can provide this support because of their relationship with human-computer interaction, including user experience.

Table 2. Six thematic points of tension from a survey of emergency managers

Points of Tension	Description
Tension of information	Concern about the spread of false information and its impact on public safety
Tension of volunteering	“Flash” volunteers who do not coordinate with emergency management and appear on scene are difficult to incorporate
Tension of tourism	Seeing photos on social media may cause others to come to the scene to see if for themselves, putting their lives in danger
Tension of community expectation	Concern about sharing accurate, timely information at the speed of social media within structured emergency processes and legislative frameworks
Tension of PPRR (Prevention, Preparedness, Response, and Recovery)	Protocols for disaster recovery need to be updated to incorporate social media
Tension of crisis communication	More research needs to be done on social media channels in comparison to other media

User experience is not a new term, though its influence has grown over the past few years, particularly surrounding user-centered design and usability studies. As noted earlier, usability methods have been used within technical communication since the 1980’s, but with technological advances, there are new considerations for how to best serve users. According to Salvo (2001), “in developing new design models, technical communicators have an ethical

responsibility to help users become more informed users while making producers more responsive producers, and the clearest route to this goal is to raise the interaction, the dialogic interaction, between these populations” (p. 289). This is possible through a variety of user experience and usability methods, such as participant think-aloud protocols, focus groups, journaling, and interviews, resulting in a more ethically responsible product because the needs of users are considered rather than solely relying on the agenda of the technical communicator or the organization they are employed by.

New programs and digital spaces allow for new and/or improved types of user experience and usability testing. This, in turn, has allowed risk communication researchers to use these tools to study online communities and focus on how to create more effective spaces for collaboration between technical communicator and user. Bowdon (2014), for example, uses tweets from Hurricane Irene to examine the rhetorical strategies used by organizations in her classroom. Liza Potts conducts a similar type of analysis for Hurricane Katrina, focusing on social media and how users interact during times of disaster (2013). Potts also utilizes actor-network theory (ANT) to illustrate the online ecosystems that exists in and outside of official emergency management organizations. She argues that although experience architects come from a variety of areas of expertise, they should come together to analyze online ecosystems to better serve participants within them. Potts’ claim—that risk communication happens largely outside of government forums and in online social spaces—has led to additional studies of the intersections of risk communication and social media. My dissertation relies on the same concept of online ecosystems as Potts, but utilizes a different methodology for determining the relationship between emergency management agencies and the public.

In contrast to Pott's use of ANT across three disaster case studies, I studied one disaster from the perspective of emergency managers and the public. I chose to study organizational workflow using Spinuzzi's (2018) topsight framework to determine how improvements can be made to better serve the public, and conducted user interviews to incorporate the public's perception of their interactions with emergency management agencies during the disaster. Amber Lancaster (2018) also incorporates Spinuzzi's methods into "Identifying Risk Communication Deficiencies: Merging Distributed Usability, Integrated Scope, and Ethics of Care," in which she creates a merged framework to improve risk communication in the workplace. She applies her framework to a past disaster through an analysis of a historical archive of reports and other documentation related to the accident. Lancaster recommends her framework for past and future studies of risk communication to determine cultural contexts and ultimately improve internal workplace practices to prevent injuries or death. In my own study, I use a similar approach to Lancaster's framework, but instead focus on natural disasters and how communication can be improved externally with the public.

In addition to different applications, the theories that inform Lancaster's framework are largely based in and recommended for technical communication, while my study incorporates other disciplines such as communication studies of risk and user experience. Research on risk relies on many disciplines (Aven, 2018), meaning many attempts have been made to determine how it can be analyzed and communicated more effectively. Although I am recommending my research be applied to technical communication, I am also interested in its application to studies of risk that happens across disciplinary lines. As I've described in this chapter, scholars in technical communication and human-computer interaction have studied risk communication and made steps towards improving it through a variety of methods and suggestions for change. Over

the years, numerous risk and crisis communication models have been created, but are debated within their own disciplines. The lack of collaboration and information sharing is caused by epistemological differences and the disciplinary silos that are created as a result (Althaus, 2005). Because of this, there is still a need for improved practices and inclusion of other disciplines concerning how risk is understood, and should be managed with the public, including an interdisciplinary, shared theory of hazard and disaster (Sherman-Morris, Houston, & Subedi, 2018). This dissertation addresses this gap in research by incorporating theories from multiple disciplines to develop a framework for improving the relationship between government emergency management agencies and the public.

Summary of Chapter

In this chapter, I contextualized the existing literature on technical communication, risk communication, and user experience and described the gap in research that my project addresses. First, I introduced each discipline separately, detailing how they progressed over time. I followed by identifying shared themes between disciplines and moments of overlap. Then, I discussed similar projects that have examined stakeholder relationships in risk communication. Finally, I explained how my research differs from these projects, and provides new insights for technical communication, user experience, and the range of disciplines that study risk communication. The next chapter describes the methods used in my project and provides a justification for why Spinuzzi's topsight and user experience testing were used to answer my research questions.

CHAPTER 3. METHODOLOGY

The purpose behind this IRB approved study (Appendix A) is to understand the rhetorical relationship between government emergency management agencies and the communities they serve, specifically during times of high-risk natural disasters. Technical and risk communication research is commonly concerned with man-made disasters that were in some way due to human error, recommending ways to avoid future accidents. Unlike disasters such as explosions or crashes, natural disasters are unavoidable and will not stop, regardless of intervention. However, research into natural disasters can help mitigate the amount of damage that happens, especially related to personal safety of the public. Successful communication about a storm could dramatically change how a person reacts to the approaching disaster. Natural disasters are unavoidable, but the amount of damage to one's self, family, and property could vary dramatically based on the communication they participate in. This study seeks to gather information on how emergency management agencies and the public communicate during a disaster. Understanding these communication strategies can lead to identifying gaps or missed opportunities in communication, which can then be addressed in future risk communication scenarios.

To determine where interventions should occur, I conducted a two-part study that examined how the stakeholders, North Carolina Emergency Management and the public, communicated during Hurricane Florence in 2018. Using *Topsight* (Spinuzzi, 2018) as the theoretical lens for Part I, I collected artifacts and conducted in-depth qualitative interviews with North Carolina emergency management employees who worked during the hurricane. I analyzed this data through thematic analysis and the analytical tools Spinuzzi terms breakdown tables, handoff chains, and other diagrams that will be described later in the chapter. The results of this

combination of analyses creates a bigger picture, or what Spinuzzi calls topsight, of the emergency management agencies in North Carolina and how they operated during the hurricane. By developing a greater understanding of the agency, I am able to identify issues with workflow and draw insights from the professional and personal experiences of the employees.

Part II focused on how the public interacted with emergency management agencies, using constructivist grounded theory to conduct interviews of participants about their experiences during the hurricane. These interviews were thematically analyzed to determine what information was most important to the community and what suggestions might arise from their experiences. The following section of this chapter describes the disaster and region studied in the project. Next, the chapter is broken down into Parts I and II, corresponding with the two stakeholders, North Carolina (NC) Emergency Management and North Carolina residents. Within each part is the method of data collection and analysis, ending with a summary of the chapter.

Choosing a Disaster

Understanding how government organizations communicate information with the public is no small task. Administrative structures within federal and state governments are complex (more on this in Chapter 4). The purpose of my study was to understand the relationship between these stakeholders, acknowledging that emergency management agencies have a variety of factors that impact their communication strategies. When I first started thinking about this project, Hurricane Florence had only recently hit the east coast and my friends and family were still recovering from its impact. As someone with family in the area of the storm, I had actively monitored media outlets for information on the storm. After I found out my family was safe and the storm had passed, I spent the new few weeks seeing images and articles on social media about the flooding and damage done to the state, including a number of casualties. And with

Florence breaking state records for amount of rainfall and millions of dollars in damages, I decided the state and disaster would be an appropriate match for my project. The areas that were the most heavily affected in the state were the Coastal region and the Sandhills area, so I decided to focus on these locations when soliciting participants. My hope was that my findings would provide insight for practitioners on building more inclusive communication strategies and provide scholars with new methods to assess risk communication through technical communication and user experience.

Part I: NC Emergency Management (NCEM)

North Carolina has state and local emergency management agencies. The state agency, North Carolina Emergency Management, oversees each level of emergency management in the state. The state is divided up into three geographic regions from West to East (also known as mountain, piedmont, and coastal) and by county and municipality, all of which have some type of emergency manager. Part I of this chapter provides a rationale for using *Topsight* as a framework for Part I of the project. It continues by describing how to achieve “topside” of an organization, according to Spinuzzi. This is achieved by studying the three levels of activity within an organization. Next, data collection procedures are described. Last, there are details about data analysis, including coding, breakdown tables and handoff chains, and other diagrams that illustrate workflow organizational structure.

Choosing *Topsight*

Entering this project, I was largely unaware of how emergency management was conducted in North Carolina. From my own experiences, I knew that emergency management was situated within public safety and that it contained employees with a variety of types of expertise and positions. In order to understand how the agency communicates with the public, I needed to access and interview employees within the organization. I also wanted to understand

how the structure of the organization impacted how information was determined and shared. In the field of technical communication, Spinuzzi's *Topsight* has been used as a model for exploring activity system in organizations to improve work and documentation processes (Ballentine, 2016; Divine & Zachry, 2018). Lancaster (2018), for example, merged Spinuzzi's activity system with usability studies and ethics of care to create a framework for studying risk communication. In her conclusion, she suggests applying her framework to past and future accidents to minimize occupational injuries and fatalities. In my own study, I used *Topsight* to develop model diagrams that best illustrated the ways the emergency agency communicated internally amongst employees, and externally with the public related to natural disasters rather than workplace injuries.

Achieving Topsight

In his book, Spinuzzi emphasizes the value and challenge of developing the overall picture of an organization, or what he terms, topsight. To get topsight, he argues, you must think of an organization as a system, and determine what the complex underlying causes are for ongoing symptoms within the workplace. Topsight can be achieved by gathering information about the three levels of activity that occur within an organization: macro, meso, and micro. I used Spinuzzi's three levels of activity (Table 3) as my approach for analyzing the processes in which information is given to the public during natural disasters.

Table 3. Spinuzzi's three levels of activity

Level of Activity	Description
Macro	The top level of the organization. This encompasses the organization's values, goals, and culture.
Meso	The middle level of the organization. This includes what is done within the organization to achieve its goals.
Micro	The lowest level of the organization. This relates to how employees complete the work tasks from the organization.

Data can be collected from each level through both etic and emic perspectives, and I integrate both to provide more thorough findings. With the information I found across the three levels, I was able to create diagram models that illustrate activity within the organization and how employees interact to achieve objectives. In the following sections, I explain each level of activity and how it relates to my research project.

Macro Level of Activity

The first level of activity Spinuzzi describes is the macro level, which is the culture and history of the organization. To gather information on the macro level, I reviewed the history of emergency management within the state of North Carolina. This information is publicly available through the NCEM website. For example, the NC Department of Public Safety, the department that houses NC Emergency Management, has the mission to “safeguard and preserve the lives and property of the people of North Carolina through prevention, protection, and preparation with integrity and honor” (About DPS). The culture, however, requires an emic perspective, achieved through interviews with emergency management employees. As

employees described other employees or regions, I took note of their comments related to their interactions and relationships.

Meso Level of Activity

The meso, or middle, level of activity focuses on what the organization does, rather than why they do it. This level requires information on the work of individual employees and groups within the agency. For example, the public information officers within the emergency operation center have similar overall goals with other employees in the center, such as providing accurate information to the public, but they have specific work related to their position that is different than police officers they are communicating with. I relied on employee interviews to determine what responsibilities different positions have. I also used artifacts provided by employees, along with some additional artifacts publicly available, to reinforce the roles the employees described and find additional commentary on their experiences.

Micro Level of Activity

The final level of activity is micro, or how individuals within the organization complete their work and goals. In this level, habits of employees are observed as they complete tasks by looking at the tools they use as well as how often they use them. Because I was investigating the past experiences of the employees, I could not observe their workflow. Instead, I prompted them with questions during their interviews about their workflow during regular periods of time and how they change during an emergency. I also asked them about their activity specific to Hurricane Florence. In addition, I located information on NCEM's website about the structure of the agency to assist with understanding how tasks are completed.

Data Collection

Before the study began, I had to determine what type of data I would be gathering from participants. I relied on Spinuzzi's levels of activity to choose interviewing as my primary

method of data collection. Interviews allowed me to ask qualitative questions about the experiences of emergency management employees who experienced Hurricane Florence. These interviews provided information about the culture and structure of the organization as well as any takeaways from the experience of a disastrous hurricane that left the state with roughly \$17 billion in damages (Stradling & Bennett, 2018). I decided to use a semi-structured interview protocol that allowed me to ask follow-up questions about artifacts they may have mentioned or are mentioned in one of their public documents on the emergency management website for their area. This section covers recruitment strategies and the types of data collected for each of the three levels of activity.

Recruitment

To gain access to North Carolina emergency management employees, I needed to gain site permission from a supervisor within the organization. I started by emailing a state emergency director to inquire about completing the study. After speaking with them on the phone, I was given permission to contact employees directly to solicit participants. In order to participate in my study, I decided the employees had to be at least 18 years or older and have worked in an emergency management position at the time of Hurricane Florence. Within the state of North Carolina, emergency management agencies are broken down into regions, branches, counties, and municipalities. Because of this structure, I focused on contacting counties within the Coastal and Piedmont regions, focusing on the Sandhills region as they were the closest to the coast and most affected by the storm (Figure 2). Of the 100 total counties in the state, about half are located in these regions. I solicited participants by reviewing county emergency management websites and finding their contact information. From there, I contacted each county inquiring about participants. The total number of counties contacted was roughly 47.

At the end of solicitation, a total of six counties responded and three decided to participate in the study.

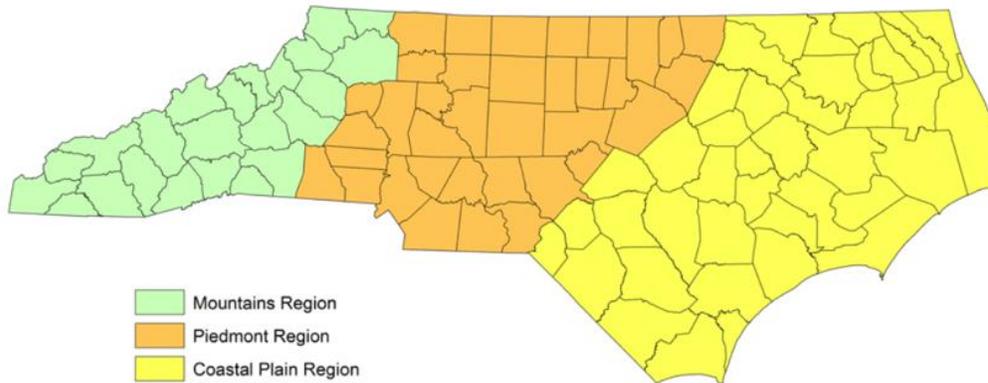


Figure 2. The three regions of North Carolina. Located at NC Forest Service website.

Artifacts

Spinuzzi designates three levels of activity: micro, meso, and macro. There are suggested ways to collect information about each level. For example, at the macro level, researchers can collect data about the culture and history of an organization through vision statements and annual reports. I gathered information from several sources Spinuzzi suggests, including collection and analysis of artifacts. Artifacts are split into three categories based on data collection: artifacts from observation, artifacts from interviews, and artifacts from background. I utilize both artifacts from interviews and artifacts from background, but I simply classify them as internal and external artifacts. I define an “internal” artifact as an artifact that was provided from within the

organization that is not readily available to the public. I define “external” artifacts as artifacts that are public facing and readily available on websites, media, etc., that may or may not have been provided by the organization. There are instances, for example, when an emergency management employee will provide me with information on where to find public information that is not clearly organized within their website or exists on an outside website. This would still be considered an external document.

