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SOCIAL MEDIA USE DURING CRISIS EVENTS: A MIXED-METHOD ANALYSIS
OF INFORMATION SOURCES AND THEIR TRUSTWORTHINESS

by

Apoorva Chauhan

A dissertation submitted in partial fulfillment
of the requirements for the degree

of

DOCTOR OF PHILOSOPHY

in

Computer Science

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Logan, Utah

2019

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ABSTRACT

Social Media Use During Crisis Events: A Mixed-Method Analysis of Information
Sources and Their Trustworthiness

by

Apoorva Chauhan, Doctor of Philosophy

Utah State University, 2019

Major Professor: Amanda Lee Hughes, Ph.D.
Department: Computer Science

This dissertation consists of three studies that examine online communications during crisis events. The first study identified and examined the information sources that provided official information online during the 2014 Carlton Complex Wildfire. Specifically, after the wildfire, a set of webpages and social media accounts were discovered that were named after the wildfire—called Crisis Named Resources (or CNRs). CNRs shared the highest percentage of wildfire-relevant information. To better understand the role of CNRs in crisis response, the second study examined CNRs that were named after the 2016 Fort McMurray Wildfire. Findings showed that many CNRs were created around the wildfire, most of which either became inactive or were closed after the wildfire containment. These CNRs shared wildfire-relevant information, served a variety of purposes from information dissemination to offers of help to expressions of solidarity. They also received good reviews and were followed by many people. These observations about CNRs laid the foundation for the third study that sought to determine the factors that

influence the trustworthiness of these resources. The third study involved 17 interviews and 105 surveys with members of the public and experts in Crisis Informatics, Communication Studies, and Emergency Management. Participants were asked to evaluate the trustworthiness of CNRs that were named after the 2017 Hurricane Irma. Findings indicate that participants evaluated the trustworthiness of CNRs based on their perceptions of CNR content, information source(s), owner, and profile.

This dissertation provides the following contributions- (1) identification and examination of online sources that provide official crisis information; (2) characteristics and behaviors of CNRs during crisis events; and (3) factors that influence the trustworthiness of CNRs.

(179 pages)

PUBLIC ABSTRACT

Social Media Use During Crisis Events: A Mixed-Method Analysis of Information

Sources and Their Trustworthiness

Apoorva Chauhan

This dissertation consists of three studies that examine online communications during crisis events. The first study identified and examined the information sources that provided official information online during the 2014 Carlton Complex Wildfire. Specifically, after the wildfire, a set of webpages and social media accounts were discovered that were named after the wildfire—called Crisis Named Resources (or CNRs). CNRs shared the highest percentage of wildfire-relevant information. Because CNRs are named after a crisis event, they are easier to find and appear to be dedicated and/or official sources around an event. They can, however, be created and deleted in a short time, and the creators of CNRs are often unknown, which raises questions of trust and credibility regarding the information CNRs provide.

To better understand the role of CNRs in crisis response, the second study examined CNRs that were named after the 2016 Fort McMurray Wildfire. Findings showed that many CNRs were created around the wildfire, most of which either became inactive or were closed after the wildfire containment. These CNRs shared wildfire-relevant information and served a variety of purposes from information dissemination to offers of help to expressions of solidarity. Additionally, even though most CNR owners remained anonymous, these resources received good reviews and were followed by many people.

These observations about CNRs laid the foundation for the third study that sought to determine the factors that influence the trustworthiness of these resources. The third

study involved 17 interviews and 105 surveys with members of the public and experts in Crisis Informatics, Communication Studies, and Emergency Management. Participants were asked to evaluate the trustworthiness of CNRs that were named after the 2017 Hurricane Irma. Findings indicate that participants evaluated the trustworthiness of CNRs based on their perceptions of CNR content, information source(s), owner, and profile.

DEDICATION

To my dear grandmother, Late Mrs. Vijaya Chauhan and uncle, Dr. Sanjay S. Chauhan for their love, guidance, and unwavering support, without which I would not have come this far.

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This work would not have been possible without God's grace and the support of many individuals.

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Apoorva Chauhan

CONTENTS

ABSTRACT.....	iii
PUBLIC ABSTRACT	v
DEDICATION.....	vii
ACKNOWLEDGMENTS	viii
LIST OF TABLES.....	xiv
LIST OF FIGURES.....	xvii
CHAPTER	
I. INTRODUCTION	1
Research design	1
Dissertation overview	5
Integration of previously published work	5
II. PROVIDING ONLINE CRISIS INFORMATION: AN ANALYSIS OF OFFICIAL SOURCES DURING THE 2014 CARLTON COMPLEX WILDFIRE	7
Abstract	7
Author keywords.....	7
ACM classification keywords.....	7
Introduction.....	7
Background	8
Online media use in crisis	8
Official information through online media	8
Event of study – Carlton Complex Wildfire	9
Method	9
Identifying official information sources	9
Data collection	10
Data analysis	11
Findings.....	11
Official information sources	11
Analysis of online media content.....	14

Discussion	16
Timeliness of official information sources	17
Event Based Resources	17
Toward more effective official online crisis information	17
Broader implications	18
Limitations & future work	18
Conclusion	18
References	19
III. SOCIAL MEDIA RESOURCES NAMED AFTER A CRISIS EVENT	22
Abstract	22
Keywords	22
Introduction	22
Background	22
Event of study – The 2016 Fort McMurray Wildfire	23
Data Collection	24
Identification and monitoring of Crisis Named Resources	24
Messages posted by Crisis Named Resources	24
Data analysis and findings	24
Life of Crisis Named Resources	24
Relevance of Crisis Named Resources	27
Types of Crisis Named Resources	29
Popular Crisis Named Resources	30
Discussion	30
Limitations & future work	32
Conclusion	32
References	32
IV. FACTORS THAT INFLUENCE THE TRUSTWORTHINESS OF SOCIAL MEDIA ACCOUNTS AND PAGES NAMED AFTER A CRISIS	34
Abstract	34
CCS concepts	34
Keywords	34
Introduction	34

Background	34
Methods.....	35
Research participants	36
Survey and interview questionnaire.....	37
Differences between survey and interview	37
Hurricane Irma contextual scenario	38
CNR selection for survey and interview studies.....	38
Data analysis and findings	39
Content.....	40
Information Source	41
Profile.....	42
Owner.....	43
Discussion.....	44
Limitations	45
Conclusions.....	46
References.....	46
V. PERCEIVED TRUSTWORTHINESS OF FACEBOOK PAGES AND TWITTER ACCOUNTS NAMED AFTER A CRISIS EVENT	49
Abstract.....	49
Keywords	49
Introduction.....	49
Background.....	49
Methods.....	50
Research participants	50
Questionnaire design.....	51
Selecting Crisis Named Resources	52
Data analysis	53
Factors that influence the trustworthiness of CNRs	53
Correlation trends between the factors that influence the trustworthiness of CNRs	56
Participant demographics and trustworthiness perceptions of CNRs	58
Discussion	59
Conclusion	60

References	60
VI. CONCLUSION.....	62
Dissertation summary	62
Study 1	62
Study II.....	62
Study III	63
Implications for social media use in emergency response.....	64
Broader implications	66
Limitations and future work.....	67
REFERENCES.....	70
APPENDICE.....	72
Appendix A: Interview recruitment materials	73
Appendix B: Survey recruitment materials.....	75
Appendix C: Survey questionnaire	77
Appendix D: Crisis Named Resources’ screenshots.....	105
Appendix E: Data from interviews and surveys	116
Appendix F: Qualitative analysis.....	132
Appendix G: Quantitative analysis (using MS Excel)	135
Appendix H: Quantitative analysis (using R)	138
Appendix I: Copyrights.....	153
CURRICULUM VITA.....	156

LIST OF TABLES

Table		Page
1	Number of websites, Facebook (FB) pages, and Twitter accounts that belong to official information sources	10
2	Number of websites, Facebook pages, & Twitter accounts and the related pages, posts, & tweets analyzed.....	11
3	Event Based Resources and on-topic posts.....	12
4	Average number of on-topic posts by Event Based Resources on Facebook and Twitter	13
5	Average number of on-topic posts by local responders on Facebook and Twitter	13
6	Average number of on-topic posts by local news media on Facebook and Twitter	14
7	Average number of on-topic posts by cooperating agencies on Facebook and Twitter	14
8	Number of official web pages, Facebook (FB) posts, and tweets that reported the number of houses consumed by the Carlton Complex Wildfire	15
9	First reports of houses consumed by the wildfire	15
10	Number of evacuation level messages per city	16
11	Number of official web pages, Facebook posts, and tweets that contain evacuation level information.....	16
12	First reports of evacuation levels for the 15 cities affected by the Carlton Complex Wildfire	16
13	Total number of CNRs and posts on Facebook and Twitter.....	24
14	Number of CNRs created on Facebook and Twitter.....	25
15	Number of CNRs created during the wildfire.....	25
16	Number of CNRs deleted on Facebook and Twitter.....	25
17	Number of CNRs deleted by week during the wildfire.	26
18	Facebook CNRs that have posted since July 2016 (* page names and descriptions have been anonymized).	27
19	Number of on-topic posts by CNRs on Facebook and Twitter.....	28
20	Types of CNRs.....	29
21	Most popular CNR on Facebook and Twitter.....	30
22	Survey and interview research participants demographics	36
23	Selected CNRs	39
24	Factors that influence CNRs' trustworthiness	40
25	Research participants demographics	51
26	Survey questionnaire.....	52
27	2017 hurricane irma CNRs used in the survey (status as of Dec 20, 2017). ..	53
28	Participants' perceptions on trustworthiness of CNRs	54
29	Participants' perceptions and rationale on trustworthiness of CNRs.....	56

30	CNR 1 (Q1.1).....	116
31	CNR 1 (Q1.2).....	116
32	CNR 1 (Q1.3).....	116
33	CNR 1 (Q1.4).....	117
34	CNR 1 (Q1.5).....	117
35	CNR 1 (Q1.6).....	117
36	CNR 2 (Q2.1).....	117
37	CNR 2 (Q2.2).....	118
38	CNR 2 (Q2.3).....	118
39	CNR 2 (Q2.4).....	118
40	CNR 2 (Q2.5).....	119
41	CNR 2 (Q2.6).....	119
42	CNR 3 (Q3.1).....	119
43	CNR 3 (Q3.2).....	119
44	CNR 3 (Q3.3).....	120
45	CNR 3 (Q3.4).....	120
46	CNR 3 (Q3.5).....	120
47	CNR 3 (Q3.6).....	120
48	CNR 4 (Q4.1).....	121
49	CNR 4 (Q4.2).....	121
50	CNR 4 (Q4.3).....	121
51	CNR 4 (Q4.4).....	121
52	CNR 4 (Q4.5).....	122
53	CNR 4 (Q4.6).....	122
54	CNR 5 (Q5.1).....	122
55	CNR 5 (Q5.2).....	123
56	CNR 5 (Q5.3).....	123
57	CNR 5 (Q5.4).....	123
58	CNR 5 (Q5.5).....	123
59	CNR 5 (Q5.6).....	124
60	CNR 6 (Q6.1).....	124
61	CNR 6 (Q6.2).....	124
62	CNR 6 (Q6.3).....	124
63	CNR 6 (Q6.4).....	125
64	CNR 6 (Q6.5).....	125
65	CNR 6 (Q6.6).....	125
66	CNR 7 (Q7.1).....	125
67	CNR 7 (Q7.2).....	126
68	CNR 7 (Q7.3).....	126
69	CNR 7 (Q7.4).....	126
70	CNR 7 (Q7.5).....	126
71	CNR 7 (Q7.6).....	127
72	CNR 8 (Q8.1).....	127

73	CNR 8 (Q8.2).....	127
74	CNR 8 (Q8.3).....	127
75	CNR 8 (Q8.4).....	128
76	CNR 8 (Q8.5).....	128
77	CNR 8 (Q8.6).....	128
78	CNR 9 (Q9.1).....	128
79	CNR 9 (Q9.2).....	129
80	CNR 9 (Q9.3).....	129
81	CNR 9 (Q9.4).....	129
82	CNR 9 (Q9.5).....	129
83	CNR 9 (Q9.6).....	130
84	CNR 10 (Q10.1).....	130
85	CNR 10 (Q10.2).....	130
86	CNR 10 (Q10.3).....	130
87	CNR 10 (Q10.4).....	131
88	CNR 10 (Q10.5).....	131
89	CNR 10 (Q10.6).....	131

LIST OF FIGURES

Figure		Page
1	Carlton Complex Wildfire perimeter map for August 20, 2014 [46]	9
2	Number of on-topic messages during the Carlton Complex Wildfire (July 14, 2014 – August 24, 2014).....	11
3	First reports of the number of houses consumed by the Carlton Complex wildfire.....	14
4	Number of on-topic messages posted by CNRs over the data collection timeframe.	28
5	Correlations between trustworthiness of the 5 CNRs.....	54
6	Correlations between participants perceptions of CNR 1 owner's perceived ability, benevolence, integrity, and trustworthiness.	56
7	Correlations between participants perceptions of CNR 2-5 owner's perceived ability, benevolence, integrity, and trustworthiness.	58
8	Survey recruitment cards.	76
9	CNR 6 – screenshot #1.	105
10	CNR 6 – screenshot #2.	106
11	CNR 6 – screenshot #3.	106
12	CNR 6 – screenshot #4.	107
13	CNR 7 – screenshot #1.	107
14	CNR 7 – screenshot #2.	108
15	CNR 7 – screenshot #3.	108
16	CNR 7 – screenshot #4.	109
17	CNR 8 – screenshot #1.	109
18	CNR 8 – screenshot #2.	110
19	CNR 8 – screenshot #3.	110
20	CNR 8 – screenshot #4.	111
21	CNR 8 – screenshot #5.	111
22	CNR 9 – screenshot #1.	112
23	CNR 9 – screenshot #2.	112
24	CNR 9 – screenshot #3.	113
25	CNR 9 – screenshot #4.	114
26	CNR 9 – screenshot #5.	114
27	CNR 10 – screenshot #1.	115
28	Affinity diagram.....	133
29	SID 59's survey response codes.	134
30	IID 13's interview codes.....	134
31	Perceptions of CNRs by gender.....	135
32	Perceptions of CNRs by age.	135
33	Perceptions of CNRs by education level completed.....	136
34	Perceptions of CNRs by expertise.	136
35	Perceptions of CNRs by comfort levels when using Facebook.....	137

36 Perceptions of CNRs by comfort level using Twitter..... 137

CHAPTER I

INTRODUCTION

Social media are increasingly becoming popular communication platforms around crisis events. While they can be effective communication tools for managing and responding to crisis events [1], [2], at times, they also contribute to misinformation (commonly referred to as “fake news”) and false rumors [3], [4].

As members of the public often use social media to access and share crisis-related information, ask for and offer help, and show solidarity around crisis situations [5]–[8], it is critical that the information sources they find on social media are credible and the information is accurate. Unreliable and inaccurate information can have adverse consequences for the crisis-affected individuals [9]. Therefore, it is important to identify who contributes to online crisis information (Study I), what they contribute (Study II), and how people evaluate the trustworthiness of these contributions (Study III).

Research Design

This dissertation consists of the findings from three studies. The three studies were executed sequentially with the results of each study informing the next. Here, I outline the research context, research questions, methods, and results for the three studies.

STUDY 1

In this study, I identified online information sources that provided official information during the 2014 Carlton Complex Wildfire. I analyzed the communication

behaviors of these resources and assessed the relevance and timeliness of the information provided by them.

The research questions for this study were the following: (a) Who contributes official information online during a crisis event? (b) What are the communication behaviors of these official information sources? and (c) How do these official information sources compare in terms of the relevance and timeliness of the information they share?

Data collection for this study involved three steps: (1) identification of the official information sources that disseminated information during the 2014 Carlton Complex Wildfire, (2) determination of the websites, public Facebook pages, and Twitter accounts that belonged to each of these sources, and (3) collection of Facebook posts, tweets, and webpages by these sources during the wildfire timeframe.

To answer my research questions, I first coded all the webpages, Facebook posts, and tweets to determine if they were relevant to the wildfire. All the relevant posts were further coded to distinguish the posts that had information about the number of homes destroyed by the wildfire and/or the current wildfire evacuation level for the affected communities. This data was then plotted by time to determine what information source first reported each piece of information in the data set.

This work led to the discovery of four types of official information sources: Local Responders, Local News Media, Cooperating Agencies, and a set of pages and social media accounts that were named after the wildfire. The data show that the Local News Media provided the highest quantity of relevant information and the timeliest information. It was found that the social media resources named after the wildfire posted the highest percentage of relevant posts around the wildfire. Though they seemed official, it was often unclear

who created them and why. This finding laid the foundation for my second study, where I studied these resources in depth.

STUDY II

This study provides an examination of the social media accounts that are named after an event. I call these resources Crisis Named Resources (CNRs). In this study, I studied the crisis response role of the CNRs around the 2016 Fort McMurray Wildfire. The research questions for this study are as follows: (a) When are CNRs created, and deleted (if applicable)? (b) What happens to CNRs after the completion of an event? (c) Do CNRs post about the event they are named after? (d) What types of CNRs exist around an event? and (e) What types of CNRs receive the most public attention?

Data collection for this study involved two activities: (1) identification and monitoring of Fort McMurray Wildfire CNRs and (2) collection of messages posted by these CNRs.

To answer my research questions, I performed many data analyses. First, to understand the lifecycle of CNRs, I determined their creation and deletion dates, and analyzed their longevity after the completion of the event. Second, I read each message posted by the CNRs and marked it as related or unrelated to the crisis event. Third, to better understand the different types of CNRs created around a wildfire, I categorized each CNR by its account name, self-description and message content. Finally, I studied the accounts that received the highest number of Facebook likes or Twitter followers to determine the types of information they shared around the event.

Findings show that CNRs appear spontaneously around an event and are often deleted or left unused after the completion of an event. These resources shared a lot of relevant information and covered a range of topics from information dissemination to offers of help to expressions of solidarity. The most liked CNRs were the ones that provided platforms for people to ask for or provide help. Additionally, in most cases, the creators of these resources chose to stay anonymous. Despite having anonymous owners, these resources, at times, were followed by tens of thousands of people. This observation laid the foundation for my third and final study, where I determined the factors that influence the trustworthiness of CNRs.

STUDY III

This study focuses on the trustworthiness of the Facebook and Twitter CNRs created around the 2017 Hurricane Irma. The research questions for this study are as follows: (a) What factors do experts and members of the public consider while judging the trustworthiness of CNRs? (b) Do the factors used for judging the trustworthiness of resources differ by gender, age, education, expertise, and comfort level with Facebook or Twitter?

Data Collection for this study included 105 surveys and 17 interviews with members of the public and experts in Crisis Informatics, Communication Studies, and Emergency Management. During the interview and survey sessions, participants were asked to evaluate the trustworthiness of CNRs created around 2017 Hurricane Irma.

To determine the factors that influence the trustworthiness of CNRs, I analyzed the content of the interview transcriptions and open-ended survey responses. I also performed

statistical analyses on the closed-ended survey responses and determined correlations between the factors that influence the trustworthiness of CNRs.

Findings show that participants tended to trust CNRs that seem to share relevant, timely, and accurate information and are linked to authoritative sources over the ones that seem to share irrelevant content and seem unauthoritative. The factors that most influenced trustworthiness of CNRs included participants' perceptions of CNR content, information source, owner, and profile.

Dissertation Overview

The dissertation consists of six chapters, including this introductory chapter. Chapter 2 (Study I) identifies the information sources that provide official information online and provides an assessment of their timeliness and relevance in crisis communications. Chapter 3 (Study II) describes a study of the lifecycle, relevance, role, and popularity of CNRs around a crisis event. Chapter 4 (part of Study III) describes the qualitative analysis of interview and survey data and determines the factors that influence the trustworthiness of CNRs. Chapter 5 (part of Study III) reports the quantitative analysis of survey responses, and finds correlations between the factors that influence the trustworthiness of CNRs. Finally, Chapter 6 concludes the dissertation with broader implications and future work for this research.

Integration of Previously Published Work

This dissertation incorporates previously published research. Chapter 2 was published and presented at CHI 2017, the most prestigious conference venue for Human Computer Interaction research [10]. Chapter 3 was published and presented at the

Information Systems for Crisis Response and Management (ISCRAM) Conference 2018, a well-known venue for researchers of Crisis Informatics [11]. This paper was also nominated for the Best Student Paper Award. I plan to submit Chapter 4 to the 2020 Social Media & Society conference and Chapter 5 to the ISCRAM 2020 conference. I am the first author for these four publications.

CHAPTER II

PROVIDING ONLINE CRISIS INFORMATION: AN ANALYSIS OF OFFICIAL SOURCES DURING THE 2014 CARLTON COMPLEX WILDFIRE

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ABSTRACT

Using the 2014 Carlton Complex Wildfire as a case study, we examine who contributes official information online during a crisis event, and the timeliness and relevance of the information provided. We identify and describe the communication behaviors of four types of official information sources (Event Based Resources, Local Responders, Local News Media, and Cooperating Agencies), and collect message data from each source's website, public Facebook page, and/or Twitter account. The data show that the Local News Media provided the highest quantity of relevant information and the timeliest information. Event Based Resources shared the highest percentage of relevant information, however, it was often unclear who managed these resources and the credibility of the information. Based on these findings, we offer suggestions for how providers of official crisis information might better manage their online communications and ways that the public can find more timely and relevant online crisis information from official sources.

Author Keywords

Social computing; social media; crisis informatics; wildfire; risk communication.

ACM Classification Keywords

H.5.3 Groups & Organization Interfaces—collaborative computing, computer-supported cooperative work, organizational design

INTRODUCTION

Timely and accurate communication of official information is a vital component of managing any emergency or crisis event [17,19,29,44]. We define “official information” as that information whose source is perceived by the public as more authoritative and/or trustworthy. Effective official information can provide members of the public with lifesaving protective measures, facilitate relief and recovery efforts, and reduce anxiety and fears [32,38,49]. This information may be distributed by emergency response agencies (e.g., fire and police departments, emergency management organizations, non-profit disaster relief groups), public officials (e.g., city mayors, governors), public works organizations (e.g., transportation authorities, utility companies), or the broadcast news media [10].

A variety of traditional mechanisms exist for distributing official information during a crisis event, including broadcast media (television, radio, and newspaper), sirens, phone messages, face-to-face interactions, and community meetings [16]. In addition, online media (websites, blogs, email, and various forms of social media) have introduced communication mechanisms that support more timely and wide-spread interaction with the public [6,11,15,21]. However, as online communication

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options continue to proliferate, decisions around how to best communicate official information to the online public have become increasingly difficult. Decisions require knowledge about the capabilities and limitations of each online media type, the affected audience, and the circumstances of the crisis event. Providers of official information must also consider their ability to use and maintain each online communication channel. Similarly, it can be challenging for members of the public to know where to look for official online information and to understand what information can be trusted amidst a flood of socially-generated data [2].

To better understand and address these challenges, we examine how providers of official information used multiple online media during the 2014 Carlton Complex Wildfire. We identify and categorize the types of sources that provided official information in this context and describe their features and communication behaviors. We also examine the relevance and timeliness of the information these sources provide. We conclude with suggestions for how providers of official crisis information might better manage their online communications and ways that the public can find more timely and relevant online crisis information from official sources.

BACKGROUND

Online Media Use in Crisis

This research engages in a *crisis informatics* [8,23] line of inquiry that turns a critical eye to the complex socio-technical information environment that surrounds a crisis event. In this context, scholars have examined the role online media (and in particular social media) play around many crisis events, including both natural (e.g., 2004 Indian Ocean Tsunami [20], 2005 Hurricane Katrina [4,30], 2012 Hurricane Sandy [13,27], and 2013 Colorado floods [5]) and man-made (e.g., 2007 Virginia Tech shooting [23], 2010 Deepwater Horizon Oil Spill [41], and 2013 Boston Marathon Bombing [9,43]) disasters. Through online media, those affected by a crisis event converge online to seek and share information and assist in response efforts [12] regardless of location and more quickly than what was previously possible [22]. Official emergency responders and other providers of official information increasingly use online media to communicate and interact with the public that they serve and to gather information that can be

used in their efforts [6,11,13,15,42]. In turn, members of the public can find, generate, and distribute online crisis information as they seek to engage with others and understand how a crisis event affects them [21,25,28,36].

Official Information through Online Media

A growing body of research examines how providers of official information use online media to convey their messages [1,6,13,15,26,43]. Social media, in particular, have made emergency responders reconsider the traditional one-way communication model—where they only push information to the public—in favor of a more interactive two-way communication model [11,24]. Through online media, providers of official information can engage in communication with the public, which can help distribute information more quickly and directly [6]. Researchers hypothesize that this two-way communication may result in the exchange of higher quality information and reduced reliance on broadcast media to distribute official crisis communications [11]. Consequently, in this research, we seek to understand whether emergency responders provided better information (in terms of relevance, quantity, and timeliness) around the Carlton Complex Wildfire than broadcast media sources.

Providing timely official information online is important because people affected by a crisis will seek information elsewhere if they cannot find it from official sources [31]. In seeking information from non-official sources, people may act on information that is incomplete or inaccurate. In offering timely, accurate information, providers of official information can also play an important role in mitigating the spread of rumor during crisis events [1]. However, the adoption of tools like social media into emergency responder practice pose many socio-technical challenges such as issues of credibility and trust, lack of support from management, organizational conflicts, poor tools, and a shortage of resources and training [3,11,15,26,33,39].

Despite much empirical work, we still know little about how online media fit into official crisis communication strategies [11,13]. Further, prior research is limited in that it tends to focus on how a single emergency responder or type of responder uses online media (typically a single platform) to

communicate official information. In this paper, we seek to better understand the different types of official information providers and how they use multiple online platforms (i.e., websites, Facebook, and Twitter) to communicate crisis information. We also evaluate the relevance and timeliness of official online crisis information, to determine what online platforms and official sources provide the most relevant and timely information.

Event of Study – Carlton Complex Wildfire

On July 14, 2014, lightning in the Methow River Valley started four wildfires: the Cougar Flat, French Creek, Gold Hike, and Stokes fires. These fires later merged (by July 20) to form the Carlton Complex Wildfire.

The Carlton Complex Wildfire burned 256,108 acres to become the largest wildfire in the history of the US state of Washington [18,34], affecting the cities and communities of Okanogan and Chelan counties (see Figure 1). The wildfire caused several closures, evacuations and power outages in and around the cities of Pateros, Malott, Brewster, Carlton, Methow, Twisp and Winthrop. The wildfire consumed more than 322 homes as well as 149 other structures and cost at least \$60 million in damages [18]. On July 23, 2014, US President Barack Obama declared the Carlton Complex Wildfire a federal emergency disaster. The fire slowed due to rain on July 24, allowing 60% containment by July 26 [34]. Finally, the fire was 100% contained by August 24, 2014 [48].

METHOD

Identifying Official Information Sources

We began this research by investigating the Carlton Complex Wildfire and the circumstances surrounding the event. Primary sources included media coverage found through Google searches and InciWeb (an interagency all-risk incident web information management system that is run by the United States Forest Service). Through this investigation, we identified the geographic regions affected by the wildfire and many of the official information sources associated with the event (i.e., emergency responders and news media from the affected regions, cities, communities, and counties). Our purpose was to identify sources that those who were directly affected by the Wildfire would have turned to for official information. Names of many of the agencies who participated in the event response were obtained from the Carlton Complex

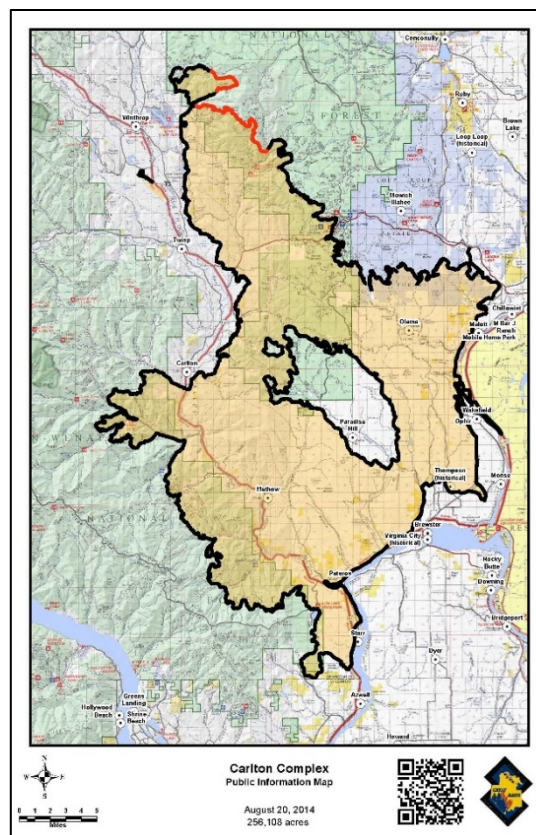


Figure 1. Carlton Complex Wildfire Perimeter Map for August 20, 2014 [46]

Wildfire's InciWeb page [47]. We also found information sources by searching on “Carlton Complex Wildfire” using the Google, Facebook, and Twitter search engines. Finally, we uncovered additional official sources as we analyzed information sent from our initial list of sources. Using iterative sorting and clustering, we divided these official sources into four categories based on their purpose: 1) Event Based Resources, 2) Local Responders, 3) Local News Media, and 4) Cooperating Agencies. In total, we identified 8 Event Based Resources, 25 Local Responders, 7 Local News Media, and 5 Cooperating Agencies.

Event Based Resources

Event based resources were named after the Carlton Complex Wildfire and were dedicated to reporting information about it. An example of this resource type is the public *Carlton Complex Wildfire* Facebook page, which describes itself as a provider of “official fire information.” These resources are of particular interest because while they appear to be sources of official information about the Wildfire, it was often unclear who actually

maintained and posted the information found there. Event Based Resources have been mentioned in prior research [37], but not beyond noting that they exist and provide information specific to the crisis event they are associated with.

Local Responders

Local responders are the agencies of the affected cities and communities who were most directly involved in the Carlton Complex Wildfire response. Examples of Local Responders include the police, fire and emergency medical services of the affected region, and the emergency management agencies of the affected counties.

Local News Media (LNM)

Local news media include the broadcast media agencies of all the affected cities, communities, and counties. The area did not have a local television station, but they did have several newspapers and radio stations that maintained an online presence. We did not include media sources outside the immediately affected region in our dataset, though the Wildfire did receive national attention; non-local media sources tend to repeat information already conveyed by the local media but with less detail and frequency [40].

Cooperating Agencies

Cooperating agencies are those agencies that assisted in the response to the Carlton Complex Wildfire, yet their assistance was usually on the periphery and not as central as Local Responders. This category includes non-profit service organizations (e.g., American Red Cross), federal agencies (e.g., Bureau of Indian Affairs, Bureau of Land Management, and Fish and Wildlife service), and state agencies (e.g., Washington State Department of Natural Resources, and Washington State Department of Transportation).

Data Collection

Next, we determined the websites, public Facebook pages, and Twitter accounts that belonged to each of the official information sources identified above—if they existed. We assumed that if a webpage or social media page or account could not be reasonably found via a basic web search (or a couple of basic web searches) using the Google, Facebook, and Twitter search engines, it was unlikely to have served as a useful source of official information around the event. Table 1 shows the

number of websites, Facebook pages, and Twitter accounts found for each official information source type.

We then collected all the Facebook posts and tweets of these official information sources using the Facebook Graph API and the Twitter Search API respectively. The relevant pages (those concerning the Carlton Complex Wildfire) from the identified websites were downloaded and stored as pdf documents for coding and analysis. The data collection timeframe was July 14 – Aug 24, 2014. We chose these dates because the Carlton Complex Wildfire began on July 14, 2014 and was reported 100% contained on August 24, 2014. Table 2 lists the number of websites, pages, or accounts found, and the number of pages, posts, or tweets collected for all three online media.

Official Sources	# Websites	# Facebook Pages	# Twitter Accounts	Total
Event Based Resources	1	5	2	8
Local Responders	20	15	7	42
Local News Media	4	7	7	18
Cooperating Agencies	5	4	5	14

Table 1: Number of Websites, Facebook (FB) Pages, and Twitter Accounts that belong to Official Information Sources

Online Media	# Websites, Pages or Accounts	# Pages, Posts or Tweets	# On-Topic Pages, Posts or Tweets
Websites	30	83	83
Facebook	31	2,232	1,576
Twitter	21	3,416	2,466

Table 2. Number of Websites, Facebook Pages, & Twitter Accounts and the Related Pages, Posts, & Tweets Analyzed

Data Analysis

We began data analysis by reading all the collected pages, posts, and tweets to determine which were about the Carlton Complex Wildfire. All coding schemes were iteratively developed between the two authors (both experienced coders). Each author labeled the posts separately, after which the results were compared. Any conflicts were collaboratively discussed until consensus could be reached. Messages relevant to this event, such as size of the wildfire, wildfire containment, wildfire progression, evacuation related information, weather and smoke conditions, donations, fundraisers, etc., were marked as on-topic. Messages that were irrelevant to this event, such as updates about other wildfires (that were burning at the same time as the Carlton Complex Wildfire but did not directly impact the same area), construction closures, and other local news, such as information about thefts, road accidents, etc., were marked as off-topic. Table 2 lists the total numbers of on-topic pages, posts, and tweets analyzed.

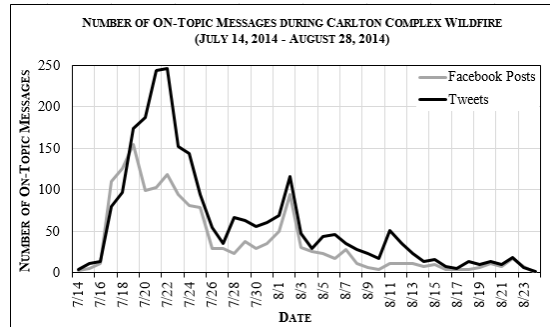


Figure 2: Number of On-Topic Messages during the Carlton Complex Wildfire (July 14, 2014 – August 24, 2014)

Figure 2 shows the number of on-topic Facebook posts, and tweets during each day of the collection timeframe. The significant increase in on-topic posts around July 22 related to the growing size of the wildfire, which resulted in mass evacuations and property damage. The spike on August 2 was caused by another fire—the Rising Eagle Road Fire—that started on August 1 [50]. Due to its proximity, this fire was later included in the Carlton Complex Wildfire [51].

To better trace when information was available and who was providing it across the online media in our datasets, we identified two important pieces of public information typically conveyed during a wildfire event: 1) the number of homes destroyed by the fire and 2) the current fire evacuation level for the affected communities. Information regarding the number of houses consumed by a wildfire indicates the effect of the fire on the community and the severity of the wildfire when compared to other (or previously experienced) fires. Information regarding evacuation levels can inform protective measures and save lives [45]. In addition to their importance, we used these two pieces of information because they were easier to track compared to other more variable types of information such as the location of evacuation centers, donation drop-off areas, roads/forest closures, etc. We read and coded every tweet, post, and webpage to determine if they contained information about the number of houses consumed by the wildfire and/or fire evacuation levels.

Next, we plotted this data by time for the reports of homes burned and evacuation levels (reported later in this paper). These plots allowed us to cluster the data around particular pieces of information within the larger information stream, such as a report of a level 3 evacuation or a report that 100 homes had burned. These clusters were then used to determine what information source first reported each piece of information in our data set. Finally, we also determined who posted the most relevant (on-topic) information as well as the highest percentage of relevant information.

FINDINGS

We report our findings in two sections. The first section describes the characteristics and information sharing behaviors of the four types of official information sources identified in this study. The second section traces official reports of the number of houses burned and evacuation levels during the Carlton Complex Wildfire.