External documents included annual reports from an area, reflecting on their experiences during Hurricane Florence, information on county or state websites about the groups such as mission statements, and press releases. Internal documents included photos of Emergency Management Operation Centers and information on the structure of EOCs that is public but not readily available. Because of the anonymity of the project, documents with identifying location information or photos that included identifiable images of employees were either edited to remove these details or not listed in the findings. These items were considered as part of the analysis, but were not directly referred to within the results, analysis, or discussion.

Interviews

Interviews can be used to find information within each of the three levels of activity. Relying on qualitative methodologies (Corbin & Strauss, 2008; Creswell, 2006), Spinuzzi describes three types of interviews: structured, unstructured, and semi-structured. These types are used in other disciplines and refer to how much flexibility there is for the questions being asked, structured being the least flexible and unstructured being the most flexible. He suggests using semi-structured for organizational research because you have a standard set of questions but can deviate from them if needed. This allows participants the opportunity to speak to a larger variety of topics that can be elaborated on further. It can also mean researchers will find information that they did not anticipate, potentially increasing the rigor of their study.

For emergency management employees, three counties were represented across three interviews. There was an additional written response that was analyzed separately which represented an additional county, bringing the total amount number represented to four. Because a site visit was not a viable option, interviews were completed over the phone during the employees' working hours. Participants allowed the interviews to be recorded to later be transcribed. All recordings were kept in a secure CyBox folder which will be deleted at the completion of this study.

The interview protocol consisted of what Spinuzzi classifies as "opening questions," or questions related to the employees' background, job description, unit's description, and other people that they may work with (Appendix B). From there, employees were asked how these roles might shift during a hurricane, referencing Hurricane Florence specifically. This gave participants an opportunity to talk about a variety of roles they may place within the agency and how those roles may shift based on the disaster type they are confronted with. Employees were asked to describe what happened to them during the Hurricane, including their personal life experiences outside of their employment. At this point in the protocol, the questions became more flexible based on what the participant said about their experiences related to the hurricane. Finally, a "closing question" was asked, such as "Is there anything else you'd like to share based on my questions today?" Interviews with emergency personnel from each county were conducted via phone and ranged from 22 to 53 minutes, with an average time of 48 minutes per interview.

Data Analysis

To develop topsight of an organization, a researcher must collect various types of data and analyze it using corresponding methods. For North Carolina emergency management, I gathered internal and external artifacts and conducted interviews with employees to determine how the agencies communicated with the public, each other within the same unit, and other

branches within the agency. This section details how the collected data was coded to develop themes and then analyzed by creating activity systems and networks.

Characterizing Data: Coding

Spinuzzi recommends several steps to analyze data collected from and about the organization and employees working there. One of his first suggestions is to conduct a thematic analysis through coding (Miles, Huberman, & Saldaña, 2014; Saldaña, 2007). He compares coding to hashtags, and structures them into three categories: starter codes, open codes, and axial codes. Starter codes are your expected themes, open codes are emerging themes, and axial codes are where codes connect to one another.

For this project, I used starter and open codes primarily, but was able to identify some axial codes after further analysis. These codes were used to develop an activity system that describes the workflow of the agencies within the state. They were also used to identify differences between counties to develop a bigger picture of how the units communicate with the public and each other. When generating starter codes, I focused on concepts I thought emergency managers might end up discussing in reference to Hurricane Florence (Table 4). After starter coding, open codes were used to develop themes (reported in Chapter 4) in relation to workflow and communication within the agency, which was in turn analyzed through Spinuzzi's diagrams.

Table 4. Starter codes for employee coding

Starter Code	Definition
Structure	Reference to how the agency is organized.
Training	Reference to education or on the job training.
Preparation	Reference to planning for the hurricane.
Evacuation	Reference to evacuation/plans that were in place/happened.
Media	Reference to TV, radio, social media, websites, etc.
Damage	Reference to the aftermath of the storm.
Support	Reference to help from other agencies or the public.

Analyzing Data: Creating Diagrams

After the data is collected and characterized, it can then be analyzed through different lenses. Because I wanted to know how information was shared and how the organization is structured, I chose to focus on the meso and macro analytical models. Three models are represented in the study: Breakdown tables, handoff chains, and flow charts. The following section provides information about how each model is structured and what type of data it represents.

Breakdown Tables

Breakdown tables are designed for the micro level of activity, meaning it focuses on the habits and reactions of participants. More specifically, the breakdown table allows you to identify moments where there is an error made by the employee, such as inputting the wrong information into a field or have to look up which step comes next in their sequence (Table 5). Logging the operations and breakdowns allows for individual steps to be understood, and

possibly determine where activities can be improved. It is also possible to identify relationships between actions. I used a breakdown table to analyze how resources are allocated within the organization. Instead of focusing on errors, I determined who was responsible for communicating between levels of the organization.

Table 5. Example of breakdown table

Participant	Breakdown	Recovery
Name of person who completes task	Describes where an error was made	Describes how they fixed the error
Same or different person involved in a task		

Handoff Chains

Handoff chains focus on the meso level of activity, or how people interact with each other by sharing resources. By constructing a handoff chain, the following types of questions can be answered: “What communication events are common in this group? What chains of communication events exist?” and “in these chains, where are decision points?” (p. 206). To create a handoff chain, it is important to first identify a communicative event, determine sequences that occur, develop the chain, and finally note any discoordination. Each type of source (observation, interview, or artifact) can be used to determine what information belongs in the chain (Figure 3). Communication events that could be represented are tasks such as sending an email, drafting a press release, or preparing a post-disaster report. I created a handoff chain to analyze how information was shared with the public.



Figure 3. Example of a handoff chain

Creating New Models

Spinuzzi ends his discussion of analytical diagrams by suggesting other models can be created if these do not fit the purposes of the research or to supplement their use with more material. He suggests using models like a matrix, network diagram, flow diagram, traffic maps, or word clouds. The usefulness of each model would depend on the type of information needed or analyzed. If there is a need to compare something or show a sequence within an organization, for example, a flow diagram would be the best fit. Supplemental models like word clouds, in contrast, would be a means of showing common words used during interviews related to a question. Finally, a combination of models can be used to show complex relationships that exist within the organization, if appropriate. In my study, I created a flow chart to show structures within one of the county agencies.

Part II: NC Residents

In order to get a complete picture of what communication strategies should be used by emergency managers during times of disaster, I relied on user experience methods, particularly

user interviews to learn about the public's experiences. Past research shows that applying user experience methods to technical communication can promote user advocacy by help stakeholders understand the benefits of good user research processes and experiences and connect user needs to organizational goals (Martin, Carrington, & Muncie, 2017). Part II of the project focuses on North Carolina residents and their experiences during Hurricane Florence. Participants were required to have been North Carolina residents during Hurricane Florence and be at least 18 years old. These two criteria were the only ones given to cast a wide net of potential participants to represent populations most effected by the hurricane. The following section discusses the rationale for conducting user interviews, data collection strategies, and how the data was analyzed.

User Interviews

As noted in Chapter 2, usability studies are an integral aspect of user experience when trying to determine how a technology functions or if the user is satisfied with their interaction with a product. There are many types of usability tests that answer different questions. For example, a think aloud protocol would give a researcher some access to the thoughts a user had while completing a task, which could impact how information is designed or where it is placed on a website. For this project, I wanted to perform testing that would relate to the residents' experience using communication, rather than a certain type of media or interface, such as a television channel or Twitter page. Because of the open-ended responses I hoped for, I decided to plan remote, semi-structured interviews with participants.

According to Chauncey Wilson's (2013) *Interview Techniques for UX Practitioners*, interviews are an important skill for UX research that requires planning and structure. Further, semi-structured interviews can be used to gather facts or opinions as well as leave the possibility of uncovering previously unknown issues because of their open-ended nature and are frequently

used in user experience methods (Bargas-Avila & Hornbaek, 2011; Wilson, 2013). Phone interviews were used because of the researcher distance from participants as well as the locations between participants. This type of remote usability test is often used with practitioners for reasons such as convenience, cost, and to eliminate appearance bias. Wilson argues that although they may sound like a dated form of testing, phone interviews can result in useful and rich data.

Constructivist Grounded Theory

In addition to relying on UX methods to determine the use of interviews, I followed constructivist grounded theory, along with the suggested qualitative interview structure that complements this methodology. Originated by Glaser and Strauss (1967), grounded theory moves between data collection and analysis to develop theories that are arguably more closely related to their data than others, compelling interviewers to question their own assumptions and try to see past them. Grounded theory has been utilized across disciplines and broken down into subcategories, including constructivist, objectivist, and post-positivist. Charmaz & Belgrave (2012) explain their take on constructivism:

Our approach to grounded theory builds on a symbolic interactionist perspective with constructivist methods. We make the following assumptions: (a) multiple realities exist, (b) data reflect researchers' and research participants' mutual constructions, and (c) the researcher enters, however incompletely, the participant's world and is affected by it. This approach explicitly provides an interpretive portrayal of the studied world, not an exact picture of it. The interviewer aims to learn participants' implicit meanings of their experience to build a conceptual analysis of them. A constructivist approach takes implicit meanings, experiential views, and grounded theory analyses as constructions of reality. Constructivist grounded theory complements symbolic interactionism because both emphasize studying how action and meaning are constructed. (349)

The constructivist approach, they argue, allows the participant and interviewer to work together, with the interviewer being tasked with sharing control of the interview with the participant. I use constructivist ground theory to acknowledge my position among my participants, as well as the constructed reality our interviews surrounding Hurricane Florence create. Like other qualitative practices, this study is not meant to represent most US residents or lead to generalizable findings. Instead, the responses from the NC residents I interviewed are representative of our shared understanding of their experiences. Using grounded theory helps me create a collective story for my participants and I rather than individual experiences. This theory also impacted the questions that were asked of participants, which were almost entirely open ended and encouraged the participant to tell their story of what happened. More information on interview structure is provided in a later section.

Data Collection

Data was collected for this project was decided by UX best practices concerning semi-structured interviews and was influenced by qualitative interview practices and constructive grounded theory. In this section, there are details about the recruitment of participants, interview structure, collection of artifacts, and the application of grounded theory.

Recruitment

To leave room for comparisons across the study, I solicited participants in Part II from the same regions of the state as Part I. In order to solicit participants, I used social media, specifically Facebook. To find participants that are outside of my community, I found Facebook groups dedicated to regions or cities. I also found several groups that were specifically made for communication during Hurricane Florence. Moderators from a total of 11 groups were contacted, and 6 approved my request. In the recruitment advertisement, participants were told to send me a private message or email me to participate and to let others know of the study who might be

interested. I used this snowball method in hopes of receiving a more diverse group of participants who might not use social media or be within one of the Facebook groups I identified.

Participants were required to be at least 18 years old and have lived in the Coastal region or Sandhills area during Hurricane Florence. At the end of solicitation, a total of 9 participants were interviewed.

Interviews

As established earlier in the chapter, semi-structured interviews were planned due to the open nature of responses they elicit and their frequent use in UX methods. Qualitative interviews are generally used in other disciplines involving communication such as writing and communication studies. According to (Tracey, 2013), qualitative interviews can begin with generative questions to make the interviewee more comfortable and provide context for the types of questions that will be asked. The interview protocol for residents of North Carolina began with rapport building by asking questions about how long they have lived in the area, where I am from in proximity, and other topics like weather. Afterward, participants were asked generative questions related to their experiences during Hurricane Florence, such as when they decided to evacuate or stay, motives for decisions during or after the storm, and future preparedness as a result of the storm (Appendix C). In between questions, follow up was often asked on responses for further explanation of ideas or thoughts. The interviews ended with catch-all questions and were anticipated to last between 30 minutes to an hour.

Artifacts

If participants mentioned pictures of the hurricane, social media posts, or other artifacts surrounding the hurricane, I would follow up and ask permission to use the materials. Because most of the artifacts include information that could be identifiable online, it was not to be included unless it could be anonymized by blurring faces or removing searchable information on

the web. These artifacts were considered as supplemental data but were not used for thematic analysis or coded along with the interviews. This decision was made because they were either photos of damage and flooding or social media posts that cannot be shared because of their identifying features.

Thematic Analysis

Qualitative interviews are often analyzed based on recurring themes found within researcher transcripts or notes. When using constructivist ground theory, data collection and analysis are often occurring simultaneously, allowing for codes and themes to become more fluid before the project ends. Coding, according to Charmaz & Belgrave (2012), consist of initial coding and selective or focused coding. Initial codes are created based on what the researcher believes will become themes within their interviews in early stages of data collection. Selective or focused codes can be used once the researcher identifies which codes are occurring the most often and seem to be the most relevant for the study. Before interviews began, I started with some initial codes I thought would appear in the transcripts (Table 6). These first codes changed as I interviewed more participants and was able to get a larger overall perspective of their experiences along with my own. Eventually the codes solidified, and themes began to emerge from the data. The results can be found in Chapter 4.

Table 6. Initial codes used to help identify emerging themes

Initial Code	Definition
Media	Reference to any form of media for communication such as TV, radio, or social media.
Fear	Reference to any fear associated with the event.
Planning	Reference to getting ready for the storm.
Government	Reference to the state, county, municipality, etc.
Evacuation	Reference to evacuating the storm.
Recovery	Reference to recuperation efforts after the hurricane.
Decisions	Reference to decisions and how/why they were made.
Experience	Reference to prior experience with hurricanes or other major storms.

Summary of Methodology

In Chapter 2, I introduced two main research questions concerning the communication strategies used amongst stakeholders during natural disasters:

- How do risk management organizations share information about natural disasters with the public?
- How does the public find information about natural disasters emergencies?

In Chapter 3, I outlined the methodology I used to answer these questions, including theories and methods of technical communication and user experience. In Part I, I described Spinuzzi's framework for achieving topsight of an organization, including the three levels of activity and the types of data that address each level. Afterwards, I introduced the tools I used to analyze the data, such as breakdown tables, also suggested by Spinuzzi. In part II, the value of user

interviews and constructivist grounded theory were underlined and descriptions of the protocols that were used to interview NC residents was given. The chapter ended with the contextualization of qualitative thematic analysis of the resident interviews. Chapter 4 provides the results of the dissertation project, Parts I and II.

CHAPTER 4. RESULTS

Chapter 4 is a report of the results found from investigating the experiences of North Carolina Emergency Management agencies and North Carolina residents. These findings revealed which communication strategies were used during Hurricane Florence, and how those strategies may be improved for future crises. In a similar structure to Chapter 3, this chapter is broken into Parts I and II, which represent each group of participants. Both Parts I and II contain excerpts from interviews, and Part I also references artifacts and models used to analyze findings. Pseudonyms were used throughout the chapter (and dissertation) to protect the identity of participants.

Part I begins with the history and culture surrounding emergency management within North Carolina, continuing with a description of the responsibilities and position of the Emergency Manager, and how they interact with others within the agency. It ends with employee experiences during hurricanes, focusing on how the agency communicates during an EOC activation. This includes delving into what Spinuzzi (2018) terms “handoff chains” and flowcharts resulting in a better overall picture how the agency operates and where each employee interacts in the system. The section ends with common themes the participants discussed that were relevant to their experiences during Hurricane Florence rather than their general work habits. Part II reports the findings from a series of qualitative interviews conducted with North Carolina residents who were in North Carolina during Hurricane Florence. First, it presents initial themes created to represent resident experiences, along with a justification for their inclusion. It follows with emerging themes that resulted from further analysis of resident narratives, including descriptions of each theme and examples from anonymized participant

interviews. Finally, the chapter ends with a brief summary of the overall results of the study and foreshadows the final chapter of the dissertation, Discussion and Conclusion.