Official Information Sources

Event Based Resources

Event Based Resources refer to online media that were specifically dedicated to the Carlton Complex Wildfire. The name of each of these resources typically made them easier to find and helped people know that they offered information about the

Carlton Complex Wildfire. Some resources were named directly after the Wildfire (e.g., @CarltonComplex), while some were named after the Wildfire’s location (e.g., *Methow Valley Fire Information*). Other resources had names that described their purpose. For example, the *Carlton Complex, WA Wildfire Lost and Found Pets-NDARRT* Facebook page was dedicated to helping pets displaced by the Wildfire. In another case, we discovered that the administrator of the @CarltonComplex Twitter account had stopped updates once the fire had subsided and started channeling communications through the @upperfallsfire Twitter account:

@CarltonComplex via Twitter (08/11/2014 04:23pm): In an effort to consolidate fire information sources, @CarltonComplex will no longer be updated. Follow @upperfallsfire for updates.

The Upper Falls Fire was another prominent fire in the area at the time. Because of the message above, we suspected that the @upperfallsfire Twitter account might also be a source for information about the Carlton Complex Wildfire. Indeed, we found that 37.8% (see Table 3) of the messages posted by @upperfallsfire were relevant to the Carlton Complex Wildfire, and so we included it in our dataset as an Event Based Resource.

Name	First Post	Last Post	# On-Topic
Website			
Carlton Complex Assistance Network	07/27/14	03/26/15	4
Facebook Pages			
Carlton Complex Wildfire	07/17/14	08/11/14	172 (89.1 %)
Carlton Complex (Camp)	07/20/14	09/16/15	2 (100 %)
Carlton Complex Fire Relief & Assistance Network	07/23/14	10/15/16	47 (52.2 %)

Name	First Post	Last Post	# On-Topic
Website			
Carlton Complex Assistance Network	07/27/14	03/26/15	4
Facebook Pages			
Methow Valley Fire Information	07/17/14	08/25/16	88 (97.8 %)
Carlton Complex, WA Wildfire Lost and Found Pets-NDARRT	07/18/14	10/14/16	96 (88.1 %)
Twitter Accounts			
@CarltonComplex	07/19/14	08/11/14	406 (95.3 %)
@upperfallsfire	08/06/14	08/23/14	17 (37.8 %)

Table 3: Event Based Resources and On-Topic Posts

Most (5 of 8) of the Event Based Resources did not provide information about who or what organization managed these websites and social media accounts. Thus, it was not always clear whether the information provided was accurate or who was accountable for the information. One resource (the @CarltonComplex Twitter account) was described as a source of “official information” but no further evidence was offered around who was running the account. In another case, we discovered that the US Forest Service managed one of the Event Based Resources (the *Carlton Complex Wildfire* Facebook page). However, this information was only discovered indirectly through a Facebook post by a Local News Media agency. Because these Event Based Resources were so tied to the Carlton Complex Wildfire (unlike the other resources in our dataset), we tracked how long these resources remained active following the event (see Table 3). We defined event based resources as ‘active’ if they had some kind of recent activity on their pages or accounts within the past year (2016). This is interesting because event based resources, in most cases, were created to provide information about a particular event. If they remain active today

(after 2+ years), it is evident that their purpose has changed over time. Findings show that some (3 of 8) resources became inactive within two months after 100% containment of Wildfire. A few (2 of 8) resources were still active up to a year following the event, while the last three resources remain active today (having most recently posted in August and October 2016). These three active Event Based Resources have since broadened their scope of concern beyond the Carlton Complex Wildfire to include wildfire events at the county and/or state level.

Online Media Type	# On-Topic Messages
Facebook	405 (83.7%)
Twitter	423 (89.8%)

Table 4: Average Number of On-Topic Posts by Event Based Resources on Facebook and Twitter

Event Based Resources averaged the most on-topic Facebook (83.7%) and Twitter (89.8%) posts of any official information type. Even though none of these Event Based Resources existed prior to the Wildfire, they attracted much interest in a short amount of time. The most popular Facebook Page—*Carlton Complex Wildfire*—collected over 10,500 likes. The *Carlton Complex Wildfire* Facebook Page (172 on-topic posts) and @*CarltonComplex* Twitter account (406 on-topic tweets) were the most active Event Based Resources.

Local Responders

The dataset of Local Responders includes the official websites, Facebook pages, and Twitter accounts of the public officials, fire and police departments, and emergency management agencies of the affected area.

Different Local Responders have different jurisdictions. For example, a county agency has responsibilities around the entire county, whereas a city agency is responsible only for city activities. This difference is reflected in the online messages of these agencies:

Okanogan County Sheriff Office via Facebook (07/19/2014 10:11am): Currently the information available to us is that there have been NO STATUS CHANGES. Omak is still at Level 0 Okanogan is at Level 1 and Malott is at Level 3.

Winthrop Washington via Facebook (07/21/2014 12:37pm): The latest update is that Winthrop expects to have power restored by the weekend!

In the first post, the Okanogan County Sheriff Office offers information about three different cities that fall within their county. In the second post, Winthrop city officials provide information for the city of Winthrop only.

More than half of the online messages (72% Facebook posts and 56% tweets) posted by the Local Responders were wildfire-related (see Table 5). The *Okanogan County Sheriff Office* Facebook Page (189 on-topic posts) and *Chelan County Emergency Management* Twitter account (700 on-topic tweets) were the most active.

Online Media Type	# On-Topic Messages
Facebook	224 (72.0%)
Twitter	757 (56.0%)

Table 5: Average Number of On-Topic Posts by Local Responders on Facebook and Twitter

Local News Media

Our Local News Media dataset consists of the official websites, Facebook pages, and Twitter accounts of the online local news media (e.g., Okanogan Valley Gazette-Tribune, Quad City Herald, and Methow Valley News) and the online local radio stations (e.g., Okanogan County Amateur Radio Club W7ORC and KTRT 97.5 The Root). The Local News Media have a broader scope of concern compared to the Local Responders who were primarily dedicated to a specific aspect of the response effort. Thus, their websites, Facebook pages, and Twitter accounts posted a wide variety of information around the wildfires, including messages about the number of houses burned by wildfire, fire evacuation levels, local events, business closures, power outages/restoration, and road closures.

The Local News Media averaged the second highest number of on-topic messages, following the Event Based Resources. Table 6 shows that 79.5% Facebook posts and 80.3% tweets by Local News Media were on-topic. The *Methow Valley News* Facebook Page (479 On-Topic posts) and the

@MethowNews Twitter account (442 On-Topic tweets) were the most active Local News Media.

Online Media Type	# On-Topic Messages
Facebook	910 (79.5%)
Twitter	937 (80.3%)

Table 6: Average Number of On-Topic Posts by Local News Media on Facebook and Twitter

Cooperating Agencies

Our dataset of Cooperating Agencies comprises the websites, Facebook pages, and Twitter accounts of service organizations, and federal and state agencies that supported the Wildfire response. Every agency in this category had a narrowly defined role and set of responsibilities with regard to the Carlton Complex Wildfire. For example, the Washington Department of Fish and Wildlife (WDFW) mostly posted about the effects of wildfire on natural habitats, whereas the Washington State Department of Transportation (WSDOT) posted about the effects of wildfire on transportation (e.g., road closures and detours).

Cooperating Agencies averaged the least on-topic Facebook (12.6%) and Twitter (38.9%) posts of any official information type (see Table 7). This low level of relevant content was likely because these agencies were less involved in the Carlton Complex Wildfire response efforts. The *Washington State Department of Natural Resources* Facebook page (32 on-topic posts) and @waDNR_fire Twitter account (221 on-topic tweets) were the most active Cooperating Agencies.

Online Media Type	# On-Topic Messages
Facebook	37 (12.6%)
Twitter	349 (38.9%)

Table 7: Average Number of On-Topic Posts by Cooperating Agencies on Facebook and Twitter

Relevance of Official Information Sources

Event Based Resources averaged the highest percentage of on-topic messages within their own message streams, followed by the Local News Media, Local Responders, and finally, Cooperating Agencies. This order reflects the role that each of these official information sources played in the response. The purpose of the Event Based

Resources was to report information around the Wildfire. The Local News Media were heavily involved in distributing important crisis information to the public. Local Responders were responsible for much of the local response effort, but their reporting of the event was less significant, and once the Wildfire lessened in severity, many responders moved on to reporting other, unrelated types of information. Cooperating Agencies had the least relevant information, which is not surprising considering they were more peripherally involved with the Wildfire response efforts.

Analysis of Online Media Content

Houses Consumed by Wildfire

First, we analyzed the number of houses consumed by the Carlton Complex Wildfire. This information can help city and government officials to estimate the damage caused by a fire. It is also useful for determining if a disaster qualifies for a federal emergency declaration and federal aid [7]. This information can also help affected citizens understand the severity of the fire, which in turn might affect their decision to take protective action or to evacuate.

We plotted the collected data (see Figure 3) to determine 1) how the information regarding houses consumed by wildfire was conveyed over time, and 2) the first reporters of the information. The graph depicts how the Wildfire temporally progressed, showing how reports of the number of houses burned changed from only a few houses on July 17 to around 300 houses on July 25—a span of only 8 days.

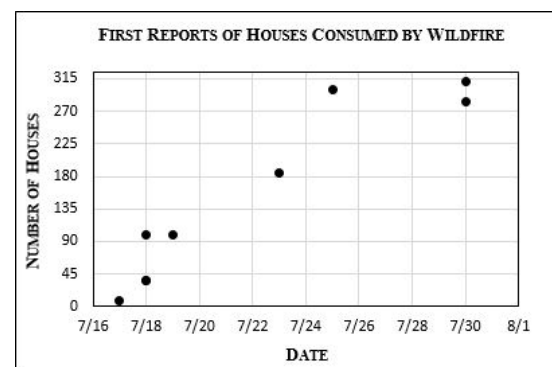


Figure 3. First Reports of the Number of Houses Consumed by the Carlton Complex Wildfire

Information around the number of houses burned was sometimes difficult to graph. In a few

instances, agencies did not report the exact number of houses burned, but rather gave a range (e.g., 80-100 homes burned) or they described it using non-specific, approximate language (e.g., several homes burned). Such data is not represented in Figure 3.

Official Sources	# Web Pages	# FB Posts	# Tweets	Total
Event Based Resources	0	29	7	36
Local Responders	0	3	25	28
Local News Media	13	76	54	143
Cooperating Agencies	2	1	3	6

Table 8. Number of Official Web Pages, Facebook (FB) Posts, and Tweets that Reported the Number of Houses Consumed by the Carlton Complex Wildfire

Official Sources	# Web Posts	# FB Posts	# Tweets	Total
Event Based Resources	0	0	0	0
Local Responders	0	1	1	2
Local News Media	2	2	4	8
Cooperating Agencies	2	0	0	2

Table 9. First Reports of Houses Consumed by the Wildfire

Local News Media (143 posts) were the most active reporters for houses consumed by the wildfire (see Table 8). Most first reports of the number of houses consumed by fire came from the Local News Media (66.7%), and in most cases, the Local News Media reported this information via Twitter (see Table 9). This finding suggests that the official Twitter accounts of Local News Media sent information earlier than the other information resources in our dataset. However, care should be taken when applying this finding because the sample rate is low (N=12).

Fire Evacuation Levels

Next, we analyzed reports of fire evacuation levels during the Carlton Complex Wildfire. The

evacuation level for a community is a critical (possibly lifesaving) piece of information. Here we analyze the messages regarding evacuation levels, the way these levels changed during the fire, and when they were reported to the public through the online media examined in this study. The evacuation levels for this wildfire ranged in severity from 0 to 3. Level 0 indicates no evacuations, while level 3 indicates immediate emergency evacuations.

To simplify our analysis, we considered fire evacuation level messages only for cities. We did not consider levels given for forests and roads because they were difficult to map to a particular geographic location for comparison. No fire evacuation levels were issued at the county level.

We grouped our data based on geographic regions, creating a different group of data for each city affected by the Carlton Complex Wildfire. Table 10 shows the number of evacuation level messages for each of the 15 cities found in the data. The more severely a city was affected by the wildfire, the more evacuation level messages were issued.

Fire evacuation levels were always reported with respect to a specific geographic region. Unlike reports of the number of homes burned, evacuation level reports were always expressed in integer values (in the range 0-4), and were never reported in a range or in a descriptive way:

@CarltonComplex via Twitter (07/21/2014 03:48pm): #CarltonComplex Urgent Update: Pleasant Valley area now under LEVEL 3 IMMEDIATE EVACUATION. Highway 20 closed between Twisp & Okanogan

The Local News Media were the most active reporters of fire evacuation levels (see Table 11).

City	Number of Evacuation Level Messages
Winthrop	48
Carlton	38
Twisp	38
Pateros	33
Pleasant Valley	32

City	Number of Evacuation Level Messages
Brewster	23
Chiliwist	16
Omak	12
Okanogan City	11
Chelan	6
Malott	6
Manson	6
Tonasket	3
Union Valley	1

Table 10. Number of Evacuation Level Messages per City

Next, we mapped the data for each cities and identified the first reporters of each change in evacuation level. The Local News Media were the first to report 57.3% of the fire evacuation levels (see Table 12). The Local News Media reported most of this information (all but 3 messages) equally across Facebook and Twitter. Upon further investigation, we discovered that some of the Local News Media had linked their Facebook and Twitter accounts and many identical messages were pushed out over the two platforms at the same time. In this case, the official Twitter accounts and Facebook pages of Local News Media sent information earlier than the Local News Media's websites.

Official Sources	# Web Pages	# FB Posts	# Twe ets	Total
Event Based Resources	0	101	100	201
Local Responders	0	52	98	150
Local News Media	47	204	202	453

Official Sources	# Web Pages	# FB Posts	# Twe ets	Total
Cooperating Agencies	15	2	16	33

Table 11. Number of Official Web Pages, Facebook Posts, and Tweets that Contain Evacuation Level Information

Relevance of Provided Information

Using the data collected around the number of houses consumed by fire and the evacuation levels, the Local News Media provided the most relevant information in terms of quantity, followed by Event Based Resources, Local Responders, and lastly, Cooperating Agencies. Local News Media sources provided more than double the number of messages that the Event Based Resources provided. This finding demonstrates how much more involved the Local News Media were in sharing information, and as a result they may be a richer source of crisis information for the affected public.

Official Sources	# Web Pages	# FB Posts	# Twe ets	Total
Event Based Resources	0	7	4	11
Local Responders	0	9	1	10
Local News Media	3	18	18	39
Cooperatin g Agencies	8	0	0	8

Table 12. First Reports of Evacuation Levels for the 15 Cities Affected by the Carlton Complex Wildfire

DISCUSSION

In this paper, we identified four types of official information sources and analyzed the timeliness and relevance of the information these sources provided during the 2014 Carlton Complex Wildfire. This categorization better articulates the roles, interests, and responsibilities of different official information sources and helps explain what type of information emergency responders,

members of the public, and researchers might expect from these sources. We now discuss broader implication of this research and offer recommendations for how to improve the effectiveness of official online crisis communications.

Timeliness of Official Information Sources

For both the number of houses consumed by fire and the evacuation levels, the Local News Media had the most first reports of this information. Earlier, we hypothesized that local responders would provide the most timely information because they now have more ability through online media to share information directly with the public through social media [11]. The data, however, disproves this hypothesis because it demonstrates that the Local News Media are still heavily relied upon to distribute timely information to the public in an online setting (at least for the Carlton Complex Wildfire).

Event Based Resources

We included Event Based Resources as sources of official information because we found that in many cases these resources either claimed to be a source of official information or they were managed by an official emergency response agency. In other cases, where “official” status was not so clear, the name of the online account tied it to the Carlton Complex Wildfire. So, at least in name, the account appeared to be official. Recent research has shown that official accounts can shape social media conversation and mitigate misinformation and false rumor around a crisis event [1]. Thus, understanding who manages these Event Based accounts, their purpose in creating these accounts, and the current intentions of account owners is important and would reveal much about the lifecycle of these accounts and their usefulness for crisis information seekers. To this end, we plan to study Event Based Resources more deeply in future crisis events.

Three of the Event Based Resources in this study continue to remain active long after the Wildfire for which they were originally created. These resources clearly filled an outstanding need in the community and continue to do so. Thus, Event Based Resources can serve another purpose in bringing community needs and challenges around a crisis event to the attention of a broader audience. As such, these

resources may be a good place for emergency responders, humanitarian organizations, and volunteers to look for unmet crisis needs that they can help address. From a Human Computer Interaction (HCI) perspective, we might consider how we can better support the shifting purpose and role of a social media group or community over time. For instance, how can we design a platform that makes the history of an online community more transparent?

Toward More Effective Official Online Crisis Information

We suggest several ways that providers of official information can improve their communication efforts. First, information providers should clearly identify themselves and their purpose when using online media. Doing so lends credibility to the information source and gives the affected public someone to hold accountable for the quality of information [10]. Many of the Event Based Resources were managed by reputable emergency response agencies, but they never clearly identified themselves. Similarly, we could not identify the source for several Event Based Resources that made claims that they were official sources of information, whether through the name of the resource or through its description. We recommend that official emergency responders monitor these accounts to ensure that the information they provide is accurate, especially if the public sees them as a source of official information. Monitoring these accounts will allow emergency responders to adjust their own communications to correct misinformation or respond to requests for information. Responders may even point the public to these sources if the information they provide is credible and meets a particular need that cannot be met by the official response (e.g., helping reunite pets with their owners).

We also offer insight into how members of the public might choose information sources from the many available options to obtain better official information during a crisis event. Based on our findings, the Local News Media provided the timeliest information and the highest number of relevant messages around the event, which suggests that the Local News Media were the best source of general information about the Wildfire. While the Event Based Resources provided the highest percentage of relevant information, it was not always clear how trustworthy the information was. If members of the public are looking for a specific

type of information (i.e., road closures), the best source of information is likely to be an official source more directly affiliated with that information (i.e., a transportation authority). Lastly, most social media platforms are open and anyone can create an account/page around a particular event or topic. One solution for helping the public understand which Event Based Resources are more authoritative is to verify the resource's account. On some social media platforms, accounts can be verified so that people know that the account is run by the entity that claims to own the account. However, this verification process can take considerable time to complete. The problem is that Event Based Resources are created in response to a specific event (usually unforeseen), which leaves no time to complete such a verification process before the account would need to be used. Streamlining the verification process, or perhaps allowing a new account to be directly linked to a previously verified account may be a possible technical solution to this problem.

Broader Implications

Though this research only looks at data from the Carlton Complex Wildfire, findings can also inform future research of crisis information more broadly. Specifically, this research unpacks who is providing official information during a crisis and identifies the different types of information each provides. This analysis lays the foundation for richer and more nuanced study of official crisis information sources, beyond assuming they all share similar motivations, behaviors, challenges, and scopes of concern—a simplifying assumption that much research in the domain makes. Better understanding of the types of official information available around a crisis and their features can also inform machine learning algorithms and text classifiers that seek to extract important crisis information from social media streams [14]. For example, a tool that automatically detects new Event Based Resources around an emerging crisis event could benefit both emergency responders and members of the public as they try to quickly assess the impact of the event.

Beyond the crisis context, this research also applies to other HCI domains where it is important to understand what online information is available and what online sources are credible. For example, the design considerations shared above around how to provide a more robust verification process for social

media accounts and how to support the shifting purpose and role of a social media group over time are broadly applicable to more general use of any social media platform. As another example, social media accounts are created and used every day around different types of non-crisis events (e.g., political rallies, sporting events, celebrations, etc.), and Event Based Resources regularly appear during these events (i.e., a Twitter account created to report on a particular political election). Study of the characteristics and content of these event specific social media accounts (as was done in this study) can help researchers and the public better understand how to interpret and filter the information these accounts provide.

Limitations & Future Work

Our focus on online media limits what can be said about all the official information available to those affected by the Carlton Complex Wildfire. Further, we used trace online data in our analyses, which does not allow us to account for the intentions of those who provided the information. Future work could take a more comprehensive approach to mapping the public information space around a crisis event by including additional sources of official information such as briefings and public meetings, TV news media content, and physical information booths and boards. This information could be supplemented with interviews of official information providers. Together these data would allow researchers to create a more complete picture of how official information is created and shared around a crisis event and across both online and offline media platforms. Next, when designing this research, we considered conducting interviews with the public affected by this Wildfire to understand how the public used and perceived online official information, but too much time had passed. The challenge of collecting ephemeral data is a well-known problem in the disaster research domain [35]. Thus, our ongoing research will seek to develop interview protocols for obtaining timely feedback from populations affected by disaster events. Finally, we may also look at the information dissemination patterns for other types of events (such as terrorist attacks, hurricanes, etc.) in the future to see if findings from this research apply in different contexts.

CONCLUSION

By analyzing the online media posts of official information providers during the Carlton Complex Wildfire, we offer new empirical insight into who provides this information, how the information is provided, and the timeliness and relevance of the information. In particular, we note that the Local News Media continue to play a primary role in distributing official crisis information online despite new possibilities for emergency responders to share information directly with the public through social media. As online communications continue to proliferate, it becomes increasingly difficult for the public to sort through the deluge of available data to find credible crisis information that is relevant and helpful. This research is an important first step toward understanding what types of official online information is provided and how members of the public might find it.

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CHAPTER III

SOCIAL MEDIA RESOURCES NAMED AFTER A CRISIS EVENT

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ABSTRACT

Crisis Named Resources (CNRs) are the social media accounts and pages named after a crisis event. CNRs typically appear spontaneously after an event as places for information exchange. They are easy to find when searching for information about the event. Yet in most cases, it is unclear who manages these resources. Thus, it is important to understand what kinds of information they provide and what role they play in crisis response. This paper describes a study of Facebook and Twitter CNRs around the 2016 Fort McMurray wildfire. We report on CNR lifecycles, and their relevance to the event. Based on the information provided by these resources, we categorize them into 8 categories: donations, fundraisers, prayers, reactions, reports, needs and offers, stories, and unrelated. We also report on the most popular CNR on both Facebook and Twitter. We conclude by discussing the role of CNRs and the need for future investigation.

Keywords

Crisis Informatics, Crisis Named Resources, Social Media.

INTRODUCTION

Individuals and organizations (such as crisis responders, governments, news media, companies, etc.) use social media during crisis events to share event updates, facilitate communication, offer help, express opinions, and show support and solidarity (Palen and Hughes 2018; Palen and Liu 2007; Sutton et al. 2008). Social media allow anyone with an Internet connection to participate in the exchange of information around a crisis event. In this paper, we draw attention to a phenomenon that occurs after most larger crisis events where people spontaneously create social media accounts and pages that are named after the event. We call these social media products Crisis Named Resources (CNRs).

CNRs are important to study for several reasons. First, CNRs appear to be dedicated venues for information exchange around an event, and they easily appear when searching for information about an event. Due to this visibility, these resources tend to attract more attention than other sources of information. Second, CNRs could be mistaken by the public as official sources of information, which could be harmful if these sources then shared false or inaccurate information (Lindsay 2011). Third, CNRs are typically created soon after a crisis occurs which leaves little to no opportunity for assessing the identity or intentions of a CNR's administrator(s) based on past activity. Lastly, most CNRs disseminate information about an event (though some do not), so it is critical to understand what kinds of information they provide and what role they play in a response.

To learn more about these resources, we analyzed the online activities of Facebook and Twitter CNRs created during the 2016 Fort McMurray wildfire. We report on the lifecycle (creation and deletion) of these resources, and how they were used for sharing information around the wildfire. We categorize these resources based on their social media profiles and posted content to understand the different roles these resources played in the crisis response. We also investigate the CNRs with the most number of Facebook likes and Twitter followers to discover why so many people followed them. The focus of this study is to determine the type of information disseminated by these CNRs, understand the role of CNRs in crisis response efforts, and lay a foundation for future analysis.

BACKGROUND

This research lies in the domain of *crisis informatics* (Palen et al. 2007; Palen and Anderson 2016) and is grounded in sociotechnical theory. This perspective advocates that technology and social systems are not only intertwined, but they also dynamically and recursively shape and influence one another (Orlikowski 1992). We see evidence of this influence in the research literature that describes how social media can empower communities to participate in crisis response (Ling et al. 2015). Members of the public often use social media to provide response and rescue relevant data, relief assistance, and emotive and evaluative support around crisis events (Palen and Liu 2007; Liu et al. 2008). People also use social media to collaborate during disasters. For instance, in the aftermath of 2007 Virginia Tech Shootings, people worked together online to discover the names of those who had died in the shootings (Vieweg et al. 2008). A similar kind of self-organizing behavior of members of the public was also observed during the response and recovery phase of the 2010 Haiti Earthquake (Starbird and Palen 2011). These emergent uses of social media during crisis events have in turn, shaped social norms around social media use as well as the technical affordances of the different social media platforms.

Though social media have proved useful around crisis events, they have also contributed to the spread of false rumors (intentionally or unintentionally) during crises (Huang et al. 2015). These false rumors can lead people to make potentially life threatening decisions (Starbird et al. 2016). Therefore, it is important to investigate who is using social media during a crisis event and how.

To better understand the sociotechnical role of social media in crisis response, researchers in *crisis informatics* have sought to identify the kinds of users who post and/or share crisis related information. Crisis informatics researchers have also tried to determine the types of information that these users share, and their intentions in doing so. For example, Olteanu and colleagues (2015) studied Twitter communications around 26 natural and human-induced crises, and found that the provided information were mainly about the affected individuals, infrastructure and utilities, donations and volunteering, caution and advice, and sympathy and emotional support. They also reported that the sources of information, comprised eyewitnesses, government, non-governmental organizations, businesses, traditional or Internet media, and outsiders (individuals who are not personally involved or affected by the event). Similarly, Purohit and Chan (2017) studied the online communications around Hurricane Matthew and Louisiana floods, and classified users into three categories (organization, organization-affiliated, and non-affiliated). They also reported how users in each of these categories have unique ways of disseminating information, for example, the organization users are less likely to retweet in contrast to non-affiliated users who are the most likely to retweet. In this research, we take a similar approach as we seek to determine the types of CNRs that were created around the 2016 Fort McMurray wildfires and their purpose.

Prior *crisis informatics* research has also observed the existence of dedicated sources that are created in response to a crisis event. For instance, Shklovski and colleagues (2008) discovered that a community-based volunteer website was a useful information source during the 2007 Southern California Wildfires. Created by a member of a rural community that had been evacuated due to the wildfire, the website played an important role in reconnecting community members and facilitating information exchange about the wildfire status and humanitarian relief efforts in the area. More recently, we examined the online communications of official sources during the 2014 Carlton Complex wildfire (Chauhan and Hughes 2017), and found that many Facebook pages, Twitter accounts, and websites (or CNRs) were created in response to and were named after the wildfire. These resources played an active role in disseminating information around the event. However, in most cases, it was difficult to determine who administered these online resources, which also made it difficult to assess their credibility. In this study, we expand upon the Carlton Complex wildfire research with a deeper examination of CNRs. Our goal is to identify the types of CNRs that appear around an event and to learn more about the different roles they play in crisis response.

EVENT OF STUDY – THE 2016 FORT MCMURRAY WILDFIRE

A wildfire in the southwest of Fort McMurray, Alberta, Canada started on May 1, 2016. On May 3, the wildfire entered the city of Fort McMurray and forced a mass evacuation of 80,000 residents—the largest

wildfire evacuation in Alberta's history (Fritz 2016). The wildfire burned nearly 600,000 hectares and destroyed over 2,400 structures (CBC News 2016). Evacuees experienced an extended period away from their homes and were only allowed to re-enter their city under a voluntary phased reentry program from June 1- June 15 (Ramsay 2016a). On June 13, 2016, the wildfire was classified as 'being held' (Giovannetti 2016) and the wildfire was finally considered 'under control' on July 5, 2016 (Ramsay 2016b).

DATA COLLECTION

Our data collection involved two activities. First, throughout the Fort McMurray Wildfire, we periodically looked for new CNRs while continuing to monitor the CNRs we had previously found. Second, we collected all Facebook posts and tweets from the CNRs we identified during the wildfire timeframe. We discuss these activities in more detail below.

Identification and Monitoring of Crisis Named Resources

We recorded the creation and deletion dates of CNRs on both Facebook and Twitter once a day during the data collection time period (May 1 – July 5, 2016). Using Facebook and Twitter search engines we determined the Facebook pages and Twitter accounts, whose name had any of the following keywords- 'Horse River Fire', 'YMM Fire', 'Fort McMurray Fire', 'Fort McMurray Wildfire', 'Fort mc fire', and 'Fort Mac Fire.' This was done daily to ensure that we did not miss the CNRs that were created over the course of the event. The account creation date for all Twitter accounts was retrieved from their respective account profiles. For Facebook, we considered the date of their first post to be their account creation date since most of the pages did not have information about when they were created. We also recorded the number of CNR Facebook page likes and Twitter followers on the last day of the data collection timeframe.

We revisited all the identified Facebook and Twitter CNRs daily to see if they continued to exist. For the CNRs that were deleted, we recorded the date when we found this information.

Messages posted by Crisis Named Resources

All Facebook posts and tweets by Fort McMurray CNRs during the timeframe May 1- July 5, 2016 (the entire duration of wildfire) were collected using the Facebook Graph API and Twitter Search API respectively. Table 13 gives the number of CNRs and the number of messages posted by these resources on Facebook and Twitter.

	# of CNRs	Total # of Posts (May 1 – July 5, 2016)
Facebook	70	2657 messages
Twitter	13	5011 tweets

Table 13. Total Number of CNRs and Posts on Facebook and Twitter.

DATA ANALYSIS AND FINDINGS

We report the findings of our study in four subsections: (1) life of CNRs, (2) relevance of CNRs, (3) types of CNRs, and (4) popular CNRs. The first subsection reports the time at which the CNRs were created and deleted (if applicable). The second subsection determines if the messages posted by these CNRs were about the Fort McMurray wildfire. The third subsection examines different types of CNRs and the fourth subsection investigates the most popular Fort McMurray CNR on both Facebook and Twitter.

Life of Crisis Named Resources

To understand the lifecycle of CNRs, we determined their creation and deletion dates, and analyzed their longevity after the completion of the event.

Creation of Crisis Named Resources

A CNR's creation date is an indicator of whether a new resource was created or if an existing resource was adapted in response to a crisis event. For an event of prolonged duration, such as the Fort McMurray wildfire, a CNR's creation date might also correlate with a significant subevent within the event (e.g., an evacuation).

Table 14 gives the number of CNRs created on Facebook and Twitter before, during, and after the wildfire. Our findings show that most Facebook (98.5%) and Twitter CNRs (92.3%) were created during the wildfire. There were, however, 2 resources (1 Facebook and 1 Twitter) created before the wildfire.

Date of CNR Creation	Facebook	Twitter
before May 1, 2016 (before wildfire)	1 out of 70 (1.4%)	1 out of 13 (7.6%)
between May 1 - July 5, 2016 (during wildfire)	69 out of 70 (98.5%)	12 out of 13 (92.3%)

Table 14. Number of CNRs Created on Facebook and Twitter.

First, we look at the two CNRs created before the wildfire. The first CNR is a Facebook page that was created in April 2012 (4 years before the wildfire). According to the page description, it was created to increase safety on Highway 63. The administrators of this page posted 4 messages during the Fort McMurray wildfire, all of which were relevant to the wildfire. The second CNR created before the wildfire is a Twitter account that was created in May 2014 (2 years before the wildfire). This CNR is owned by a woman who described herself as a proud mom of a UCLA bound student, an Ivy League grad, and an editor. During the fire, she changed her username to ‘Support #ymmfire,’ which is why the account was considered a CNR in our dataset. Later (on May 26, 2016) she changed her username back to her given name. She posted 27 messages during the data collection timeframe, none of which were relevant to the wildfire. From the data we collected, it is impossible to know why she changed the name of her account. We speculate that it could have been a way to show support for the wildfire affected population. We would have to interview the account owner to know for certain, which was not possible in this case.

Next, we look at the CNRs created during the wildfire. To find possible correlations between the CNR creation dates and the event progression, we determined the number of CNRs that were created each week of the wildfire (see Table 15). Findings show that most of the CNRs on Facebook (68.5%) and Twitter (53.8%) were created during the first week (May 1 – May 7) of the wildfire—the week that saw rapid wildfire growth and forced massive evacuations. Therefore, it appears that the creation of most of the CNRs in the first week of the wildfire reflects the chaos caused by the wildfire during that timeframe.

	May 1 - 7	May 8 - 14	May 15 - 21	May 22 - 28	May 29 - Jun 4	Jun 5 - 11	Jun 12 - 18	Jun 19 - 25	Jun 26 - Jul 2	Jul 3 - 5
Facebook	48	8	7	1	1	1	0	1	0	2
Twitter	7	2	0	0	2	0	0	1	0	0

Table 15. Number of CNRs Created During the Wildfire.

Deletion of Crisis Named Resources

Table 16 shows the number of CNRs deleted from Facebook and Twitter during and after the wildfire. We were surprised to find that a significant number of CNRs were deleted during the wildfire, 16 (22.8%) Facebook CNRs (and none of the Twitter CNRs). When we checked for the existence of these CNRs in the month of March 2018 (just prior to submitting the final version of this paper), we found that an additional 27 (38.5%) Facebook and 2 (15.3%) Twitter CNRs have been deleted, bringing the total number of deleted CNRs to 43 (61.4%) on Facebook and 2 (15.3%) on Twitter.

Date of CNRs' Deletion	Facebook	Twitter
between May 1 - July 5, 2016 (during wildfire)	16 out of 70 (22.8%)	0 out of 13 (0.0%)
after July 5, 2016 (after wildfire controlled)	27 out of 70 (38.5%)	2 out of 13 (15.3%)

Table 16. Number of CNRs Deleted on Facebook and Twitter.

We did not investigate the CNRs that were deleted after the wildfire because the deletion of a CNR after the conclusion of an event is in alignment with the goal of serving as a resource during an event. However, the deletion of CNRs while an event is still happening needs more inspection.

We first looked at the number of Facebook CNRs deleted each week of the wildfire (see Table 17). The data show a fairly uniform distribution of the number of deleted accounts during the wildfire, and thus there seems to be no correlation with the deletion of CNRs and event progression. Since these 16 CNRs were deleted during the wildfire, we do not report on the details of these resources and the messages they posted. In some cases, the CNRs were deleted before we could even retrieve their messages.

The deletion of CNRs during an ongoing event prompts the question of why these accounts were deleted. We were unable to find any messages from the deleted CNRs that indicated why they were deleted, thus answers to this question are unknown. Also, since these CNRs left no record of their existence (such as an alternate page or account), questioning the administrators about the reasons for deleting their CNRs is now impossible.

	May 1 - 7	May 8 - 14	May 15 - 21	May 22 - 28	May 29 - Jun 4	Jun 5 - 11	Jun 12 - 18	Jun 19 - 25	Jun 26 - Jul 2	Jul 3 - 5
Facebook	1	2	2	2	0	3	2	0	1	3

Table 17. Number of CNRs Deleted by Week During the Wildfire.

Crisis Named Resources After the Event

Next, we looked at the CNRs that continue to exist in the month of March 2018. We revisited all the CNRs identified earlier in the study and found that of the 27 Facebook CNRs and 11 Twitter CNRs that continue to exist, 18 Facebook CNRs and all 11 Twitter CNRs have not posted anything since the month the wildfire was considered under control, i.e., after July 2016. This means that even though these resources still exist, people are no longer contributing content to them. There were 9 Facebook CNRs that continue to exist and have shown some online activity after July 2016 (see Table 18).

Facebook Page Name*	Page Description*	#Likes and #Followers	# Posts Since July 2016	Content of Posts Since July 2016
Fort McMurray CNR 1	The administrator was saddened by the wildfires and wanted to help in some way with this page.	60 Likes. 52 Followers.	1	Funny Video.
Fort McMurray CNR 2	This page was a place where people shared and collected photos of the event.	28,982 Likes. 28,675 Followers.	4	Post about community gatherings on the anniversary of Fort Mc wildfire, and some photos of wildfire.
Fort McMurray CNR 3	This page aims to help victims by collecting stories, information and offers of help.	160 Likes. 159 Followers.	17	Posts about legalizing marijuana, unemployment, immigration, oil and gas industry workers, B.C. wildfire, and Fort McMurray wildfire.
Fort McMurray CNR 4	-	31 Likes. 30 Followers.	1	Post about Roller Derby.