Part I: NC Emergency Management (NCEM)

As previously discussed in Chapter 3, participants for Part I of this study were North Carolina emergency management employees who worked for the state during Hurricane Florence. These participants were required to be at least 18 years of age and have worked in either the Coastal or Piedmont regions of North Carolina to participate in the study (Figure 4). Of the roughly 47 counties contacted, a total four inquired about the project and three agreed to be interviewed. The fourth county provided a brief statement about their procedures during the hurricane. The three counties represented were in the Coastal region of North Carolina and experienced either a mandatory or voluntary evacuation during the storm.

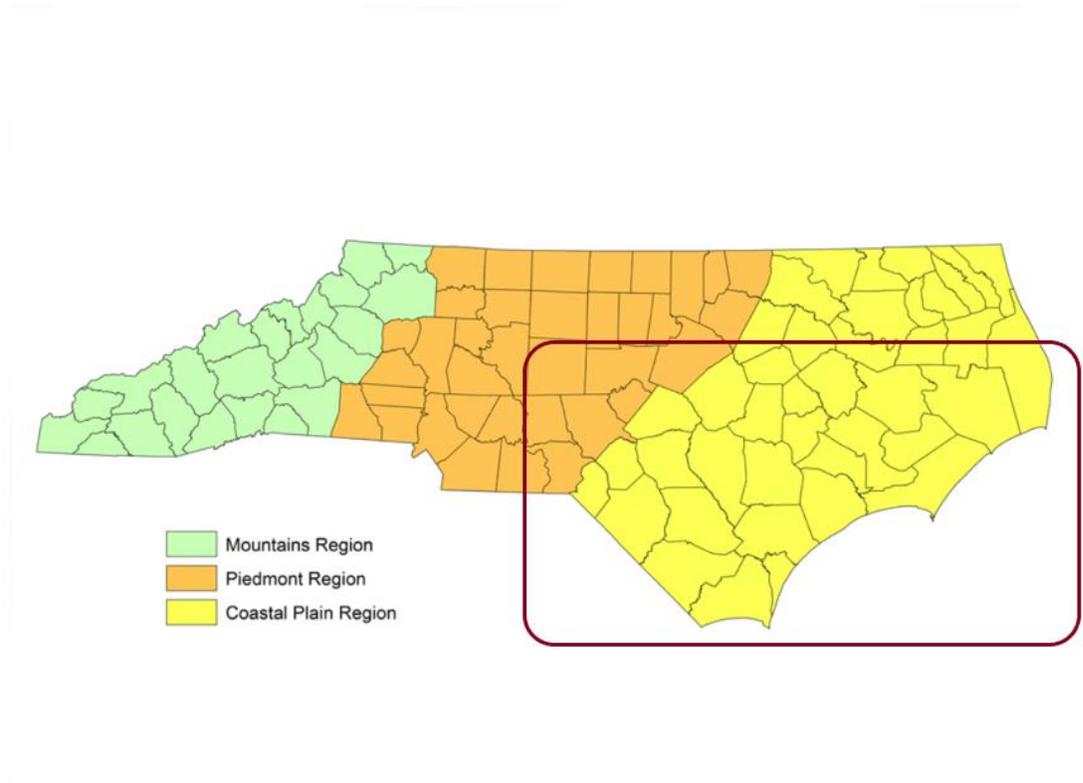


Figure 4. Area of North Carolina that participants either resided or were employed in

One employee from each county was interviewed. Each participant was involved in communication with the public during Hurricane Florence but had different titles for their individual positions. These included Emergency Management Planner, Assistant Emergency Management Director, and Public Information Officer for Emergency Management. The variation in their position titles reflected their county employment structure, which is explained later in the chapter. All three employees identified as female and Caucasian. Their average age was 48 years old, and their average working in the field of emergency management was 12.8 years. Each employee owned a smartphone for either work, personal use, or both. The pseudonyms used for these workers are Monika, Mary, and Tammy.

Interviews with emergency personnel from each county were conducted via phone and ranged from 22 to 53 minutes, with an average time of 48 minutes per interview. The interviews for this group of participants totaled nearly two and a half hours and resulted in 44 pages of transcriptions. The results provided in this chapter are supported by interviews with participants and artifacts provided by participants or found online, including, but not limited to: press releases, webpages, personal and public photos, and organizational documents.

History and Culture

North Carolina Emergency Management (NCEM) is a branch of the North Carolina Department of Public Safety. Listed on their state website, NCEM's goal is to help North Carolinians prepare for, respond to, and recover from disasters and emergencies ("Emergency Communications"). They provide information about the tasks within NCEM such as emergency communications and disaster recovery. They also include a list of county EM offices within the state and their contact information. The overall mission of the Department of Public Safety is to "safeguard and preserve the lives and property of the people of North Carolina through prevention, protection, and preparation with integrity and honor" ("About DPS"). This section

reviews the structure of emergency management at the state and federal level, followed with information about positions in emergency management and themes in employee experiences from Hurricane Florence.

State and federal structure

In the United States, emergency management is separated into national and state levels. At the national level, the Department of Homeland Security houses the Federal Emergency Management Agency (FEMA), which was created in 1979 as a result of an executive order that merged several programs that worked individually on disaster mitigation. The mission of FEMA is “helping people before, during, and after disasters” (“About the Agency”). Within its organizational structure, FEMA has ten regional offices that represent an area of the US and its territories. Region IV includes North Carolina Emergency Management as one of its state partners, which also includes Alabama, Florida, Georgia, Kentucky, Mississippi, South Carolina, and Tennessee.

North Carolina Emergency Management (NCEM) is categorized under the North Carolina Department of Public Safety. The structure of emergency management has five levels: state, branch, region, county, and municipality. NCEM has its headquarters in Raleigh, representing the state level. There are three branches (Western, Central, and Eastern) that contain 15 regions (Figure 5). Each region includes several counties, with NC having 100 counties in total. Across the 100 counties, there are 552 municipalities that reside within them (“How NC Cities Work”). Emergency Operations Centers (EOCs) are required at all levels except municipalities, where groups are optional. Resources for every county and municipality can vary dramatically depending on budgeting. If a municipality is unable to hold an emergency management employee or team, they rely on their county to support their residents. This study focuses on parts of the central and entire coastal region. The branches that are included in the

study fall in these regions, including branches 1 to 8. Each county within the selected branches were contacted to participate in the study.



Figure 5. North Carolina regions, branches, and counties. Located in 2017 NCEOP.

The Emergency Operations Center (EOC)

As previously discussed, emergency management agencies exist on each level of government, from FEMA to localized municipalities across the country. In North Carolina, each level of emergency management, except for municipalities, is required to have an Emergency Operations Center (EOC). An EOC is a command center for coordinating and supporting emergency response efforts within a region. EOCs can be physical locations or virtual, with physical locations often being converted conferences rooms and virtual locations being conference calls amongst participants. The EOC allows representatives from different emergency management departments or agencies come together to communicate about the disaster more efficiently and effectively.

An EOC has levels of activation related to the state of the emergency. North Carolina has a 5-level system based on the amount of resources that will be needed for the emergency. The levels are arranged in descending order, from 5 and 4 being the lowest level with no activation,

to 3-1 having partial up to complete activation. During a hurricane, the EOC is usually activated and at level one because of the potential danger of the event (Table 7).

Table 7. North Carolina's EOC Activation Levels

Levels	Description
1	Any disaster/emergency that requires continued involvement of all SERT members after the event (e.g. hurricane, winter storm). The EOC is fully activated with 24-hour staffing from all SERT members. The National Response Plan is activated with deployment of the Federal Emergency Response Team (ERT) to the State EOC for response and recovery activities.
2	Any disaster/emergency that will require large scale State and possibly federal assistance in recovery. The EOC is fully activated with 24-hour staffing from all State Emergency Response Team (SERT) members.
3	Any disaster/emergency that is likely to require the assistance of several State agencies. All emergency support function agencies are alerted; however, the EOC is activated and staffed only with NC Emergency Management personnel and identified or specific State agencies.
4	Any disaster/emergency that is likely to be within the capabilities of local government and results in only minimal need for state assistance. State agencies that would take action as part of normal day-to-day responsibilities are notified. The EOC is not activated.
5	Normal day-to-day activities. EOC not activated.

On an average day, the EOC is not activated. When there is a hurricane projected to land on the coast, however, the activity level becomes 1, and the EOC will be activated. During Hurricane Florence, emergency managers were notified days prior that their EOCs would be activated and to prepare their homes and plan accordingly.

EOC Structure

FEMA provides courses for emergency management personnel to take that suggest three structures: ICS or ICS-like, Incident Support Model, or Departmental. These structures determine the hierarchy of positions as well as what individual employees are responsible for during an emergency. In North Carolina, an EOC can be managed under any structure the agency sees fit. According to FEMA's IS-700.B: An Introduction to the National Incident Management System course, The ICS or ICS-like structure (Figure 6) is utilized often because it aligns with existing positions in emergency management when the EOC is not activated. Monika, a local emergency manager, described this model briefly during her interview, saying her EOC switched to this structure after Florence when they had used the ISM EOC Structure (Figure 7).

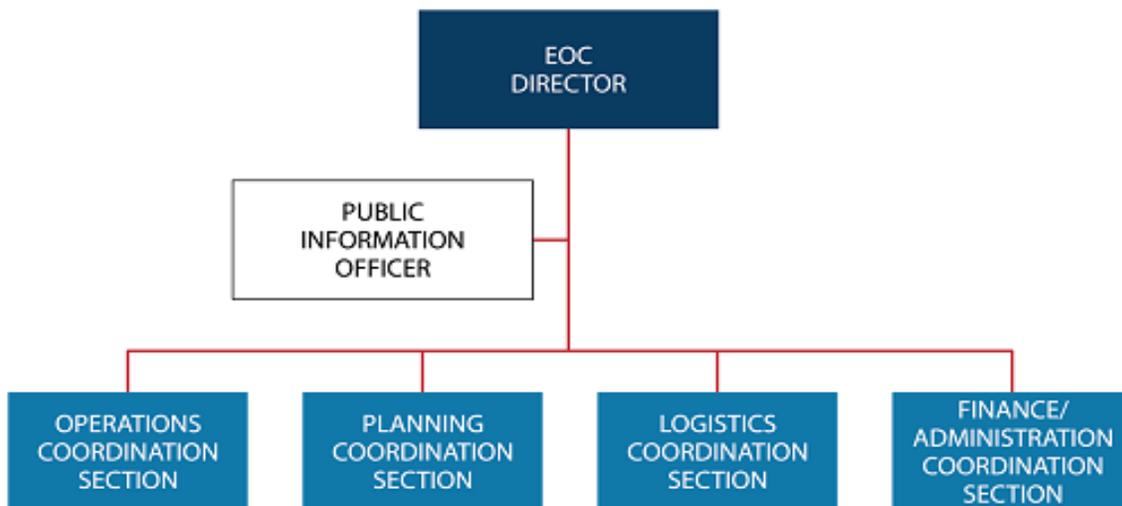


Figure 6. ICS or ICS-like EOC Structure from IS-700

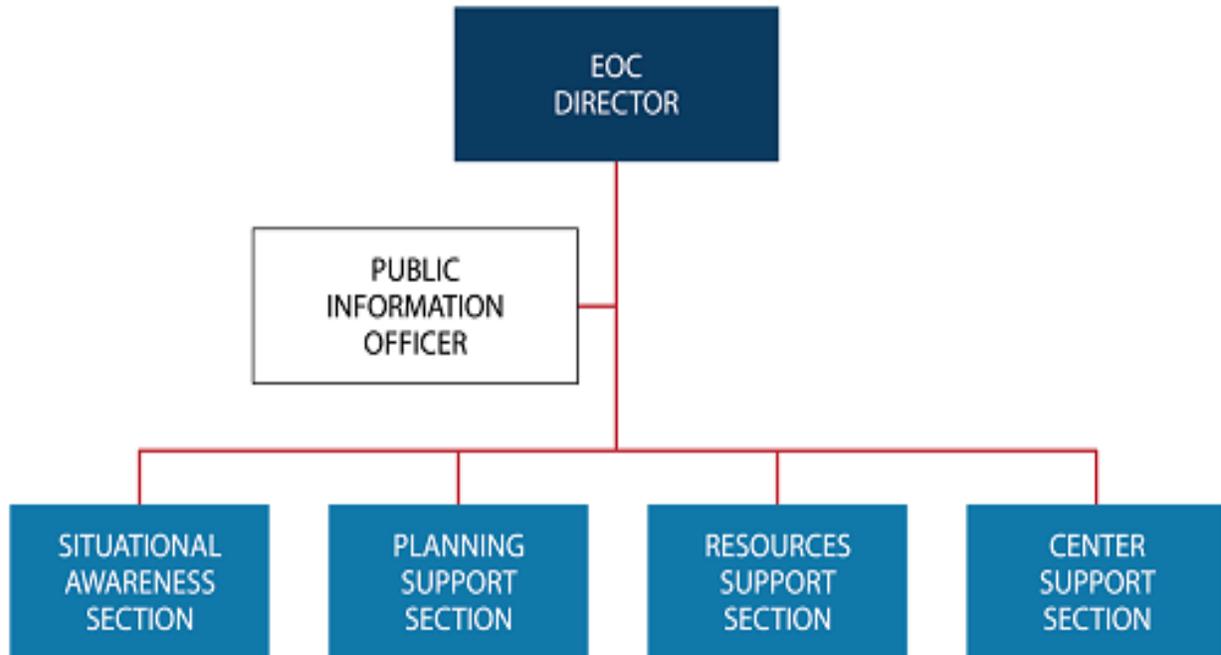


Figure 7. Incident Support Model (ISM) EOC Structure from IS-700

Although Monika could not share the exact structure of their EOC, she said that personnel found the ISM structure confusing because it stepped out of their normal work structure: “nobody really understood what their subject matter expertise did in the EOC environment and things, so it needs to work better for us.” She also said that since Florence, there has been a significant increase in the amount of supporting staff. During Hurricane Florence, she had been one of two people who could serve in her position:

I know we’ve done more, and it actually takes longer than I think people anticipate. But we’ve ramped up more position specific training for every position in the whole EOC. So, on a fully staffed 12 hour shift we generally have about 100 folks in the room. So, take that and multiply by four, and having back-up folks for every position just in case somebody’s on vacation or they can’t get here. Then reserve folks for every position in

case the back-up isn't available. So now we go almost six deep in those positions, whereas before, during Florence, if we were hitting three deep, that was a stretch.

Tammy's description of her own EOC structure was briefer, saying that roles were based on functions, hinting at a departmental structure (Figure 8). She was able to describe the physical layout of the room the EOC was located, a multipurpose room containing movable desks and chairs for the occasion. The location of her EOC within the building was purposefully arranged on the second floor in case of flooding.

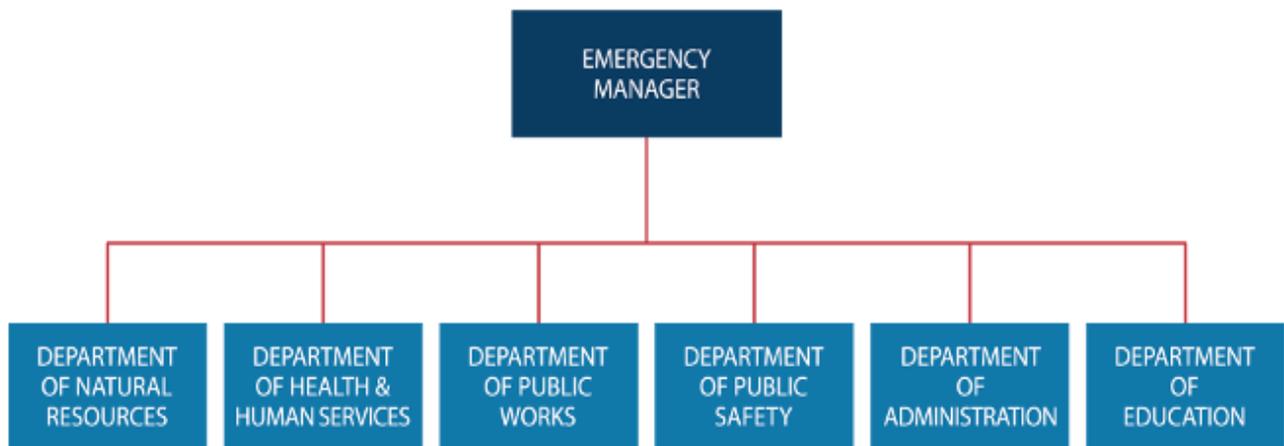


Figure 8. Departmental EOC Structure from IS-700

Other emergency managers did not disclose the type of EOC structure they follow within their county but did describe the physical location. For Mary, the placement of her office was not ideal, and as of our interview, had not changed. Mary appreciated not having to rely on a teleconference for her EOC, but still said they could use more space, as she estimated as many as 20 agencies are represented within the space:

But we, the county is, I'd say we're [in a] pretty building poor right now. We don't, there's not a lot of funding for new buildings and stuff. I'm sure, I mean a lot of counties have really nice public safety buildings or new operations centers and we're still, I mean

we're working, we're in a building that was built in the 50s as a hospital and we're down in the basement. And we're had situations where, weather is, depending on, you know, we could have flooding going on in the building and it can get pretty bad back here, and we try to, Matthew was the worst. We, the building was so old that the rain, we had to put a trash can in the middle of the EOC, because we had rain coming in through the roof and water coming through. And we're collecting the water in a big trash can and water was coming down into the stairwells because the building is so old. But hopefully one day the county will have the funds to be able, we'll be able to maybe move out of this building and maybe build our own, maybe public safety center and have a really nice EOC.

Mary did not provide any other details about the financial strain of her county, but her EOC serves about 150,000 residents.

One aspect of EOCs that is uniform is the protocol for finding resources outside of each unit. According to Monika, if a municipality needs help finding a resource, they will go through the same process as someone at the county level. If a resource is not found, the chain will continue until it reaches the state level, and FEMA may become involved. The following breakdown table illustrates how requests for resources move through the different levels of emergency management within the state and country (Table 8). While this breakdown table shows a worst-case scenario where a resource can't be found within the state, it illustrates how resources are shared between EOCs.

Table 8. Breakdown table for emergency management in North Carolina

Participant	Breakdown	Recovery
Municipality EM	In need of resource X for community relief but does not have in supply.	Contacts county EM to see if they have access to resource X.
County EM	Talks with other members of EOC, but does not have access to resource X.	Contacts area coordinator EM to see if they have access to resource X.
Area Coordinator EM	Checks with other counties within the area, but still can't find resource X.	Contacts branch director EM to see if they have access to resource X.
Branch Director EM	Checks with the other areas within the branch, but has no luck finding resource X.	Contacts state EM in Raleigh to see if they have access to resource X.
State EM	Checks with all 99 other counties in the state, as well as other states in the area and EMAC. Everyone is out of resource X.	Contacts FEMA for last hope in finding resource X.
FEMA	Looks for federal assets to assist, such as nearby task forces.	Resource X is found and provided to EOCs in need.

From what Monika recalls, FEMA usually only get involves post-disaster or under extreme circumstances. In addition to disaster relief, they also provide courses on their website for

emergency managers (and anyone with interest) on emergency management procedures and structures across the United States and train more than 2 million people annually (“EMI Mission”).

Responsibilities of an Emergency Manager

Like the EOC structure, the expectations for an emergency manager vary based on the resources and personnel available during an emergency. For those with a larger support network, objectives are usually more specific. Monika’s current position did not exist prior to Hurricane Florence, but she had already been working in emergency management for over 10 years before the hurricane. In her agency, she serves as the assistant director of emergency management, with four planners working for her who specialize in other positions (Figure 9). She acknowledged that she is in a unique county, as most only have one to two emergency management employees.

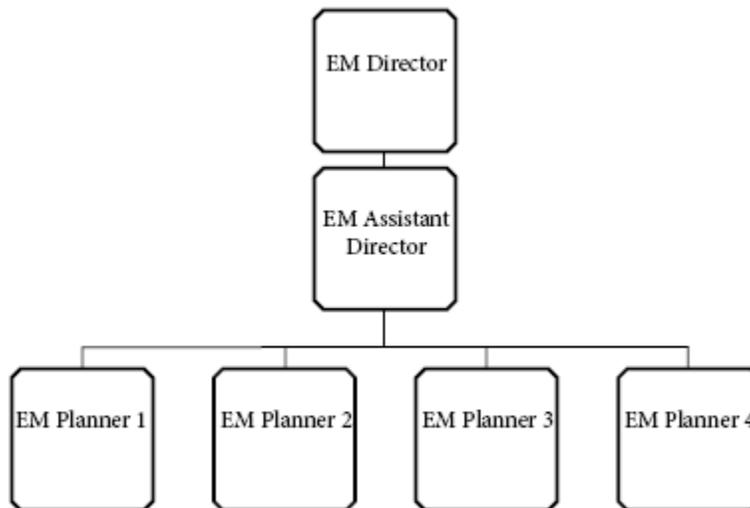


Figure 9. Example of a county EM employee structure

When the EOC is activated, Monika also works with a public information officer (PIO) who has a separate team of 6 responsible for general communications. Monika discusses what need to be conveyed with the PIO, who drafts a message with the team. Once the message is approved, the

PIO takes the message to the Joint Information Center (JIC) which includes PIOs from other areas. The purpose of the JIC is to ensure messages from emergency management are consistent across the county or area being represented. The amount of positions within the JIC is again, dependent upon the county. The JIC within her county includes an emergency call center that answers phone calls from the public related to non-emergency accidents, such as a fallen tree or asking where there is a nearby shelter.

In Tammy's county, she is the POI throughout the year, but focuses only emergency management during an EOC activation. She is responsible for sending information to employees of the county and the public. Like Monika, she has several years of experience working in her area but works alone on communications unless she is being relieved for her shift. Both Monika and Tammy referenced standard emergency messages they are responsible for drafting before the storm and editing as needed before publication. Tammy described her ability to prepare early because of her experiences:

Well, and like I said, I've worked Hurricane Matthew, I've worked Hurricane Irene, Hurricane Florence, Hurricane Dorian. Did some prep work for Hurricane Arthur. So normally what I do as a PIO is you have certain press releases that you know you have to have ready. So, when that was kind of what I worked on when, the county manager called me and said, "Make your preparation be ready to go Monday." Well I knew then to start taking my, main press releases and to start drafting them up.

When it is time to publish the actual press release, she tries to take the perspective of people in the community, considering what information is the most valuable for them:

So, we also have an emergency management plan. So, some of the language comes from there. And, I get my information basically when we have our management meetings. We

sit in, we talk about what's coming up, and I try to take it from a perspective; okay, what does the public need to know? And then, I ask the questions and get the information, and I draft it up. And, I share it with the county manager, and the emergency management director before I sent them out.

After the press release is complete, she ensures it reaches the appropriate channels, such as her national and local distribution lists (Figure 10). National lists include media outlets from across the country and become larger as hurricanes are predicted to cause more damage. Local lists are relatively standardized and include stakeholders like elected officials, other departments, hospitals, and at the county level, their municipalities. From there, she can provide the list to the call bank that is responsible for answering non-emergency calls within her county. This process happens every time there is a need for a new press release or series of press releases. According to Tammy, she creates an average of 20 PRs per hurricane. For Hurricane Florence, she wrote nearly 50.

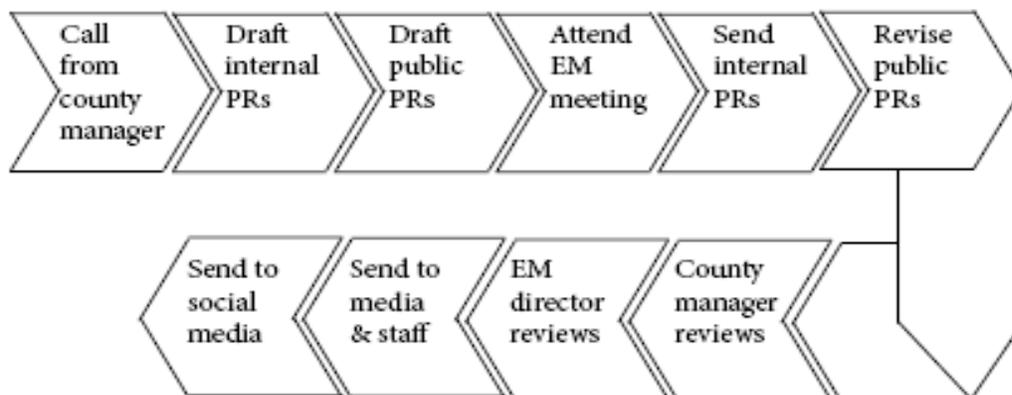


Figure 10. Handoff Chain showing how public releases are created by an EM PIO

Mary was less specific about her tasks but mentioned her EOC has a dedicated PIO who works closely with their own JIC to ensure messages are consistent and accurate. Her PIO will draft a message and at least show it to their director before moving forward, but often consults everyone within the EOC to make sure everyone is on the same page about what is being shared with the public. Mary stated that about half of the work does is related to emergency management tasks, such as applying for grants, but the other half is accounting:

So, which is kind of unique, which is kind of based off, because when I came down here, I had the county experience, which has really helped out. So, I would say for me a good, probably 50% of what I do, and this is probably not typical for other EM planners, 50% of what I do is handling the accounting, purchasing the accounting for the office. I do a lot of reports, looking at data, kind of, analysis and then I would say 50% would be doing anything from maintaining the emergency operation plan or continuity of operations plan. All our other individual plans we have. Anything, any grants that we get from the state, Homeland security grants, manage that. Just any reports, anything that has to be, like our, we have a committee called our LEPC, which is our Local Emergency Planning Committee. So I'm the liaison to that. So I'm trying to think of what else. I mean, there's, there's just, it's just the, it's really a plethora of different things. It's kind of a catch-all.

The "catch-all" nature of Mary's position seems to reflect her experience and lack of supporting roles. According to Mary, she had been working in accounting for 20 years before applying for an administrative role in the county. Soon after taking the job, she began taking on responsibilities of emergency management, and her emergency planner position was developed from there.

Hurricane Florence

Although every emergency management employee had experienced hurricanes before, Hurricane Florence had a larger presence than most hurricanes during an average season, because of the damage it caused to property and loss of lives. There were some areas in the state, for example, that measured up to 30 inches of rainfall during the storm (“Hurricane Florence”). Because the state had not seen such a significant storm in years, some counties were not as prepared or did not anticipate the impact the hurricane would have. Along with the structure of their units and general responsibilities during an active EOC, employees described their roles during Hurricane Florence as an employee, but also as a resident of the county they served. Based on their narratives and starter codes, the following themes were shared across their experiences:

- Value of social media
- Feelings of support
- Post-Florence Plans

The Value of Social media

When participants talked about their county’s use of social media, they had extremely different perspectives on its value to the public. Tammy, for example, was a strong advocate for using Facebook as a way to relay information to people. She recalled that Hurricane Florence was the emergency where her county actively used social media to share information with the public:

I think a lot of people were on social media. There were people that were on social media requesting help saying that they were trapped in their homes, that they needed assistance. During the height of the storm, I think people did have cell phones. And, still had, I had a friend actually who stayed, and she had a riverfront property featured in a lot of the news

stories. And they were, she was texting me and sending me photos of as the river was getting closer to her house. [...] That's just how people get information. And, you can put out a press release, but if people aren't watching TV, and they're not knowing to go to your website, it's more of they have to actively seek out information. To get it that way. But with social media, you push it out there, it just automatically shows up on their newsfeed. Or their friends are sharing it. And so, it can be active, but it can also be passive. So, that was one of the reasons why we wanted to go to social media is; we just see an increase of people wanting to use it. And, it being a really good way to keep getting information out, that they might not see otherwise.

Tammy believed their social media account was a necessity during the storm for those in the storm, seeking help, and for people who did not know what was going on from farther away who could see updates from those still in the area or on their social media account. Monika, in contrast, seemed hesitant to place too much value on social media as she described all the platforms her county used:

So we want to try to hit them wherever we can, so I know we have Facebook, we have Twitter, we have Flickr, we have a Penguin or Tumblr account, LinkedIn of course, more business stuff. But we put emergency messaging out on LinkedIn too. Snap Chat, we've hired, not really like a social media specialist per se, but part of her job description is to stay tuned into what is the new Facebook. I have a 15-year-old and she said she dropped her Facebook account when she found out I was on there, because old people, she said in quotes, use Facebook. So I'm like whatever. But we also don't only focus on social media. We still do a lot of traditional print media. Because a lot of the older generation X

people like me, we're still reading newspapers, but we're also going social media stuff.

Folks like my mom and the previous generation, she's all about a newspaper.

The two counties the women work in have significantly different social media presence in terms of types of applications used, but Monika, the employee whose county has a larger variety of accounts, is less enthusiastic about their implementation. Mary acknowledged there is some value in the Facebook page her county has, but also recognized that it does not reach all of the population in her county:

The Facebook page is good to have. It doesn't reach the vast majority of the people because a lot of people, the elderly, older, senior, older population are not in tune as much to Facebook and all that. So I think people, I would say people probably get most of their information from the news media. That's where they're, that's where they're hearing it from. Just the news media is your best bang for your buck there.

Each representative placed a different value on social media and emergency management, but all three counties at least had a Facebook page they were updating alongside their other media outlets. In stark contrast, Monika's county used at least 6 social media accounts and hired an additional staff member to monitor what applications would reach a younger audience.

Feelings of Support

Taking an industry position in technical communication or writing typically involves working with a variety of Subject Matter Experts (SMEs) (Lee & Mehlenbacher, 2000), and emergency management is no exception. Emergency managers work with other personnel during their daily work, but the number of SMEs they work with during an emergency such as a hurricane increases exponentially. Each employee recalled the positive support they receive in their position, either from their co-workers or the community around them. For Mary, she argued a built rapport with others in the EOC lowers tension during stressful situations:

We all work very well together, and I think that's probably the key is the relationships that you build before you have to all be thrown into a room in a stressful situation. That you build those relationships beforehand and don't, you don't do it when it happens, because that's when your tempers get short and you get frustrated and you're getting stressed out. That's not the time to be the first time meeting somebody. Yeah. And you know the person you're talking to, that you know them. It's not the first time meeting them, or you know, here. Yeah, it really helps and it makes things go, you can get a lot more done like that when you know that person. They're more apt to go out of their way to do what they can, be above and beyond, if you've already built that rapport with them.

Monika also acknowledged her EOC team as vital to their success, but also referenced community partners. In her county, a faith-based group was created to provide disaster relief after the hurricane. The group became a permanent part of the community, even hosting events with the county to educate the public about hurricane safety:

That group was designed initially to be focused on the faith-based community and volunteer groups and bring them together to go, post-Florence, do repairs, put roofs on houses and things like that. That group has literally exploded with interest. There are partners from the private sector, from small business, from the faith-based community, non-profits, volunteer groups. So we spend a lot of time working with them to say hey, as you're going your outreach, can you include our messaging. So that's working really well to the point where, for example, with the faith-based community, we're going to be doing a workshop [with them in March] where we will be focusing on developing emergency action plans for faith-based facilities.