Fort McMurray CNR 5	This page was created to help Fort McMurray residents and family, but after the fire only posted about flowers and quilts.	40 Likes. 40 Follows.	23	Posts about flowers and quilting.
Fort McMurray CNR 6	A page to keep the pictures of displaced pets and livestock that are not yet claimed as a result of the Fort McMurray fire 2016	45 Likes. 45 Followers.	153	Posts about missing animals and animal care.
Fort McMurray CNR 7	This page took names and numbers of those who need a place to stay, and those that can provide a place.	479 Likes. 454 Followers.	17	Posts about B.C. wildfires, and a few about Fort McMurray fire.
Fort McMurray CNR 8	This page was created by a teen who wanted to help with relief efforts despite being told he was too young to help.	66 Likes. 62 Followers.	1	1 post about the plan of getting horses back to Fort McMurray.
Fort McMurray CNR 9	This page posts information regarding the wellbeing of pets that the administrator is tending or has rescued.	436 Likes. 407 Followers.	1	Posted a video about a dog suffering in a hot car.

Table 18: Facebook CNRs That Have Posted Since July 2016 (* Page Names and Descriptions have been anonymized).

Table 18 shows that 4 of the 9 CNRs have generated only 1 post since the wildfire was under control. One of these resources (Fort McMurray CNR 8) was created by a teen, who felt that this Facebook page was the only way he could meaningfully help. His single post following the fire talked about how he still plans to continue his efforts in getting the displaced horses back to Fort McMurray and that he is still concerned about helping around the event. We also found that 1 CNR (Fort McMurray CNR 2) has posted only 4 messages. All these messages were about the Fort McMurray wildfire, so this resource is still being used for the wildfire response. Another CNR (Fort McMurray CNR 3) has posted 17 times after the wildfire. All these posts were about the issues and challenges at the local (public inquiry on Fort McMurray wildfire, mental health challenges and increased unemployment of wildfire-affected oil workers), state (increase in the unemployment rate of Alberta), and national level (immigration, use of toxic Bromine in British Columbia (B.C.), and the B.C. wildfire). Furthermore, we found one CNR (Fort McMurray CNR 5) that was created on May 2, 2016. The administrator(s) of this CNR posted on May 4, 2016, after which this resource became idle for a while. The page became active again during August – September 2017, when the administrator(s) of this resource posted 23 times. All of these posts were related to flowers and quilting; none were related to the wildfire. After this activity, the page has once again become idle. We also found 1 CNR (Fort McMurray CNR 6) that has expanded its mission of reporting on the animals affected by the wildfire to missing animals and animal care, in general, with 153 posts following the wildfire. Another CNR (Fort McMurray CNR 7) has been sharing information about a wildfire in the southern Cariboo region of B.C. Even though this CNR is informing (or hoping to inform) people about a recent wildfire in B.C., it is unclear how people, ones who are not following this resource, would come to know that it could be useful in getting information about the B.C. wildfire. The online activity shown by these CNRs demonstrate how after the completion of an event CNRs sometimes broaden their goals (e.g., by putting their efforts towards animal safety on a broader scale, or by informing people about surrounding wildfires) or change their goals (e.g., by talking about quilts).

Relevance of Crisis Named Resources

After identifying the Fort McMurray named resources on Facebook and Twitter, we assessed whether they were posting about the wildfire. We read each message posted by the CNRs that existed throughout the wildfire and marked each message as on-topic (event-related) or off-topic (not related to the event). Examples of on-topic posts included messages about the fire size, evacuations, fire containment, re-entry, etc. Off-topic posts included posts about other local and national wildfires, Canada Day, etc. We did not mark the messages posted by the CNRs that were deleted before July 5 (the day the wildfire was classified as ‘under control’) as on- or off-topic due to terms-of-service obligations that require consumers of this data to remove deleted social media posts (Maddock et al. 2015).

Table 19 shows that the majority of the messages posted by these resources on Facebook (99.3%) and Twitter (99.2%) were related to the wildfire. However, there were a few resources (12 (of 54) on Facebook and 3 (of 13) on Twitter) that have no posts, not even posts irrelevant to the wildfire. We include these resources because these resources can still potentially be seen as sources of information about an event (even if they have no posts). Among the remaining 42 Facebook and 10 Twitter CNRs that posted information about the wildfire, 35 Facebook and 7 Twitter CNRs had less than 100 on-topic posts. This means that there were only 7 (12.9%) Facebook and 3 (23%) Twitter CNRs that were heavily used during the wildfire.

	Total Number of On-Topic Posts
Facebook	2639 of 2657 posts (99.3%)
Twitter	4974 of 5011 tweets (99.2%)

Table 19. Number of On-Topic Posts by CNRs on Facebook and Twitter.

We compared the number of on-topic posts per week during the wildfire timeframe to see if there is a correlation between the number of on-topic posts and event progression. Figure 1 shows that the highest number of on-topic messages on Facebook and Twitter were posted during the first two weeks of the wildfire. This finding indicates most of the online chatter about the event fell on the days when mandatory evacuations were in place.

To identify the administrator(s) of these CNRs, we analyzed the CNRs’ names, their descriptions, and the messages they posted. We could only identify 9 (16.6%) CNR administrators on Facebook (1 via the CNR’s description and CNR’s posts, and the remaining 8 only through post content) and 2 (15%) CNR administrators on Twitter (1 via through the account description and the other via tweet content). The administrators for the other CNRs (i.e., 84% on Facebook and 85% on Twitter) are unknown.

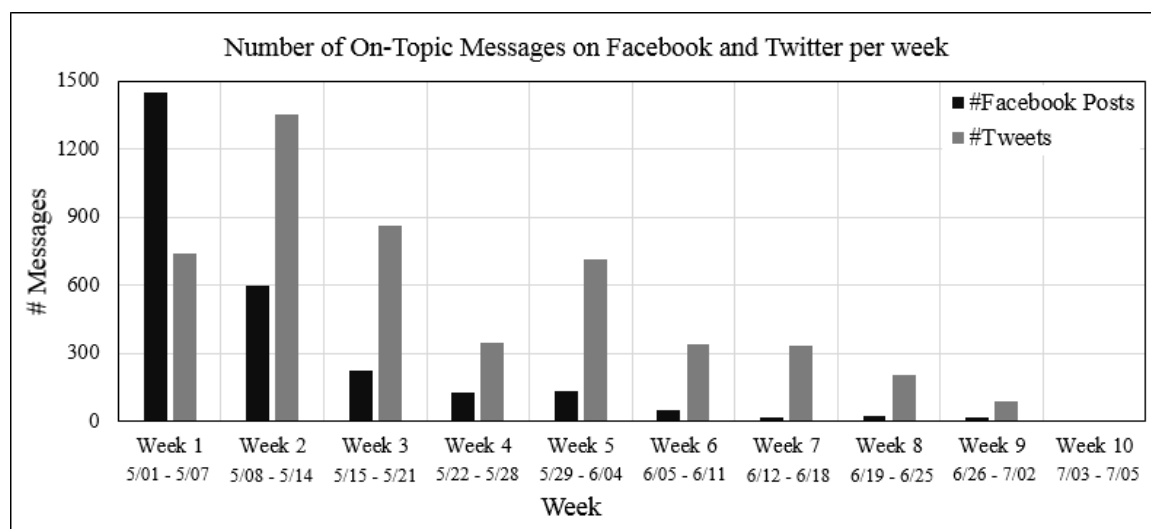


Figure 4. Number of On-Topic Messages Posted by CNRs over the Data Collection Timeframe.

Types of Crisis Named Resources

To better understand the different types of CNRs people create around a wildfire, we categorized each CNR by its content. We report only on the 54 Facebook and 13 Twitter CNRs that existed throughout the wildfire timeframe.

CNRs Categories	Definition	# Facebook Pages	# Twitter Accounts
Donations	Resources asking for money or items for the Fort McMurray wildfire victims.	8	0
Fundraisers	Resources used for selling or auctioning items, money of which was/would be used for the benefit of wildfire victims.	13	1
Prayers	Resources used for sending best wishes and messages of hope for wildfire victims.	1	2
Reactions	Resources used to express personal views and opinions about handling of the Fort Mac wildfire.	1	1
Reports	Resources used for reporting on the Fort McMurray wildfire event.	18	7
Needs & Offers	Resources used by people to ask for or provide help.	15	2
Stories	Resources that were asking for stories from individuals about their individual experiences, regarding evacuations, cheating, etc.	4	0
Unrelated	Resources that were named after the event but did not post about it.	0	1
Unclassified	Resources that lacked enough information to classify; ones with generic names (such as Fort McMurray wildfire), no self-description, and no posts.	3	2

Table 20. Types of CNRs.

We identified 3 parameters—the CNR 1) name, 2) description, and 3) message content—that could be used to categorize a CNR. We found that 8 (14.8%) Facebook pages and 6 (46.1%) Twitter accounts, in our dataset, had a generic name (such as “Fort McMurray Wildfire 2016” or “Fort Mc Fire”). Also, 15 (27.7%) Facebook pages and 6 (46.1%) Twitter accounts had no page or account description. Additionally, 13 (24%) Facebook pages and 2 (15.3%) Twitter accounts posted no messages. Thus, none of our three parameters were sufficient by themselves to categorize a CNR. As a result, we included all 3 parameters to categorize a CNR. We looked for purpose-defining keywords (such as recovery, support, fundraiser, etc.) in the name and description of the CNRs. We also read the on-topic messages posted by the CNRs to see if there were any posts from the CNR administrators that reveal their purpose for creating these resources, or if there are themes around the posts. Once we found a consistent theme around each CNR in its name, description, and/or messages, we assigned a brief description, such as ‘collecting donations.’ Over time, after a number of discussions between the authors, we grouped our CNRs into 8 categories. Table 20 lists these categories and the number of Facebook and Twitter CNRs that fit within each category. Note that a CNR could fall into multiple categories.

Table 20 shows that most creators of Fort McMurray CNRs reported information about the event (reports), sought and/or provided resources (needs and offers), and raised money for victims (fundraisers). The most frequent CNR type was the ‘reports’ category. Reports in our dataset, were mostly about wildfire updates (such as fire size, fire containment, etc.), evacuation notifications, alerts and advisories, or re-entry information. Reporting found in these CNRs was done through rebroadcasts (sharing or retweeting a web link), status updates, and links to other sources of information. The next most frequent CNR type was ‘needs and offers,’ the resources used by people to ask for things they needed, and to provide offers of help such as rescuing pets, building restoration, providing temporary accommodation, fuel, and other necessary items. Offers of help, in our dataset, were provided from individuals, families, and businesses. The third most

frequently appearing type of CNR was ‘fundraisers.’ Fundraisers for this event included live auctions and the selling of items (such as sea salt scrub, hoodies and tanks, sports memorabilia, etc.).

Popular Crisis Named Resources

We define the most popular CNRs as those that received the highest number of Facebook likes or Twitter followers. A large number of page likes or Twitter followers indicates what resources people were paying attention to during this wildfire. ‘Fort McMurray Evacuee Open Source Help Page’ and ‘YMMHelps’ were the most popular CNRs in our dataset on Facebook and Twitter respectively (see Table 21).

	Most Popular CNR	CNR Description	#on-topic posts	#likes/#followers (MAX)
Facebook	Fort McMurray Evacuee Open Source Help Page	This is an open source page to help Albertan's Evacuating from Fort McMurray wildfires. Albertan's are encouraged to post offers of help. Website: https://ymmhelp.com	932 out of 932 (100%)	41,428
Twitter	YMMHelps (@YMMhelp)	Fort McMurray Evacuee Open Source Help Page - Crowdsourcing support for evacuees, and all subsequent volunteer/community rebuilding efforts. ymmhelp.com	950 out of 951 (99.9%)	1,446

Table 21. Most Popular CNR on Facebook and Twitter.

Looking at the self-descriptions for these resources (see Table 21), it appears they were administered by the same entity (the administrator of ymmhelp.com). To take a deeper look at these CNRs, we analyzed the messages they posted. Both Facebook and Twitter CNRs used the social platforms heavily to share wildfire-related messages with a rate of on-topic posts of 100% and 99.9% respectively. Also, both these CNRs are of the ‘needs and offers’ type i.e., they contained posts regarding the resources needed and resources available (known through offers of help). Both accounts acquired a large number of likes/followers, though the Facebook page had many more followers than the Twitter account (41,428 followers versus 1,446 followers).

Next, we looked at the distribution of on-topic posts for both of these CNRs over the wildfire timeframe, and also the number of likes/followers they gained over time. We found that both our most popular CNRs posted messages only in the month of May. The most on-topic posts on both the Facebook page (811 of 932; 87.0%) and Twitter account (616 of 951; 64.7%) were posted during the first week of the wildfire (May 1 – May 7). To break that down, the most number of on-topic posts on both the Facebook page (718 messages) and Twitter account (339 tweets) were posted on May 4, 2016 – a day after the massive evacuations (mass evacuations were forced on the night of May 3). Also, both of these accounts were created on May 3, 2016. The similarities between the accounts is not surprising given these resources appear to be managed by the same party.

We also looked at their follower counts in March 2018 and found that the Facebook page has 38,764 likes and the Twitter account has 1,244 followers. These findings reflect a small decrease in the number of followers on both these resources after the wildfire was controlled.

DISCUSSION

In this paper, we examined the online behaviors of the 2016 Fort McMurray wildfire CNRs. Findings show that these CNRs primarily posted wildfire-related information and tried to help the wildfire-affected public

in different ways. We also found that a large number of these CNRs were created during the wildfire, most of which became inactive or were deleted after the wildfire. Additionally, we discovered that most of the CNRs' owners did not explicitly disclose their identities, which raises questions of credibility. Below, we discuss these findings in more detail and offer broader implications and future directions for this research.

The CNRs in this study covered a diverse range of topics around the wildfire, from information dissemination (reports), to offers of help (donations, fundraisers, needs and offers), to expressions of solidarity (reactions, stories, prayers). We would expect to see more of these behaviors on a larger scale for larger events. We did not see any fake or malicious CNRs for the Fort McMurray wildfire, though that does not mean that they do not occur in other events. The list of categories developed in this work was specific to this event and would likely vary based on the context of the crisis event. Nonetheless, it does serve as a starting place for further investigation.

Most of the CNRs were used to post wildfire related information, but there were some resources that were never used to share anything. This is interesting because if someone creates a CNR, it implies that s/he intended, at some point in time, to post event-related content or something that would potentially be found by those looking for information about the event. Because the owners of these CNRs never posted or shared anything, it is difficult to evaluate the roles that these CNRs played in wildfire response efforts. We speculate that there could be multiple reasons for not posting. For instance, the owners of these resources may not have felt skilled enough to use their CNR, or they may have been directly affected by the wildfire leaving no time to use their resource.

While the majority of the Fort McMurray CNRs were created during the wildfire, we did find two CNRs that were created long before the wildfire but were adapted for the event. The owners of these two CNRs never stated reasons for changing the names of their accounts/pages, but there are likely many possible reasons for this behavior. First, changing the name to something related to the Fort McMurray wildfire could be a way to show support to the wildfire-affected public. Researchers saw similar behavior during the Virginia Tech Shootings of 2007, when Facebook users changed their profile picture to an image that demonstrated their support for the Virginia Tech community (Hughes et al. 2008). Second, it could be a way to publicly let people know they are participating in the wildfire response efforts. Third, it could be a tactic to gather more attention for their account/page. Fourth, the CNR owner may want to build on their current network instead of starting a new CNR as a way to share their wildfire-response efforts with a broader, already-familiar audience. Lastly, it could be a way for a CNR owner to build trust by letting everyone see their past activity, especially if they have prior experience in crisis response. Findings also indicate that many of the CNRs became inactive after the wildfire. However, a few CNRs are still in use, some of which continue to report on the Fort McMurray wildfire, while the others have either broadened their goals or have moved on to a new cause. This implies that the owners of these CNRs have found the social media platforms to be useful in working toward their goals.

Many of the CNRs created during the event were later deleted. Deleting a resource after an event concludes might be understandable, but it does make one wonder whether these resources should be curated to preserve a history of how people have responded to past events. Such archives might be useful for future crisis events. Most puzzling was the large number of CNRs that were deleted during the event. Unfortunately, we were unable to discern why these resources were deleted with the data we collected. Investigation of upcoming crisis events could provide opportunities to explore this phenomenon, though researchers would have to act quickly to collect the information before it disappears.

CNRs are named after events and thus are easier to find on social media when someone searches for information about a particular crisis event. Because of their naming convention, they also have greater potential to be mistaken as official sources of information. Surprisingly, we were unable to identify most of the administrators of the CNRs in our dataset. We were also unable to identify the intentions of CNRs that had a generic name, no account description, or had very limited to no posts. This finding is consistent with the findings of our previous study, where we studied the CNRs created in response to the 2014 Carlton Complex wildfire (Chauhan and Hughes 2017). A similar finding was also reported in a study conducted by Zhao and colleagues (2008). The researchers in this study examined the identity construction of 63 Facebook accounts and found that the majority of these users did not provide explicit self-descriptions, and rather chose

to present themselves indirectly by sharing their pictures, posting wall posts, and/or stating their interests and hobbies. The unknown administrators of these CNRs and the unknown intentions behind creating these CNRs could make it difficult to judge the veracity of the information provided by them. Further, there is cause for concern, because these anonymous resources could potentially spread misinformation or false rumor with little accountability, especially if they later delete the social media page or account. This concern is at least partially validated by Oh and colleagues (2013) who report that information with no clear source is the most important rumor causing factor on Twitter in crisis situations. Because CNRs are highly visible sources of information with potential credibility issues, emergency responders will likely want to quickly identify and monitor CNRs during a crisis event for potential misuse.

Limitations & Future Work

The data in this study is limited to publicly available Facebook pages and Twitter accounts and does not include CNRs found on websites, blogs, or other social media. To continue investigating CNRs, we plan to compare the roles played by CNRs in crisis response across different events. We also plan to interview the owners of CNRs of future crisis events to determine ‘who’ creates CNRs and ‘why.’ These interviews will also determine ‘what’ approach (if any) the administrators of these CNRs take to ensure the veracity of information that they share. Additionally, we plan to interview and survey people about how they perceive CNRs. The aim of these activities will be to determine the factors that people consider when evaluating the trustworthiness and usefulness of these resources.

CONCLUSION

This paper offers empirical insight into the lifecycle of CNRs, the relevance of CNR content to the events they are named after, and the types of informational content CNRs can offer. While the study revealed much about CNRs and their activity, it also raised many new questions for future investigation, such as: Why do people delete accounts about a crisis event while the event is still occurring? Why do some accounts named after a crisis event never post any information? What are the intentions of CNR administrators? This study lays the foundation for this future investigation.

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CHAPTER IV

Factors that Influence the Trustworthiness of Social Media Accounts and Pages Named after a Crisis

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ABSTRACT

People sometimes create social media accounts and pages that are named after a crisis event. We named such resources Crisis Named Resources (CNRs). CNRs share information around crisis and are followed by many. Yet, in most cases, the owners of these resources are unknown. Thus, it can be challenging for crisis-affected audiences to know whether to trust (or not trust) these CNRs and the information they provide. In this study, using surveys and interviews, we determined the factors that influence the trustworthiness of CNRs. Findings showed that participants evaluated a CNR's trustworthiness based on their perceptions of its content, information source, owner, and profile.

CCS CONCEPTS

• Networks → Social media

KEYWORDS

Social Media, Crisis Named Resources, Trust.

INTRODUCTION

Social media are increasingly used for information exchange during crisis events. Members of the public often use social media to access and share crisis-related information, ask for and offer help, and show solidarity around crisis situations [1, 27, 30]. One way that people facilitate information exchange is by creating Crisis Named Resources (or CNRs). CNRs are social media pages and accounts that are named after a crisis event. They are easily identifiable and visible due to their names and are known to share information, as well as support and help crisis affected individuals [10]. In most cases, however, the owners of these resources are unknown. Yet, they are often followed and liked by a large number of people [11]. A large number

of followers for a social media page or account is an indicator of broader social influence and can lead to more amplification of its content [3]. Information coming from an unknown source can, however, be hard to evaluate on trustworthiness.

This paper aims to determine the factors that influence (or do not influence) the trustworthiness of these resources. Evaluating the trustworthiness of CNRs is important because they provide information during a crisis event and they are often the first resources found when searching because they are named after the event. Crises create a need for immediate and accurate information and require sensemaking from both disaster-affected people and decision makers [33]. This research is, therefore, an attempt to aid sensemaking by identifying the factors that make a crisis-information provider seem trustworthy (or not trustworthy). The research question for this study is as follows: *What factors influence the trustworthiness of CNRs?*

To answer this research question, we conducted 105 surveys and 17 semi-structured interviews with members of the public and experts in crisis informatics, communication studies, and emergency response. In both studies, participants were shown 2017 Hurricane Irma CNRs and were asked to evaluate the trustworthiness of these resources. Our analyses reveal that people evaluate the trustworthiness of CNRs based on their perceptions of CNR *content*, *information source*, *owner*, and *profile*.

BACKGROUND

Social media are changing the information landscape for participation in crisis response and recovery activities [36]. They have been used for crisis response during a variety of crisis events

worldwide [35, 20, 9, 13, 42]. False rumors, however, also spread intentionally or unintentionally on social media during crisis events [38, 45, 22, 37]. Additionally, both official and unofficial sources use social media to share information. This increases the uncertainty and difficulty in identifying trustworthy sources of information [18]. Therefore, it is important to understand how social media are used and evaluated so that we can improve the quality of interactions on social media during a crisis event.

In this study, we focus on how people determine the trustworthiness of CNRs. CNRs are interesting to study as they play diverse roles in crisis response, such as, raising money, expressing support and personal opinions and experiences, and providing information and help for crisis-affected individuals [11]. Yet, in most cases, owners of these resources are unknown [10, 11]. Thus, it is challenging to categorize these resources as trustworthy or untrustworthy sources of information.

The focus of this study is on online trust. Online trust has been defined differently depending on the context. Most existing literature on online trust is grounded in e-business, particularly online shopping [34, 5, 41, 6]. Trust has also been studied in the context of user-generated content (UGC) in online communities. For instance, Golbeck and Fleischmann [15] studied the perceived trustworthiness of the answerers in social Q & A. Their results showed that text cues improved trust in the answerer among all populations, however photo cues improved trust only among the population with no personal connection to the topic being discussed. Ayeh and colleagues [4] also examined online travelers' perceptions of the credibility of UGC sources and found that both perceived trustworthiness and perceived expertise positively influence the attitude and the behavioral intention of using UGC for travel planning. They also found that perceptual homophily positively influences the perceived trustworthiness, perceived expertise, and attitude toward using UGC for travel planning. Similarly, Ma and colleagues [28] examined how hosts describe themselves on Airbnb profile pages, and what contributes to the perceived trustworthiness of these profiles. Their findings showed that hosts, who disclosed more

assessment signals (ones that can be verified easily) than conventional signals (ones that cannot be verified easily) were perceived more trustworthy by the guests.

Studies on people's perceptions of trust in the information and information providers during crisis events also exist. For instance, Hagar [17] conducted interviews with farmers on their information seeking and use during the UK foot and mouth disease crisis and found that information from local sources (except local government) was generally trusted, while information from central government was not trusted. A study by Hacıyakupoglu and Zhang [16] on how trust was built and maintained among the protestors during the 2013 Gezi protests revealed that social trust and system trust were intertwined in actual practices. Szymczak et al. [40] also examined the factors that influence the perceived trustworthiness of Facebook in crisis situations and showed that general trust towards Facebook predicts trust towards Facebook in crisis situations. Halse and colleagues [19] studied tweets around a natural (2012 Hurricane Sandy) and a man-made (2013 Boston Bombing) crisis event. They found that similar factors, such as, support for the victims, informational data, use of humor, and type of emotion used influence the trustworthiness and usefulness of tweets around both disaster types.

Our definition of trust aligns the most with Pee and Lee [31], who defined trust as "the extent to which one feels secure and comfortable about relying on the information on social media." In addition, we also build this study on the work of Mayer and colleagues [29], who showed ability, benevolence, and integrity to be the three main characteristics of a trustee (a trusted party). They defined ability as the group of skills, competencies, and characteristics that make a party influential in a specific domain, benevolence as the extent to which a trustee is believed to work in the trustor's interests, and integrity as the extent to which a trustee adheres to the principles acceptable by the trustor. We used these two theories to construct our interview and survey questions.

METHODS

We conducted a survey and interview study to better understand how people evaluate the trustworthiness of CNRs. The same questionnaire was used for both studies. The difference was that the survey questions were closed-ended, while the interview questions were open-ended (participants were prompted to provide reasons for their evaluations). We conducted these studies to develop both an in-breadth (using surveys) and an in-depth (using interviews) understanding of the factors that influence participants' perceptions of trustworthiness of these resources. We describe the method used below.

Research Participants

Research participants for both the survey and interview study included members of the public and experts in crisis informatics, communication studies, and emergency response. We included two types of participants because we believed that experts might have different perceptions of trustworthiness than non-experts or members of the public. Members of the public were 18 years or older and had a profile on either Facebook or Twitter. An individual's presence on either of these sites provided some level of assurance that s/he had a basic level of experience with social media. Experts in crisis informatics and communication studies included individuals who conduct research in these areas. Experts in emergency response included people who have experience with crisis response (e.g., individuals from a fire or police department). We obtained Institutional Review Board approval for both studies.

Survey Recruitment and Demographics

We contacted potential participants through online media. We posted the survey description and link to the survey on our Facebook and Twitter accounts and professional websites and requested people share our post. We also designed a survey recruitment card with the name of the study, contact information, and a link to the survey. These cards were used to share the survey information with people in-person. See Appendix B for survey recruitment materials. Taking these approaches, we collected 148 survey responses (105 complete responses and 43 incomplete responses) between March 30 and June 17 of 2018. Table 1 contains the survey participants' demographic information for the 105 complete

responses. Participants were 50% male and 50% female. Most participants (60%) belonged to the age group 18 – 34, which implies that the opinions expressed in this study may not fairly represent the opinions from all age groups. The majority (85%) of participants were members of the public, which means that the opinions presented here are heavily representative of the public. Also, while half of the participants (50%) were extremely comfortable with Facebook, only 21% participants were extremely comfortable with Twitter.

Table 22: Survey and Interview Research Participants Demographics

Demographic		Interviewees (N = 17)	Survey Participants (N = 105)
Gender	Male	7 (41.1%)	53 (50.4%)
	Female	10 (58.8%)	52 (49.5%)
Age	18 - 24	2 (11.7%)	32 (30.4%)
	25 - 34	3 (17.6%)	31 (29.5%)
	35 - 44	8 (47.0%)	16 (15.2%)
	45 - 54	4 (23.5%)	11 (10.4%)
	55 - 64	-	13 (12.3%)
	65 - 74	-	2 (1.9%)
Highest level of Education Completed	High school graduate	-	4 (3.8%)
	Some college	2 (11.7%)	19 (18.0%)
	2-year degree	-	7 (6.6%)
	4-year degree	3 (17.6%)	38 (36.1%)
	Master's degree	7 (41.1%)	24 (22.8%)
	Doctorate	5 (29.4%)	13 (12.3%)
Expert	Yes	5 (29.4%)	17 (16.1%)
	No	12 (70.5%)	88 (84.7%)
Comfort level using Facebook	Extremely uncomfortable	-	7 (6.6%)
	Somewhat uncomfortable	2 (11.7%)	8 (7.6%)
	Neither comfortable nor uncomfortable	1 (5.8%)	9 (8.5%)
	Somewhat comfortable	5 (29.4%)	29 (27.6%)
	Extremely comfortable	9 (52.9%)	52 (49.5%)
Comfort level using Twitter	Extremely uncomfortable	-	15 (14.2%)
	Somewhat uncomfortable	4 (23.5%)	22 (20.9%)
	Neither comfortable nor uncomfortable	4 (23.5%)	22 (20.9%)
	Somewhat comfortable	6 (35.2%)	24 (22.8%)
	Extremely comfortable	-	-

Demographic	Interviewees (N = 17)	Survey Participants (N = 105)
Extremely comfortable	3 (17.6%)	22 (20.9%)

Interview Recruitment and Demographics

We contacted experts and members of the public via emails, Facebook, and Twitter. Members of the public were recruited using snowball sampling. Experts in crisis informatics and emergency response were recruited through prior research contacts, while experts in communication studies were identified and recruited through Google searches in top and/or near-by institutions. See Appendix A for interview recruitment materials. We conducted 17 interviews between March 7 and June 4 of 2018. Of these 17 interviewees, 59% were female and 41% were male. About half of the participants (47%) belonged to the age group 35 – 44 and none were older than 55 years of age. More than half (70.5%) of the participants had a graduate degree, likely as a result of the snowball sampling. The majority (71%) of participants were members of the public. This discrepancy is to be expected because we intentionally recruited more members of the public than experts. Also, while half of the participants (53%) were extremely comfortable with Facebook, only 18% participants were extremely comfortable with Twitter (see Table 1).

Survey and Interview Questionnaire

The questionnaire for both studies included two blocks. Questions in the first block gathered information about participants' perceptions on the trustworthiness of CNRs. Questions in the second block gathered information about participants' demographics. See Appendix C for Survey Questionnaire.

Block I Questions

Block I had the following seven questions:

Q1.1: Do you feel that the owner of this Twitter account (or Facebook page) has prior experience in crisis response?

Q1.2: Do you feel that the owner of this Twitter account (or Facebook page) is capable of helping you respond to hurricane Irma?

Q1.3: Do you feel that the owner of this Twitter account (or Facebook page) has your best interests in mind?

Q1.4: Do you feel that the owner of this Twitter account (or Facebook page) understands your situation?

Q1.5: Do you feel that the owner of this Twitter account (or Facebook page) will provide misleading information intentionally?

Q1.6: Do you feel that the owner of this Twitter account (or Facebook page) will make efforts to correct any false rumor or misinformation as soon as it comes to his/her notice?

Q1.7: Would you trust the information on this Twitter account (or Facebook page)? Trust is defined as the extent to which you feel secure and comfortable relying on the information.

Yes, because _____

Maybe, because _____

No, because _____

All questions in block I were based on the work of Mayer et al [29] and Pee & Lee [31] and were asked for each CNR. The first 6 questions gathered participant's perceptions on the CNR owner's ability (Q1.1 and Q1.2), benevolence (Q1.3 and Q1.4) and integrity (Q1.5 and Q1.6). They required closed-ended responses on a 5-point Likert scale ranging from 'extremely unlikely' to 'extremely likely' from survey participants and open-ended responses from interview participants. The last question (Q1.7) requested the participants' overall opinion on the trustworthiness of a CNR and required an open-ended response for both studies.

Block II Questions

Questions in this block collected information about the participants' gender, age, highest level of education completed, expertise, and comfort level when using Facebook and Twitter. All these questions required closed-ended response(s) for both studies.

Differences Between Survey and Interview

Though the survey and interview studies used the same questionnaire, there were a few differences in their design and execution. First, survey participants evaluated 5 CNRs while interviewees evaluated 10 CNRs. Second, surveys sessions were designed to last 15 – 20 minutes, while interview sessions were designed to last 45 – 60 minutes. Third, while most survey questions required a closed-ended response, all interview questions required open-ended responses. We also asked interviewees to think aloud while they were looking at the CNR screenshots so that we could observe their thinking process when evaluating CNRs. Fourth, the survey did not require the researchers' presence and was designed to record responses in Qualtrics (an online survey tool). Interview sessions were either conducted in-person or on Skype and voice recordings were made after obtaining permission. All voice recordings were transcribed. Finally, the incentive for the two studies differed. Each interviewee was given a \$20 Amazon Gift Card. For the survey, participants had the option to enter a drawing where one participant won a \$50 Amazon Gift Card.

Hurricane Irma Contextual Scenario

To provide context to participants during surveys and interviews, we designed a disaster scenario. In the scenario, the participants imagined they were in Florida and had been affected by Hurricane Irma. The 2017 Hurricane Irma served as a prompt for these studies as it was a recent major crisis event and the most intense Atlantic hurricane to strike the United States since Katrina in 2005 [26]. In the beginning of each study, participants were briefly reminded about Hurricane Irma. They were told that Hurricane Irma made its first landfall as a category 5 storm in Cuba on September 8, 2017 [43]. On September 10th, Irma made its first landfall on the US mainland at Cudjoe Key, Florida as a category 4 storm, and its second landfall on the US mainland at Marco Island, Florida [39]. To prepare for the hurricane, a state of emergency was declared for Florida [44]. Also, 5.6M people in Florida and 540K people on the Georgia coast were ordered to evacuate, making it one of the nation's largest evacuations [2]. Participants were then told that they were looking for information on how to respond to this event.

CNR Selection for Survey and Interview Studies

We identified Hurricane Irma CNRs by searching pages and accounts that had "Hurricane Irma" in their name on the Facebook and Twitter platforms. We searched for these CNRs a month following Irma's US landfall. In total, we identified 32 Hurricane Irma CNRs: 20 Facebook pages and 12 Twitter accounts. To pick a reasonable number of CNRs that could demonstrate some variation in content and still be manageable for the studies, we selected 5 Hurricane Irma CNRs (CNRs 1 through 5) for the survey and 10 (CNRs 1 through 10) for the interviews. When selecting these CNRs, we tried to vary them along several dimensions. First, we chose CNRs on different social media platforms: 6 from Facebook (CNR 2, 3, 4, 6, 8, and 9) and 4 from Twitter (CNR 1, 5, 7, and 10). Second, we selected CNRs that had different purposes: 6 (CNR 2, 5, 7, 8, 9, and 10) reported about the event, 2 (CNR 1 and 4) provided humor, 1 (CNR 3) fundraised money, and 1 (CNR 6) shared needs and offers around the crisis. Third, we chose CNRs that varied in popularity: 2 (CNR 7 and 9) had a significant number of page likes and follows (Facebook) and account followers (Twitter), and 2 (CNR 1 and 10) had a fewer number of account followers. Fourth, we selected CNRs that varied in the completeness of the profile (in terms of profile picture, cover photo, and self-description): 1 (CNR 10) CNR had no bio and 9 had complete profiles. Finally, we selected CNRs that varied in their account activity: 1 (CNR 5) that tweeted frequently throughout the event and 1 (CNR 10) that never tweeted. We chose these variations to ensure that study participants were exposed to the different kinds of CNRs that are created around events.

When retrieving these CNRs, we captured screenshots of these resources (see Appendix D) as opposed to the actual on-line pages, so that all interviewees and survey participants would see the same information. Otherwise, participants may see different content depending on how these resources change over time and findings may not be comparable. The downside of static screenshots was that participants were restricted in their ability to click on links and photos, which they could have done on actual on-line pages.

Table 2 provides details for each of the selected CNRs. The number of account followers (for Twitter accounts) and page follows (for Facebook pages) mentioned for these CNRs are as of December 20, 2017. All CNR names and descriptions have been anonymized.

DATA ANALYSIS AND FINDINGS

In this paper, we report only on the findings of our qualitative analysis. The findings from our quantitative analysis are not reported because they are beyond the scope of this initial analysis and still in progress.