Listening to these employees, it became evident that they rely on each other for both logistical and emotional support. As employees, they are also members of the community and face the same safety concerns as everyone else. Each participant remembered working at least 12-hour shifts during the storm, with one employee living in her county building with other employees from her county for over a week. Tammy talked about the difficulty of the work, but the reward of her team coming together during the storm:

It's a horrible situation, but it's work that I love to do. It is unbelievable. The feeling you get from watching our county government team, come together. And, how much we can do, and how quickly we can get things done, and how well we work as a team. It just, in regular daily work you don't see that as much. But, during a hurricane it's just a really cool thing to see.

The support each employee described within the community and in their county, teamwork played an important role in their self-reports afterward about morale during the storm—and their perception of overall success, afterward.

Post-Florence Plans

The emergency management employees were asked towards the end of their interviews how Florence impacted their preparation for storms, but most participants framed their experiences into before and after Florence. Each had different takeaways from Hurricane Florence, some positive and others more constructive. Monika happily found that more people were interested in learning about emergency safety after experiencing Florence:

That's the sad thing...is...I know nothing, which I think is one of the most exciting things about this locality pre-Florence and post-Florence is we're very hurricane focused, and a lot of our plannings and things like that tend to have a hurricane flavor. But especially post-Florence, the desire from the community and even at the granular level of

the staff here in [the county], they want to know more about how to be prepared for tornadoes or lift current safety.

She also noted that her county plans to spend more time educating people on personal safety, because she remembers hearing that people did not know Florence was going to bring so much damage, or that it would be unlike other hurricanes. Her county is working on a three-phase plan to increase their disaster preparedness education throughout the year rather than during hurricane season alone. She credited these changes to receiving feedback from the staff and residents of the county, who were invited to answer questions about their experiences.

Tammy's county also made changes after Hurricane Florence, including using new state resources to keep residents educated on their vulnerability to flooding. North Carolina began a "Know Your Zone" initiative that shows evacuation zones based on historical flooding that was promoted in her county. She was wary of the balance between not enough information and information overload with her community:

Our challenge is getting the community to stay engaged with that. Because there are so many things going on in the world and so many other things to think about. If we can make general preparedness knowing what to do during an emergency and understanding the recovery process easier on the citizens, that's our main goal. Getting everybody back to the new normal, so just making sure that folks know we're communicating all the time. We're trying to find new and better ways to do it.

Hurricane season is roughly six months, with August through October being peak months, but residents have to take steps throughout the year to ensure they are ready if a hurricane comes, such as purchasing the correct insurance or creating a family evacuation plan. Overall, Tammy emphasized the need to educate the public well before a disaster to ensure the

safety of as many residents as possible. She also believed being transparent was important to show how they adapted to Hurricane Florence to better serve their community in future hurricanes.

Part II: NC Residents

The second question posed at the beginning of the dissertation is, “How does the public find information about natural disaster emergencies?” Part II of Chapter 4 provides a synopsis of themes that emerged from qualitative interviews of North Carolina residents. After soliciting participants through social media and snowball sampling, a total of 12 people expressed interest in participating in the study. Of the 12 interested, 8 were interviewed for the project. Each interview was completed by telephone and recorded with the participant’s permission. Length of interviews ranged from 18 minutes to 1 hour and 46 minutes, with an average interview time of 43 minutes. Most participants were women, and all participants lived with the Coastal region of North Carolina during Hurricane Florence (W=6, M=2). In addition, participants ranged in age between 35 and 62, with the average age being 50. All together there were over 5 hours of interviews and 97 pages of transcripts from this group.

The participants all have at least some years of college as their highest level of education, including 2 participants with master’s degrees. They work in a variety of professions with some being retired during the storm. Most had experienced hurricanes before and were under mandatory evacuation during Florence. Of the mandatory evacuations, over half left their homes while the remainder stayed behind to protect their homes and the homes of others or because they did not want to have to wait to return to their homes after the storm was over. All participants identified as Caucasian, and most were married. Each member of the community was willing to discuss their experiences during Hurricane Florence with me, particularly focusing on how they communicated with others about the disaster and recovery. Some provided

pictures of their homes or neighborhoods. Pictures with identifying information were not included as part of the data set.

Emerging Themes

Using constructivist grounded theory, I conducted a qualitative analysis of NC resident interviews about experiences during Hurricane Florence. This method allows for participants' narratives to shape the thematic analysis by moving through data collection and analysis simultaneously. After creating an initial codebook, I revisited codes and themes as I conducted interviews. Finally, I developed emerging themes from the narratives of the participants. The following themes were identified:

- Go-to Media
- Cautious of Evacuation
- Reliance on Technology
- Government Mis/trust
- Community Growth

Each theme relates back to research question 2 by analyzing how the public finds information related to natural disasters. In this section, I explain each theme and its relation to the initial codes that were generated for the analysis. Each description follows with examples from the interviews to provide evidence for the theme.

Go-to media

Participants cited numerous locations to find information, which caused frustration and confusion. Most participants, however, recalled relying on one medium, such as radio, TV, or social media, over others, preferring one channel to find information. There was not a consistent medium that was liked over another, however, as one that worked well for a participant caused

suspicion in another. When Chris was looking for information during the storm, he relied on Facebook to relay more timely news than traditional TV stations:

If I would've had to just follow the news, I felt like, just going by TV, they waited so long to say that something bad was going to happen, that by the time they said it, it was almost too late...It's one of those things to where, since I was watching in on Facebook as it happened, it gave me enough time to keep considering, what am I going to do?

Others, like Ross, were more suspicious of municipalities only sharing updates through Facebook:

The [other] towns were posting on Facebook, which that's fine but that's not the best. They needed to have a system to actually give out info or give it to the county to send out. A lot of people had urged people to sign up for news and alerts and those types of things through here. But the [other] towns were basically just using Facebook. There are a lot of people that aren't on Facebook or don't use it religiously. (Ross)

Ross goes on to describe a Facebook group he was a member of that he was disappointed in because of how information was managed and prioritized:

We have this [city] group and it's got 30,000 people. Well everybody's got an opinion, everybody. And you're looking at...now the people that run the group, they're power sharks. So they don't care if people are destroying each other. It's all about exposure. And it's unfortunate too because I would have some posts where I'm like that should have really gotten further on social media, but because it wasn't "bad enough" it didn't because it wasn't a shock." (Ross)

In an opposite perspective from Chris, Ruth found the TV news comforting, referring to specific meteorologists that she felt were reliable and calming:

I mean, in terms of communication part of it, I thought it went extremely well. I really, really think that the WTC weather people, I said, again, I can't remember all the other names. Eric Davis and there's about five of them. I think they were fabulous. I think they were very calm. They shared what was going on, but they didn't get everybody all crazy and upset. So I think them, not their news team, but the weather people with WCT were really, really good." (Ruth)

Although the participants felt differently about the quality and reliability of the media, they each articulated a preference of traditional or social media as a way of finding information during the storm. Their interaction with media influenced their actions and perceptions of the action of others, as the following themes suggest.

Cautious of Evacuation

During Hurricane Florence, at least 20 counties were under voluntary or mandatory evacuation. During a voluntary evacuation, residents are given an open option of if they would like to leave their homes to seek shelter somewhere else. Oftentimes during a voluntary evacuation, employers will not excuse absences from their employees. These changes, however, when there is a mandatory evacuation, as all residents are expected to leave the area. During a mandatory evacuation, the county is required to provide residents with options for shelters and does not guarantee any services to homes while the evacuation is under effect, such as water and power. The only people who are required to stay are emergency personnel such as those who work in the EOC, or other rescue teams.

Participants had mixed experiences on whether they evacuated or not, but each talked about the considerations they have to make leading up to their decision. For some, it was an easy decision once police went from door to door and she saw her neighbors leaving:

I left on a Tuesday. When they said that you had no choice, then I did it because I felt like if they felt like we needed to go, we needed to go. And I'm by myself with a dog. So I figured it was not smart for me and no one stayed. Everybody I know left. I mean, I know there were people who did stay in different places [in the town], but everybody that I know did not stay.

Ruth knew the evacuation was mandatory and lists this as one of the reasons she left, but she also relied on the actions of her community to determine if she would be safe to stay. But many other residents expressed the emotional toll the decision played on them because of their county and community in a negative light. Ross, for example, recalls the shame he felt from the community, not matter what his decision was:

Anyway, I go home and we start watching the weather channel, then everybody starts freaking out because now they're predicting a category four hurricane...Now we have a situation where everybody is trying to decide if they're going to evacuate, which is not typical. People don't typically evacuate. Because we don't really ever get direct hits like that, and the news I think was trying to freak everyone out. We were getting phone calls and text messages. And I have screenshots of this in one of the posts from the county saying this is going to be the worst storm in 60 years. Get out, get out, get out. Over and over and over again. I think that kind of had the opposite effect. That was scary. I think it was Tuesday when I was like, "Oh my god. If somebody else says something to me about not evacuating..." and then there's a lot of shame in not evacuating. People shamed you if you left, people shamed you if you stayed. I have no felt that high intensity decision making since we were at the height of two wars and deployments were coming and going left and right. Men coming back and women being freaked out, all those things. I have

not seen my community in that state since then. It was a really very heightened emotional time and whatever.

Olivia was suspicious of the support structure and supply for those who were displaced because of the hurricane:

Yeah, they say there are shelters but a lot of people won't leave their animals and the shelters won't take pets. But in the last few years I've noticed they would include somewhere, the shelters are inland like [a city] or pretty far away. And some of them have said you can bring pets, but I know that it's a sticking point for a lot of people. They're not going to leave their animals [...] If I had it my way I would evacuate. But sometimes like Hurricane Floyd, everyone evacuated and then it was three weeks before the roads were clear to get back in. Now where do you go into stay in a hotel for three weeks? Who can afford that? And even though everything's fine in the county, the roads coming, and bridges, they will be covered in water over them.

Her financial concerns were shared by others, who acknowledged their privilege for being able to find hotel or shelter with people they knew, which was not the case for every person who needed to leave the area:

I mean, they do have shelters, but we had two dogs, and my husband works from home and everything. It was not like his business was closed, you know. So we knew we needed to be somewhere where it was far enough away where we could have internet access and things, and that we could take our pets.

As Karen reiterates above, participants commonly mentioned pets as a reason they delayed or did not evacuate, as they were under the impression, they were not allowed to bring pets or that they would not have enough room. After the storm passes, work goes on, regardless of the damage

you may have faced in your home or if you are unable to make it back because of traffic or a blocked path.

Reliance on Smart Phones

Apart from one participant, all respondents confirmed that they regularly used a smartphone in addition to using their computer or other technology for updates on Hurricane Florence. These personal devices were used to share their safety with others as well as keep in touch with members of their community to find out what was happening back home if they evacuated. Particularly for those evacuated, a smartphone is one of the most convenient ways to receive information. But it was not without flaws. Karen remembers not being able find out what was going on back at her home despite the amount of technology she had available:

After we evacuated, you couldn't get hardly any information because communications were down on the island. There was no power and no internet. And people here had a hard time getting information out. Once it got out, somebody like me who was offsite, I could share it and spread it, and email and text and call people and all that. But it was hard to get information out of the town to those of us who were away and wanted to know what was happening. It was very difficult.

When it was time to get back, however, some considered the journey nearly impossible without their smartphones showing them the most up-to-date routes. Allen refers to his family's dependence on Google Maps to find their way back to their house where he had stayed for the duration of the storm:

The only way they were able to get back was with their phones because they had Google maps and the only way they were able to get back was with their phones because they had Google maps and the only way that you could get back to [the city] and follow all the detours and figure out how to get from Florida to North Carolina was to just put your

faith in Google Maps to let it know what roads are going to be closed and then you just follow and it took you back home. So it was really interesting to see how smartphones and the technology was able to get people back. Because you wouldn't never been able to do it listening to the radio or trying to figure it out to the state troopers or anything else. It was the technology of the algorithms that Google has in Google maps to know what lanes of travel are clear and then sending you that way. It's really super interesting.

Allen emphasized the use of other resources, such as the radio or state troopers, were not as reliable for up-to-date information as Google was able to be.

Government Mis/trust

There is a long history of government mistrust when it comes to sharing information with the public (Hadden, 1989). Several participants shared this suspicion during or after Florence for a collection of reasons. For Karen, she became frustrated during the storm with the inconsistent communication she experienced from different government offices:

But then as it got closer, we were relying on information from our state governor, and our town officials. But they...it was hard to get immediate or timely information, to know where to go. Because we would go to our town's website and it wasn't updated. We'd go to the town's Facebook page, and sometimes it was updated, sometimes it was not. And they weren't sending out emails.

In Karen's interview, she still found that the messages she did receive were better than the lack of messages she had after the storm. Karen's post-hurricane experience, as described in Chapter 1, left her feeling unsupported, wanting more transparency from her town:

So really, it was just more information about why certain decisions are being made, and have it be updated very regularly. Not once a day or every other day. Even if there's no change, I want to see an 8:00AM, 11:00AM, 3:00PM, 6:00PM. I want to see an update

of, “No change”, “We’re working on this”, “This has been done.” “Now this has come up.” You know, give me updates. And I don’t think I’m alone in that. I think people just...it just makes you feel like you know what’s happening. Because you can’t do anything about it, you feel very helpless.

Karen’s frustrations speak to the overload of information sources as well as the inconsistencies between communication strategies from government sources. In this case, Karen trusted that her town and county would provide accurate and up-to-date information but was ultimately disappointed with the communication she received.

Another topic that contributed to mistrust was evacuating. Not only were participants unsure if they should leave their homes or not; they were also concerned that the government had ulterior motives for their decision surrounding evacuation. When Chris thought back to the mandatory evacuation he faced, he took a different take than those who were angry an evacuation wasn’t announced earlier:

The only thing that, when I look back, and I look at everything, it’s when they issue a mandatory evacuation, I don’t feel like it’s in your best interest. I feel like it’s in, and I hate to sound like this, but the government’s best interest to not have you there. It’s one of those things where, “Look, you’re not here. We don’t have to worry about you.” But it doesn’t matter exactly what is going to happen to you after you leave. But that’s the feeling that I got throughout the whole time. It was just like, “It’s 3:00AM. Get out of the bar. You can’t stay here, but you got to go.”

Chris’s mistrust speaks to the difference between voluntary and mandatory evacuations, something that not all participants felt educated about. During a voluntary evacuation, residents

are not required to leave, and emergency services are still activated. When the evacuation is mandatory, however, services are no longer guaranteed, and shelters need to be established.

Earlier in Chapter 4, emergency manager Tammy addressed some issues with mistrust in her own experience, saying that her agency prides themselves in being transparent with the actions they take during a disaster. Some participants, however, seemed to think that the mistrust with government agencies is past repair, and that a completely separate organization should be responsible for communication with the public. When asked what the most ideal scenario would be, Ross suggested a non-profit being in charge:

I'd actually like to see [communication from] an NGO. I would not want it to be a government organization. I'd like to see an NGO. Do we have those inside this country or just outside the country? I don't even know how to answer that question. But I'd like it...a non-profit that is...I don't know. I don't know exactly how the financial system works on that, but essentially, I'd like to see it as a non-profit, but is sponsored by the government if that makes sense. Not completely, but endorse, Not sponsored, endorsed by the government. Because it's be an agency that has the...what do I want to say? The accolades or whatever but is not a news organization so is not look for...because the weather channel is ultimately entertainment. Right? While they can provide some really great information, you have to wade through the entertainment. I think having...I wouldn't want to see it as a government organization, because then people are like, "It's the government." I think a lot of people's responses to something the government does is "Oh they suck." You know what I mean? I just think there's an immediate write off.