Table 23: Selected CNRs

CNR Name and Description	CNR Follows/ Followers
CNR 1 (Twitter account) – Tweets were written in the first person, as if Hurricane Irma herself had created the account. All tweets were either sarcastic or humorous with frequent political references.	3
CNR 2 (Facebook page) – This page was created by the editor and proprietor of a news media outlet in Florida because she had difficulty finding news and information specific to Key West and the Lower Keys where she had family. The Page owner provided her phone number, email address, and website and shared many hurricane-related posts, photos, and videos.	13,209
CNR 3 (Facebook page) – This page provided a link to a fundraiser site without stating who owns this page and who is raising the funds, why, and how. It shared many hurricane-related posts and pictures.	4,116
CNR 4 (Facebook page) – This page claimed to be the official page for Hurricane Irma memes, and indeed all posts were memes. Page claimed to be ‘just for fun’ and it provided a link to a shop that sells hemp wick.	899
CNR 5 (Twitter account) – This account tweeted actively about hurricane-related information during the storm. The account bio showed the owner’s location as Florida and provided a link to their Instagram account. It followed the city mayor and people from news stations. CNR 5 also had 8 lists, all related to news stations and weather channels.	167
CNR 6 (Facebook page) – This page claimed to be the official page for the Hurricane Irma Rescue Dispatch Operations. All posts were hurricane-related. The page owners, however, cautioned people that it is not monitored by	260

emergency services and people should call 9-1-1 in a life-threatening emergency.	
CNR 7 (Twitter account) – This account was created by self-proclaimed weather nerds in Tampa Florida who were tracking Irma 24/7. This account shared photos and videos of the path of Hurricane Irma and its bio provided a link to nhc.noaa.gov . It also followed many accounts, most of which were verified accounts and belonged to weather professionals and organizations.	28,591
CNR 8 (Facebook page) – This page shared many hurricane-related posts, photos, and live camera feeds. The owners mentioned that it is not the official page for Hurricane Irma, instead it is a page is to let everyone know the safe points and news regarding the Hurricane.	7,917
CNR 9 (Facebook page) – Despite being named after Hurricane Irma, this page’s user handle was named after Hurricane Sandy and it was created in 2012. The page claimed to be the official page of Hurricane Irma and it provided a lot of information about the event.	37,338
CNR 10 (Twitter account) – This account was created in September 2017 but it had no profile picture, no cover picture, no bio, and no location.	7

To determine the factors that influence the trustworthiness of CNRs, we analyzed our qualitative data using affinity diagrams [7]. We first read all the open-ended survey responses and all the interview transcriptions. This was useful in determining common themes across the data (see Appendix F for qualitative analysis). Identified common themes then influenced our coding process, where we formulated codes to represent various themes. These codes were then merged into categories. The codebook was consolidated and calibrated through weekly discussions and deliberation. Once the codebook was finalized, we applied it to the participant interviews and open-ended survey responses and resolved all disagreements to reach consensus on our code applications. In some cases, multiple codes were applied to an excerpt.

Our findings show that participants when evaluating the trustworthiness of CNRs, talked about their perceptions of CNR *content*, *information source*, *profile*, and *owner*. Participants perceptions about the information found on the CNRs were coded as *content*. When participants discussed from where the CNRs were obtaining their information, we coded these

excerpts as *information source*. Participants perception of how these resources were designed, in terms of how authentic and/or professional they appear or how many followers they have or if they are created with the purpose to help crisis-affected individuals were coded as *CNR profile*. Participants perceptions of the ability, identity, and intentions of CNR owners were coded as *owners*. Table 3 shows the number of interviews and surveys excerpts coded in each category. We did not find a noticeable difference between experts and members of the public in their evaluation of the trustworthiness of CNRs. We now explain each of our codes in detail.

Content

When evaluating the trustworthiness of CNRs, participants frequently talked about the *content* found on a CNR. Table 3 shows that 517 excerpts in the interview data and 214 excerpts in the survey data were coded in this category. We further classified content into 7 subcategories: *relevant*, *quality*, *quantity*, *media*, *timely*, *useful*, or *veracity*. We explain these sub-categories and their importance in the following sub-sections.

Relevant

Many participants felt that an important factor in determining whether a CNR was trustworthy was whether the content was related to Hurricane Irma. Excerpts coded as relevant include 181 excerpts from the interview data and 102 excerpts from the survey data. Participants tended to trust a CNR if they perceived that CNR content was related to Hurricane Irma. For instance, SID 72¹ trusted CNR 2 because “*most of the information is relevant to the context and pictures are also shared*.” In contrast, if participants perceived that a CNR was not related to Hurricane Irma, they tended not to trust it. For example, SID 84 did not trust CNR 1 because “*it seems that their comments are all politically focused, and AGAINST [sic] Donald Trump*.” The frequent appearance of this code implies that for a CNR to be perceived as trustworthy, it is critical that the content it provides is relevant to the crisis it was created for.

Table 24: Factors that Influence CNRs’ Trustworthiness

Primary Codes	Interviews Excerpt Count	Surveys Excerpt Count
Content	517	214
Information Source	175	92
CNR Profile	408	298
CNR Owner	1053	169

Quality

This code was applied to the data where participants talked about the *quality* of CNR content. We coded 34 excerpts from interviews and 29 excerpts from surveys for *quality*. If a CNR’s content was seen as having high quality, it tended to increase its trustworthiness and vice-versa. IID 03, who chose to ‘maybe’ trust CNR 8 said, “*they have some good pictures of what the situation was*.” SID 52 did not trust CNR 3 because according to him, it “*feels like it is really vague on information and details*.” This code suggests that perceived trustworthiness of a CNR depends upon the perceived quality of the information found on a CNR.

Quantity

When evaluating the trustworthiness of CNRs, participants often discussed whether the CNR provided enough content for decision making. We coded 143 excerpts from the interview data and 14 excerpts from the survey data in this category. Participants perceptions of whether a CNR shared an adequate amount of content seemed to influence its trustworthiness. For example, IID 10, who trusted CNR 5 said, “*there are so many tweets, 531. So, it looks like it has been quite active, and for a person that’s been struck, like, if I am being struck, I would be waiting for more and more tweets, more and more updates, which they are providing*.” In contrast, SID 67 did not trust CNR 3 and wrote, “*there’s pretty much no information*.” This code suggests that the amount of information found on a CNR can influence its perceived trustworthiness. This is especially applicable to the context of crisis, where there is an increased need for information.

¹ We identify survey participants and interviewees with their survey ID (SID) and interviewee ID (IID) respectively.

Media

Excerpts coded for *media* include participants' perceptions of whether a CNR shared (or did not share) multimedia content, such as photos, videos, or maps. We coded 110 excerpts in the interview data and 36 excerpts in the survey data. Our data suggest that participants appreciated the presence of multimedia content in the hurricane related posts and tweets. IID 17, who chose to 'maybe' trust CNR 8 said, *"there is a lot of sharing of videos about what's going on and photos of damage in different places."* In contrast, IID 11 did not trust CNR 10 and said, *"they don't really design their page. They leave no information, provide no information, no pictures, no videos, no followers, no likes, no anything. No information at all! So, it is useless and a waste of time to look at this one."* Participants found CNRs that shared more media (such as photos and videos) to be more trustworthy, whereas a lack of media content tended to make CNRs less trustworthy.

Timely

Participants' perceptions of whether a CNR's content is up-to-date (or not up-to-date) were coded as timely. The Timely dataset includes 57 excerpts from the interview study and 11 excerpts from survey. CNRs that shared timely content seemed trustworthy to many participants. IID 16 trusted CNR 7 because *"it seems like they are trying to share information and share tracking and provide real time information about what the storm is doing and where it is hitting."* Similarly, IID 12 did not trust CNR 9 and stated, *"they have failed that bar that they changed their name from Sandy to Irma. They still have outdated information, misleading information. Let's say somebody is not that aware with the different hurricanes, they might think that the name of Irma was changed to Sandy. So, you know, that could be really, really bad because it shows the same side of Atlantic and people who are not quite versed in geography, a lot of people are not, this could be way misleading."* This code suggests that the timeliness of the information found on a CNR influences its perceived trustworthiness. Timely information is known to be key in crisis-response [48] and is also reflected in our findings.

Useful

Participants often shared their perceptions of whether a CNR's content could be used (or not used) to respond to Hurricane Irma. We coded 187 excerpts from interview data and 46 excerpts from survey data as *useful*. Unsurprisingly, participants tended to trust a CNR that shared useful information and vice-versa. IID 03 trusted CNR 8 and said, *"the news links seems very helpful. I would probably follow those."* SID 89 did not trust CNR 1 and wrote, *"there is no official information that I could use and/or apply to my emergency situation."* Our findings suggest that the perceived usefulness of the information found on a CNR affects its perceived trustworthiness.

Veracity

When evaluating the trustworthiness of CNRs, participants often discussed the accuracy of the CNR content. We coded such excerpts as *veracity*. The *veracity* dataset includes 46 excerpts in the interview data and 33 excerpts in the survey data. Participants tended to trust a CNR if they perceived its content to be accurate. SID 51 trusted CNR 2 and wrote, *"I think it's telling the truth."* On the other hand, participants did not trust a CNR if they perceived the content was inaccurate. IID 07, who chose to 'maybe' trust CNR 8, said, *"I think that this is a page that is not very likely to find out if something is misleading information or false information. It looks like that they are just sharing things that they find, which means that it could be accurate or inaccurate and I don't think they would know."* Accurate information is one of the very basic needs in the times of crisis. This is also reflected here, such that the perceived accuracy of the information found on a CNR influence its perceived trustworthiness.

Information Source

Participants often considered the source of the information found on a CNR when evaluating its trustworthiness. Table 3 shows that 175 excerpts from the interview study and 92 excerpts from the survey data were coded for this category. We further classified information source category into four sub categories: *Known Trusted Source*, *Local*, *Connected*, and *Refers Recommends Rebroadcasts*. Each of these sub-categories are discussed in-depth below.

Known Trusted Source

Instances where participants thought information was coming (or not coming) from known and/or trusted sources, were coded as *Known Trusted Source*. Only 14 excerpts from the interview data and 13 excerpts from the survey data were coded in this category. Findings show that participants tend not to trust information if they were not able to identify its source. For example, IID 07, who did not trust CNR 3 said, “*they are not giving any context for where they are getting their information and so that makes me unsure of how careful they will be with what their sources are, and like if they may be listening to rumors and sharing those.*” This suggests that perceived trustworthiness of a CNR is influenced by the source of the information.

Local

This code was applied to the excerpts that contained participants perceptions of whether the information was coming from Florida, the disaster-affected area, were coded as *local*. Only 32 excerpts from the interview data and 13 excerpts from the survey data were coded in this category. Information from locals seemed trustworthy to many of our participants. IID 17 trusted CNR 2 because to her “*it seems like they are also in Florida.*” This code suggests that our participants believed the information coming from people-on-the-ground to be more trustworthy.

Connected

Participants’ perceptions of whether a CNR follows or links to or is associated with reliable and/or familiar information sources were coded as *connected*. We coded 101 excerpts from interview data and 44 excerpts from survey data under this category. Participants trusted CNRs that seemed to be linked to an authority. For example, SID 31 trusted CNR 5 because it “*subscribed to news anchors and followed various weather stations.*” On the other hand, SID 129 did not trust a CNR 1 and wrote, “*I have no reason to believe the account has any relation to official sources. Furthermore, the presence of political/partisan commentary increases the untrustworthiness.*” This suggests that the CNRs that seemed to be connected to reliable or familiar information sources were perceived as more trustworthy by our research participants.

Refers, Recommends, or Rebroadcasts

This code was applied to the data when participants mentioned if a CNR cites, recommends, and/or rebroadcasts information from reliable and/or familiar information sources. We coded 56 excerpts from interview data and 38 excerpts from survey data under this category. CNRs that seemed to have an association with an authority were considered trustworthy. For example, IID 16 trusted CNR 5 and said, “*it looks like they are tweeting and retweeting information from some reliable sources that help with crisis response, like, National Weather Report, Weather Syndicates, and some local news outlets.*” In contrast, IID 04 did not trust CNR 8 because “*there is nothing in the post that gives me information on what to do, dos and don’ts, no links, no relief efforts, no shelters.*” This implies that if CNRs owners refer, recommend, and/or rebroadcast other reliable information sources, it increases the perceived trustworthiness of their source.

Profile

This category includes participants perceptions of a CNR profile. It appeared frequently throughout the data; 408 excerpts in the interview data and 298 excerpts in the survey data were coded for perceptions of the CNR profile (see Table 3). There are four sub-categories under CNR profile: *professionalism*, *popularity*, *authenticity*, and *self-identification*. We discuss each of them in detail below.

Professionalism

Participants’ perceptions of a CNR’s look and feel were coded for *professionalism*. This code includes 73 excerpts from the interview data and 70 excerpts from the survey data. Participants in our study, when evaluating the trustworthiness of a CNR paid a lot of attention to whether it was well organized and/or had content with correct grammar and spelling, and preferred CNRs with meaningful names. For example, SID 69 trusted CNR 5 because “*it looks very professional and serious. Like people have put good time into making a helpful resource for people.*” Contrarily, SID 17 did not trust CNR 1 because according to her, CNR 1 owner has an “*informal, messy and unprofessional manner of speaking.*” This implies that the perceived trustworthiness of a CNR can be influenced by the extent to which its owner is

perceived to be professional in his/her interactions on social media.

Popularity

Participants when evaluating the trustworthiness of CNRs, often shared their perceptions of how well a CNR was received by others. We coded 119 excerpts from interview data and 27 excerpts from the survey data in this category. Our findings indicate that participants tended to trust CNRs with a significant number of followers and/or good reviews. SID 45 trusted CNR 2 because *“It has a large following and good reviews.”* On the other hand, IID 06 perceived CNR 1 as untrustworthy because *“I see a lot of, I don’t know, kind of personal stuff and political statements, and then they don’t have a lot of, like he doesn’t have a reputation. I think that there are just 3 followers.”*

Authenticity

Participants sometimes talked about whether a CNR seemed legitimate or not. We coded 70 excerpts from the survey data and 54 excerpts from the interview data in this category. We found that participants trusted a CNR, if it seemed authentic to them and vice-versa. For instance, SID 112 trusted CNR 5 because he perceived its *“content and sources seem legitimate.”* However, SID 45 did not trust CNR 1 because *“it seems like a fake account.”* This code suggests that the perceived authenticity of the source of information found on a CNR influences its perceived trustworthiness.

Purpose

When evaluating the trustworthiness of CNRs, participants often discussed whether or not the CNR’s purpose was to help crisis affected individuals. This code appeared frequently in the interview data (98 excerpts) and was the most used code (142 excerpts) in the survey data. Findings show that participants preferred CNRs that seemed to be created in the interests of hurricane-affected people and vice-versa. For example, SID 13 trusted CNR 2 and said, *“she is pulling from multiple sources in the area and trying to connect those in the Lower Keys area. The fact that it is a public account where those who live in that area can post real time images of the situation, makes this a more believable source.”* On the other hand, SID 57 did not trust

CNR 4 because she perceived, *“this Facebook page is clearly set up to be funny and have fun memes, not to provide real information.”* The frequent appearance of this code suggests that the perceived purpose of a CNR, which means, whether it is created for the crisis-affected individuals or not, influences its trustworthiness.

Self-Identification

This code was applied to the data when participants mentioned whether a CNR administrator disclosed his/her identity and/or intentions. 191 excerpts from the interview data and 66 excerpts from the survey data were coded for self-identification. Participants trusted CNRs when they knew who was behind them. For example, SID 24 trusted CNR 2 and wrote, *“The owner gives a name and 3 ways to contact. Owner said she will moderate postings.”* On the contrary, SID 83 did not trust CNR 3 and wrote, *“there is no information about who runs this page or what they are doing.”*

Owner

This category includes data about participant perceptions of the CNR owner. Table 3 shows that 1053 excerpts from the interview study and 169 excerpts from the survey study were coded for this category. This code has three subcategories, namely, *ability*, *identity*, and *intentions*, each of which is explained below.

Ability

This code is applied to the data, where the participants mentioned their perceptions of the CNR owners’ *ability*. More specifically, this included if the CNR owner had prior experience in crisis response, was capable of helping the hurricane-affected public, or could manage the CNR he or she created. 340 excerpts from the interview study and 9 excerpts from the survey study were coded in this category. When evaluating the trustworthiness of a CNR, participants usually considered its owners’ ability to help in crisis response. For example, IID 16 said in the context of CNR 7 that *“It looks like it because they state that they are bunch of weather nerds tracking Irma. So, they have some prior experience with weather and then some of the resources that are posted and government resources and they talk about preparedness. So, I think, they have some.”* Similarly, SID 11, who is

not sure about the trustworthiness of CNR 2, wrote, *“this person is trying to disseminate information about the hurricane. I doubt their ability to exhaustively cover every aspect of the hurricane, but they have interesting and potentially helpful information.”* This suggests that CNR owners’ perceived ability, whether the owner of a CNR is capable of helping crisis-affected individuals to respond to a crisis-situation, affects its perceived trustworthiness.

Identity

This category included excerpts that contained perceptions about a CNR owner’s *identity*, for example, observations about his/her age, profession, personality traits, and nature (human or bot). We coded 306 excerpts in the interview data and 55 excerpts in the survey data for identity. CNR owner’s perceived identity seemed to influence the trustworthiness of the CNR. For example, IID 03, who chose to ‘maybe’ trust CNR 8 believed that its owners *“are either there or are in contact with people who are there, because they have some good pictures of what the situation was.”* In contrast, SID 42 did not trust CNR 1 and wrote, *“it seems like a teenager is running the account.”*

Intentions

This was one of the most-frequently occurring codes in the dataset. It includes perceptions of the CNR owner’s intentions behind creating a CNR. 597 excerpts from the interview study and 137 excerpts from the survey data were coded under intentions. Participants tend to trust CNRs that seem to be owned by people with good intentions. For example, SID 62 trusted CNR 5 because he perceived that CNR 5 owners *“have the sole interests of spreading information about the hurricane.”* In contrast, IID 07 perceived CNR 1 as untrustworthy and said, *“I don’t feel that they are trying to help with the crisis. It just sounds like that they are just making jokes about it.”* The frequent occurrence of this code suggests perceived trustworthiness of a CNR depends a lot upon the perceived intentions of its owner.

DISCUSSION

This research determined the factors that experts and members of the public considered when judging the trustworthiness of a group of CNRs. The methods used in this research include

interviews and surveys with members of the public and experts. Our data analysis revealed that factors that influence the perceived trustworthiness of a CNR are CNR *content, information source, profile, and owner*. It is important to note that the aforementioned factors affect the *perceived* trustworthiness of CNRs and we haven’t evaluated the *actual* trustworthiness of CNRs. This was out of the scope for this study and we plan to address this issue in future studies.

Our research, in many ways, is consistent with existing literature. For instance, our findings showed that content that seems relevant, timely, and from local, reliable and/or familiar (*refers, recommends, or rebroadcasts*) sources are perceived as trustworthy. These findings offer support for the hypothesis of Hughes and Chauhan [23], who offered ‘supply timely and relevant information’, ‘serve as a local authority for information in your domain’, and ‘cite others for information outside your domain’ as recommendations for building trust on social media with members of the public for emergency responders. We suspect that the reason our findings are consistent is that both of these studies used Mayer and colleagues [29] trust framework. Similarly, our findings showed that participants trusted CNRs whose owners disclosed their identity and/or intentions (Self-Identification). These findings are consistent with Ma and colleagues [28] who also used Mayer et al., trust framework and discovered that guests trusted the Airbnb hosts who disclosed more assessment signals (ones that can be verified easily) than conventional signals (ones that cannot be verified easily). Additionally, we found that participants trusted information coming from locals. This finding is consistent with Hagar [17] who found that farmers during the UK foot and mouth disease crisis trusted information from local sources (except local government) and information from central government was not trusted. One of our findings also suggests that participants, in general, trusted CNRs that had appropriate usernames, page descriptions and account bios, and that shared content with correct grammar and spelling (Professionalism). This finding aligns with Morris and colleagues [46], who studied users’ perceptions of tweet credibility and found that use of non-standard grammar damaged credibility more than any other

factor in their survey. Like many scholars who studied the trustworthiness of online resources suggested ways to improve the trustworthiness of a resource, we do the same. For instance, we suggest that CNR owners clearly identify themselves and be cognizant of how they design their profile, what content they share, and which information sources they quote to increase the perceived trustworthiness of their resource. We are, however, concerned that one can use the findings of this study to make a CNR appear more credible than it is. Also based on our findings, it appears that most people still continue to pay attention to the very basic elements, all of which can be easily spoofed. For example, anyone can share relevant content, indicate that s/he is local to the crisis-affected area, buy followers, or use a fake identity. As people continue to place their trust on the face value and there is no “online police,” who verify account owners’ identity, it appears that designing trustworthy interfaces may only be part of a viable solution.

Though findings of this study are based on the trustworthiness of CNRs named after Hurricane Irma, it is broadly related to the “fake news” problem. One of the ways researchers suggest reducing the problem is to design machine learning (ML) or Artificial Intelligence (AI) algorithms that rank resources on their authenticity and flag or remove the fake accounts. Facebook and Twitter, for instance, have removed millions of fake accounts in 2018 [25, 32]. Recently, Facebook also removed a fake page titled, ‘Black Lives Matter’ that had about 700,000 followers and generated at least \$100,000 in donations, but was run by a white man in Australia who used the funds for himself [21]. However, there have been cases, where these algorithms fail to spot a fake account or flag a genuine account. For example, AI algorithms, at times, cannot understand subtleties of tone, cultural context, memes, or jokes. They can also eliminate content containing bad spelling and grammar, which may not necessarily be fake news [47]. We, therefore, suggest that future studies continue to investigate trustworthiness and derive robust trustworthiness rubrics to evaluate these resources. One way to correctly classify accounts on trustworthiness could be to combine algorithms with human judgement. For example, after an algorithm lists fake accounts, a moderator

could randomly spot check a portion of the accounts to verify they were correctly classified.

Our next step, in this direction would be to empower social media users with knowledge and tools to understand what is trustworthy on the social media. For our future work, we plan to create educational materials, such as infographics, short videos, and games, especially for youth and senior adults, to help them understand the kind of things to look for when assessing the trustworthiness of an online resource.

In future, we also plan to conduct interviews with the owners of CNRs named after a future event to investigate what measures do they take to increase the perceived trustworthiness of their resources. It would then be interesting to compare the findings of that work to our current work to see if owner’s understanding or indicators of trustworthiness aligns to that of the social media users.

Limitations

This study has several limitations. First and foremost, the findings reported in this paper are based entirely on the open-ended responses to our survey and interviews. Our immediate next step, therefore, will be to do a quantitative analysis, where we determine if participants’ demographics have any impact on their perspectives of trustworthiness of CNR. This analysis would also be useful in determining the parameter(s) that influence the trustworthiness of a CNR. For instance, if CNR owners’ ability to help people respond to Hurricane Irma has positive and direct influence on its trustworthiness. Second, participants were asked to make trust decisions based on a hypothetical situation, therefore they may or may not have been as critical in evaluating the trustworthiness of CNRs as they would have been if they were really affected. In the future, we plan to conduct a study, where we conduct semi-structured interviews with the people, who are in evacuation shelters or camps to see if they trust these resources. Finally, participants were shown CNR screenshots and not real pages, which did not allow them to click and explore the CNRs, something they could have done in a real scenario. We plan to address these issues by conducting a study with crisis-affected individuals, where we show them CNRs and see if they trust these resources and the content found on them. The

findings of this study would also be helpful in assessing if crisis-affected individuals consider CNRs useful. If not, which sources of information do they consider useful and why?

CONCLUSIONS

This study showed that factors that influence the perceived trustworthiness of CNRs fall under the broad categories of CNR content, information source, profile, and owner. We found that participants tended to consider a CNR trustworthy if they perceive its content as relevant, personalized, high quality, adequate in quantity, timely, useful, and accurate, and if it contained media. Participants also trusted CNRs that either linked to authoritative and/or local sources or mentioned their information sources. Additionally, participants considered a CNR as trustworthy if they perceived it to be professional, popular, authentic, purposeful, and transparent. Lastly, participants tended to trust CNRs if they perceived that its owners could help and/or had good intentions for crisis-affected individuals.

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CHAPTER V

Perceived Trustworthiness of Facebook Pages and Twitter Accounts Named after a Crisis Event

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ABSTRACT

Crisis named resources (CNRs) are the social media pages and accounts that are named after a crisis event. CNRs' owners may disseminate misinformation intentionally or unintentionally. Therefore, it is important to determine if and why people trust (or do not trust) these CNRs. We conducted surveys with experts and members of the public and asked them to evaluate the trustworthiness of CNRs named after the 2017 Hurricane Irma. Findings show that if participants perceived that a CNR owner had prior experience in crisis response, could help people respond to the on-going crisis, had the best interests of the crisis-affected people in mind, or would make efforts to correct misinformation, they tended to trust that CNR. Conversely, participants did not trust a CNR if they perceived its owner was insensitive to crisis-affected populations or would disseminate misinformation intentionally. Participant demographics seemed to have no effect on perceptions of trustworthiness.

Keywords

Social Media, Trust, Crisis Named Resources.

INTRODUCTION

Social media continue to play an important role in crisis response (Al-Akkad and Zimmermann 2012; Liu et al. 2008; Palen and Hughes 2018). While social media can contribute to situational awareness (Vieweg et al. 2010) and facilitate community building around a crisis event (Dufty 2012), outdated, inaccurate and false information can also disseminate through these platforms (Lindsay 2011). It is then often the responsibility of those who access this information to determine its credibility before sharing or acting upon it.

In this work, we aim to better understand this sensemaking process by assessing the factors that make a crisis-information provider seem trustworthy (or not trustworthy). We conducted 105 surveys with experts in crisis informatics, emergency response, and communication studies and members of the public. During the surveys, participants were shown five Crisis Named Resources (CNRs) named after the 2017 Hurricane Irma and were asked to evaluate these resources on trustworthiness. CNRs are social media pages and accounts that are named after a crisis event. Evaluating the trustworthiness of CNRs is important because they are highly-visible sources of information during a crisis response and are frequently followed by many people (Chauhan and Hughes 2017, 2018). Additionally, it is unknown in most cases who manages these resources, how, and why (Chauhan and Hughes 2017, 2018).

Our inquiry is guided by the question: *How do people assess the trustworthiness of CNRs?* Findings show that participants tended to trust a CNR if they perceived that a CNR owner had prior experience in crisis response, was capable of helping people respond to the on-going crisis, had the best interests of the crisis-affected people in mind, or would make efforts to correct misinformation. Conversely, participants tended to mistrust a CNR, if they perceived its owner was insensitive to crisis-affected populations or might disseminate misinformation intentionally. Participant demographics seemed to have no effect on perceptions of trustworthiness.

BACKGROUND

People increasingly use online platforms to connect with people, share information and news, and voice their opinions (Java et al. 2007). The information generated by people on online platforms is popularly known as user-generated content, or UGC (Krumm et al. 2008; Tirunillai and Tellis 2012). CNRs are one type of UGC that people create to raise money, ask for and offer help, and share information, opinions, and experiences during a crisis event (Chauhan and Hughes 2018).

UGC during a crisis event has the potential to contribute to situational awareness (Vieweg et al. 2010) but at the same time it can also be inaccurate or misleading (Starbird et al. 2014). A study with hundreds of local journalists reported that while journalists value interactions with users and acknowledge the ability of UGC to contribute to local coverage and boost website traffic, they are often concerned about the low-quality and credibility of UGC (Singer 2010). Studies with emergency responders have also reported that emergency responders often have concerns about the trustworthiness of the content found on social media and worry that people will act on incorrect information (Hughes and Palen 2012; Plotnick and Hiltz 2016).

Several researchers have studied the trustworthiness of UGC in crisis contexts. For instance, Endsley and colleagues (2014) examined the factors that affect perception of credibility of crisis information about natural disasters. Their study showed that people's perceptions of the credibility of crisis information are based on the source of information. They found that people consider the printed news to be the most credible source of information. Another study by Plotnick and colleagues (2018) explored people's practices when assessing trustworthiness of social media posts. Their findings demonstrated that the trustworthiness of the sender is deemed to be the strongest indicator of trustworthiness of social media posts. Both studies find that the trustworthiness of information depends on who shares it, which has interesting implications for CNRs, as in most cases, we do not know who is sharing the information and why (Chauhan and Hughes 2017, 2018).

The definition of trust that we use in this study aligns best with that of Pee and Lee (2016), who defined trust as "the extent to which one feels secure and comfortable about relying on the information on social media." We also build our work on the trust framework provided by Mayer and colleagues (1995). They showed that ability (trustee's skillset), benevolence (trustee's work in the trustor's interest), and integrity (trustee's adherence to principles acceptable by the trustor) are the three main characteristics of a trustee. We used these theories and framework to inform our study design, particularly in formulating our survey questions.

METHODS

Research Participants

We recruited two types of research participants for our study: experts and members of the public (see Appendix B for Survey Recruitment Materials). Experts are the individuals who either conduct research in crisis informatics or communication studies or have experience with emergency response. Members of the public are individuals who are above the age of 18 and have a profile on either Facebook or Twitter. An individual's presence on either of these sites provides some level of assurance that s/he has a basic understanding of how social media works. We chose two types of participants because we believed that experts will have different perceptions of trustworthiness of CNRs than non-experts.

Participant Recruitment and Demographics

After obtaining Institutional Review Board (IRB) approval, we contacted potential participants through online media. We posted the survey description and a link to the survey on our Facebook and Twitter accounts and professional websites. We also designed a survey recruitment card with the name of the study, a link to the survey, and our contact information. These cards were used to share survey information with people who came in our contact in professional settings and had the necessary background for our study. Our survey was active March 30 – June 17, 2018, during which we collected 148 survey responses (105 complete responses and 43 incomplete responses). Table 1 shows research participant demographics. Of these 105 survey respondents, 50% were male and 50% were female. Most participants (60%) belonged to the age group 18 – 34. The majority of these respondents (85%) were members of the public. Also, while half of the participants (50%) were extremely comfortable with Facebook, 20.9% participants were extremely comfortable with Twitter. This means that more participants were more comfortable with Facebook.

Table 25. Research Participants Demographics

Demographic		Participants (N = 105)
Gender	Male	53 (50.4%)
	Female	52 (49.5%)
Age	18 – 24	32 (30.4%)
	25 – 34	31 (29.5%)
	35 – 44	16 (15.2%)
	45 – 54	11 (10.4%)
	55 – 64	13 (12.3%)
	65 – 74	2 (1.9%)
Highest Level of Education Completed	High School Graduate	4 (3.8%)
	Some College	19 (18.0%)
	2-year Degree	7 (6.6%)
	4-year Degree	38 (36.1%)
	Master's Degree	24 (22.8%)
	Doctorate	13 (12.3%)
Expert in Crisis Informatics, Communication Studies, or Emergency Response	Yes	17 (16.1%)
	No	88 (84.7%)
Comfort Level Using Facebook	Extremely Uncomfortable	7 (6.6%)
	Somewhat Uncomfortable	8 (7.6%)
	Neither Uncomfortable nor Comfortable	9 (8.5%)
	Somewhat Comfortable	29 (27.6%)
	Extremely Comfortable	52 (49.5%)
Comfort Level Using Twitter	Extremely Uncomfortable	15 (14.2%)
	Somewhat Uncomfortable	22 (20.9%)
	Neither Uncomfortable nor Comfortable	22 (20.9%)
	Somewhat Comfortable	24 (22.8%)
	Extremely Comfortable	22 (20.9%)

Questionnaire Design

We used Qualtrics to administer our survey. Table 2 shows the questionnaire for our study. Questions in block I gathered information about participants' perceptions on the trustworthiness of CNRs. These questions were based on the work of Mayer et al (1995) and Pee & Lee (2016) and were asked for each CNR. The first 6 questions in block I asked about the CNR owner's ability (Q1.1 and Q1.2), benevolence (Q1.3 and Q1.4), and integrity (Q1.5 and Q1.6). Q1.1 – Q1.6 required closed-ended responses on a 5-point Likert scale from 'extremely unlikely' to 'extremely likely.' Q1.7 collected participants' overall perception on the trustworthiness of a CNR and required an open-ended response. Questions in block II gathered demographic information about the participant. We included an optional drawing for survey participants as an incentive (one participant received a \$50 Amazon Gift Card). See Appendix C for Survey Questionnaire.

To provide context to our participants, we included a scenario in our survey design. The scenario asked participants to imagine that they were in Florida and had been affected by Hurricane Irma. The 2017 Hurricane Irma served as a prompt for these studies as it was a recent major crisis event at the time and the most intense Atlantic hurricane to strike the United States since Katrina in 2005 (Kettley, 2017).

Table 26. Survey Questionnaire

Block I: Perceptions on Trustworthiness of Crisis Named Resources
Q1.1: Do you feel that the owner of this Twitter account (or Facebook page) has prior experience in crisis response?
Q1.2: Do you feel that the owner of this Twitter account (or Facebook page) is capable of helping you respond to Hurricane Irma?
Q1.3: Do you feel that the owner of this Twitter account (or Facebook page) has your best interests in mind?
Q1.4: Do you feel that the owner of this Twitter account (or Facebook page) understands your situation?
Q1.5: Do you feel that the owner of this Twitter account (or Facebook page) will provide misleading information intentionally?
Q1.6: Do you feel that the owner of this Twitter account (or Facebook page) will make efforts to correct any false rumor or misinformation as soon as it comes to his/her notice?
Q1.7: Would you trust the information on this Twitter account (or Facebook page)? Trust is defined as the extent to which you feel secure and comfortable relying on the information.
<input type="radio"/> Yes, because: _____ <input type="radio"/> Maybe, because: _____ <input type="radio"/> No, because: _____
Block II: Demographics
Q2.1: Please select your gender.
<input type="radio"/> Male <input type="radio"/> Female <input type="radio"/> Other
Q2.2: Please select your age.
<input type="radio"/> 18 – 24 <input type="radio"/> 25 – 34 <input type="radio"/> 35 – 44 <input type="radio"/> 45 – 54 <input type="radio"/> 55 – 64 <input type="radio"/> 65 – 74 <input type="radio"/> 75 – 84 <input type="radio"/> 85 or older
Q2.3: Please select the highest level of education you have completed.
<input type="radio"/> Less than high school <input type="radio"/> High school graduate <input type="radio"/> Some College <input type="radio"/> 2-year degree <input type="radio"/> 4-year degree <input type="radio"/> Master's Degree <input type="radio"/> Doctorate
Q2.5 Do you consider yourself as an expert in Crisis Informatics, Communication Studies, or Emergency Response?
<input type="radio"/> Yes <input type="radio"/> No
Q2.4 Please select your comfort level when using Facebook.
<input type="radio"/> Extremely uncomfortable <input type="radio"/> Somewhat uncomfortable <input type="radio"/> Neither uncomfortable nor comfortable <input type="radio"/> Somewhat comfortable <input type="radio"/> Extremely comfortable
Q2.5 Please select your comfort level when using Twitter.
<input type="radio"/> Extremely uncomfortable <input type="radio"/> Somewhat uncomfortable <input type="radio"/> Neither uncomfortable nor comfortable <input type="radio"/> Somewhat comfortable <input type="radio"/> Extremely comfortable

Selecting Crisis Named Resources

We searched for pages and accounts that had “Hurricane Irma” in their name on Facebook and Twitter platforms one month following Irma’s US landfall. In total, we identified 32 Hurricane Irma CNRs: 20 Facebook pages and 12 Twitter accounts. To pick a reasonable number of CNRs that could demonstrate some variation in content and still be manageable for our study, we selected 5 Hurricane Irma CNRs (see Table 3, all CNR names and descriptions are anonymized). When selecting these CNRs, we varied them along several dimensions (i.e., different social media platforms, purposes, and number of followers). We chose these variations to ensure that participants were exposed to the different kinds of CNRs that are created around events. When retrieving these CNRs, we captured their screenshots as opposed to the actual online pages, so that all participants would see the same information. See Appendix D for Crisis Named resources’ Screenshots. Otherwise, participants may see different content depending on how these resources change over time, and findings may not be comparable. However, the downside of static screenshots was that participants were restricted in their ability to click on links and photos, which they could have done on actual online pages.

Table 27. 2017 Hurricane Irma CNRs Used in the Survey (Status as of Dec 20, 2017).