Ross notes the government should endorse the non-profit because of their authority within the United States, saying the media should be separated as well. This refers to the sensationalism

element he described earlier in the chapter when talking about the social media groups he was a part of.

Community Growth

Despite concerns with some media outlets and the government providing inconsistent information in the eyes of some participants, community growth was recognized during and after the Hurricane as a generally positive experience. Although some residents expressed frustration with social media, others found community through their online experiences, such as Ruth:

I think the fact that Facebook was an avenue to open groups...I think some of those groups would have never actually started, but they started sort of out of necessity...and I think that for the most part the things that I read and whatnot, I mean people really felt supported and felt like everybody's kind of in this together and oh your roof collapsed, my roof collapsed too. Now we have something in common. I think there was a lot of good communication. And by the way, all those groups are still active, not active for a hurricane. They're just active groups and so now they're providing information just about general stuff. It's just that people who joined those groups, the groups have maintained themselves.

Because of these groups, Ruth said she was able to access information about what was going on near her home during the storm and after she evacuated. Because Ross stayed home during his mandatory evacuation, he was able to record videos of what was happening and upload them online for others like Ruth to see:

A lot of people have told me that they watched my videos instead of the news, because the news and the weather channel is only showing you the most craziest stuff, whereas mine they're like, "Okay, we're watching." But it almost backfired because I couldn't see inside the houses. So even some of the houses in my video that looked fine were

completely destroyed on in the inside. So they came home thinking their house is fine and it wasn't. But needless to say, yes, it made me feel a lot better that so many people were like, "That kept us sane. That kept us knowing there wasn't mass destruction." Because when you watched the weather channel, they're only focused on mass destruction.

Because that's what brings in the viewers.

Ross stated many locals recognized him after the Hurricane as the person who shared those videos and thanked him profusely. He was proud to be able to support his community when he felt unsupported by any official channels. Offline, his mother helped her community by feeding others in the neighborhood who were not able to leave during the evacuation for health reasons:

You're bombarded with people talking. And it was more of the situation. And we had neighbors that couldn't go anywhere. We had a neighbor who was in the hospital, and they made her leave because even though she really shouldn't have been at home, but she wasn't critical and they needed the space. So they sent her home. But there was no way she could have traveled anywhere. And they didn't have any power at their house. So my mom was feeding them and a couple other elderly people in the neighborhood. We have a I think she's 91 or 92, she would not leave her home. My mom had got to her food to have when she was there. She can barely see too. I still can't believe her kids didn't come get her or something.

Shirley, who stayed home during a voluntary evacuation, had a similar experience within her community when a fallen tree prevented anyone from leaving the neighborhood for seven days after the hurricane. To provide support, a local restaurant opened their doors to allow residents to come together and make meals while the power was out in their homes:

The people that ran the restaurant were not going to be there, but any of us could go eat and cook. One time we had pancakes and bacon, everybody brought what they had to get rid of it, so the refrigerator wouldn't spoil, and they would just have a breakfast, and a supper, or a lunch, whatever, which [was what] I had as far as what they had.

Shirley also mentioned that during preparation, her neighbors had kept each other up to date with their individual plans on evacuating and what they had heard on the news. It was her neighbors who had first alerted her to the voluntary evacuation.

Chapter 4 Summary

This chapter reported the findings from Part I and Part II of the project. In Part I, three counties were represented through qualitative interviews, resulting in work flow diagrams and themes related to their experiences during Hurricane Florence. In addition, artifacts such as public websites provided information about the history and culture of emergency management within the United States and North Carolina. For Part II, qualitative interviews with North Carolina residents about their experiences during Hurricane Florence resulted in recurring themes amongst participants such as reliance on technology and community growth. Chapter 5 begins with a discussion of these findings, and their implications for emergency managers, the public, and the fields of risk, technical communication, and user experience.

CHAPTER 5. DISCUSSION AND CONCLUSION

The purpose of this dissertation has been to study the rhetorical relationships between emergency managers within the US government and the populations they serve. To investigate how these stakeholders share information with the public, I conducted a two-part study using theories and methods of risk, technical communication, and user experience. In this final chapter of the dissertation, I start by reviewing the methods used and results found in the project. Then, I situate my interpretations within Jason Swarts' *Wicked, Incomplete, and Uncertain: User Support in the Wilds and the Role of Technical Communication* (Rittel & Webber, 1973; Swarts, 2018) and suggest implications for emergency managers and scholars within technical communication and other interdisciplinary fields that study risk. I follow with a short discussion of the limitations of this study, recommendations for future research in this area, and a brief argument for the need for further studies of this sort.

Summary of Results and Interpretations

In Part I of this study, I conducted an organizational case study of North Carolina emergency management agencies at the county level, using Spinuzzi's *Topsight* as a framework for my methods. This included gathering data from what Spinuzzi refers to as three levels of activity: micro, meso, and macro, to determine activity interruptions and recommendations within the organization. To do this, I researched information on the agencies' history, conducted interviews, and gathered artifacts from online and interview participants. From this data, I was able to create handoff chains and other diagrams to illustrate how tasks were managed within the agency during Hurricane Florence in 2018. In total I was able to access 3 county agencies for data.

For Part II of the study, I carried out user interviews of NC residents that lived in the coastal or piedmont regions during Hurricane Florence. These interviews were based in constructivist grounded theory and supported by common remote interview practices within usability testing. After completing a total of nine community interviews, I was able to identify emerging themes throughout the participant's experiences that spoke to their perception of communication with their emergency management agency during Hurricane Florence. This section provides a summary of the results and interpretation of their meaning.

Part I: NC Emergency Management (NCEM)

The Federal Emergency Management Agency (FEMA) provides a consistent and informative history of their organization, including regional offices that are held in partnership with state emergency management agencies. They offer free online courses on basic emergency preparedness and have an Emergency Management Institute in Maryland where courses are offered for certifications in emergency management positions and planning. FEMA's relationship with individual states, however, is unclear. Each state is assigned to a region, but different regions describe their relationships differently. Region 9, for example, lists the states under "Areas of Operation," but Region 6 describes the states as "partners." It appears that every state is expected to follow FEMA's training and develop initiatives based from suggestions, such as Know Your Zone. State-wide initiatives like Know Your Zone are established by the state agency, but county-wide decisions like EOC structures are determined by county managers with a range of experiences.

The state of North Carolina has 100 counties, and therefore over 100 emergency management agencies coordinating with the state headquarters to ensure their residents are receiving adequate resources and outreach. Individual municipalities have the right to have their own coordinators or EOCs besides the county's, meaning there are likely thousands of

employees in the emergency management system in the state. And with North Carolina being known as “Nature’s Sample Case (Ready, 2005),” each region has diverse considerations for emergency preparedness throughout the year.

Within each emergency management agency in North Carolina, there is likely one of three structures used to determine what roles employees have when their EOC is activated. Based on that structure, their responsibilities may change rather significantly or remain the same. Additionally, there is a wide range of support for positions. For one emergency management team, there may be a team of six, where another only has one to two people who are responsible for maintaining the emergency planning for the county. Consequently, the financial resources seem to be related, with some offices in need of relocation or more training on procedures.

The structure and resources available to each agency are important because they determine to what extent emergency management agencies can communicate with their residents. In addition, there is an emphasis on consistent messaging across counties that is difficult to measure with so many procedure types. The creation of an emergency management position, for example, seems to vary and change based on the need and financial support of the county. While there is a natural ebb and flow with the need of support within an organization, the variance in hierarchy leaves questions about what responsibilities are related to each title. This results in employees with drastically different training and educational backgrounds being expected to carry out similar functions. If there is an effort to provide communication training across the state, for example, the amount of training, how often training would need to occur, and who would need to be trained within the county would be difficult to measure and implement.

For those in emergency management positions, the career appears to be a labor of love, particularly during hurricane season. When Hurricane Florence hit in 2018, emergency

management employees were working for days rather than hours to ensure the safety of their communities. At the same time, they were managing their own response to the event. One participant recalled an employee who worked the storm, and ultimately had to move away from the area because their own home was destroyed. Despite the lack of consistency and resources within the organization, the participants generally had a positive memory of their experience, expressing pride in what they were able to achieve, and the support they received.

The reflections of the individual employees highlighted split opinions on the use and value of social media during the hurricane. While the use of “traditional” media like radio and television were standard, social media has now emerged as an alternative source, treated by a necessity by some and supplemental by others. It was unclear from the interviews how traffic across platforms was measured, but there was inconsistent involvement with the community concerning feedback for improvement after a hurricane. In terms of community support, each participant recalled camaraderie with either their co-workers, their communities, or outside support groups that came in for relief after Florence. The groups some of the participants engaged with have resulted in greater education efforts since the hurricane over two years ago, which speaks to future collaborative opportunities between emergency managers and their communities.

Part II: NC Residents

In a similar vein to the emergency managers, the North Carolina residents had mixed opinions about media, especially Facebook. There were some residents who relied solely on TV channels, their weather app, or what they had heard from their neighbors. At the same time, some participants relied almost completely on their social media groups. People generally had a preferred media source, but those who relied on social media discussed its need during and after the event more than before it happened. Across experiences, all participants, with the exception

of one, had access to a smart phone. If they evacuated and were displaced, their phone was a quick way to find out what was going on, or to look up directions for the safest and quickest way to get back to their home or nearest hotel. For those in the disaster, they could record their experiences and let other residents know what was going on back home through social media.

Another helpful feature of social media noted were the interactions that took place. When information is shared on social media, users can comment, ask questions, or share the information with their other friends. If they are a part of a regional support group, they can receive updates from members of their community outside of officials reporting on the incident. Karen's story in the beginning of the dissertation spoke to several things, like the desire for consistent updates from her town, and the emotional toll of the unknown. For some participants, social media groups provided updates that were faster than official channels. Several mentioned its importance during recovery efforts, when they needed to get recommendations from people they trusted about contractors. Yet for others, it was a non-regulated space that was difficult to navigate.

There are, of course, downsides to relying too heavily on social media channels or other online channels for information, such as concerns with the spread of false information (Elbanna, Bunker, Levine, & Sleigh, 2019). Moreover, there are people who do not use social media regularly and may not be able to participate in conversations and communities that are completely online. One participant did not have any social media accounts but would search for the public Facebook pages of weather stations or her town to look for more updates. You cannot join a group on Facebook unless you have a profile, and many of the conversations from this platform were happening, according to participants, within specific groups for their area. And

there are others who may not be able to participate for a variety of reasons who could be put at risk by not providing information through other forms of media.

In addition to resident access to a social media concern, there is less regulation for credible news. As detailed in Chapter 4, some participants were unhappy with the social media they had access to because it had less regulation. What seemed to be valuable information may not become a popular post and therefore get pushed to the bottom of the feed for something that may be less relevant. One emergency management spoke to the measures she takes to make sure the information she provides to the public is credible and relevant. In her position, she serves as the gatekeeper for what could be deemed inaccurate information. Facebook groups are required to have administrators, but this position is voluntary and does not have any requirements.

A contrasting narrative existed between the employees and residents concerning communication strategies and intent. As research and history shows, members of the public are often suspicious of communication from the government (Covello, 2009). Further, there has been debate about what information the public has the right to have access to and what can be held confidential for the safety of country, state, etc. One emergency manager explicitly described the county desire for transparency, saying their reports and press releases are public and readily available. Despite these efforts, residents still exhibit suspicion towards the motives of the government that was, in some cases, supported by past experiences.

Residents expressed distrust of emergency management concerning evacuation and general communication patterns. Several residents said that their county was inconsistent throughout the experience and they were displeased with their experience communicating with them. Others found them extremely useful and were thankful. This could be due to a lack of consistency across counties and the varying needs and expectations of residents. Still, others

were suspicious of motives behind evacuations and the feasibility of shelters in their area. One resident did not recall receiving any information about where she could go with her pets, and another mentioned the cost of trying to stay in a hotel for an unknown amount of time. Yet some emergency managers claim they made this type of information readily available, even commenting on the increase in shelters that allow pets.

Participants from both Part I and Part II of the study consistently talked about how much value they placed in community support, mentioning neighbors and community groups. These groups were said to have more accurate and up-to-date information, especially if communication was in-person. One resident, Allen, talked about staying behind during the storm to try to protect his home and the homes of others during the storm. One of his other neighbors also stayed, and after the storm had passed another resident helped with minor repairs as people returned to their homes. Ruth noted that the group she followed online has continued past the hurricane and is now used to share general information about what is happening in the area.

Wicked Problems and Implications

In *Wicked, Incomplete, and Uncertain: User Support in the Wilds and the Role of Technical Communication* (2018), Jason Swartz refers to the shift in the work of documentation from static solutions for manageable user problems as the role of support in technical writing becomes forum-based and interactive:

If tasks and problems encountered in carrying out those tasks are tied up with values and principles, then addressing them will be more situation-specific and the approach more iterative. The problems will be less distinct and better addressed with active assistance from creative and well-intentioned users rather than solely through expertly crafted and rehearsed solutions. Of course technical communicators are no strangers to providing

individualized assistance, but it is the scale and variability of these issues that underscore the appeal of a community-based approach. (39)

He considers this new dynamic between users and technical writers as what Rittel and Webber describe as “wicked problems,” or “the inability to address or answer a problem definitely because of our inability to plan or look ahead at the consequences of our solutions” (1973). Swarts applies wicked problems to user support documentation and describes the skills and expertise technical communicators must find solutions for these problems.

The role of the emergency manager in supporting users has reached a similar impasse, where residents search for solutions through official government channels but will rely on their communities to find answers to disaster related problems during an emergency. It is not that the emergency manager is obsolete; instead, the emergency manager position must adapt to reach users where they are. In the following section, I include a rationale for how risk communication in emergency management scenarios is a well-defined, wicked problem, based on my interpretation of the results of Parts I and II of my study. Next, I discuss the implications for practitioners and scholars in risk and technical communication, including user experience theories and methods. Then, I introduce potential solutions, limitations to my study, and future research opportunities.

Well-defined and Wicked Problems

According to Swarts, problems or questions can either be well-defined or ill-defined in terms of clarity, and either tame or wicked in nature. Well-defined problems have attributes such as context, sources, or precise outcomes. Ill-defined problems, then, do not have these known attributes, making it more difficult to determine the scope of the issue. Tame problems, in contrast, may have single simplistic answers, common concerns, or be isolated problems. Wicked problems are the opposite, with no clear range of possible solutions. This results in four

possible problem types with well-defined, tame problems having the easiest solutions and ill-defined wicked problems having the most complex solutions (Figure 11).

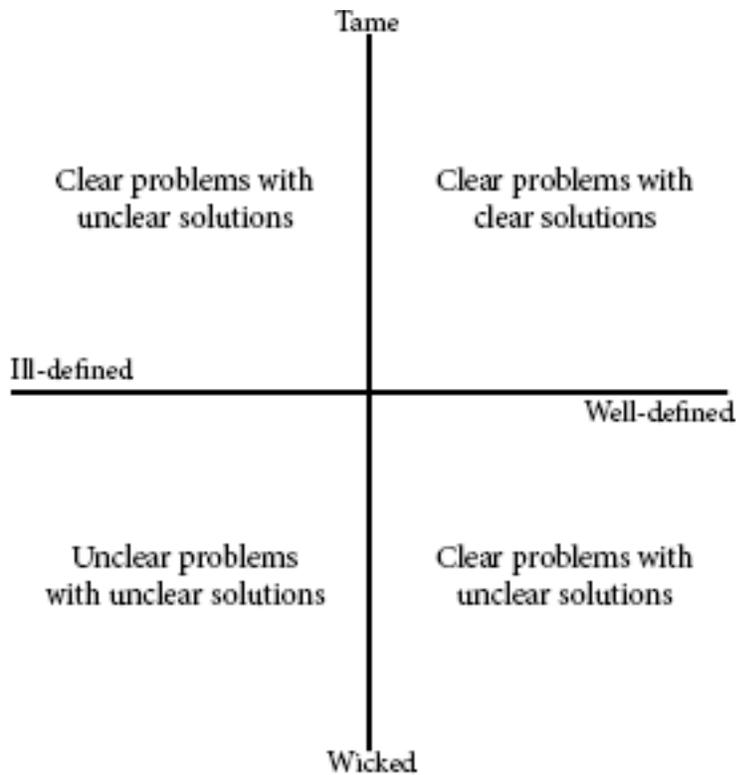


Figure 11. Types of problems users face

This project asked the following research questions:

- How do risk management organizations share information about natural disasters with the public?
- How does the public find information about natural disasters emergencies?