CNR Name and Description	CNR Follows/ Followers
<i>CNR 1 (Twitter account)</i> – Tweets were written in the first person, as if Hurricane Irma herself had created the account. All tweets were either sarcastic or humorous with frequent political references.	3
<i>CNR 2 (Facebook page)</i> – This page was created by the editor and proprietor of a news media outlet in Florida because she had difficulty finding news and information specific to Key West and the Lower Keys where she had family. The Page owner provided her phone number, email address, and the website and shared many hurricane-related posts, photos, and videos.	13,209
<i>CNR 3 (Facebook page)</i> – This page provided a link to a fundraiser site without stating who owns this page and who is raising the funds, why, and how. It shared many hurricane-related posts and pictures.	4,116
<i>CNR 4 (Facebook page)</i> – This page claimed to be the official page for Hurricane Irma memes, and indeed all posts were memes. Page claimed to be ‘just for fun’ and it provided a link to a shop that sells hemp wick.	899
<i>CNR 5 (Twitter account)</i> – This account tweeted actively about hurricane-related information during the storm. The account bio showed the owner’s location as Florida and provided a link to their Instagram account. It followed the city mayor and people from news stations. CNR 5 also had 8 lists, all related to news stations and weather channels.	167

DATA ANALYSIS

In this paper, we report on our analyses of the survey responses. To begin, we exported all the responses from Qualtrics and cleaned the data. The cleaning process involved removing unnecessary columns, redundant information, and rows with incomplete responses. The aim of these analyses was to assess the factors that influence the trustworthiness of CNRs and associations between participants’ perceptions of CNRs’ trustworthiness and their demographics.

We started our data analysis by determining the degree to which each participant trusted (or did not trust) each CNR. If a participant selected that s/he did not trust a CNR, we gave it a 0. Similarly, “maybe trust” and “trust” responses were coded as 1 and 2 respectively. We also coded “extremely unlikely,” “somewhat unlikely,” “neither unlikely nor likely,” “somewhat likely,” and “extremely likely” as 0, 1, 2, 3, and 4 respectively.

We next calculated the Spearman correlations between the trustworthiness of all 5 CNRs (see Figure 1). This calculation tells us if participants’ perceptions of trustworthiness of one CNR affected their perceptions of trustworthiness of other CNRs. Thereafter, we analyzed the open-ended survey responses for each of the CNR and determined participants’ rationale behind categorizing a CNR as trustworthy or untrustworthy. Finally, we determined correlations between the perceived ability, benevolence, integrity, and trustworthiness of each CNRs.

FINDINGS

This section is divided into two sub-sections. The first section describes the factors that influence the trustworthiness of CNRs and the second section describes the correlation trends between the factors that influence the trustworthiness of CNRs.

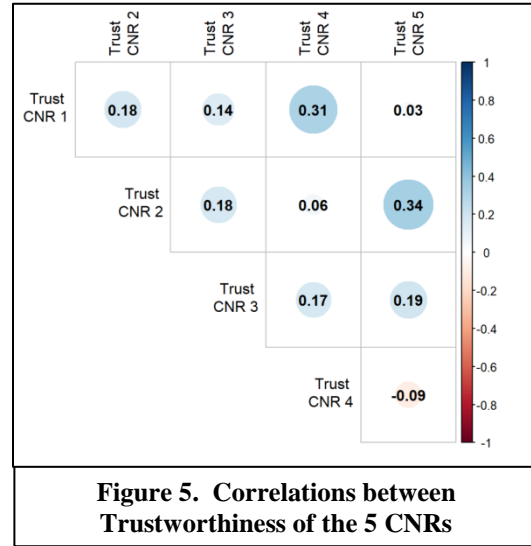
Factors that Influence the Trustworthiness of CNRs

Our analysis reveals that most participants trusted CNR 5 (see Table 4). In comments, participants appreciated that it provided hurricane-related information and connected to other Twitter accounts through Twitter lists. We also found that most participants did not trust CNRs 1, 3, and 4 (see Table 4). CNRs 1 and 4 mostly provided comedic accounts of the Hurricane event. Many of the participants felt the information on these CNRs were irrelevant and in some cases insensitive to the disaster circumstances. CNR 3 was a Facebook page that asked for money without sharing where the money would go and how it would be used. Finally, most participants were unsure about whether to trust CNR 2 (see Table 4). While some trusted CNR 2 for sharing useful hurricane-related information, some did not trust it because they believed that it to be impossible or too much work for the CNR 2 owner (an individual) to keep up with all the hurricane-related information while also managing misinformation. See Appendix E for all the survey data.

Table 28. Participants' Perceptions on Trustworthiness of CNRs

CNR ID	Do Not Trust	Maybe Trust	Trust
CNR 1	92 (87.6%)	10 (9.5%)	3 (2.8%)
CNR 2	10 (9.5%)	53 (50.4%)	42 (40.0%)
CNR 3	56 (53.3%)	37 (35.2%)	12 (11.4%)
CNR 4	96 (91.4%)	7 (6.6%)	2 (1.9%)
CNR 5	6 (5.7%)	44 (41.9%)	55 (52.3%)

Figure 1 shows a relatively high correlation between CNR 1 and CNR 4 and between CNR 2 and CNR 5. The Spearman correlation (0.31) between *Trust CNR 1* and *Trust CNR 4* signifies that participants who trusted CNR 1 also tended to trust CNR 4. Also, people who did not trust CNR 1 tend to not trust CNR 4 as well. This is most likely because both accounts were similar, in that they both shared comedic commentary on the event and did not seem to be focused on hurricane response. These results are also reflective of participants' beliefs. For example, several participants indicated that humor would not help them respond to Hurricane Irma in their written comments. ID 73 did not trust CNR 1 and CNR 4. For CNR 1, he wrote, *"This is obviously a joke account and more than likely will not report anything with real value."* For CNR 4, he wrote, *"Meme pages are not sources of information. Good for laughs and not much else."* The Spearman correlation (0.34) between *Trust CNR 2* and *Trust CNR 5* signifies that participants who trusted CNR 2 also tended to trust CNR 5. It also means that people who did not trust CNR 2 tended not to trust CNR 5. This is most likely again because both accounts were similar, in that they shared a lot of information about Hurricane Irma. There are no other significant correlations between the other CNRs.

**Figure 5. Correlations between Trustworthiness of the 5 CNRs**

The following three subsections take a closer look at the CNRs that most participants 1) did not trust, 2) trusted, or 3) were unsure whether to trust.

CNRs that Most Participants Did Not Trust

The majority of our participants did not trust CNR 1, CNR 3, and CNR 4. We now describe their perceptions of these CNRs in detail.

CNR 1

Our findings indicate that most participants (87.6%) did not trust CNR 1 (see Table 4). Some participants did not trust CNR 1 because they felt that its owners provided irrelevant information. For instance, ID² 24 did not trust CNR 1 because she found that most of the tweets were *"about dis/approval of US Pres rather than how to survive hurricane damage."* Some participants also felt that CNR 1 had not been created by an authoritative source. ID 129 did not trust this CNR and wrote, *"I have no reason to believe the account has any relation to official sources. Furthermore, the presence of political/partisan commentary increases the untrustworthiness."* Additionally, some participants believed that CNR 1 had not been created with the intention of helping the disaster affected public. As ID 58 wrote, *"They're way more interested in Donald*

² To protect participant anonymity, we use a unique study identifier.

Trump than providing useful information. It seems to me that whoever created this account wants to make cheap jabs at politicians more than they want to help hurricane victims.”

CNR 3

More than half (53.3%) of the participants chose not to trust CNR 3. Our findings indicate that many participants did not trust CNR 3 because they believed it to be a scam that provided a link to a fundraising site but never shared who was collecting the money and where the money was going. ID 123 did not trust CNR 3. She wrote, *“it is raising money without additional information -- who is it fundraising for, how will the money be disseminated, etc. Feels like a scam.”*

CNR 4

Most (91.4%) participants in our dataset chose not to trust CNR 4. Most participants felt it had not been created by an official, was providing irrelevant information, and was not created in the interest of crisis-affected individuals. For instance, ID 11, who did not trust CNR 4, wrote, *“this site is making jokes and memes about the hurricane, not intending to help or disseminate information.”*

Based on the analyses of open-ended survey responses of the CNRs that most participants did not trust, we found that the factors that decrease the perceived trustworthiness of resources are irrelevant content, lack of authority, and a lack of information about the owner and the intentions of the owner.

CNR That Most Participants Trusted

We now report on CNR 5, a Twitter account that more than half (52.3%) of the participants trusted and over 40% said that they might trust it. Our findings indicate that many participants trusted CNR 5 because they perceived that CNR 5 owners provided hurricane-related information, linked to many other resources using Twitter Lists, and were professional in manner. ID 42 trusted CNR 5 and wrote, *“it seems legit because of the information that has been posted about updates and disaster preparedness plans. The design also is more professional and they even have famous news-stations' news-anchors' Twitter accounts attached to it, which makes it seem more legit.”* Some participants also felt that the CNR 5 owners created this CNR to help the crisis-affected public and shared useful content. For example, ID 62 trusted CNR 5 because it seemed *“to have the sole interest of spreading information about the hurricane.”* ID 14, who also trusted CNR 5 wrote, *“it looks professional and the content seems relevant to information I may need if I was affected by hurricane Irma.”*

CNR that Received Mixed Reactions

Lastly, we report on CNR 2, a Facebook page that received mixed reactions on trustworthiness. Table 4 show that while 40% participants trusted CNR 2, half (50.4%) of the participants were on the fence about whether to trust it or not. CNR 2 is an example that shows how a CNR that seems trustworthy to some participants, does not seem trustworthy to others.

We first analyzed the open-ended responses of participants who trusted CNR 2. Our analysis shows that some participants trusted CNR 2 because the owner of this page revealed her identity. ID 15 trusted CNR 2 and wrote, *“she's given credentials, explained who she is, her personal situation - which gives the reader the confidence to trust the information she's gathering and dispersing. She's also provided personal information, which lends credence.”* Some participants also trusted it because they believed that the owners of this page had good intentions. ID 37 trusted CNR 2 and perceived that its owners *“have good intentions and a good purpose.”* Participants also trusted CNR 2 because they thought that it shared relevant information and was well-received by the public. ID 39 trusted CNR 2 and wrote, *“she has many followers and her page is dedicated to providing up to date information on the storm crisis. She also has many photos and videos providing further details.”*

Next, we analyzed open-ended responses of participants, who were on the fence about whether to trust CNR 2 or not. We found that some participants did not like that CNR 2 was a public page and that the page owner asked people to use it as a resource and a place to share information. Others questioned the page owner's

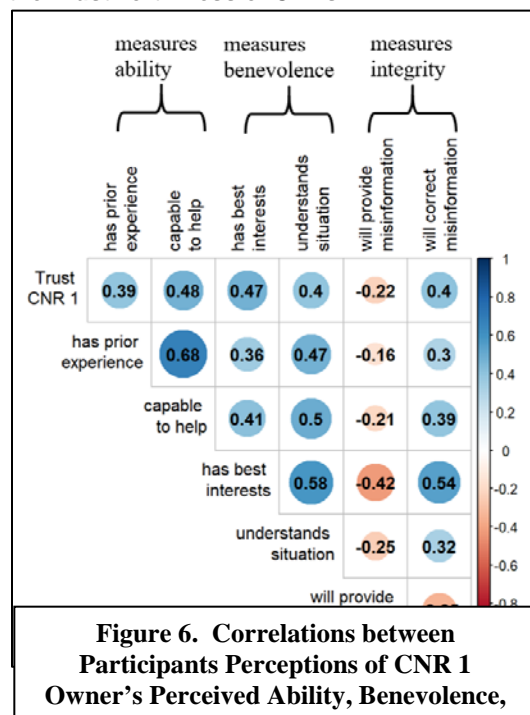
ability to run the page and described how they would verify the information provided on this page before taking any action. ID 88 chose to ‘maybe’ trust CNR 2 and wrote, “*it is intended as a share point where anybody can post info about the event. So, depending on the primary source of the posted info, I’ll be willing to trust it or not.*” ID 67, who also chose to ‘maybe’ trust CNR 2 wrote, “*the page owner seems to have good intentions, but I have doubts about her competence in maintaining the page.*”

Table 29. Participants’ Perceptions and Rationale on Trustworthiness of CNRs

CNR ID	Participants’ Opinions on Trustworthiness	Participants’ Rationale on the Trustworthiness (Code Categories Ref. Chapter IV)
CNR 1	Most participants did not trust it.	Content found on this CNR was not Relevant . Information did not seem to come from Known Trusted Sources . Owner Intentions did not seem to help the affected public.
CNR 2	Most participants were unsure about its trustworthiness	On one hand, participants trusted CNR 2 because the owner self-identified herself. Some participants also felt that the CNR 2 owner had good intentions and shared relevant information. Some participants also trusted CNR 2 because it was popular . On the other hand, some participants did not trust CNR 2 because they doubted CNR 2 owner’s ability (as an individual) to help the crisis-affected public.
CNR 3	Most participants did not trust it.	Lack of Self Identification .
CNR 4	Most participants did not trust it.	Content found on this CNR was not Relevant . Information did not seem to come from Known Trusted Sources . Owner Intentions did not seem to help the affected public.
CNR 5	Most participants trusted it.	Content found on this CNR seemed Relevant to the event. This CNR Connected to many other officials and seemed to follow Professionalism . The Intentions of this CNR owner seemed to help crisis affected public.

Correlation Trends between the Factors that Influence the Trustworthiness of CNRs

We also determined correlations between the perceived ability, benevolence, integrity, and trustworthiness of each CNR’s owner and found many consistent trends. Perceived ability was measured by asking the participant if they felt the owner had prior experience and whether that owner had the capability to help respond to a disaster. Figures 6-7 show a positive Spearman Correlation (ranging from 0.39-0.63) between *Trust* in a CNR and *has prior experience*. This correlation indicates that participants tended to trust a CNR if they believed that the owner had experience in crisis response. The correlation also shows the opposite to be true, that participants tended to not trust a CNR if they believed that the owner did not have experience in crisis response. Figures 6-7 also show a positive Spearman Correlation (ranging from 0.48-0.79) between *Trust* in a CNR and *the ability to help respond to disaster*. This indicates that participants tended to trust a CNR if they believed the CNR owner has the capability to help respond to the event. It also means that when participants felt that a CNR owner is not capable to help respond to the event, they tended not to trust the CNR.



Perceived benevolence was measured by having the participant determine if they felt the owner had the best interests of the public in mind and that the owner understood the situation of the Hurricane-affected public. Figures 6-7 show a positive Spearman Correlation (ranging from 0.44-0.73) between *Trust* in a CNR and *has best interests*. This correlation indicates that participants tended to trust a CNR if they believed that the owner had the best interests. The correlation also shows the opposite to be true, that participants tended to not trust a CNR if they believed that the owner did not have the best interests. Figures 6-7 also show a positive Spearman Correlation (ranging from 0.4-0.64) between *Trust* in a CNR and *understands situation*. This indicates that participants tended to trust a CNR if they believed that the owner understands the situation of crisis-affected populations. It also means that participants tended not to trust a CNR if they believed that the owner does not understand the situation of crisis-affected populations.

Finally, perceived integrity was measured by asking the participants if they felt the owner would not provide misinformation intentionally and would correct misinformation if it comes to his/her notice. Figures 6-7 show a negative Spearman Correlation (ranging from -0.56 to -0.22) between *Trust* in a CNR and *will provide misinformation*. This implies that when participants felt that the owner of a CNR would provide misinformation intentionally, they tended not to trust it. Or, when participants felt that the owner of a CNR would not provide misinformation intentionally, they tended to trust it. Figures 6-7 also show a positive Spearman Correlation (ranging from 0.4-0.59) between *Trust* in a CNR and *will correct misinformation*. This implies that participants tended to trust a CNR, if they felt the owner of a CNR will correct misinformation and vice-versa.

In addition to the correlations already discussed, we found several high-level correlations between some of the trust factors across all of the CNRS. These correlations are listed below:

- “*prior experience*” and “*capability to help*” - Our findings indicate that when participants felt that a CNR owner had prior experience with crisis response, they were more likely to feel that the CNR owner was also capable of helping them to respond to crisis and vice versa. High correlation between these two factors (ranging from 0.62-0.8) are reflected in Figures 6-7.
- “*best interests*” and “*understands your situation*” - We found that when participants felt that a CNR owner has their best interests in mind, they tended to feel that s/he also understands their situation. This is reflected by the high correlations ranging from 0.43-0.79 in Figures 6-7.
- “*best interests*” and “*will correct misinformation*” - Our data suggests that participants are most likely to believe that a CNR owner will correct misinformation, if they felt that s/he has their best interests in mind. This finding is supported by Figures 6-7 that show high correlations between these two factors ranging from 0.53-0.69.
- “*will provide misinformation*” and “*trustworthiness*” - We found that participants tended not to trust a CNR if they believed that it’s owner will provide misinformation. Conversely, participants tended to trust a CNR, if they believed that it’s owner will not provide misinformation. This is reflected in Figures 6-7 by negative correlations as -0.22, -0.54, -0.34, -0.56, and -0.33 respectively.

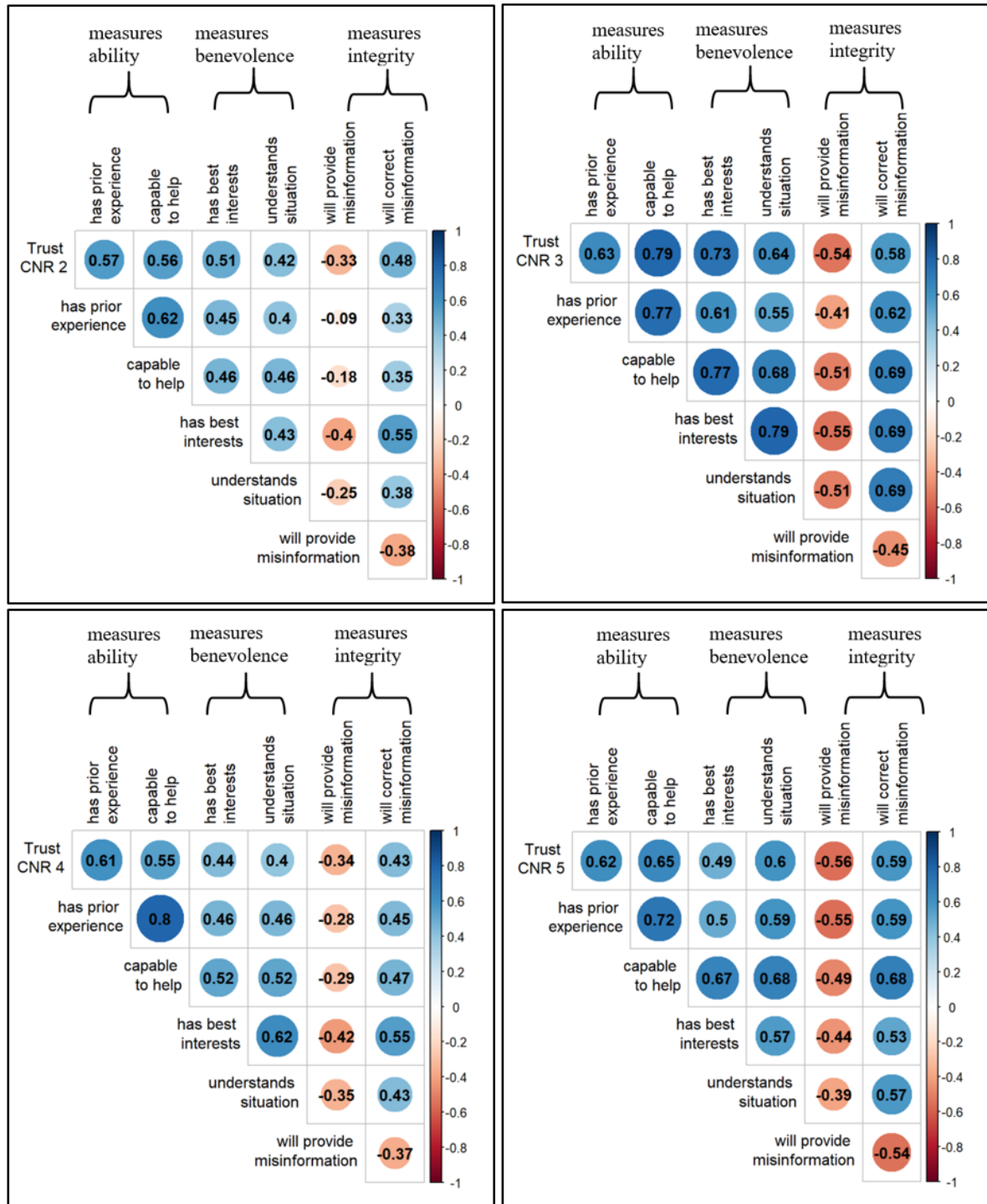


Figure 7. Correlations between Participants Perceptions of CNR 2-5 Owner's Perceived Ability, Benevolence, Integrity, and Trustworthiness.

Participant Demographics and Trustworthiness Perceptions of CNRs

To see if there is a correlation between participant demographics and their perceptions of trustworthiness, we calculated Spearman correlations among these parameters. Our findings indicated a small, insignificant correlation (0.23) between a participants' age and their trustworthiness of resources. We did not find

correlations between a participant's perception of trustworthiness of a CNR and the participant's educational background and/or expertise. We were surprised to find that there was no significant difference in trustworthy opinions between experts and members of the public, but we acknowledge that it is likely due to a skewed dataset with many more members of the public than experts. We also calculated the correlations between a participant's comfort level with Facebook or Twitter and his/her perceptions of the trustworthiness of the shown Facebook pages (CNR 2, CNR 3, and CNR 4) or Twitter accounts (CNR 1 and CNR 5) and found no correlations. Appendix G and H contain results of our quantitative analyses using MS Excel and R. We state these observations with caution as our survey data comprises only 105 survey responses, a sample size that does not allow for robust generalization. Additionally, our dataset was skewed in many cases (for example, a significant number of participants were highly educated, members of the public, and younger than the age of 55 years) making it insufficient for any kind of causal relationships and generalizations.

DISCUSSION

In this research, we assessed known factors that tend to increase the trustworthiness of CNRs. Our findings indicate that a participant's perceptions of trustworthiness of a CNR is based on their perceptions of the abilities and intentions of the owners of the CNR. For instance, if participants perceived that the owner of a CNR had prior experience in crisis response, the capability to help respond to crisis, the best interests of the affected population in mind, an understanding of the crisis situation, or was likely to correct misinformation, they tend to trust it. These findings are consistent with the findings of Endsley and colleagues (2014), who showed that the source of information influences the perceived credibility of the information shared during crisis events. Our findings also align with those of Plotnick and colleagues (2018), who showed that people assess the trustworthiness of social media posts based on their perceptions of the trustworthiness of the sender.

This research has implications for emergency managers and response organizations that want to increase their perceived trustworthiness on social media. We found that participants tended to trust a CNR if they believed the CNR owner had prior experience in crisis response or the ability to help people respond to the disaster. Based on this finding, emergency managers may want to clearly state their expertise and affiliation(s) on their social media accounts. We also found that people tended to trust a CNR, if they perceived that a CNR owner had their best interests or an understanding of the situation. Emergency responders can therefore craft social media messages that show that they understand the needs of the crisis-affected populations and have their best interests in mind. Another finding of this study suggests that people tend to trust a CNR if they believed that its owner is likely to correct misinformation. Therefore, whenever possible, emergency managers should correct misinformation that comes to their notice and attempt to make these correction efforts visible. Similar recommendations for improving trust were provided by Hughes and Chauhan (2015), who studied the online communications of Hurricane Sandy affected fire and police departments.

Findings of this research also have direct implications for those who want to design trustworthy CNRs. Specifically, this research could inform the design of an interface that guides people step-by-step in designing a trustworthy CNR. The first step would be to guide people to complete their profile, i.e., to give an appropriate name and handle to their resource, as well as write a bio that clearly states their expertise (ability) and affiliations. People could then be asked to publish their first post or tweet, where they state their goals and intentions for creating a CNR. This first post should be crafted in such a way that shows that the CNR owners have the best interests of the crisis-affected populations in mind and their understanding of the situation of the event (benevolence). Finally, people would be guided to ensure that they verify each piece of information before publishing it and monitor the UGC content on their CNR for misinformation (integrity). However, we provide the above suggestions with caution, because people could use such an interface to make their untrustworthy accounts and websites appear more trustworthy. Ultimately it is the responsibility of the people who look for information online to vet the information in the best way they can. Also, if people continue to evaluate trustworthiness of online resources only based on surface features (e.g., an appropriate profile or cover photo, number of likes, etc.) of these resources, they might perceive "fake news" as

trustworthy. In the future, we plan to create educational materials to educate people to distinguish fake news on social media.

This study has a few limitations. Participants were asked to make trust decisions based on a hypothetical situation, therefore they may or may not be as critical in evaluating trustworthiness of CNRs as they would have been if they were really affected. Additionally, participants were shown CNR screenshots and not the real pages, which in turn did not allow them to click and explore CNRs in-depth, something they would have done in a real scenario. Furthermore, there were only 105 complete survey responses, therefore the findings of this study may be difficult to generalize regarding the effect of participants' demographics on trustworthiness of CNRs. Finally, all our participants were English speaking and from the United States, therefore, we did not consider cultural differences in this work.

In the future, we plan to conduct an interview study with people who have recently faced a disaster and ask them about the usefulness of CNRs. Doing so, will overcome the issue of including participants who have never faced a disaster or are unaware about the crisis response procedures or needs of crisis-affected populations. We also plan to build on the findings of this research and identify factors that influence the trustworthiness of CNR posts. To do so, we will choose a CNR, and show participants its posts one-by-one. This will allow us to garner participants perceptions of trustworthiness on each post and will also allow us to understand how trust may develop and evolve over time.

CONCLUSION

This research determines how people assess the trustworthiness of CNRs. Findings of this research show that if people perceive that a CNR owner has prior experience in crisis response, can help crisis-affected public to respond to the event, understands the situation and has best interests of affected individuals, or will correct misinformation that comes into his/her notice, they tend to trust that CNR. In contrast, if people feel that CNR owner can share misinformation intentionally, they tend not to trust that CNR. No significant correlation between participants perceptions on the trustworthiness of CNRs and their demographics was found.

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CHAPTER VI

CONCLUSION

In this final chapter, I summarize the findings of this dissertation research. I also reflect upon the use of social media in crisis events. Finally, I discuss the limitations of this research and offer suggestions for future work.

Dissertation Summary

The aim of this dissertation is to study crisis communications on social media and to determine the factors that contribute to the trustworthiness of Crisis Named Resources (CNRs). This dissertation consists of three studies.

STUDY I

In this study, I identified Local Responders, Local News Media, Cooperating Agencies, and a set of social media accounts and pages named after the wildfire as the four online information sources that provided official information during the 2014 Carlton Complex Wildfire. I analyzed the communication behaviors of these resources and assessed the relevance and timeliness of the information provided by them. The data show that the Local News Media provided the highest quantity of relevant information and the timeliest information. I also found that the social media resources named after the wildfire (also known as CNRs) posted the highest percentage of relevant posts around the wildfire. Though they seemed official, it was often unclear who created them and why. This finding laid the foundation for my second study, where I studied these CNRs in depth.

STUDY II

This study provided an examination of the social media accounts that are named after a crisis event, called CNRs. Specifically, I studied the crisis response role of CNRs around the 2016 Fort McMurray Wildfire. Findings showed that CNRs appear spontaneously around an event and are often deleted or left unused after the completion of an event. These resources shared a lot of relevant information and covered a range of topics from information dissemination, to offers of help, to expressions of solidarity. The most liked CNRs were the ones that provided platforms for people to ask for or provide help. Additionally, in most cases, the creators of these resources chose to stay anonymous, which may or may not have been intentional. Despite having anonymous owners, these resources, at times, were followed by tens of thousands of people. A large number of followers for a social media page or account is an indicator of broader social influence and leads to more amplification of its content [12]. Information coming from an anonymous source can, however, be hard to evaluate on trustworthiness. This observation laid the foundation for my third and final study, where I determined how people evaluate the trustworthiness of CNRs.

STUDY III

In this study, I focused on the trustworthiness of the Facebook and Twitter CNRs created around the 2017 Hurricane Irma. This study included 105 surveys and 17 interviews with members of the public and experts in Crisis Informatics, Communication Studies, and Emergency Management. During the interview and survey sessions, participants were asked to evaluate the trustworthiness of CNRs created around 2017 Hurricane Irma. Findings from the interview study showed that the factors that influenced trustworthiness of CNRs the most were the participants' perceptions of CNR content,

information source, owner, and profile. Also, CNRs that shared content which were seen as insensitive and/or irrelevant to Hurricane Irma were not trusted by the majority of participants. Findings from the survey study showed that participants tended to trust CNRs if they perceived the CNR owner had prior experience in crisis response, the capability to help respond to disaster, the best interests, and an understanding of the situation. Also, if participants believed that a CNR owner is unlikely to share misinformation and likely to correct misinformation, they tended to trust the CNR. There was no correlation between perceived trustworthiness and a participants' gender, age, education, expertise, and comfort level with Facebook or Twitter.

Implications for Social Media Use in Emergency Response

Past literature has demonstrated the ways social media have been used during crisis events [13]–[17]. In this dissertation, I continue looking at how social media are used during crisis events. Doing so, led to the discovery of Crisis Named Resources (CNRs)—the social media pages and accounts that are named after a crisis event. CNRs seem to provide yet another way of facilitating engagement around a crisis event.

All studies in this dissertation research affirmed that CNRs appear around crisis events and participate actively in crisis response. CNRs offer platforms for people to obtain information and participate in a crisis response. Findings from Study II (Chapter III) revealed 8 types of CNRs: *donations*, *fundraisers*, *needs & offers*, *prayers*, *reactions*, *stories*, and *reports*. *Donations*, *fundraisers*, and *needs & offers* CNRs offered platforms for individuals or organizations to ask for/offer help in terms of money and resources. Providing and asking for help online lead to community building in times of need. *Prayers*,

reactions, and *stories* CNRs are also another way of community building, which allow individuals to share their support, opinions, and experiences during a crisis event. *Reports* CNRs, on the other hand, facilitate information dissemination and/or exchange around a crisis event. Such CNRs have the potential to contribute to situational awareness, a phenomenon that commonly appeared throughout the crisis informatics literature [18]. All of the CNRs found in Study II seemed to be altruistic in purpose, however, that is not always the case. Study III (chapter IV and V) revealed two CNRs whose content appeared to be insensitive to the situation of crisis-affected populations. While one resource trolled President Trump, the other shared humorous memes about Hurricane Irma. Such resources do not provide information that can be used to respond to the event but nonetheless could help in community building by providing people with comic relief during crisis. It seems likely that other “less useful” CNRs exist, and it would be interesting to study future crisis events to identify and study them.

Another consistent finding across these studies was that most of the CNR owners were anonymous and did not explicitly disclose the purpose of their CNR, which may or may not have been intentional. While anonymity may allow people to freely express their situation or opinions [19], [20], anonymity can also encourage cybercrimes such as trolling [21] or money laundering [22]. Anonymity can also lead to lesser perceived accountability or trustworthiness. In the case of this research, anonymity could be a particular issue for CNRs that are of the *donations*, *fundraisers*, and *needs & offers* type. When following advice from such a CNR, one should take steps to ensure that it is not a hoax.

This research has implications for people seeking information on social media during a crisis event. As found in this research, numerous resources disseminate

information around crisis events, some of which are more trustworthy than others. Knowing how people make decisions on the trustworthiness of social media content, can help members of the public to look for markers (such as clearly stated goals or people identifying themselves and their expertise and intentions) of trustworthiness. For example, if people find a resource whose owner seems to be sharing misinformation or is not monitoring the content on his/her resource for outdated or incorrect information, they can either choose not to follow it or verify information from others before taking any action.

This research also has implications for emergency response. I recommend that official emergency responders monitor CNRs to ensure that the information they provide is accurate, especially if the public sees them as a source of official information. Resources that are insensitive to the crisis should be monitored for sharing misinformation. Monitoring these accounts will allow emergency responders to know what people are concerned about or what types of information they need. This will allow them to adjust their own communications to correct misinformation or respond to requests for information. If during monitoring these resources, responders find a very useful CNR, they may reach out to the CNR owners and offer to work together. Responders may even point the public to these sources if the information they provide is credible and meets a particular need that cannot be met by the official response (e.g., helping reunite pets with their owners).

Broader Implications

This research also has implications for the broader consumption of social media data. Many people on social media tend to believe fake news [23]. This phenomenon was

highlighted in the case of the 2016 US Presidential election, where people believed reliable-looking fake websites and social media bots to be reliable sources of information [24]. Given this, Google and many of social media platforms, including Twitter and Facebook, have adjusted the way they present news and information. For instance, Facebook recently updated its ad policy and ensured that the policy update will not allow the flow of fake news stories through its news feed [25]. Facebook, recently, also made several attempts to address hoaxes and fake news. First, it made it easier for users to report a hoax post. Second, it started working with third-party fact-checking organizations, where once a fake story is identified, Facebook flags it as “disputed” and shows it lower in the news feed. Third, it has started analyzing the stories that are less shared. Finally, Facebook is taking steps to reduce the financial incentives, one of the biggest motivations for those who spread fake news [26]. More recently, Twitter has also acquired a London-based start-up named “Fabula AI, which claims to identify fake news [27]. One contribution of this research is, therefore, to aid members of the public with a list of factors that affect the trustworthiness of online sources. I, however, caution that some of these factors can be easily spoofed, thus members of the public would have to use their discretion to identify trustworthy resources. Also, as there are different types of online resources, some which raise money, whereas some that share humor, factors to consider when evaluating the trustworthiness of a resource might vary. For example, it is not as critical to know the CNR owner for an account that provides humor as for the one that asks for money.

Limitations and Future Work

In this section, I list the limitations of this dissertation work and offer recommendations for future work. First, the data was limited to Facebook and Twitter

platforms. In future research, I would be more inclusive of other social media, mobile and web platforms. Each of these platforms have different affordances, thus the users on these platforms might consider different factors to judge the trustworthiness of profiles. For instance, on WhatsApp one has to verify his/her phone number to create an account, while on Redditt one can create throwaway (or one-time-use) accounts. Second, only natural crisis events are considered (i.e., wildfires and hurricanes). It would be interesting to compare the findings of this dissertation with CNRs created during man-made crisis events, which are not only sudden but are also short-lived. During a man-made crisis, such as an active shooter scenario, people must take immediate action and do not have time to create Facebook or Twitter profiles with a complete bio and suitable profile and background pictures. Also, most of the CNRs, in this case, would be created after the event and would likely consist of reactions on gun violence or speculations about the identity and intentions of the shooter. Therefore, it seems that CNRs may vary widely in their role and purpose in a different kind of crisis event. Third, I studied only one kind of social media resource that appears around a crisis event (CNRs). In the future, I plan to do a comparative study on the trustworthiness of resources that are created just-in-time (CNRs) versus the established accounts that belong to well-known organizations or celebrities.

In future work, I plan to continue investigating the trustworthiness of CNRs. I plan to conduct an interview study, where I ask members of the public to evaluate the trustworthiness of CNRs whose owners stay anonymous versus those who clearly state their identity and intentions. This study would be useful to infer the influence of anonymity in crisis communications on trustworthiness.

Finally, this research could be used to inform the design of a machine learning algorithm that identifies CNRs as they appear and calculates a trustworthiness score for them. Such an algorithm could assign each CNR profile a score based on its completeness (complete bio, presence of profile or cover picture), relevance to the event, and popularity. These scores could then be aggregated to give a final trustworthiness score. People would be able to view these scores as well as sort and search across them. Such an algorithm could be helpful to people who are not familiar with social media or the nuances of indicators of credibility. A possible downside of this approach is that if the algorithm was openly available, people could manipulate the generated results of the algorithm. For example, if someone knew that a completed bio, presence of a profile and cover photo, relevant posts, and more followers would get them a higher trustworthiness score, they might choose to manipulate the system by filling in the bio information, uploading a profile and cover picture, writing posts using relevant hashtags, and buying followers. Doing so, would rank them higher on their trustworthiness, despite not being very trustworthy. These issues and ways to counter them would have to be investigated as part of future work in this area.

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APPENDICES

Appendix A: INTERVIEW RECRUITMENT MATERIALS

Email Script (Experts)

TO: Select Crisis Informatics Experts

SUBJECT: Interview about Trustworthiness of Crisis-Related Social Media

BODY:

Dear <Name of Crisis Informatics Expert>,

I am a Computer Science doctoral student at Utah State University who is studying the communications found in Facebook and Twitter accounts about Hurricane Irma. My work is advised by Professor Amanda Lee Hughes (<http://amandaleehughes.com>).

I am contacting you because you have expertise in crisis informatics and are familiar with this kind of research. I would like to interview you about your opinions on the trustworthiness of these resources. The interview will be about 45-60 minutes. All interviewees will receive a \$20 Amazon Gift Card at the end of interview!

If you would like to participate, please either reply to this email or email me directly (apoorva.chauhan@aggiemail.usu.edu). Also, please feel free to contact me to find out more about this study. Any help from you will be greatly appreciated!

Thank you for your consideration,

Apoorva Chauhan

<http://www.apoorvachauhan.com/>

Email Script (Members of Public)

TO: Select Members of Public

SUBJECT: Interview about Trustworthiness of Crisis-Related Social Media

BODY:

Dear <Name of a Person>,

I am a Computer Science doctoral student at Utah State University whose work is advised by Professor Amanda Lee Hughes (<http://amandaleehughes.com>).

I am contacting you to invite you to an interview study that determines the factors that people consider when evaluating the trustworthiness of social media profiles that are created around crisis events. The interview is expected to be 45-60 minutes long and all interviewees will receive a \$20 Amazon gift card at the end of the interview. To be eligible for the interview, you must be older than 18 years of age and should have either a Facebook or Twitter account.

This study is approved by the Computer Science department and Institutional Review Board at Utah State University. To participate in this study, either reply to this email or

email me directly (apoorva.chauhan@aggiemail.usu.edu). I am happy to answer any questions regarding this study. Any input from you will be greatly appreciated!

Thank you for your consideration,
Apoorva Chauhan (<http://www.apoorvachauhan.com/>)

Facebook Script (Experts and Members of the Public)

Hi! I am a doctoral student in the Department of Computer Science at Utah State University, who is studying the public communications of Hurricane Irma named accounts on Facebook and Twitter. If you are 18 years or older and are interested in sharing your opinions on the trustworthiness of social media profiles created around crises, you are invited to participate in an interview study. To participate in this study, or to ask questions regarding this study, either reply to this post or email me at apoorva.chauhan@aggiemail.usu.edu. Any input from you will be much appreciated and will make a difference in the area of online trust! *(All interviewees will receive a \$20 Amazon Gift Card at the end of the interview.)*

Best Regards,
Apoorva Chauhan (<http://www.apoorvachauhan.com/>)

Twitter Script (Experts and Members of the Public)

18+? Voice your opinions on the trustworthiness of social media profiles that are created around crises. Contact @HCI_researcher *(All interviewees will receive a \$20 Amazon Gift Card.)*

Appendix B: SURVEY RECRUITMENT MATERIALS

Facebook Script (Experts and Members of the Public)

Hi! I am a doctoral student in the Department of Computer Science at Utah State University (USU). I am conducting a study to determine how people judge the trustworthiness of social media profiles that are created in response to crisis events. My work is advised by Prof. Amanda Lee Hughes, and is approved by the Computer Science department and Institutional Review Board at USU. If you are 18 years or older and are interested in sharing your opinions on the trustworthiness of social media profiles created around crises, please complete this survey <survey link>. To know more about this study, either reply to this post or email me at apoorva.chauhan@aggiemail.usu.edu. Any input from you will be much appreciated and will make a difference in the field of online trust!

Best Regards,

Apoorva Chauhan (<http://www.apoorvachauhan.com/>)

Twitter Script (Experts and Members of the Public)

18+? Take a survey <survey link> to voice your opinions on the trustworthiness of social media profiles created around crises. Direct any related questions to @HCI_researcher

Email Script (Experts and Members of the Public)

TO: Select Members of Public

SUBJECT: Survey about Trustworthiness of Crisis-Related Social Media

BODY:

Dear <Name of a Person>,

I am a Computer Science doctoral student at Utah State University whose work is advised by Professor Amanda Lee Hughes (<http://amandaleehughes.com>).

I am conducting a study to determine the factors that people consider when evaluating the trustworthiness of social media profiles.

I am contacting you to invite you to complete a survey <survey link> about the trustworthiness of online resources created around crises. To participate in this study, you must be older than 18 years of age, and should have a Facebook or Twitter account. This study is approved by the Computer Science department and Institutional Review Board at Utah State University. To participate in this study, either reply to this email, or email me directly (apoorva.chauhan@aggiemail.usu.edu). Feel free to contact me to find out more about this study. Any input from you will add to the research!

Thank you for your consideration,

Apoorva Chauhan

<http://www.apoorvachauhan.com/>

Survey Cards (Experts and Members of the Public)

I created survey cards (size 2 x 3.5 inches) that had details about the survey study with survey link and QR code and contact information. These cards were printed on a thick sheet of paper and were handed to experts and members of the public who were eligible for my study in person.



Figure 8: Survey Recruitment Cards.

Appendix C: SURVEY QUESTIONNAIRE

The survey comprises of 4 blocks. Block 1 includes the informed consent form for the survey. Block 2 has questions that determine participants' opinions on the trustworthiness of the shown 5 CNRs. Block 3 has questions that gather participants' demographic information. Block 4 asks participants' their email address for the participation in the lottery. This block is optional.

Trustworthiness of Crisis Event Based Resources on Facebook and Twitter

Start of Block: Informed Consent

Q1.1 Informed Consent: Trustworthiness of Crisis Event Based Resources on Facebook and Twitter – Survey

Introduction

You are invited to participate in a research study conducted by Amanda Lee Hughes and Apoorva Chauhan, an assistant professor and a PhD student in the Department of Computer Science at Utah State University. The purpose of this research is to determine the trustworthiness of social media profiles named after and created for a particular crisis event. This form includes detailed information on the research to help you decide whether to participate in this research. Please read it carefully and ask any questions before you agree to participate.

Procedures

Your participation will involve a survey. If you agree to participate, the survey will begin by asking your age, gender, education level, computer proficiency, and profession. Next, you will be asked to imagine you have been affected by Hurricane Irma and you are looking for information on how to respond to this event. You will then be shown images of a few Twitter accounts and Facebook pages named after Hurricane Irma. For each of these accounts and pages, you will be asked a series of survey questions about whether you would trust them. The survey is expected to take 15-30 minutes to complete. We anticipate that about 70 people will participate

Risks & Benefits

This is a minimal risk research study. That means that the risks of participating are no more likely or serious than those you encounter in everyday activities. There is also a small risk of loss of confidentiality, but we will take steps to reduce this risk. If you have a bad research-related experience, please contact the principal investigator of this study right away at 435-797-3671 or amanda.hughes@usu.edu.

There is no direct benefit to you for participating in this research study. More broadly, this study will help the researchers learn more about how people trust (or do not trust) social media profiles and may help future researchers to understand the factors considered by experts and members of the public when evaluating the trustworthiness of social media.

Confidentiality

The researchers will make every effort to ensure that the information you provide as part of this study remains confidential. Your identity will not be revealed in any publications, presentations, or reports resulting from this research study. We will collect your information through the Qualtrics survey software. This information will be securely stored in a restricted-access folder on Box.com an encrypted, cloud-based storage system. This data will be kept for three years after the study is complete, and then it will be destroyed.

It is unlikely, but possible, that others (Utah State University or state or federal officials) may require us to share the information you give us from the study to ensure that the research was conducted safely and appropriately. We will only share your information if law or policy requires us to do so. The research team works to ensure confidentiality to the degree permitted by technology. It is possible, although unlikely, that unauthorized individuals could gain access to your responses because you are responding online.

Voluntary Participation & Withdrawal

Your participation in this research is completely voluntary. If you agree to participate now and change your mind later, you may withdraw at any time by leaving the survey. If you choose to withdraw after we have already collected information about you, we will delete your information to the extent to which withdrawal is possible.

Compensation

On completing the survey, you will be given a choice to participate in the lottery, where one individual will receive a \$50 Amazon gift card. If you wish to participate in the lottery, you will be asked to provide your email address.

IRB Review

The Institutional Review Board (IRB) for the protection of human research participants at Utah State University has reviewed and approved this study. If you have questions about the research study itself, please contact the Principal Investigator at (435) 797-3671 or amanda.hughes@usu.edu. If you have questions about your rights or would simply like to speak with someone other than the research team about questions or concerns, please contact the IRB Director at (435) 797-0567 or irb@usu.edu.

Amanda Hughes

Principal Investigator

(435) 797-3671; amanda.hughes@usu.edu

Apoorva Chauhan
Student Investigator
apoorva.chauhan@aggiemail.usu.edu

Informed Consent

By agreeing to participate in this study below, you indicate that you understand the risks and benefits of participation, and that you know what you will be asked to do. You also understand that your participation is voluntary and you may leave the survey at any time.

If you are over the age of 18 and agree to participate in this study, please sign below.

If you are not over the age of 18 or you do not agree to participate in this study, please exit the survey.

End of Block: Informed Consent

Start of Block: Introduction

Q2.1 Imagine you are in Florida and have been affected by Hurricane Irma. You are looking on social media for information about how to respond to this crisis event.

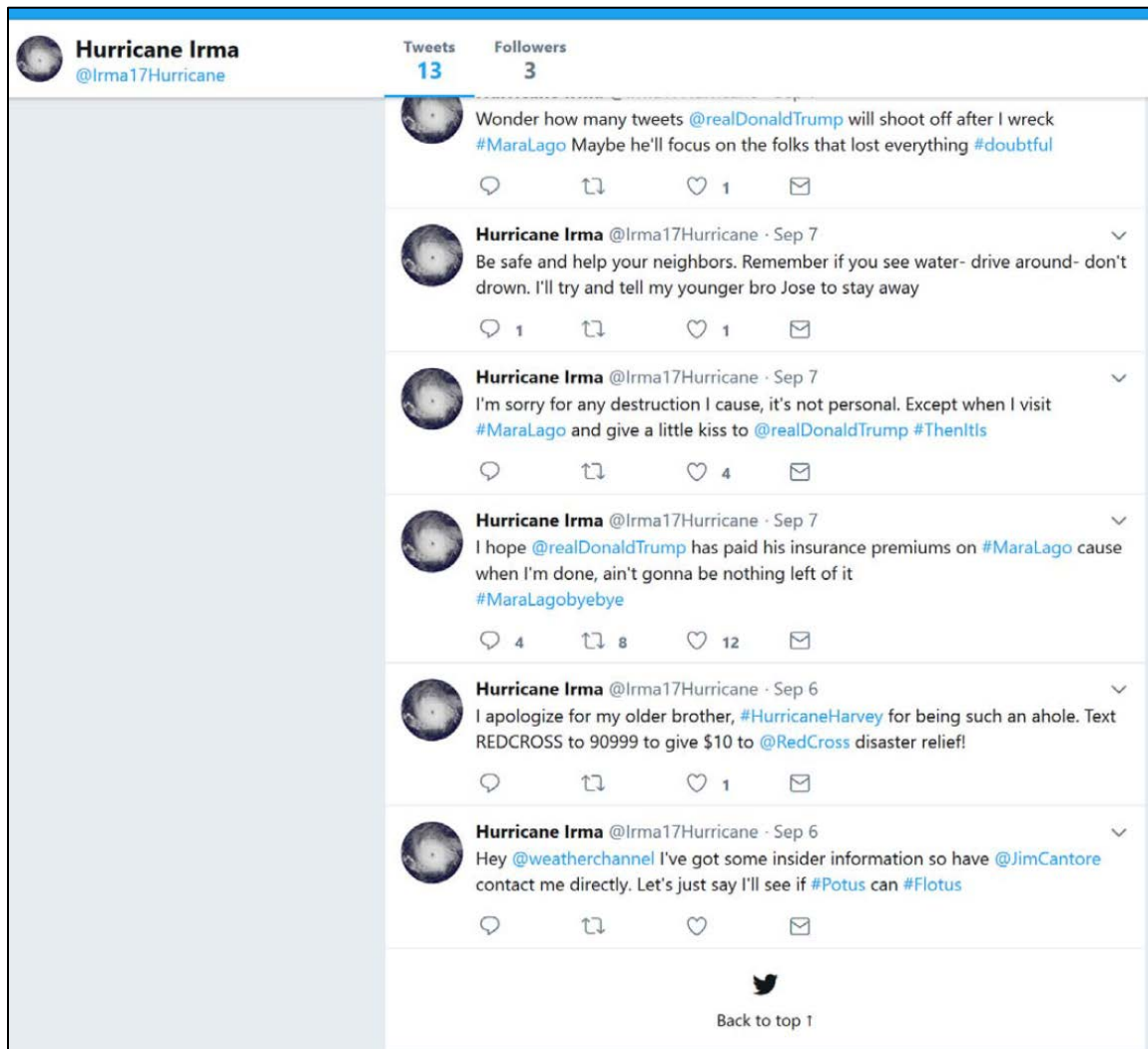
You will now be shown images of 5 Facebook pages and Twitter accounts named after Hurricane Irma. You will then be asked to evaluate the trustworthiness of these social media resources.

Your responses will help us learn more about how people trust (or do not trust) social media profiles.

End of Block: Introduction

Start of Block: Social Media Profile 1

Q3.1 Please look at the images of the Twitter account below and then answer the following questions.



Q3.2 Do you feel that the owner of this Twitter account has prior experience in crisis-response?

- ☐ Extremely unlikely
- ☐ Somewhat unlikely
- ☐ Neither likely nor unlikely
- ☐ Somewhat likely
- ☐ Extremely likely

Q3.3 Do you feel that the owner of this Twitter account is capable of helping you respond to Hurricane Irma?

- ☐ Extremely unlikely
 - ☐ Somewhat unlikely
 - ☐ Neither likely nor unlikely
 - ☐ Somewhat likely
 - ☐ Extremely likely
-

Q3.4 Do you feel that the owner of this Twitter account has your best interests in mind?

- ☐ Extremely unlikely
 - ☐ Somewhat unlikely
 - ☐ Neither likely nor unlikely
 - ☐ Somewhat likely
 - ☐ Extremely likely
-

Q3.5 Do you feel that the owner of this Twitter account understands your situation?

- ☐ Extremely unlikely
 - ☐ Somewhat unlikely
 - ☐ Neither likely nor unlikely
 - ☐ Somewhat likely
 - ☐ Extremely likely
-

Q3.6 Do you feel that the owner of this Twitter account will provide misleading information intentionally?

- ☐ Extremely unlikely
- ☐ Somewhat unlikely

- ☐ Neither likely nor unlikely
 - ☐ Somewhat likely
 - ☐ Extremely likely
-

Q3.7 Do you feel that the owner of this Twitter account will make efforts to correct any false rumor or misinformation as soon as it comes into his/her notice?

- ☐ Extremely unlikely
 - ☐ Somewhat unlikely
 - ☐ Neither likely nor unlikely
 - ☐ Somewhat likely
 - ☐ Extremely likely
-

Q3.8 Would you trust the information on this Twitter account? Trust is defined as the extent to which you feel secure and comfortable relying on the information.

- ☐ Yes, because _____
- ☐ Maybe, because _____
- ☐ No, because _____

End of Block: Social Media Profile 1

Start of Block: Social Media Profile 2

Q4.1 Please look at the images of the Facebook page below and then answer the following questions.



Key West Hurricane Irma
@KeyWestHurricaneIrma

Home
Posts
Reviews
Videos
Photos
About
Community

Create a Page

Hurricane Irma Key West

Sept. 5 - Sept. 23, 2017 | News for and from Key West locals

Time to head home

Be well, our friends. We are grateful.

Ed and Linda Cunningham, John Teets
And the Cat 5s

Like

Follow

Share

...

Learn More

Posts

**Key West Hurricane Irma**
September 23 · 🌐

Time to go home

Two weeks since Hurricane Irma became our unwelcome house guest. You've been with us from apprehension through the relief of recovery. We are grateful.

In the news feed you'll find links to our final columns, best news sources to follow and charities.

Community in Key West, Florida
4.9 ★★★★★

Community [See All](#)

Invite your friends to like this Page

11,481 people like this


13,209 people follow this


About [See All](#)

(305) 294-3066

www.lindagriscunningham.com

Community

 Key West Hurricane Irma



Like Follow Share

Key West Hurricane Irma
September 5 · 🌐

LIVE AT 9 A.M. | Get the latest -- and best -- modeling information on Hurricane Irma from [Mike's Weather Page](#).

Like Comment Share

1

Write a comment...

Home

Posts

Reviews

Videos

Photos

About

Community

Key West Hurricane Irma
September 5 · 🌐

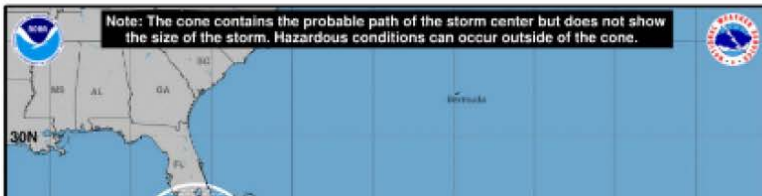
Tuesday, Sept. 5 | Good morning, my friends. I am in Virginia on a family errand while my family is doing storm prep in Key West. I created this Facebook Page because I been having a hard time finding news and information specific to Key West and the Lower Keys. Please share this with your friends and families. The page is totally public. Use it as a resource and a share point. Post pictures and helpful information. I'll do my best from afar to keep it moderated and updated. Godspeed.


Like Comment Share

4

Write a comment...

Key West Hurricane Irma updated their cover photo.
September 5 · 🌐






Key West Hurricane Irma
@KeyWestHurricaneIrma

- Home
- Posts
- Reviews
- Videos**
- Photos
- About
- Community

Like Follow Share ...


Learn More

3-10-13-17
3.9K views · September 16




Key West before Hurricane Irma 9-9-19 Historic Key West Seaport
2.2K views · September 9

3-10-13-17
686 views · September 16




Key West before Hurricane Irma 9-9-17 Pier House
2.5K views · September 9

3-10-13-17
2.8K views · September 16




Key West before Hurricane Irma Sept. 8 Bonus Vid
901 views · September 8


3-10-13-17
5.6K views · September 10




Key West before Hurricane Irma Sept. 8 #8
661 views · September 8




Key West before Hurricane Irma Sept. 8 #7
522 views · September 8




Key West before Hurricane Irma Sept. 8 #6
543 views · September 8




Key West before Hurricane Irma Sept. 8 #5
389 views · September 8




Key West before Hurricane Irma Sept. 8 #4
435 views · September 8




Key West before Hurricane Irma Sept. 8 #3
518 views · September 8




Key West before Hurricane Irma Sept. 8 #2
347 views · September 8



Key West before Hurricane Irma Sept. 8
283 views · September 8



Key West pre-hurricane party | Sept. 7, 2017
1.6K views · September 7



Key West Hurricane Irma
@KeyWestHurricaneIrma


- Home
- Posts
- Reviews
- Videos
- Photos**
- About
- Community

Like Follow Share ...


Learn More

See All


Albums




Cover Photos
4 Photos



Timeline Photos
90 Photos





Mobile Uploads
23 Photos





The Day Before Hurricane Irma
56 Photos

All Photos





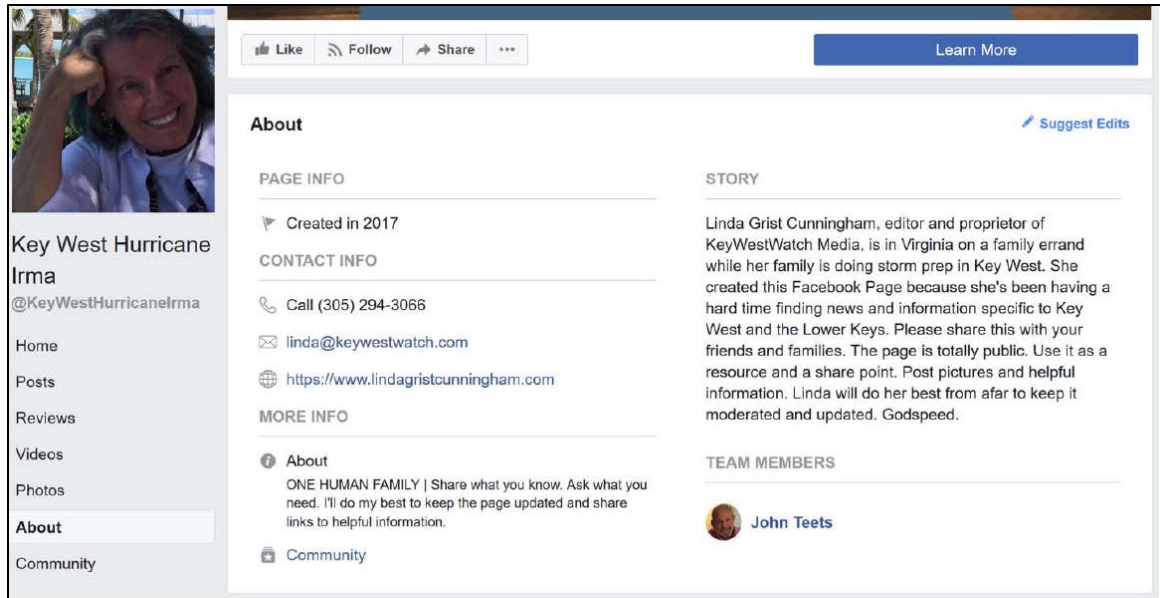




Florida SERT

Key West Incident Update

Key West Police Dept



Q4.2 Do you feel that the owner of this Facebook page has prior experience in crisis-response?

- ☐ Extremely unlikely
- ☐ Somewhat unlikely
- ☐ Neither likely nor unlikely
- ☐ Somewhat likely
- ☐ Extremely likely

Q4.3 Do you feel that the owner of this Facebook page is capable of helping you respond to Hurricane Irma?

- ☐ Extremely unlikely
- ☐ Somewhat unlikely
- ☐ Neither likely nor unlikely
- ☐ Somewhat likely
- ☐ Extremely likely

Q4.4 Do you feel that the owner of this Facebook page has your best interests in mind?

- ☐ Extremely unlikely
- ☐ Somewhat unlikely
- ☐ Neither likely nor unlikely
- ☐ Somewhat likely
- ☐ Extremely likely

Q4.5 Do you feel that the owner of this Facebook page understands your situation?

- ☐ Extremely unlikely
- ☐ Somewhat unlikely
- ☐ Neither likely nor unlikely
- ☐ Somewhat likely
- ☐ Extremely likely

Q4.6 Do you feel that the owner of this Facebook page will provide misleading information intentionally?

- ☐ Extremely unlikely
- ☐ Somewhat unlikely
- ☐ Neither likely nor unlikely
- ☐ Somewhat likely
- ☐ Extremely likely

Q4.7 Do you feel that the owner of this Facebook page will make efforts to correct any false rumor or misinformation as soon as it comes into his/her notice?

- ☐ Extremely unlikely

- ☐ Somewhat unlikely
- ☐ Neither likely nor unlikely
- ☐ Somewhat likely
- ☐ Extremely likely

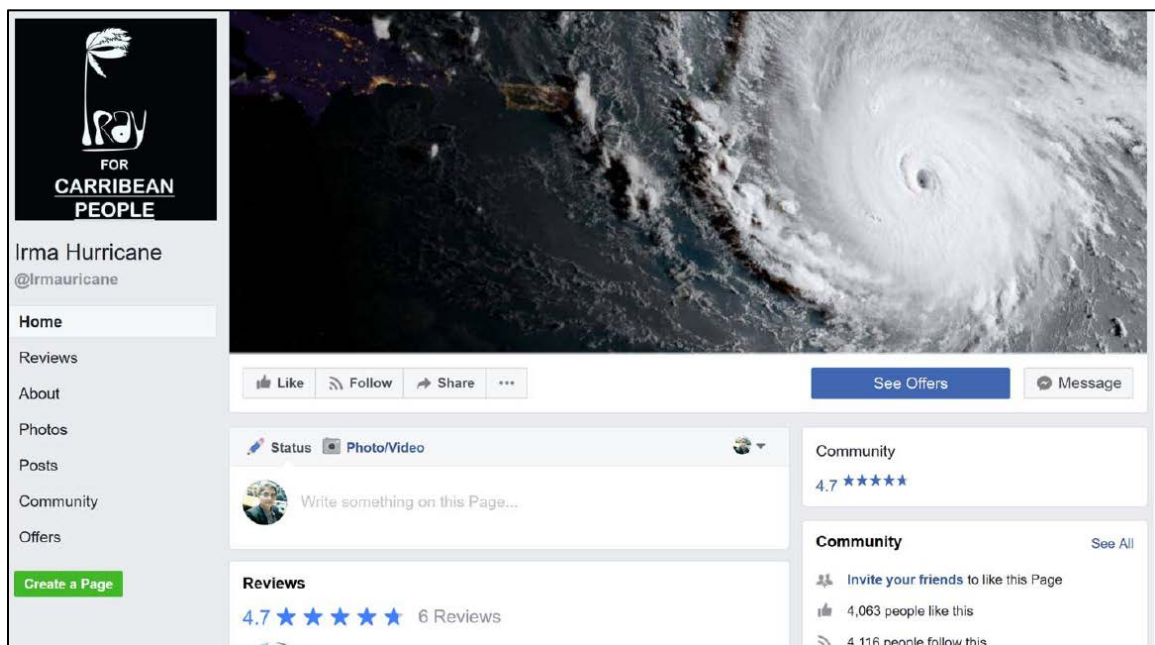
Q4.8 Would you trust the information on this Facebook page? Trust is defined as the extent to which you feel secure and comfortable relying on the information.


- ☐ Yes, because _____
- ☐ Maybe, because _____
- ☐ No, because _____

End of Block: Social Media Profile 2

Start of Block: Social Media Profile 3

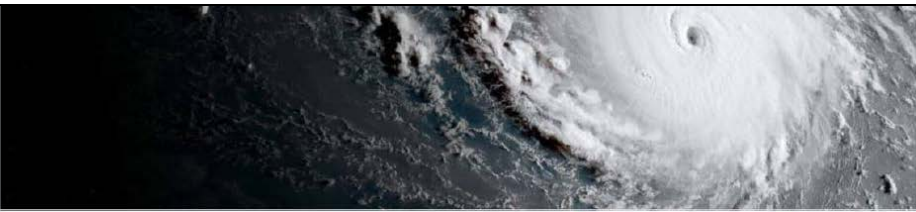
Q5.1 Please look at the images of the Facebook page below and then answer the following questions.





Irma Hurricane
@Irmaurricane

- Home
- Reviews
- About**
- Photos
- Posts
- Community
- Offers



Like Follow Share ...

See Offers Message

About [Suggest Edits](#)

CONTACT INFO

@Irmaurricane [Send Message](#)

<https://igg.me/at/8DF-XeLoxTM>

MORE INFO


About
<https://www.generosity.com/fundraisers/aid-for-the-stricken-victims-of-irma>

Impressum
<https://www.generosity.com/emergencies-fundraising/help-needed-after-irma-devastation/x/9591865>

Community

STORY

Irma Hurricane Support




Irma Hurricane
@Irmaurricane

- Home
- Reviews
- About
- Photos**
- Posts
- Community
- Offers


Like Follow Share ...

See Offers Message


Albums [See All](#)



Timeline Photos
24 Photos

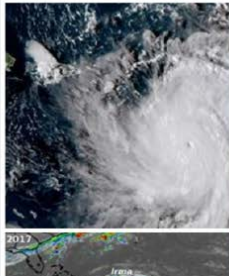





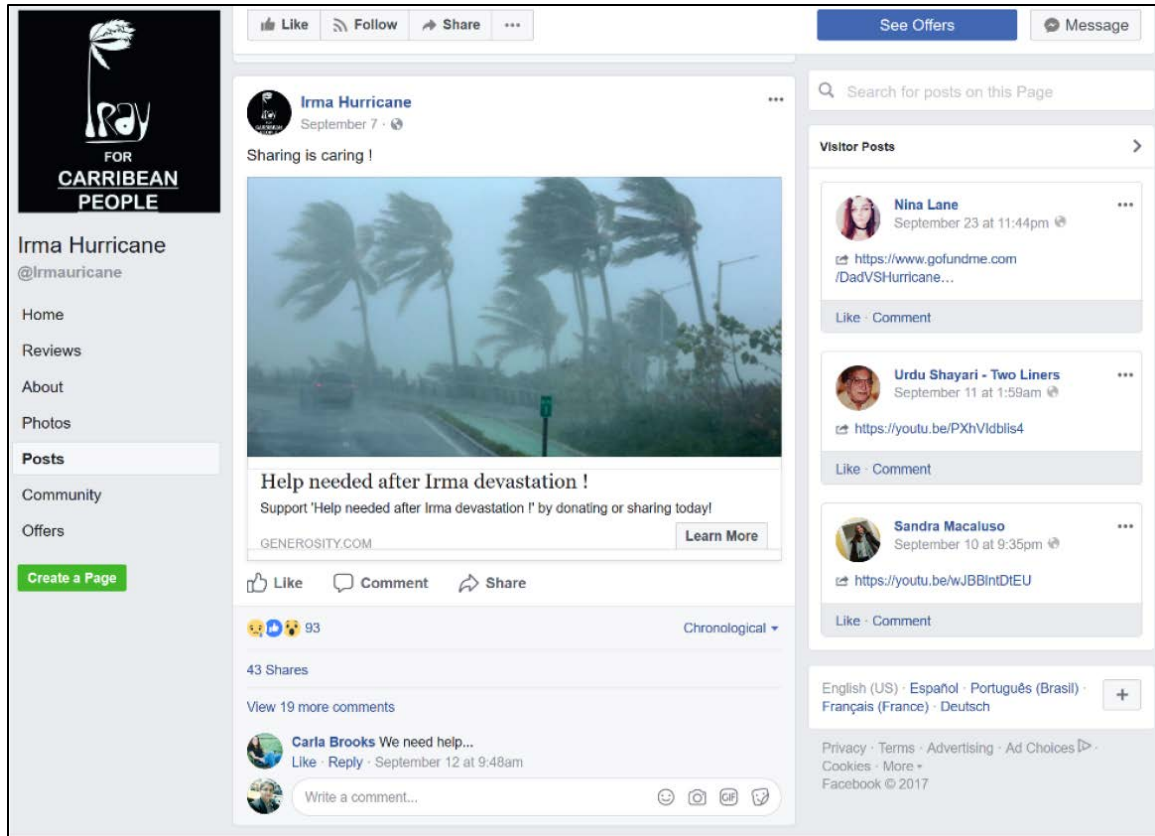
Profile Pictures
3 Photos



Cover Photos
2 Photos

All Photos



Q5.2 Do you feel that the owner of this Facebook page has prior experience in crisis-response?

- ☐ Extremely unlikely
- ☐ Somewhat unlikely
- ☐ Neither likely nor unlikely
- ☐ Somewhat likely
- ☐ Extremely likely

Q5.3 Do you feel that the owner of this Facebook page is capable of helping you respond to Hurricane Irma?

- ☐ Extremely unlikely

- ☐ Somewhat unlikely
 - ☐ Neither likely nor unlikely
 - ☐ Somewhat likely
 - ☐ Extremely likely
-

Q5.4 Do you feel that the owner of this Facebook page has your best interests in mind?

- ☐ Extremely unlikely
 - ☐ Somewhat unlikely
 - ☐ Neither likely nor unlikely
 - ☐ Somewhat likely
 - ☐ Extremely likely
-

Q5.5 Do you feel that the owner of this Facebook page understands your situation?

- ☐ Extremely unlikely
 - ☐ Somewhat unlikely
 - ☐ Neither likely nor unlikely
 - ☐ Somewhat likely
 - ☐ Extremely likely
-

Q5.6 Do you feel that the owner of this Facebook page will provide misleading information intentionally?

- ☐ Extremely unlikely
- ☐ Somewhat unlikely
- ☐ Neither likely nor unlikely
- ☐ Somewhat likely

☐ Extremely likely

Q5.7 Do you feel that the owner of this Facebook page will make efforts to correct any false rumor or misinformation as soon as it comes into his/her notice?

- ☐ Extremely unlikely
- ☐ Somewhat unlikely
- ☐ Neither likely nor unlikely
- ☐ Somewhat likely
- ☐ Extremely likely
-

Q5.8 Would you trust the information on this Facebook page? Trust is defined as the extent to which you feel secure and comfortable relying on the information.

- ☐ Yes, because _____
- ☐ Maybe, because _____
- ☐ No, because _____

End of Block: Social Media Profile 3

Start of Block: Social Media Profile 4

Q6.1 Please look at the images of the Facebook page below and then answer the following questions.



HURRICANE IRMA

Official Hurricane Irma Meme's
@officialhurricaneirmame
mes

Home
Posts
Reviews
Photos
About
Community

Create a Page



Like Follow Share ...

Send Message

Status Photo/Video

Write something on this Page...

Posts

Official Hurricane Irma Meme's shared The Oatmeal's post. ...
November 22 at 4:36am · 🌐
<https://www.battleforthenet.com/>

The Oatmeal
November 21 at 1:05pm · 🌐 Like Page

I wrote this a few years ago, but it still stands as a great primer on Net Neutrality. http://theoatmeal.com/blog/net_neutrality

Just For Fun
4.8 ★★★★★

Community See All

Invite your friends to like this Page
878 people like this
899 people follow this

About See All

Typically replies within an hour
Send Message

Globalhempwickdispensers.com
Just For Fun

Cover Photos
1 of 1



Official Hurricane Irma Meme's
Like This Page · September 5 · 🌐

Like Comment Share

👍👎 22 Chronological ▾

64 Shares 1 Comment


Leonardo Rafael Grismay Romero
Like · Reply · September 7 at 8:04am

Write a comment... 🗨️ 📷 📺 📧

Official Hurricane Irma Meme's

HomeFind Friends

Send Message



HURRICANE
IRMAHGERD

Official Hurricane Irma Meme's
@officialhurricaneirmame
mes

Home

Posts


Reviews

Photos

About

Community

LikeFollowShare



HURRICANE
IRMAHGERD


LikeCommentShare

20

Chronological


48 Shares

View 5 more comments



Aliyah Derington Skylar Smith




Like · Reply · 1 · September 8 at 12:04pm



Mary Grace Barnes Aliyah Derington Skylar Smith

Like · Reply · 1 · September 8 at 12:20pm

Write a comment...



Search for posts on this Page

Visitor Posts



Cassandra McGilvray

September 19 at 7:50am

2 Likes

Like · Comment




Cassandra McGilvray

September 14 at 10:07pm

Yep!

Like · Comment



Cassandra McGilvray

September 14 at 4:53pm

Here's a funny meme we can all relate to!


1 Like

Like · Comment

English (US) · Español · Português (Brasil) · Français (France) · Deutsch

Privacy · Terms · Advertising · Ad Choices · Cookies · More

Facebook © 2017



HURRICANE IRMAHGERD

Official Hurricane Irma Meme's

@officialhurricaneirmame
mes

Home

Posts

Reviews

Photos





About

Community

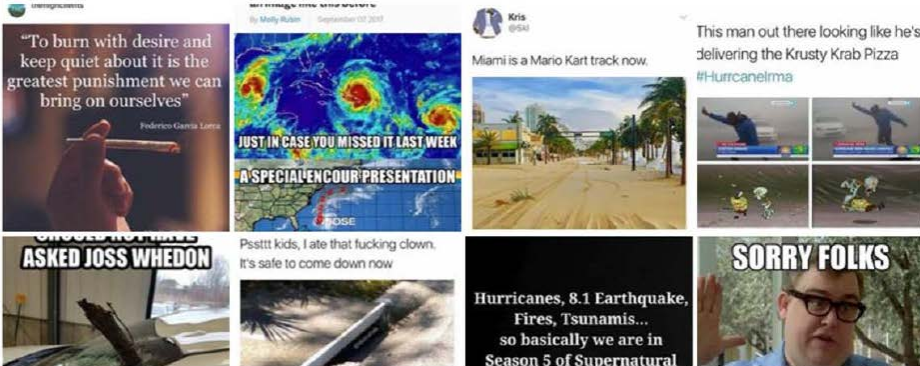
Like Follow Share ...