Within the context of the study, these questions are well-defined. The questions are related to emergency management agencies, more specifically North Carolina during Hurricane Florence. And emergency managers are actively making improvements to their current practices based on past experiences and feedback. Outcomes are expected to exist within frameworks of risk,

technical communication, and user experience. It is not ill-defined because the source of the question is known and there are already proposed solutions in existing scholarship.

After completing the study, however, it is evident that developing a clear solution for how to improve communication between groups is remains a wicked problem. This is because the outcome of the problem, or the study, shows the numerous possible solutions that are unique to certain users. There is also no “right” or “wrong” solution but rather how fitting they are for each area. Swartz defines well-defined and wicked problems as follows:

Users are fully aware of the kinds of problems they are encountering and what factors are coming together to create those problems. What users tend not to know are what actors are entailed into a solution or how those actors might or might not work together.

Problems are more inscrutable and amorphous. They change shape as people talk about them, and especially as users take steps to resolve them. Implementing a solution may resolve the problem, but more often, it simply changes the problem, sometimes by clarifying it and sometimes by complicating it. (54)

The description Swartz provides for user forums mirrors the frustrations of users and the attempts made by emergency management to alleviate their concerns. Because of disastrous moments in risk communication, like FEMA’s response to Hurricane Katrina, local agencies know they should work towards being transparent with the public. Some agencies start providing information more frequently, across different platforms, and some users begin to feel overwhelmed, or hear conflicting messages from others. Shelters may be available, but only under mandatory evacuation orders and enough resources from the county or state. FEMA may step in, but their response structure may not align with the county EOC, leading to confusion amongst employees who are trying to help from both agencies.

These examples, along with the contrast between employees' and residents' perception of communication, underline the wicked nature of emergency management and their relationship with the public. The problems addressed are difficult to pinpoint. And with the range of population size, demographics such as age, race, and education, resources, available staff, along with other aspects, one solution does not fit all. This makes it difficult and sometimes frustrating for stakeholders involved because there is no wrong solution, just good or bad solutions for different publics.

After painting a seemingly grim future for technical communicators working in online communities, Swarts goes on to argue that the skills of a technical communicator are not obsolete, but instead need to be repurposed. It is impossible to expect users to not try to find their own solutions, like Swarts describes through online help forums, or in this study, outside groups that provide faster, more dynamic answers than official emergency management channels. Instead, the technical communicator can adapt their skills to help the user and take on a new role:

Herein, a new frontier for technical communication, satisfying the knowledge demands of user communities, to help them act more like knowledge communities. This work is in addition to the contributions that technical communicators can make directly to users of the software. (p. 133)

Swarts is speaking to general help forums, but the same claims can be said for emergency managers, who often serve the role of the technical communicator. As Monika, an emergency management employee said, "it's important to meet people where they are at." Swarts ends his book with the skills technical communicators possess that can help user communities with problems they face that are beyond the scope of user documentation:

- Rhetorical skills
- Negotiation and workflow management

- Interpretation and problem solving
- Facilitating interpersonal communication
- Structuring information
- Knowledge management and community development
- Encourage good habits and good character
- Shape contributions into genre forms
- Articulate and preserve knowledge

With these skills, he argues that technical communicators hold an expertise in networking that needs to be emphasized more as we teach students, preparing them for industry. The skills he describes also apply to emergency managers, but the context of their position is wide ranging and still, difficult to manage. Furthermore, emergency managers are not explicitly trained in communication (Rowan, Botan, Kreps, Samoilenko, & Farnsworth, 2009), so they may not realize what skills they have or should be utilizing in their jobs, nor do they necessarily have resources to develop skills. Scholars in technical communication, however, can assist with training and implementation of these skills, along with incorporating theories of user experience to improve communication and interface design.

Implications for Emergency Managers

After analysis and interpretation, this study highlights the wicked problems emergency managers face in their positions because of the inconsistencies in expectations and structure, as well as the unpredictability of their work. This is in part due to their ongoing relationship with FEMA. Although the participants I spoke to are not representative of the state, only one described which recommended EOC structure they utilized within their county. They also had a variety of training, which can also lead to confusion over responsibilities. FEMA lists universities across the country that have programs in emergency management, but employees already in this role are unlikely to have time to pursue these degrees unless they can be completed remotely or they have sponsorship from their county. If a county or state is using

FEMA structures and protocols, the employees working in that agency should have onboarding where they have access to the available online courses and be able to apply them to their own work flow. Additional investigation into these agencies could reveal more about their hiring and training practices that were not discussed in the current study.

Residents, or users, expectations and perceptions of emergency communication are also inconsistent, meaning there is no standardized or simple solution available for how emergency management should be handled across the state. To find localized solutions, emergency management agencies should participate in additional user experience studies, such as focus groups, surveys, or think aloud protocols. This should be done at the county or region level, but not branch or state. Because user needs are so varied, standardized practices are usually implemented to meet the needs of the most users. Risk communication can move away from this model by moving away from the one-size-fits-all approach and finding local solutions to local problems that occur on a national level.

Implications for Technical Communication

Technical communication scholars conduct research in both theory and practice in the field. Despite interest in improving technical communication practices, there is a noticeable gap between theory and practice that separates practitioners from researchers (Rude, 2015). With the lack of consistency amongst emergency managers as well as the need for localized user experience practices, there is a need for intervention to help people in these positions improve these skills without burdening them with added responsibilities. Scholars in technical communication can attempt to bridge the gap between technical communication research and practice by addressing problems practitioners, such as the ones emergency managers face, and incorporating them into their research. Facilitating the collaboration between research and practitioners will improve outcomes of both groups. For practitioners, or in this case, emergency

managers, problems surrounding risk communication will be addressed and improvements can be put into place for the public. They will also benefit from learning how to comfortably conduct this type of testing in their positions, which can help them articulate the value and need for support in their job. For scholars, methods in user experience can be improved through testing. In addition, classroom pedagogies can be altered to more accurately reflect the needs of industry, potentially increasing the marketability of graduates in the field.

Implications for Risk Communication and User Experience

Applying usability methods to risk communication practices is not a new concept in technical communication or other disciplines such as human-computer interaction or mass communications. Even in technical communication, the intersections of usability and risk communication have been considered since at least the 1980's. Still, there has not been an adequate amount of scholarship that works with practitioners or consider user experience theories overall when creating new communication models. Current risk communication models include valuable suggestions for emergency managers and other communicators of risk but are often generalized and rely on theories within the same discipline. Althaus suggests this occurs because of different ideologies concerning the meaning of risk and how it should be analyzed. These information silos result in a lack of shared theories and findings that could improve risk communication strategies and other aspects of risk that are explored within different disciplines. A multidisciplinary approach, Althaus suggests, would lead to new understandings of risk that would have an impact on research practices and society.

The research questions explored in this study are primarily focused on improving communication strategies for emergency management within local government agencies. Because of the qualitative, grounded approach used, the results are not representative of emergency management agencies generally, and instead represent local user needs during

Hurricane Florence. However, the methods used can be applied to other risk scenarios to determine how strategies of local agencies can be adapted to their individual communities. The inclusion of interdisciplinary theories of user experience works towards a framework for scholars outside of technical communication to consider alternative methods to address their own disciplinary questions concerning risk. By using a multidisciplinary framework, scholars may develop more complex and evolved conceptions of risk that can extend research and practice across disciplines, ideally leading to safer procedures, stronger communities, and fewer disaster casualties.

Limitations

The limitations for this research project are the number of counties represented, the demographics of participants, and online interviews, in place of Spinuzzi's recommended site visit. Despite these limitations, this project is a move towards incorporating user experience theories and risk communication practices into the technical communication industry and scholarship. This section describes each limitation and how they may have impacted the results of the study.

Three counties were represented within Part I of the project, meaning there were few responses to the email solicitation strategy used. As Spinuzzi admits, there can be difficulty in getting employees to speak with you for reasons such as interrupting productivity for data collection and risk of outcomes from observations (p. 47). As a result, it may be challenging to build trust with workers who are hesitant to participate. My study represents the experiences of three larger counties within the coastal and piedmont regions that had an activated EOC and participated in evacuations. Although there is a low number of participating counties, each experienced significant damage during Hurricane Florence, with hundreds of thousands of dollars in repairs. Each county represented had over 100,000 residents, but there were disparities

between the experiences of the emergency managers from each area. Their differences support the need for localized user experience testing to meet the needs of each area.

NC residents that who were interviewed for Part II of the study were all Caucasian with the majority identifying as women. In addition, most participants were tech-savvy and said they used social media frequently. Ideally, participants would vary in ethnicity and experience with online tools and platforms. This reflects the sampling methods, as most participants were solicited through the same Facebook group. Although the participants were of the same ethnicity and mostly gender, their age, education, evacuation plan, and experience with hurricanes provided some variance in their demographic information.

In *Topsight*, Spinuzzi emphasizes the need for onsite visits of the organization being studied. He believes visiting the site is valuable because it allowed the researcher to observe the behavior and habits of employees during work. While there is value in the practice of an onsite visit, the work habits studied in this project happened roughly two years ago, and at least two of the three county representatives acknowledged that some structures within the organization had changed since the hurricane, or that there were new positions created as a response to the disaster. Because of the time since the event as well as the changes to protocol after the hurricane, there would be no way to observe current practices, making a site visit less relevant for this study.

In addition to the historical nature of the event being studied, many usability tests, such as interviews, are and can be completed remotely rather than face-to-face, eliciting similar results. Remote user testing is considered a cost effective, convenient means of collecting data for both researchers and subjects (Martin, Shamari, Seliaman, & Mayhew, 2014). Many practitioners and scholars have explored best practices with remote testing to ensure the

implementation of effective remote testing, arguing that remote testing can alleviate the need for dedicated laboratory space and increase access to representative users (Thompson, Rozanski, & Haake, 2004). For a university or organization with limited resources, remote testing can be a viable solution to these challenges. With online tools, synchronous and asynchronous methods can be used, also increasing types of testing that can be conducted remotely. Qualitative interviews are done synchronously and can be carried out through telephone or telecommunication tools like Skype, with some researchers suggesting there is little significant difference in interviews using these modes versus face-to-face interactions (Janghorban, Roudsari, & Taghipour, 2014; Sturges & Hanrahan, 2004).

One obvious drawback to telephone interviews is the lack of non-verbal communication available for the interviewer to make note of or respond to in conversation. Some scholars argue that the non-verbal language used by participants is often only used for notes and is not incorporated into analysis. They also argue that this deficit allows interviewers to explicitly ask questions concerning feelings that they cannot see, potentially leading to richer findings (Cachia & Millward, 2011). Participants may also feel more comfortable with the additional level of anonymity, since the interviewer cannot see their appearance.

Aside from the flexibility and convenience for both participants and interviewers that telephone interviews create, there is an increasing need for alternative and remote user testing strategies. Even our current crisis warrants remote testing, as participants may not be able to access a research lab or meet with a researcher at a public location. Additionally, remote testing makes international interviews more feasible, allowing for research in cross-cultural communication (Dray & Siegel, 2004). COVID-19 will continue to have consequences for countries across the world, and the communication involved by the unsurmountable number of

stakeholders is a crucial aspect of implementing safety procedures and mitigating risk with and for the public. The ability to conduct research with stakeholders who are inaccessible in person might become a necessity in future risk communication studies.

Future Research

The data collected during this study introduced a mixed-methods approach to understanding the relationship between government emergency management agencies and the public, resulting in several hours of invaluable interviews with emergency management employees and North Carolina residents. These interviews, along with the other methods used in this study, could be used to support additional findings and research projects within risk, technical communication, and user experience. With this work completed, I recommend a replication of the study applied to another site, including modifications to interview protocols and the inclusion of additional types of usability testing.

The results of this study are representative of the experiences of some emergency management employees and residents of North Carolina during Hurricane Florence in 2018. The results from their narratives are meaningful and significant but could be interpreted as limited because they are not generalizable. However, it would be useful to apply the same methods to a different region of the country, with perhaps a different disaster, because of the variation in how emergency management is conducted between states.

Looking back on the project, I would also recommend amending the interview protocols with the employees to include more questions about how they interacted with specific areas during the hurricane, such as meteorologists. Before the study began, I had a limited understanding of the EOC and how the structure of workflow changed so dramatically during an active, wide-scale emergency. Questions about interactions were addressed during interviews, but the specific employees the interviewee spoke with were not taken into consideration at the

time of the interview. For those interested in pursuing this type of project, I would either suggest modifying the existing interview protocol or including a follow up interview after all initial interviews were completed.

Conclusion

The purpose of this dissertation was to examine the relationship between government emergency agencies and the communities they serve, including communication strategies of organizations and needs of communities. To determine if and where they are communication breakdowns or opportunities between stakeholders, I conducted a two-part study representing each group. Part I of the study used Spinuzzi's *Topsight* as a framework for understanding the organizational culture, structure, and work flow during Hurricane Florence in North Carolina county emergency agencies. Part II of the study relied on methods of user experience to conduct qualitative user interviews of North Carolina residents who experienced Hurricane Florence. The results of the study show that while there are commonalities in agency practices and user needs in each area, there are still drastic differences that call for more localized user testing. The results call for scholars in technical communication to bridge the gap between theory and practice by involving emergency managers in research, including user testing at local municipalities or counties, potentially including students. For researchers outside of technical communication, the study offers a multidisciplinary framework for studying risk and relationships between stakeholders. It also supports and extends remote testing strategies used increasingly in user experience studies and practices. Future research suggestions include additional types of testing, replicating the study with a narrower locality, and amending some interview questions that are more specific.

REFERENCES

- Althaus, C. E. (2005). A disciplinary perspective on the epistemological status of risk. *Risk Analysis: An International Journal*, 25(3), 567-588.
- Aven, T. (2018). An emerging new risk analysis science: Foundations and implications. *Risk Analysis*, 38(5), 876-888.
- Bargas-Avila, J. A., & Hornbæk, K. (2011, May). Old wine in new bottles or novel challenges: a critical analysis of empirical studies of user experience. In *Proceedings of the SIGCHI conference on human factors in computing systems* (pp. 2689-2698).
- Barton, B. F., & Barton, M. S. (1993). Modes of power in technical and professional visuals. *Journal of business and technical communication*, 7(1), 138-162.
- Bimber, B. (1990). Karl Marx and the three faces of technological determinism. *Social studies of science*, 20(2), 333-351.
- Blakeslee, A. M., & Spilka, R. (2004). The state of research in technical communication. *Technical communication quarterly*, 13(1), 73-92.
- Bowdon, M. A. (2014). Tweeting an ethos: Emergency messaging, social media, and teaching technical communication. *Technical Communication Quarterly*, 23(1), 35-54.
- Bowen, S. A. (2009). Ethical responsibility and guidelines for managing issues of risk and risk communication. *Handbook of risk and crisis communication*, 343-363.
- Brumberger, E., & Lauer, C. (2015). The evolution of technical communication: An analysis of industry job postings. *Technical Communication*, 62(4), 224-243.
- Cachia, M., & Millward, L. (2011). The telephone medium and semi-structured interviews: a complementary fit. *Qualitative Research in Organizations and Management: An International Journal*. 6(3), 265-277
- Charmaz, K., & Belgrave, L. (2012). Qualitative interviewing and grounded theory analysis. *The SAGE handbook of interview research: The complexity of the craft*, 347-365.
- Citrin, J., & Stoker, L. (2018). Political trust in a cynical age. *Annual Review of Political Science*, 21, 49-70.
- Connors, R. J. (2004). The rise of technical writing instruction in America. *Central works in technical communication*, 3-19.
- Cook, T. E., & Gronke, P. (2005). The skeptical American: Revisiting the meanings of trust in government and confidence in institutions. *The Journal of Politics*, 67(3), 784-803.