Send Message

Albums See All

 <p>Mobile Uploads 55 Photos</p>	 <p>Timeline Photos 61 Photos</p>	 <p>Cover Photos 1 Photo</p>	 <p>Profile Pictures 2 Photos</p>
---	--	---	--

All Photos





HURRICANE IRMAHGERD

Official Hurricane Irma Meme's

@officialhurricaneirmame
mes

Home


Posts

Reviews

Photos

About

Community





Like Follow Share ...

Send Message


About Suggest Edits


CONTACT INFO

 @officialhurricaneirmamemes Send Message

 <http://Globalhempwickdispensers.com>

MORE INFO

 About
 Meme's from all over the Internet. Have original content? Want credit? Shoot us a DM! We're all about credit where credit is due.

 Just For Fun

Q6.2 Do you feel that the owner of this Facebook page has prior experience in crisis-response?

- ☐ Extremely unlikely
 - ☐ Somewhat unlikely
 - ☐ Neither likely nor unlikely
 - ☐ Somewhat likely
 - ☐ Extremely likely
-

Q6.3 Do you feel that the owner of this Facebook page is capable of helping you respond to Hurricane Irma?

- ☐ Extremely unlikely
 - ☐ Somewhat unlikely
 - ☐ Neither likely nor unlikely
 - ☐ Somewhat likely
 - ☐ Extremely likely
-

Q6.4 Do you feel that the owner of this Facebook page has your best interests in mind?

- ☐ Extremely unlikely
 - ☐ Somewhat unlikely
 - ☐ Neither likely nor unlikely
 - ☐ Somewhat likely
 - ☐ Extremely likely
-

Q6.5 Do you feel that the owner of this Facebook page understands your situation?

- ☐ Extremely unlikely
- ☐ Somewhat unlikely

- ☐ Neither likely nor unlikely
 - ☐ Somewhat likely
 - ☐ Extremely likely
-

Q6.6 Do you feel that the owner of this Facebook page will provide misleading information intentionally?

- ☐ Extremely unlikely
 - ☐ Somewhat unlikely
 - ☐ Neither likely nor unlikely
 - ☐ Somewhat likely
 - ☐ Extremely likely
-

Q6.7 Do you feel that the owner of this Facebook page will make efforts to correct any false rumor or misinformation as soon as it comes into his/her notice?

- ☐ Extremely unlikely
 - ☐ Somewhat unlikely
 - ☐ Neither likely nor unlikely
 - ☐ Somewhat likely
 - ☐ Extremely likely
-

Q6.8 Would you trust the information on this Facebook page? Trust is defined as the extent to which you feel secure and comfortable relying on the information.

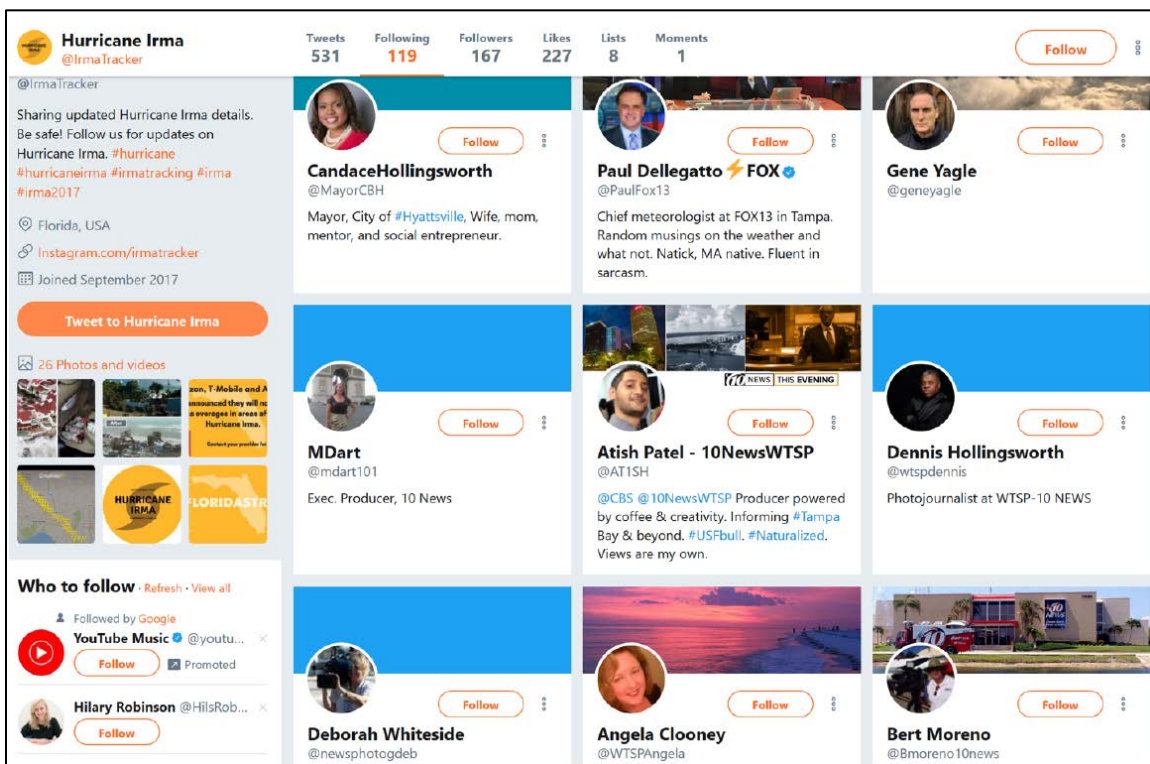
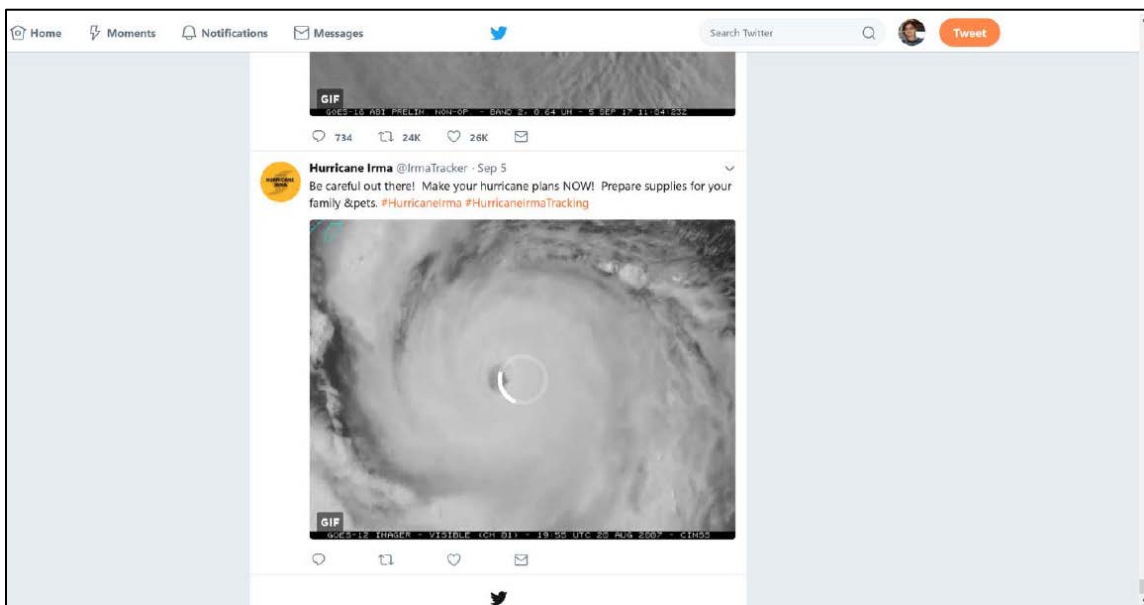
- ☐ Yes, because _____
- ☐ Maybe, because _____
- ☐ No, because _____

End of Block: Social Media Profile 4

Start of Block: Social Media Profile 5

Q7.1 Please look at the images of the Twitter account below and answer the following questions.





Hurricane Irma
@IrmaTracker

Sharing updated Hurricane Irma details. Be safe! Follow us for updates on Hurricane Irma. #hurricane #hurricaneirma #irmatracking #irma #irma2017

Florida, USA
Instagram.com/irmatracker
Joined September 2017

Tweet to Hurricane Irma

26 Photos and videos

Subscribed to **Member of**

- Florida State Accounts** by Hurricane Irma
4 Members
- Southwest Florida News** by Hurricane Irma
Fort Myers, Cape Coral, Port Charlotte, Naples, Everglade City
1 Member
- National Weather Reporter** by Hurricane Irma
4 Members
- Weather Syndicates** by Hurricane Irma
5 Members
- FL Keys Weather** by Hurricane Irma
9 Members
- Miami Weather** by Hurricane Irma
9 Members
- Tampa weather** by Hurricane Irma
26 Members
- National Wx Accounts** by Hurricane Irma
National official weather accounts
12 Members

Q7.2 Do you feel that the owner of this Twitter account has prior experience in crisis-response?

- ☐ Extremely unlikely
- ☐ Somewhat unlikely
- ☐ Neither likely nor unlikely
- ☐ Somewhat likely
- ☐ Extremely likely

Q7.3 Do you feel that the owner of this Twitter account is capable of helping you respond to Hurricane Irma?

- ☐ Extremely unlikely
 - ☐ Somewhat unlikely
 - ☐ Neither likely nor unlikely
 - ☐ Somewhat likely
 - ☐ Extremely likely
-

Q7.4 Do you feel that the owner of this Twitter account has your best interests in mind?

- ☐ Extremely unlikely
 - ☐ Somewhat unlikely
 - ☐ Neither likely nor unlikely
 - ☐ Somewhat likely
 - ☐ Extremely likely
-

Q7.5 Do you feel that the owner of this Twitter account understands your situation?

- ☐ Extremely unlikely
 - ☐ Somewhat unlikely
 - ☐ Neither likely nor unlikely
 - ☐ Somewhat likely
 - ☐ Extremely likely
-

Q7.6 Do you feel that the owner of this Twitter account will provide misleading information intentionally?

- ☐ Extremely unlikely
- ☐ Somewhat unlikely
- ☐ Neither likely nor unlikely

- ☐ Somewhat likely
- ☐ Extremely likely

Q7.7 Do you feel that the owner of this Twitter account will make efforts to correct any false rumor or misinformation as soon as it comes into his/her notice?

- ☐ Extremely unlikely
- ☐ Somewhat unlikely
- ☐ Neither likely nor unlikely
- ☐ Somewhat likely
- ☐ Extremely likely

Q7.8 Would you trust the information on this Twitter account? Trust is defined as the extent to which you feel secure and comfortable relying on the information.

- ☐ Yes, because _____
- ☐ Maybe, because _____
- ☐ No, because _____

End of Block: Social Media Profile 5

Start of Block: Demographics

Q8.1 Please select your gender.

- ☐ Male
- ☐ Female
- ☐ Other

Q8.2 Please select your age.

- ☐ 18 - 24
 - ☐ 25 - 34
 - ☐ 35 - 44
 - ☐ 45 - 54
 - ☐ 55 - 64
 - ☐ 65 - 74
 - ☐ 75 - 84
 - ☐ 85 or older
-

Q8.3 Please select the highest level of education you have completed.

- ☐ Less than high school
 - ☐ High school graduate
 - ☐ Some college
 - ☐ 2 year degree
 - ☐ 4 year degree
 - ☐ Master's degree
 - ☐ Doctorate
-

Q8.4 Do you consider yourself an expert in the area of Crisis Informatics, Communication Studies, or Emergency Management?

- ☐ Yes
 - ☐ No
-

Q8.5 Please select your comfort level when using Facebook.

- ☐ Extremely uncomfortable

- ☐ Somewhat uncomfortable
 - ☐ Neither comfortable nor uncomfortable
 - ☐ Somewhat comfortable
 - ☐ Extremely comfortable
-

Q8.6 Please select your comfort level when using Twitter.

- ☐ Extremely uncomfortable
- ☐ Somewhat uncomfortable
- ☐ Neither comfortable nor uncomfortable
- ☐ Somewhat comfortable
- ☐ Extremely comfortable

End of Block: Demographics

Start of Block: Thank you!

Q9.1 Thank you for completing the survey!

You now have the option of entering a drawing for a \$50 Amazon Gift Card. To enter, please provide your email address below **(If you do not wish to participate in the drawing, there is no need to enter your email address).**

End of Block: Thank you!

Appendix D: CRISIS NAMED RESOURCES' SCREENSHOTS

The first 5 CNRs' screenshots are shown in Appendix C: Survey Questionnaire and the remaining 5 CNRs' screenshots are as follows.

CNR 6: Hurricane Irma Resource Assistance (Facebook Page)

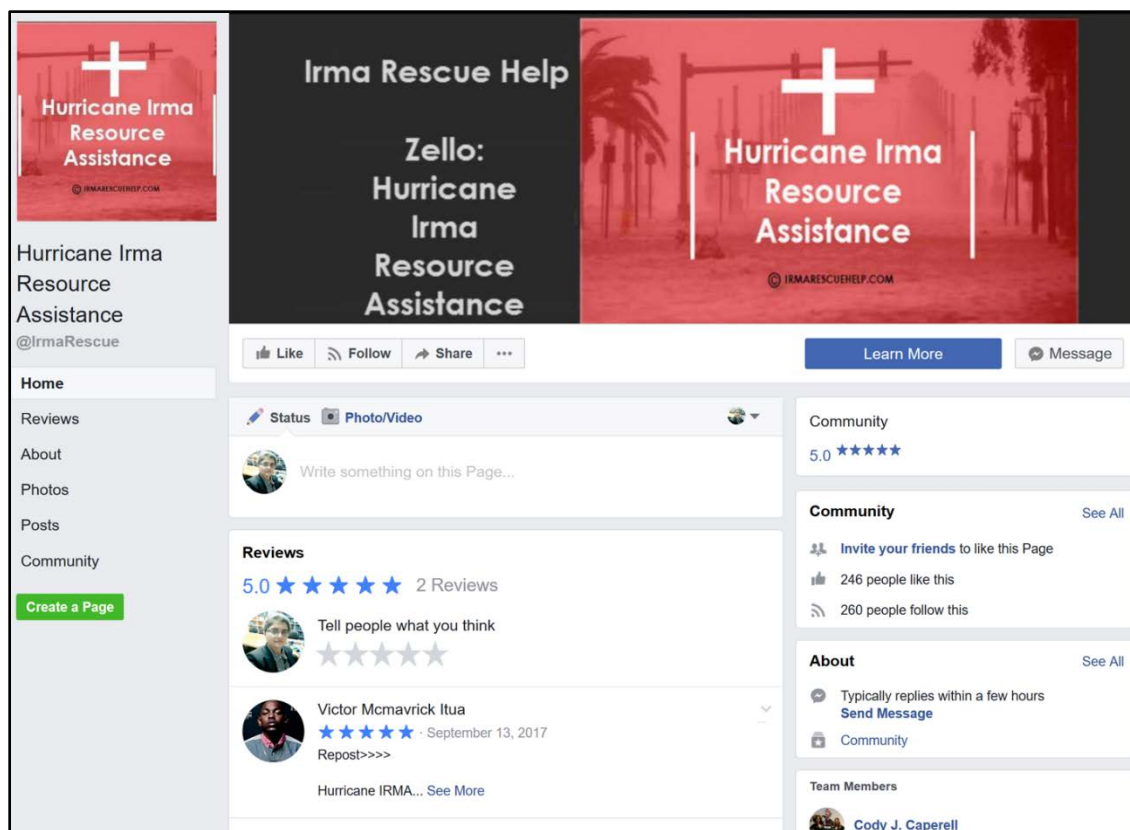


Figure 9: CNR 6 – Screenshot #1.

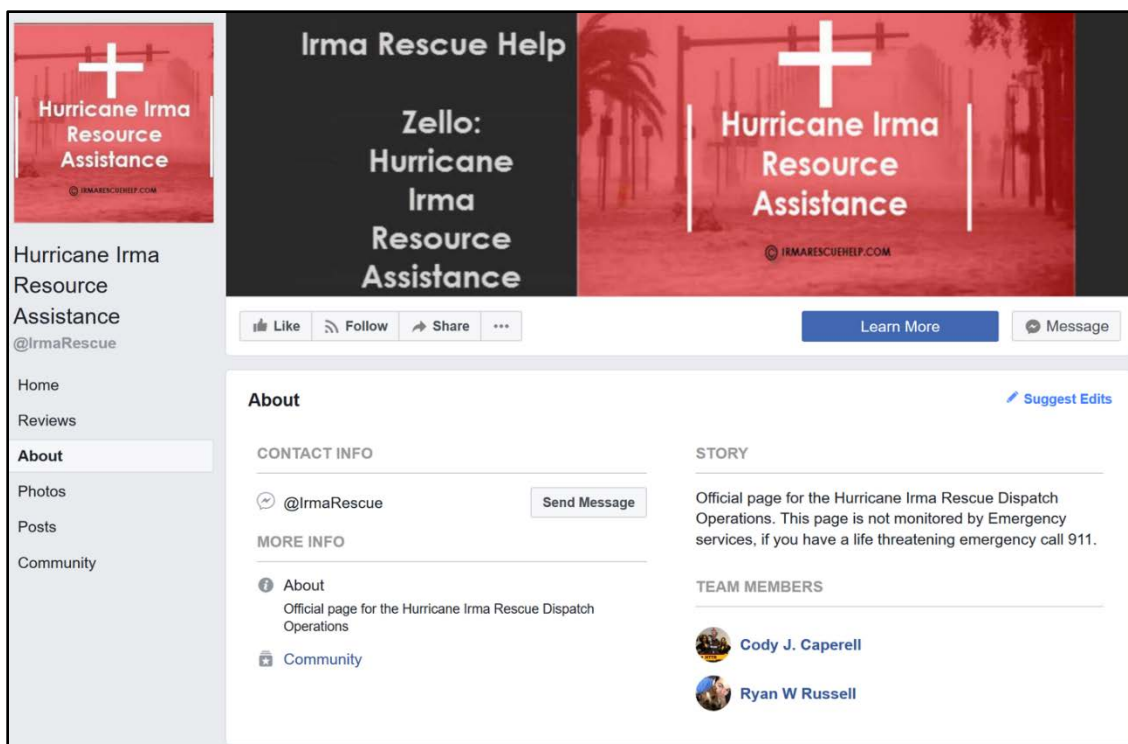


Figure 10: CNR 6 – Screenshot #2.

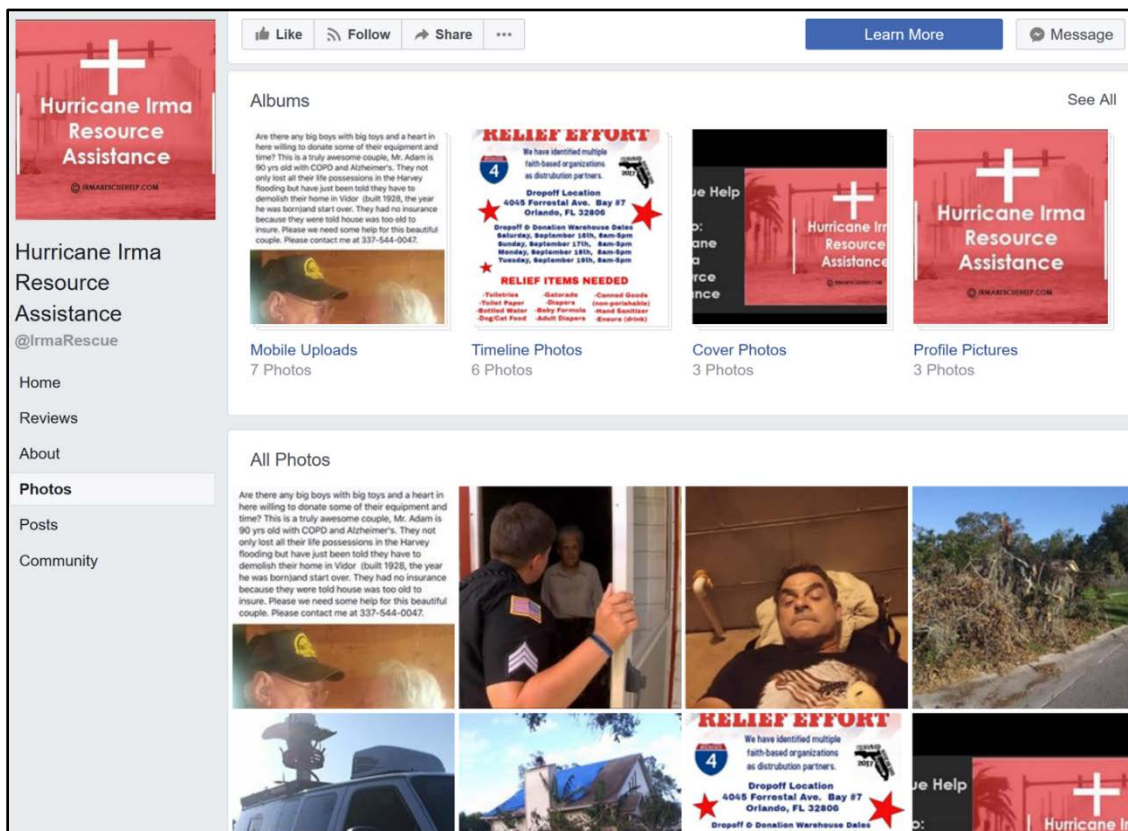


Figure 11: CNR 6 – Screenshot #3.

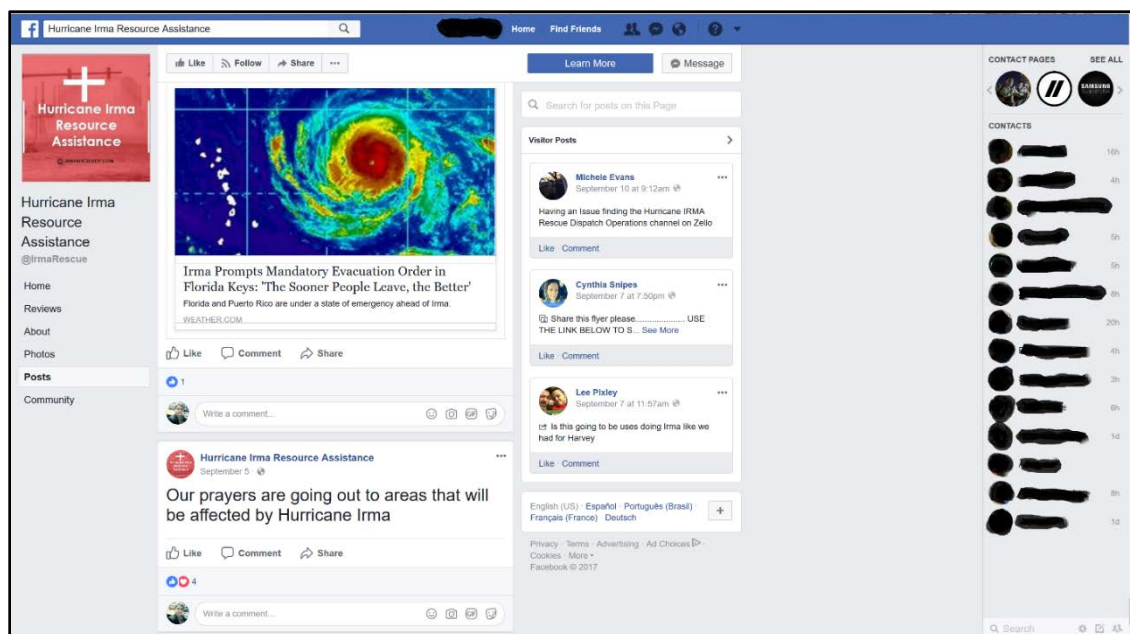


Figure 12: CNR 6 – Screenshot #4.

CNR 7: Track Hurricane Irma (Twitter Account)



Figure 13: CNR 7 – Screenshot #1.



Figure 14: CNR 7 – Screenshot #2.



Figure 15: CNR 7 – Screenshot #3.

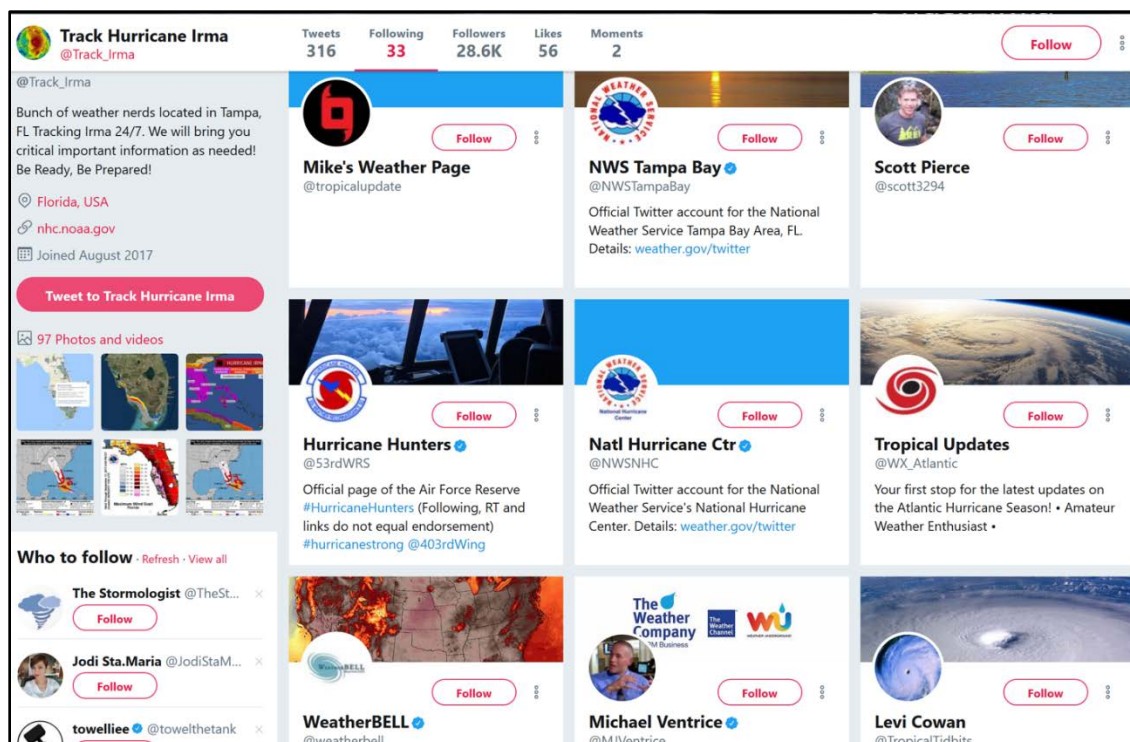


Figure 16: CNR 7 – Screenshot #4.

CNR 8: Hurricane Irma (Facebook Page)

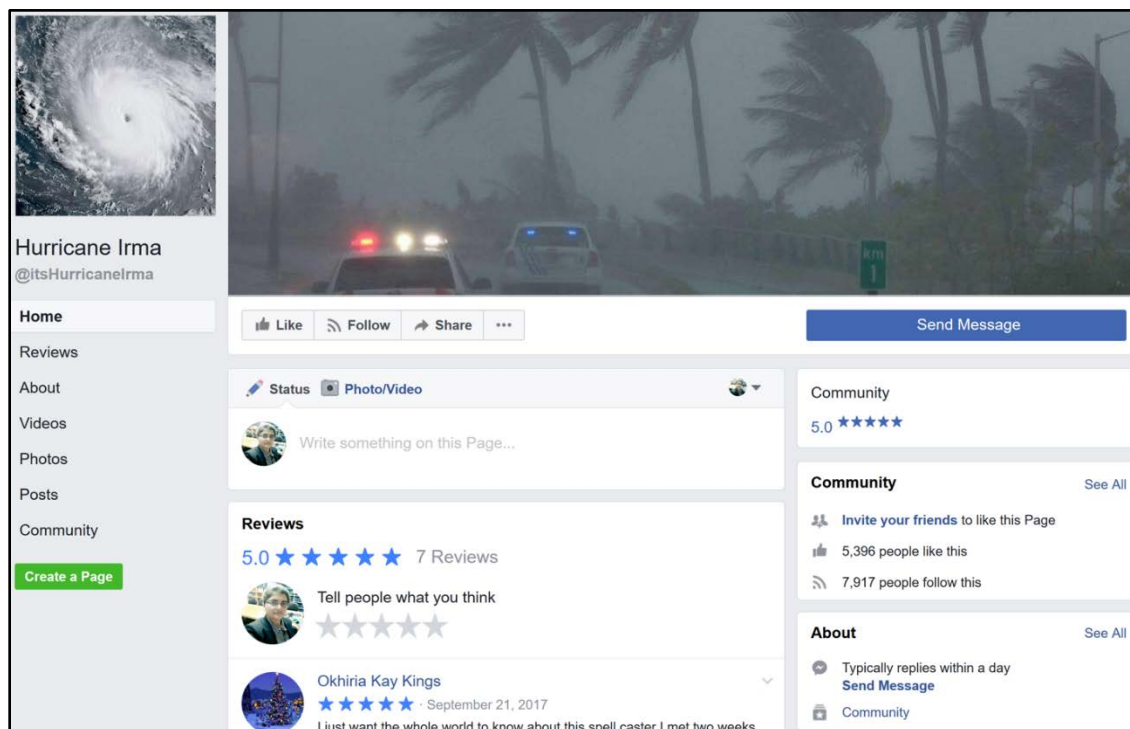


Figure 17: CNR 8 – Screenshot #1.

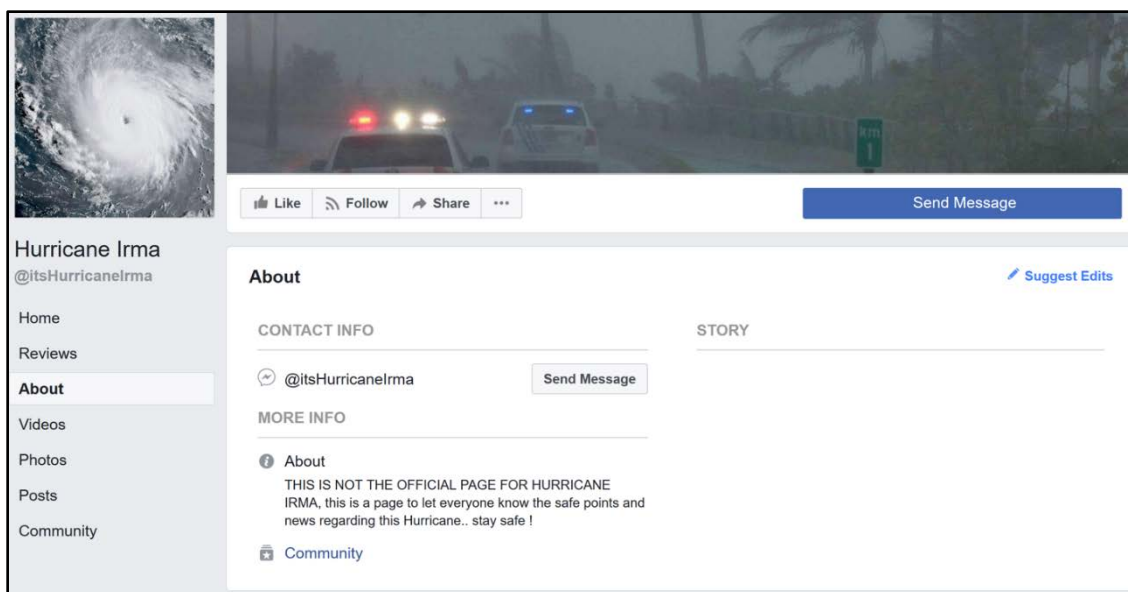


Figure 18: CNR 8 – Screenshot #2.

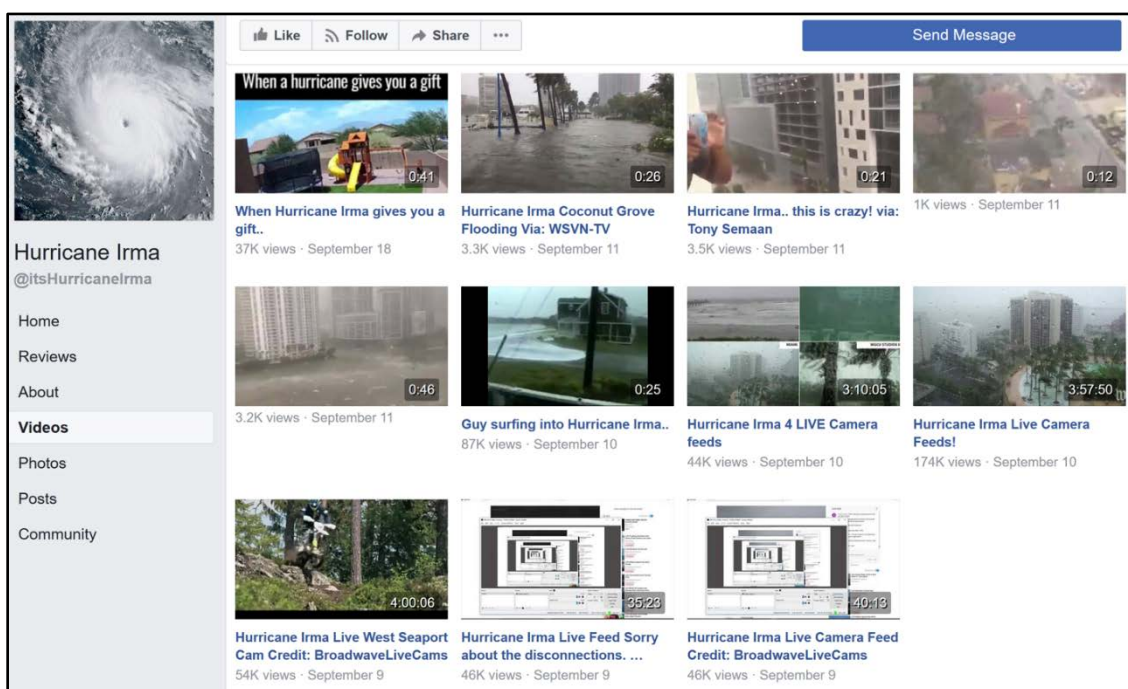


Figure 19: CNR 8 – Screenshot #3.

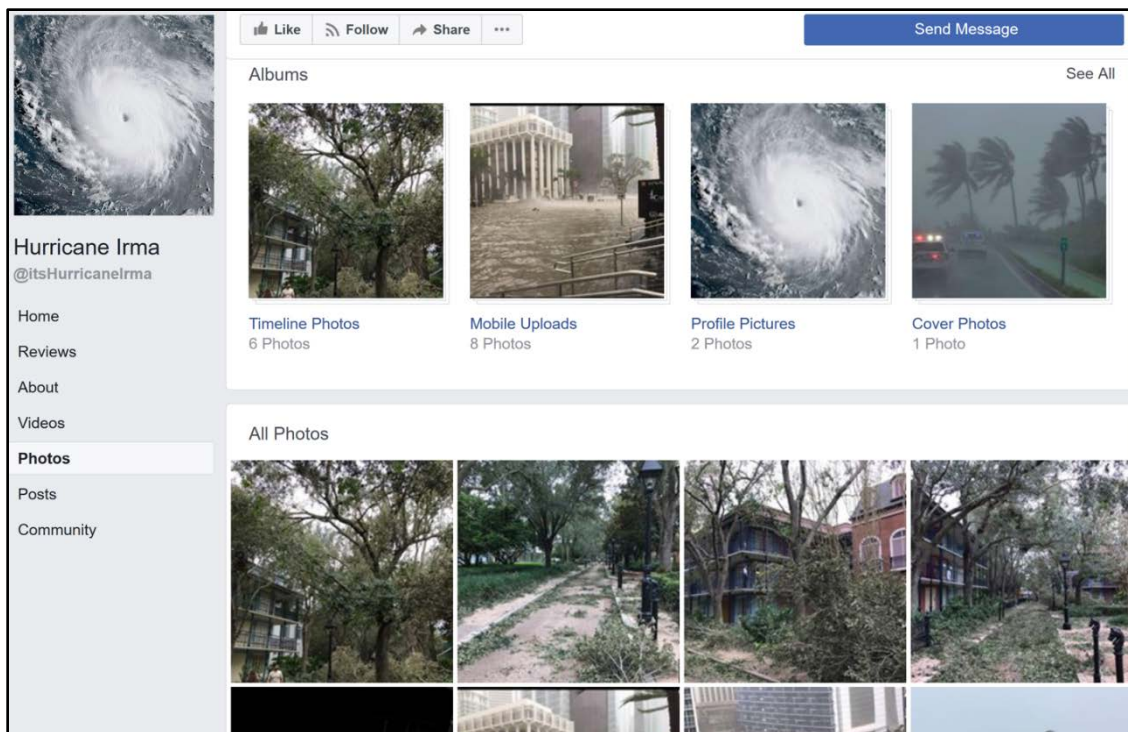


Figure 20: CNR 8 – Screenshot #4.