- Corbin, J., & Strauss, A. (2008). *Basics of qualitative research: Qualitative and quantitative approaches* (3rd ed.). SAGE Publications.
- Covello, V. T. (2009). Strategies for overcoming challenges to effective risk communication. In *Handbook of risk and crisis communication* (pp. 155-179). Routledge.
- Creswell, J. W. (2006). *Qualitative inquiry and research design: Choosing among five traditions*. SAGE Publications.
- Dix, A. (2017). Human–computer interaction, foundations and new paradigms. *Journal of Visual Languages & Computing*, 42, 122-134.
- Dragga, S., & Gong, G. (2014). Dangerous neighbors: Erasive rhetoric and communities at risk. *Technical Communication*, 61(2), 76-94.
- Dragga, S., & Voss, D. (2001). Cruel pies: The inhumanity of technical illustrations. *Technical communication*, 48(3), 265-274.
- Dray, S., & Siegel, D. (2004). Remote possibilities? International usability testing at a distance. *interactions*, 11(2), 10-17.
- Elbanna, A., Bunker, D., Levine, L., & Sleight, A. (2019). Emergency management in the changing world of social media: Framing the research agenda with the stakeholders through engaged scholarship. *International Journal of Information Management*, 47, 112-120.
- Federal Emergency Management Agency (FEMA). (2014). Emergency Management Institute mission. Retrieved from <https://training.fema.gov/mission.aspx>
- Federal Emergency Management Agency (FEMA). (2018). IS-700.B: An introduction to the National Incident Management System. Retrieved from <https://training.fema.gov/is/courseoverview.aspx?code=IS-700.b>
- Federal Emergency Management Agency (FEMA). (2018). North Carolina Hurricane Florence (DR-4293). Retrieved from: <https://www.fema.gov/disaster/4393>
- Federal Emergency Management Agency (FEMA). (n.d.). About the agency. Retrieved from <https://www.fema.gov/about-agency>
- Fischhoff, B. (1995). Risk perception and communication unplugged: twenty years of process 1. *Risk analysis*, 15(2), 137-145.
- Frost, E. A. (2013). Transcultural risk communication on Dauphin Island: An analysis of ironically located responses to the Deepwater Horizon disaster. *Technical Communication Quarterly*, 22(1), 50-66.

- Glaser, B. G., & Strauss, A. L. (2017). *Discovery of grounded theory: Strategies for qualitative research*. Routledge.
- Grabill, J. T., & Simmons, W. M. (1998). Toward a critical rhetoric of risk communication: Producing citizens and the role of technical communicators. *Technical communication quarterly*, 7(4), 415-441.
- Gray, G. M., & Ropeik, D. P. (2002). Dealing with the dangers of fear: the role of risk communication. *Health Affairs*, 21(6), 106-116.
- Hadden, S. G. (1989). *A citizen's right to know: Risk communication and public policy*. Westview Press.
- Hallahan, K. (2009). Crises and risk in cyberspace. *Handbook of risk and crisis communication*, 412-445.
- Hart-Davidson, W. (2013). What are the work patterns of technical communication. *Solving problems in technical communication*, 50-74.
- Heath, R. L., Lee, J., Palenchar, M. J., & Lemon, L. L. (2018). Risk communication emergency response preparedness: Contextual assessment of the protective action decision model. *Risk analysis*, 38(2), 333-344.
- Henning, T., & Bemer, A. (2016). Reconsidering power and legitimacy in technical communication: A case for enlarging the definition of technical communicator. *Journal of technical writing and communication*, 46(3), 311-341.
- Henning, T., & Bemer, A. (2016). Reconsidering power and legitimacy in technical communication: A case for enlarging the definition of technical communicator. *Journal of technical writing and communication*, 46(3), 311-341.
- Houston, J. B. (2012). Intervention across disaster phases. *Journal of Emergency Management*, 10(4), 283.
- Janghorban, R., Roudsari, R. L., & Taghipour, A. (2014). Skype interviewing: The new generation of online synchronous interview in qualitative research. *International journal of qualitative studies on health and well-being*, 9(1), 24152.
- Katz, S. B. (1992). The ethic of expediency: Classical rhetoric, technology, and the Holocaust. *College English*, 54(3), 255-275.
- Katz, S. B., & Miller, C. R. (1996). The low-level radioactive waste siting controversy in North Carolina: Toward a rhetorical model of risk communication. *Green culture: Environmental rhetoric in contemporary America*, 111-140.
- Kienzler, D. S. (1997). Visual ethics. *The Journal of Business Communication*, 34(2), 171-187.

- Kimball, M. A. (2017). The golden age of technical communication. *Journal of Technical Writing and Communication*, 47(3), 330-358.
- Kostelnick, C. (2016). The re-emergence of emotional appeals in interactive data visualization. *Technical Communication*, 63(2), 116-135.
- Kostelnick, C., & Kostelnick, J. (2016). Online Visualizations of Natural Disasters and Hazards: The Rhetorical Dynamic of Charting Risk. *Science and the Internet: Communicating Knowledge in a Digital Age*, 157-90.
- Lancaster, A. (2018). Identifying Risk Communication Deficiencies: Merging Distributed Usability, Integrated Scope, and Ethics of Care. *Technical Communication*, 65(3), 247-264.
- Lauer, C., & Brumberger, E. (2016). Technical communication as user experience in a broadening industry landscape. *Technical Communication*, 63(3), 248-264.
- Lee, M. F., & Mehlenbacher, B. (2000). Technical writer/subject-matter expert interaction: The writer's perspective, the organizational challenge. *Technical communication*, 47(4), 544-552.
- Leiss, W. (1996). Three phases in the evolution of risk communication practice. *The Annals of the American Academy of Political and Social Science*, 545(1), 85-94.
- Longo, B. (2000). *Spurious coin: A history of science, management, and technical writing*. SUNY Press.
- Martin, R., Shamari, M. A., Seliaman, M. E., & Mayhew, P. (2014). Remote asynchronous testing: A cost-effective alternative for website usability evaluation. *International Journal of Computer and Information Technology*, 3(1), 99-104.
- Martin, S., Carrington, N., & Muncie, N. (2017). Promoting user advocacy to shift technical communication identity and value. *Technical Communication*, 64(4), 328-344.
- Miles, M. B., Huberman, A. M. & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). SAGE Publications.
- Miller, C. R. (1979). A humanistic rationale for technical writing. *College English*, 40(6), 610-617.
- Moore, P. (1992). When politeness is fatal: Technical communication and the Challenger accident. *Journal of Business and Technical Communication*, 6(3), 269-292.
- National Weather Service (NWS). (2018). Hurricane Florence. Retrieved from <https://www.weather.gov/ilm/HurricaneFlorence>

- NC League of Municipalities (NCLM). (n.d.). How NC cities work. Retrieved from <https://www.fema.gov/about-agency>
- Norman, D. (2013). *The design of everyday things: Revised and expanded edition*. Basic books.
- North Carolina Department of Public Safety (NCDPS). (n.d.) North Carolina Emergency Management 2018 year in review [PDF]. Retrieved from https://files.nc.gov/ncdps/news-documents/2018-NCEM-YearReview_web.pdf
- North Carolina Department of Public Safety (NCDPS). (n.d.). Emergency communications. Retrieved from <https://www.ncdps.gov/emergency-management/emergency-communications>
- North Carolina Department of Public Safety (NCPS). (n.d.). About DPS. Retrieved from <https://www.ncdps.gov/about-dps>
- North Carolina Forest Service (2017). Map of North Carolina Counties. Retrieved from https://www.ncforestsERVICE.gov/water_quality/bmp_costs.htm
- Palenchar, M. J. (2009). Historical trends of risk and crisis communication. In *Handbook of risk and crisis communication* (pp. 43-64). Routledge.
- Porter, G. (2018). Hurricane Florence can be a lot like Harvey. Here's why. *The Washington Post*. Retrieved from <https://www.washingtonpost.com/weather/2018/09/10/hurricane-florence-could-be-lot-like-harvey-heres-why/>
- Potts, L. (2013). *Social media in disaster response: How experience architects can build for participation*. Routledge.
- Pringle, K., & Williams, S. (2005). The future is the past: Has technical communication arrived as a profession?. *Technical communication*, 52(3), 361-370.
- Ready, M. (2005). *The Tar Heel State: A history of North Carolina*. University of South Carolina Press.
- Rechard, R. P. (1999). Historical relationship between performance assessment for radioactive waste disposal and other types of risk assessment. *Risk Analysis*, 19(5), 763-807.
- Redish, G. and Barnum, C. (2011). Overlap, influence, intertwining: The interplay of UX and technical communication. *Journal of Usability Studies*, 6(3), 90-101.
- Reynolds, B., & Seeger, M. W. (2005). Crisis and emergency risk communication as an integrative model. *Journal of health communication*, 10(1), 43-55.

- Rittel, H. W., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy sciences*, 4(2), 155-169.
- Rowan, K. E., Botan, C. H., Kreps, G. L., Samoilenko, S., & Farnsworth, K. (2009). Risk communication education for local emergency managers: Using the CAUSE model for research, education, and outreach. In *Handbook of risk and crisis communication* (pp. 180-203). Routledge.
- Rude, C. D. (2015). Building identity and community through research. *Journal of Technical Writing and Communication*, 45(4), 366-380.
- Saldaña, J. (2013). *The coding manual for qualitative researchers*. SAGE publications.
- Salvo, M. J. (2001). Ethics of engagement: User-centered design and rhetorical methodology. *Technical communication quarterly*, 10(3), 273-290.
- Sauer, B. A. (1993). Sense and sensibility in technical documentation: How feminist interpretation strategies can save lives in the nation's mines. *Journal of Business and Technical Communication*, 7(1), 63-83.
- Sauer, B. A. (2003). *The rhetoric of risk: Technical documentation in hazardous environments*. Taylor & Francis.
- Sherman-Morris, K., Houston, J. B., & Subedi, J. (2018). Theoretical matters: on the need for hazard and disaster theory developed through interdisciplinary research and collaboration. *Risk analysis*.
- Simis, M. J., Madden, H., Cacciatore, M. A., & Yeo, S. K. (2016). The lure of rationality: Why does the deficit model persist in science communication?. *Public Understanding of Science*, 25(4), 400-414.
- Slack, J. D., Miller, D. J., & Doak, J. (1993). The technical communicator as author: Meaning, power, authority. *Journal of Business and Technical Communication*, 7(1), 12-36.
- Soderston, C. (1985). The Usability Edit: A New Level. *Technical Communication*, 32(1), 16-18.
- Spinuzzi, C. (2018). *Topsight: A guide to studying, diagnosing, and fixing information flow in organizations* (2nd ed.). Urso Press.
- St. Amant, K., & Graham, S. S. (2019). Research that Resonates: A Perspective on Durable and Portable Approaches to Scholarship in Technical Communication and Rhetoric of Science. *Technical Communication Quarterly*, 28(2), 99-111.
- Stewart, S. R. & Berg, R. (2019). *National Hurricane Center tropical cyclone report: Hurricane Florence* [PDF]. Retrieved from https://www.nhc.noaa.gov/data/tcr/AL062018_Florence.pdf

- Stratman, J. F., Boykin, C., Holmes, M. C., Laufer, M. J., & Breen, M. (1995). Risk communication, metacommunication, and rhetorical stases in the Aspen-EPA Superfund controversy. *Journal of Business and Technical Communication*, 9(1), 5-41.
- Sturges, J. E., & Hanrahan, K. J. (2004). Comparing telephone and face-to-face qualitative interviewing: a research note. *Qualitative research*, 4(1), 107-118.
- Sullivan, P. (1989). Beyond a narrow conception of usability testing. *IEEE Transactions on Professional Communication*, 32(4), 256-264.
- Swarts, J. (2018). *Wicked, incomplete, and uncertain: User support in the wild and the role of technical communication*. University Press of Colorado.
- Thompson, K. E., Rozanski, E. P., & Haake, A. R. (2004, October). Here, there, anywhere: remote usability testing that works. In *Proceedings of the 5th conference on Information technology education* (pp. 132-137).
- Webler, T., & Tuler, S. (2018). Four decades of public participation in risk decision making. *Risk Analysis*.
- Whitehead, J. C. (2003). One million dollars per mile? The opportunity costs of hurricane evacuation. *Ocean & coastal management*, 46(11-12), 1069-1083.
- Wilson, C. (2013). *Interview techniques for UX practitioners: A user-centered design method*. Elsevier.
- Winsor, D.A. (1988). Communication Failures Contributing to the Challenger Accident: An Example for Technical Communicators. *IEEE Transactions on Professional Communication*, 31: 101-107.
- Youngblood, S. (2012). Balancing the rhetorical tension between right to know and security in risk communication ambiguity and avoidance. *Journal of Business and Technical Communication*, 26(1), 35-64.

APPENDIX B. PART I INTERVIEW PROTOCOL

Emergency Management Employee Interview Protocol (Group 1)

Tell me about being an emergency management employee.

How long have you worked in your current position?

How did you get the position you have now?

What made you decide to take a role in this organization?

Talk about your typical work day.

What tasks are you responsible for?

Do you work with others on these tasks? If so, how? If not, why not?

What tools do you use to accomplish your tasks?

What are some things you like best about these tools?

What are some things you dislike about these tools?

What are primary outputs of your work? Can you show me examples?

Tell me about your personal experiences with hurricanes.

How long have you lived in this area?

Have you been personally impacted by hurricanes in any way? How?

What actions or types of communication are made to prepare for a hurricane?

What actions or types of communication are taken during a hurricane?

What actions or types of communication are taken after a hurricane?

Tell me about your experiences working as an emergency management employee during Hurricane Florence last year.

What tasks were you responsible for?

Did you work with others on these tasks? If so, how? If not, why not?

Is there anything else you would like to share with me about your experiences?

APPENDIX C. PART II INTERVIEW PROTOCOL

North Carolina Resident Interview Protocol (Group 2)

How long have you lived here?

Have you lived in other areas of the South before?

What made you decide to live here?

Talk about how you use electronic technology during your typical day.

Tell me about your personal experiences with hurricanes.

Have you been personally impacted by hurricanes in the past in any way? How?

Tell me about your personal experiences with Hurricane Florence.

What steps do you take to prepare for the hurricane?

What resources, if any, did you seek?

Did you use electronic/electronic technology? If so, what?

How do you think technology impacted your ability to receive information?

What did you do during Hurricane Florence (aka what happened)?

What resources, if any, did you seek?

Did you use technology? If so, what?

How do you think technology impacted your ability to receive information?

What did you do after Hurricane Florence?

What resources, if any, did you seek?

Did you use technology? If so, what?

How do you think technology impacted your ability to receive information?

Was there anything you might have done differently or liked more information about concerning Hurricane Florence? What information or resources were you glad to have access to?

How did Hurricane Florence impact your future preparedness for hurricanes? Have you done anything differently this year?

Is there anything else you would like to add about your experiences?