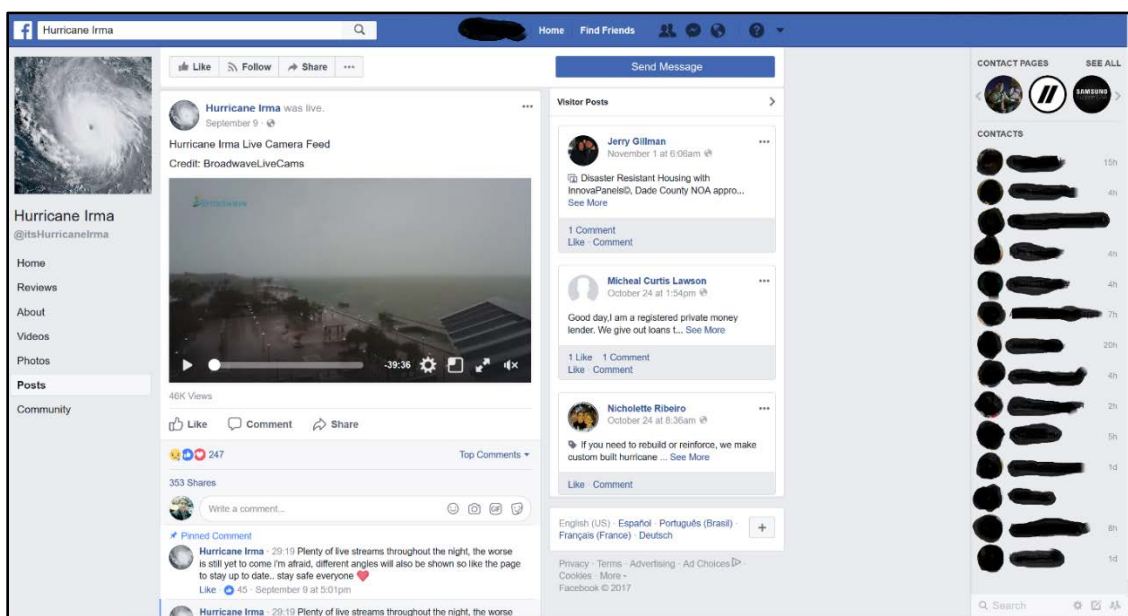


Figure 21: CNR 8 – Screenshot #5.

CNR 9: Hurricane Irma (Facebook Page)



Figure 22: CNR 9 – Screenshot #1.



Figure 23: CNR 9 – Screenshot #2.

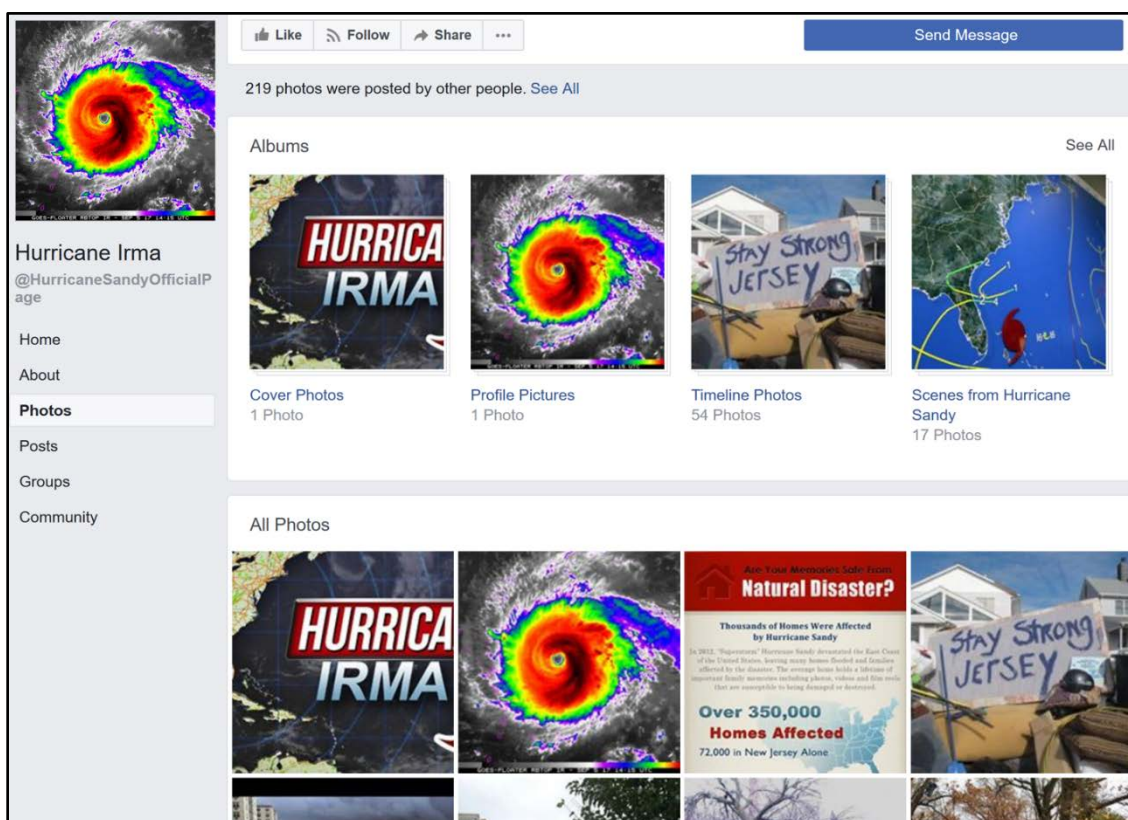


Figure 24: CNR 9 – Screenshot #3.

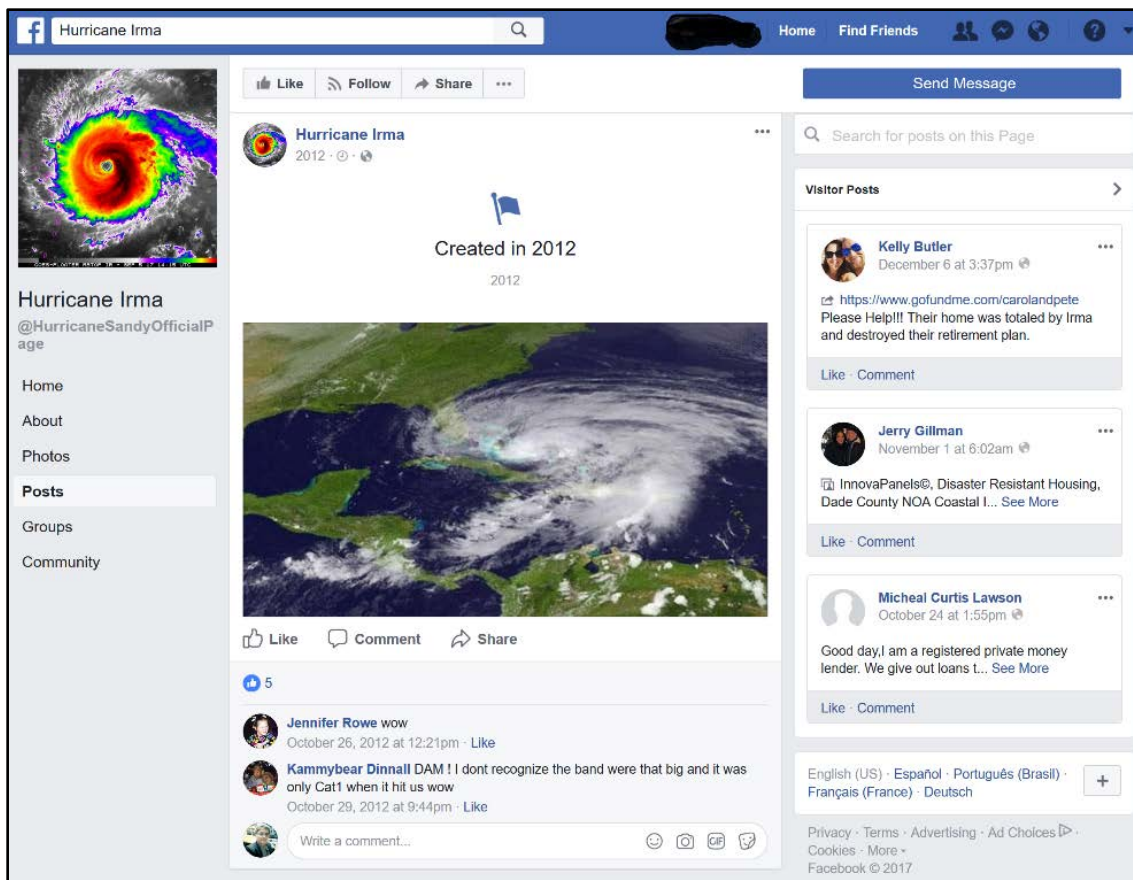


Figure 25: CNR 9 – Screenshot #4.



Figure 26: CNR 9 – Screenshot #5.

CNR 10: Hurricane Irma News (Twitter Account)

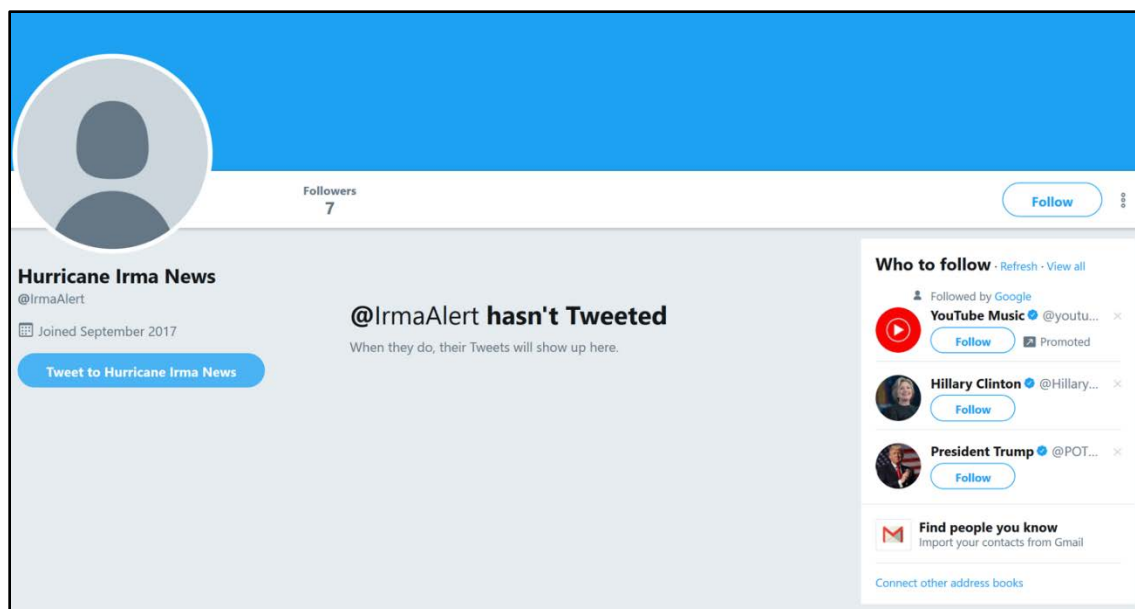


Figure 27: CNR 10 – Screenshot #1.

Appendix E: DATA FROM INTERVIEWS AND SURVEYS

CNR 1

Q1.1: Do you feel that the owner of this Twitter account (or Facebook page) has prior experience in crisis response?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	3 (60%)	9 (75%)	13 (76.4%)	57 (64.7%)
Somewhat Unlikely	1 (20%)	1 (8.3%)	3 (17.6%)	22 (25%)
Neither Unlikely nor Likely	-	-	1 (5.8%)	4 (4.5%)
Somewhat Likely	1 (20%)	2 (16.6%)	-	4 (4.5%)
Extremely Likely	-	-	-	1 (1.1%)

Table 30: CNR 1 (Q1.1)

Q1.2: Do you feel that the owner of this Twitter account (or Facebook page) is capable of helping you respond to hurricane Irma?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	3 (60%)	10 (83.3%)	12 (70.5%)	56 (63.6%)
Somewhat Unlikely	1 (20%)	-	3 (17.6%)	24 (27.2%)
Neither Unlikely nor Likely	-	-	1 (5.8%)	4 (4.5%)
Somewhat Likely	1 (20%)	2 (16.6%)	1 (5.8%)	4 (4.5%)
Extremely Likely	-	-	-	-

Table 31: CNR 1 (Q1.2)

Q1.3: Do you feel that the owner of this Twitter account (or Facebook page) has your best interests in mind?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	3 (60%)	9 (75%)	10 (58.8%)	40 (45.4%)
Somewhat Unlikely	-	1 (8.3%)	3 (17.6%)	22 (25%)
Neither Unlikely nor Likely	-	-	2 (11.7%)	18 (20.4%)
Somewhat Likely	1 (20%)	1 (8.3%)	2 (11.7%)	6 (6.8%)
Extremely Likely	1 (20%)	1 (8.3%)	-	2 (2.2%)

Table 32: CNR 1 (Q1.3)

Q1.4: Do you feel that the owner of this Twitter account (or Facebook page) understands your situation?

	Interviewees	Survey Participants
--	--------------	---------------------

	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	3 (60%)	7 (58.3%)	13 (76.4%)	42 (47.7%)
Somewhat Unlikely	-	2 (16.6%)	3 (17.6%)	28 (31.8%)
Neither Unlikely nor Likely	1 (20%)	-	-	12 (13.6%)
Somewhat Likely	1 (20%)	1 (8.3%)	1 (5.8%)	6 (6.8%)
Extremely Likely	-	2 (16.6%)	-	-

Table 33: CNR 1 (Q1.4)

Q1.5: Do you feel that the owner of this Twitter account (or Facebook page) will provide misleading information intentionally?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	3 (60%)	2 (16.6%)	1 (5.8%)	3 (8.4%)
Somewhat Unlikely	-	1 (8.3%)	3 (17.6%)	15 (17%)
Neither Unlikely nor Likely	-	2 (16.6%)	3 (17.6%)	21 (23.8%)
Somewhat Likely	1 (20%)	4 (33.3%)	8 (47%)	30 (34%)
Extremely Likely	1 (20%)	3 (25%)	2 (11.7%)	19 (21.5%)

Table 34: CNR 1 (Q1.5)

Q1.6: Do you feel that the owner of this Twitter account (or Facebook page) will make efforts to correct any false rumor or misinformation as soon as it comes to his/her notice?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	4 (80%)	8 (66.6%)	4 (23.5%)	40 (45.4%)
Somewhat Unlikely	-	-	8 (47%)	28 (31.8%)
Neither Unlikely nor Likely	-	1 (8.3%)	3 (17.6%)	11 (12.5%)
Somewhat Likely	1 (20%)	1 (8.3%)	2 (11.7%)	8 (9%)
Extremely Likely	-	2 (16.6%)	-	1 (1.1%)

Table 35: CNR 1 (Q1.6)

CNR 2

Q2.1: Do you feel that the owner of this Twitter account (or Facebook page) has prior experience in crisis response?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	3 (60%)	3 (25%)	4 (23.5%)	15 (17%)
Somewhat Unlikely	-	2 (16.6%)	2 (11.7%)	22 (25%)
Neither Unlikely nor Likely	-	-	6 (35.2%)	21 (23.8%)
Somewhat Likely	2 (40%)	6 (50%)	4 (23.5%)	24 (27.2%)
Extremely Likely	-	1 (8.3%)	1 (5.8%)	6 (6.8%)

Table 36: CNR 2 (Q2.1)

Q2.2: Do you feel that the owner of this Twitter account (or Facebook page) is capable of helping you respond to hurricane Irma?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	1 (20%)	3 (25%)	-	7 (7.9%)
Somewhat Unlikely	-	-	4 (23.5%)	15 (17%)
Neither Unlikely nor Likely	-	-	4 (23.5%)	11 (12.5%)
Somewhat Likely	-	7 (58.3%)	7 (41.1%)	50 (56.8%)
Extremely Likely	4 (80%)	2 (16.6%)	2 (11.7%)	5 (5.6%)

Table 37: CNR 2 (Q2.2)

Q2.3: Do you feel that the owner of this Twitter account (or Facebook page) has your best interests in mind?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	1 (20%)	1 (8.3%)	-	2 (2.2%)
Somewhat Unlikely	-	-	1 (5.8%)	2 (2.2%)
Neither Unlikely nor Likely	-	1 (8.3%)	4 (23.5%)	11 (12.5%)
Somewhat Likely	-	4 (33.3%)	2 (11.7%)	41 (46.5%)
Extremely Likely	4 (80%)	6 (50%)	10 (58.8%)	32 (36.6%)

Table 38: CNR 2 (Q2.3)

Q2.4: Do you feel that the owner of this Twitter account (or Facebook page) understands your situation?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	1 (20%)	1 (8.3%)	1 (5.8%)	3 (3.4%)
Somewhat Unlikely	-	-	2 (11.7%)	9 (10.2%)
Neither Unlikely nor Likely	-	-	2 (11.7%)	12 (13.6%)
Somewhat Likely	-	1 (8.3%)	6 (35.2%)	47 (53.4%)
Extremely Likely	4 (80%)	10 (83.3%)	6 (35.2%)	17 (19.3%)

Table 39: CNR 2 (Q2.4)

Q2.5: Do you feel that the owner of this Twitter account (or Facebook page) will provide misleading information intentionally?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	4 (80%)	9 (75%)	6 (35.2%)	38 (43.1%)
Somewhat Unlikely	-	2 (16.6%)	8 (47%)	42 (47.7%)
Neither Unlikely nor Likely	-	-	3 (17.6%)	5 (5.6%)
Somewhat Likely	1 (20%)	-	-	2 (2.2%)
Extremely Likely	-	1 (8.3%)	-	1 (1.1%)

Table 40: CNR 2 (Q2.5)

Q2.6: Do you feel that the owner of this Twitter account (or Facebook page) will make efforts to correct any false rumor or misinformation as soon as it comes to his/her notice?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	1 (20%)	-	-	1 (1.1%)
Somewhat Unlikely	-	-	2 (11.7%)	3 (3.4%)
Neither Unlikely nor Likely	-	1 (8.3%)	3 (17.6%)	9 (10.2%)
Somewhat Likely	2 (40%)	3 (25%)	5 (29.4%)	55 (62.5%)
Extremely Likely	2 (40%)	8 (66.6%)	7 (41.1%)	20 (22.7%)

Table 41: CNR 2 (Q2.6)

CNR 3

Q3.1: Do you feel that the owner of this Twitter account (or Facebook page) has prior experience in crisis response?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	3 (60%)	6 (50%)	6 (35.2%)	20 (22.7%)
Somewhat Unlikely	-	1 (8.3%)	6 (35.2%)	22 (25%)
Neither Unlikely nor Likely	1 (20%)	-	2 (11.7%)	26 (29.5%)
Somewhat Likely	1 (20%)	3 (25%)	3 (17.6%)	15 (17%)
Extremely Likely	-	2 (16.6%)	-	5 (5.6%)

Table 42: CNR 3 (Q3.1)

Q3.2: Do you feel that the owner of this Twitter account (or Facebook page) is capable of helping you respond to hurricane Irma?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	5 (100%)	7 (58.3%)	5 (29.4%)	24 (27.2%)
Somewhat Unlikely	-	2 (16.6%)	4 (23.5%)	26 (29.5%)
Neither Unlikely nor Likely	-	-	3 (17.6%)	14 (15.9%)
Somewhat Likely	-	2 (16.6%)	5 (29.4%)	21 (23.8%)
Extremely Likely	-	1 (8.3%)	-	3 (3.4%)

Table 43: CNR 3 (Q3.2)

Q3.3: Do you feel that the owner of this Twitter account (or Facebook page) has your best interests in mind?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	2 (40%)	5 (41.6%)	3 (17.6%)	17 (19.3%)

Somewhat Unlikely	2 (40%)	1 (8.3%)	3 (17.6%)	20 (22.7%)
Neither Unlikely nor Likely	-	-	4 (23.5%)	25 (28.4%)
Somewhat Likely	-	3 (25%)	4 (23.5%)	18 (20.4%)
Extremely Likely	1 (20%)	3 (25%)	3 (17.6%)	8 (9%)

Table 44: CNR 3 (Q3.3)

Q3.4: Do you feel that the owner of this Twitter account (or Facebook page) understands your situation?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	3 (60%)	2 (16.6%)	3 (17.6%)	12 (13.6%)
Somewhat Unlikely	1 (20%)	1 (8.3%)	5 (29.4%)	25 (28.4%)
Neither Unlikely nor Likely	-	1 (8.3%)	5 (29.4%)	20 (22.7%)
Somewhat Likely	-	5 (41.6%)	3 (17.6%)	29 (32.9%)
Extremely Likely	1 (20%)	3 (25%)	1 (5.8%)	2 (2.2%)

Table 45: CNR 3 (Q3.4)

Q3.5: Do you feel that the owner of this Twitter account (or Facebook page) will provide misleading information intentionally?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	1 (20%)	5 (41.6%)	4 (23.5%)	11 (12.5%)
Somewhat Unlikely	1 (20%)	1 (8.3%)	5 (29.4%)	30 (34%)
Neither Unlikely nor Likely	1 (20%)	1 (8.3%)	3 (17.6%)	25 (28.4%)
Somewhat Likely	1 (20%)	2 (16.6%)	3 (17.6%)	14 (15.9%)
Extremely Likely	1 (20%)	3 (25%)	2 (11.7%)	8 (9%)

Table 46: CNR 3 (Q3.5)

Q3.6: Do you feel that the owner of this Twitter account (or Facebook page) will make efforts to correct any false rumor or misinformation as soon as it comes to his/her notice?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	2 (40%)	5 (41.6%)	3 (17.6%)	13 (14.7%)
Somewhat Unlikely	1 (20%)	1 (8.3%)	8 (47%)	19 (21.5%)
Neither Unlikely nor Likely	1 (20%)	2 (16.6%)	3 (17.6%)	27 (30.6%)
Somewhat Likely	1 (20%)	1 (8.3%)	2 (11.7%)	22 (25%)
Extremely Likely	-	3 (25%)	1 (5.8%)	7 (7.9%)

Table 47: CNR 3 (Q3.6)

CNR 4

Q4.1: Do you feel that the owner of this Twitter account (or Facebook page) has prior experience in crisis response?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	5 (100%)	11 (91.6%)	14 (82.3%)	66 (75%)
Somewhat Unlikely	-	-	1 (5.8%)	10 (11.3%)
Neither Unlikely nor Likely	-	-	1 (5.8%)	6 (6.8%)
Somewhat Likely	-	1 (8.3%)	1 (5.8%)	5 (5.6%)
Extremely Likely	-	-	-	1 (1.1%)

Table 48: CNR 4 (Q4.1)

Q4.2: Do you feel that the owner of this Twitter account (or Facebook page) is capable of helping you respond to hurricane Irma?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	4 (80%)	12 (100%)	16 (94%)	71 (80.6%)
Somewhat Unlikely	-	-	-	8 (9.0%)
Neither Unlikely nor Likely	-	-	1 (5.8%)	3 (3.4%)
Somewhat Likely	-	-	-	6 (6.8%)
Extremely Likely	1 (20%)	-	-	-

Table 49: CNR 4 (Q4.2)

Q4.3: Do you feel that the owner of this Twitter account (or Facebook page) has your best interests in mind?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	3 (60%)	11 (91.6%)	9 (52.9%)	44 (50%)
Somewhat Unlikely	-	-	4 (23.5%)	21 (23.8%)
Neither Unlikely nor Likely	-	-	3 (17.6%)	19 (21.5%)
Somewhat Likely	2 (40%)	1 (8.3%)	1 (5.8%)	4 (4.5%)
Extremely Likely	-	-	-	-

Table 50: CNR 4 (Q4.3)

Q4.4: Do you feel that the owner of this Twitter account (or Facebook page) understands your situation?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	2 (40%)	10 (83.3%)	11 (64.7%)	50 (56.8%)
Somewhat Unlikely	1 (20%)	1 (8.3%)	5 (29.4%)	25 (28.4%)
Neither Unlikely nor Likely	1 (20%)	-	1 (5.8%)	9 (10.2%)
Somewhat Likely	1 (20%)	1 (8.3%)	-	4 (4.5%)
Extremely Likely	-	-	-	-

Table 51: CNR 4 (Q4.4)

Q4.5: Do you feel that the owner of this Twitter account (or Facebook page) will provide misleading information intentionally?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	2 (40%)	2 (16.6%)	2 (11.7%)	6 (10.2%)
Somewhat Unlikely	1 (20%)	1 (8.3%)	2 (11.7%)	8 (9%)
Neither Unlikely nor Likely	1 (20%)	-	6 (35.2%)	24 (27.2%)
Somewhat Likely	-	4 (33.3%)	4 (23.5%)	34 (38.6%)
Extremely Likely	1 (20%)	5 (41.6%)	3 (17.6%)	16 (18.1%)

Table 52: CNR 4 (Q4.5)

Q4.6: Do you feel that the owner of this Twitter account (or Facebook page) will make efforts to correct any false rumor or misinformation as soon as it comes to his/her notice?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	5 (100%)	9 (75%)	12 (70.5%)	43 (48.8%)
Somewhat Unlikely	-	-	2 (11.7%)	35 (39.7%)
Neither Unlikely nor Likely	-	1 (8.3%)	1 (5.8%)	6 (6.8%)
Somewhat Likely	-	2 (16.6%)	2 (11.7%)	4 (4.5%)
Extremely Likely	-	-	-	-

Table 53: CNR 4 (Q4.6)

CNR 5

Q5.1: Do you feel that the owner of this Twitter account (or Facebook page) has prior experience in crisis response?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	1 (20%)	1 (8.3%)	-	3 (3.4%)
Somewhat Unlikely	-	-	-	5 (5.6%)
Neither Unlikely nor Likely	-	2 (16.6%)	6 (35.2%)	18 (20.4%)
Somewhat Likely	2 (40%)	6 (50%)	9 (52.9%)	38 (43.1%)
Extremely Likely	2 (40%)	3 (25%)	2 (11.7%)	24 (27.2%)

Table 54: CNR 5 (Q5.1)

Q5.2: Do you feel that the owner of this Twitter account (or Facebook page) is capable of helping you respond to hurricane Irma?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	1 (20%)	1 (8.3%)	-	3 (3.4%)
Somewhat Unlikely	-	2 (16.6%)	-	5 (5.6%)
Neither Unlikely nor Likely	-	-	6 (35.2%)	11 (12.5%)

Somewhat Likely	1 (20%)	4 (33.3%)	7 (41.1%)	48 (54.5%)
Extremely Likely	3 (60%)	5 (41.6%)	4 (23.5%)	21 (23.8%)

Table 55: CNR 5 (Q5.2)

Q5.3: Do you feel that the owner of this Twitter account (or Facebook page) has your best interests in mind?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	1 (20%)	1 (8.3%)	-	3 (3.4%)
Somewhat Unlikely	-	-	-	-
Neither Unlikely nor Likely	-	-	-	15 (17%)
Somewhat Likely	2 (40%)	5 (41.6%)	10 (58.8%)	43 (48.8%)
Extremely Likely	2 (40%)	6 (50%)	7 (41.1%)	27 (30.6%)

Table 56: CNR 5 (Q5.3)

Q5.4: Do you feel that the owner of this Twitter account (or Facebook page) understands your situation?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	1 (20%)	-	-	3 (3.4%)
Somewhat Unlikely	-	1 (8.3%)	2 (11.7%)	5 (5.6%)
Neither Unlikely nor Likely	-	-	3 (17.6%)	17 (19.3%)
Somewhat Likely	1 (20%)	5 (41.6%)	11 (64.7%)	44 (50%)
Extremely Likely	3 (60%)	6 (50%)	1 (5.8%)	19 (21.5%)

Table 57: CNR 5 (Q5.4)

Q5.5: Do you feel that the owner of this Twitter account (or Facebook page) will provide misleading information intentionally?

	Interviewees		Survey Participants	
	Experts (N = 5)	Members of the Public (N = 12)	Experts (N = 17)	Members of the Public (N = 88)
Extremely Unlikely	4 (80%)	11 (91.6%)	10 (58.8%)	42 (47.7%)
Somewhat Unlikely	-	-	7 (41.1%)	38 (43.1%)
Neither Unlikely nor Likely	-	1 (8.3%)	-	6 (6.8%)
Somewhat Likely	1 (20%)	-	-	2 (2.2%)
Extremely Likely	-	-	-	-

Table 58: CNR 5 (Q5.5)

Q5.6: Do you feel that the owner of this Twitter account (or Facebook page) will make efforts to correct any false rumor or misinformation as soon as it comes to his/her notice?

	Interviewees		Survey Participants	
	Experts	Members of the Public	Experts	Members of the Public

	(N = 5)	(N = 12)	(N = 17)	(N = 88)
Extremely Unlikely	-	1 (8.3%)	-	2 (2.2%)
Somewhat Unlikely	-	-	1 (5.8%)	4 (4.5%)
Neither Unlikely nor Likely	-	1 (8.3%)	4 (23.5%)	14 (15.9%)
Somewhat Likely	2 (40%)	1 (8.3%)	5 (29.4%)	35 (39.7%)
Extremely Likely	3 (60%)	9 (75%)	7 (41.1%)	33 (37.5%)

Table 59: CNR 5 (Q5.6)

CNR 6

This CNR was only shown to interviewees.

Q6.1: Do you feel that the owner of this Twitter account (or Facebook page) has prior experience in crisis response?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	2 (40%)	3 (25%)
Somewhat Unlikely	-	-
Neither Unlikely nor Likely	-	1 (8.3%)
Somewhat Likely	3 (60%)	5 (41.6%)
Extremely Likely	-	3 (25%)

Table 60: CNR 6 (Q6.1)

Q6.2: Do you feel that the owner of this Twitter account (or Facebook page) is capable of helping you respond to hurricane Irma?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	2 (40%)	2 (16.6%)
Somewhat Unlikely	-	1 (8.3%)
Neither Unlikely nor Likely	-	-
Somewhat Likely	3 (60%)	7 (58.3%)
Extremely Likely	-	2 (16.6%)

Table 61: CNR 6 (Q6.2)

Q6.3: Do you feel that the owner of this Twitter account (or Facebook page) has your best interests in mind?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	2 (40%)	-
Somewhat Unlikely	-	-
Neither Unlikely nor Likely	-	-
Somewhat Likely	1 (20%)	5 (41.6%)
Extremely Likely	2 (40%)	7 (58.3%)

Table 62: CNR 6 (Q6.3)

Q6.4: Do you feel that the owner of this Twitter account (or Facebook page) understands your situation?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	2 (40%)	-
Somewhat Unlikely	-	1 (8.3%)
Neither Unlikely nor Likely	1 (20%)	1 (8.3%)
Somewhat Likely	-	3 (25%)
Extremely Likely	2 (40%)	7 (58.3%)

Table 63: CNR 6 (Q6.4)

Q6.5: Do you feel that the owner of this Twitter account (or Facebook page) will provide misleading information intentionally?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	3 (60%)	9 (75%)
Somewhat Unlikely	-	1 (8.3%)
Neither Unlikely nor Likely	-	1 (8.3%)
Somewhat Likely	1 (20%)	1 (8.3%)
Extremely Likely	1 (20%)	-

Table 64: CNR 6 (Q6.5)

Q6.6: Do you feel that the owner of this Twitter account (or Facebook page) will make efforts to correct any false rumor or misinformation as soon as it comes to his/her notice?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	2 (40%)	1 (8.3%)
Somewhat Unlikely	-	2 (16.6%)
Neither Unlikely nor Likely	1 (20%)	1 (8.3%)
Somewhat Likely	2 (40%)	3 (25%)
Extremely Likely	-	5 (41.6%)

Table 65: CNR 6 (Q6.6)

CNR 7

This CNR was only shown to interviewees.

Q7.1: Do you feel that the owner of this Twitter account (or Facebook page) has prior experience in crisis response?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	1 (20%)	1 (8.3%)
Somewhat Unlikely	-	-
Neither Unlikely nor Likely	-	-
Somewhat Likely	2 (40%)	4 (33.3%)
Extremely Likely	2 (40%)	7 (58.3%)

Table 66: CNR 7 (Q7.1)

Q7.2: Do you feel that the owner of this Twitter account (or Facebook page) is capable of helping you respond to hurricane Irma?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	1 (20%)	-
Somewhat Unlikely	-	1 (8.3%)
Neither Unlikely nor Likely	-	-
Somewhat Likely	2 (40%)	4 (33.3%)
Extremely Likely	2 (40%)	7 (58.3%)

Table 67: CNR 7 (Q7.2)

Q7.3: Do you feel that the owner of this Twitter account (or Facebook page) has your best interests in mind?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	1 (20%)	-
Somewhat Unlikely	-	-
Neither Unlikely nor Likely	-	-
Somewhat Likely	-	3 (25%)
Extremely Likely	4 (80%)	9 (75%)

Table 68: CNR 7 (Q7.3)

Q7.4: Do you feel that the owner of this Twitter account (or Facebook page) understands your situation?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	1 (20%)	-
Somewhat Unlikely	-	-
Neither Unlikely nor Likely	-	-
Somewhat Likely	-	3 (25%)
Extremely Likely	4 (80%)	9 (75%)

Table 69: CNR 7 (Q7.4)

Q7.5: Do you feel that the owner of this Twitter account (or Facebook page) will provide misleading information intentionally?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	4 (80%)	12 (100%)
Somewhat Unlikely	-	-
Neither Unlikely nor Likely	-	-
Somewhat Likely	1 (20%)	-
Extremely Likely	-	-

Table 70: CNR 7 (Q7.5)

Q7.6: Do you feel that the owner of this Twitter account (or Facebook page) will make efforts to correct any false rumor or misinformation as soon as it comes to his/her notice?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)

Extremely Unlikely	-	1 (8.3%)
Somewhat Unlikely	1 (20%)	-
Neither Unlikely nor Likely	-	-
Somewhat Likely	3 (60%)	2 (16.6%)
Extremely Likely	1 (20%)	9 (75%)

Table 71: CNR 7 (Q7.6)

CNR 8

This CNR was only shown to interviewees.

Q8.1: Do you feel that the owner of this Twitter account (or Facebook page) has prior experience in crisis response?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	3 (60%)	7 (58.3%)
Somewhat Unlikely	-	-
Neither Unlikely nor Likely	1 (20%)	1 (8.3%)
Somewhat Likely	1 (20%)	3 (25%)
Extremely Likely	-	1 (8.3%)

Table 72: CNR 8 (Q8.1)

Q8.2: Do you feel that the owner of this Twitter account (or Facebook page) is capable of helping you respond to hurricane Irma?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	1 (20%)	3 (25%)
Somewhat Unlikely	-	1 (8.3%)
Neither Unlikely nor Likely	-	-
Somewhat Likely	3 (60%)	6 (50%)
Extremely Likely	1 (20%)	2 (16.6%)

Table 73: CNR 8 (Q8.2)

Q8.3: Do you feel that the owner of this Twitter account (or Facebook page) has your best interests in mind?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	1 (20%)	2 (16.6%)
Somewhat Unlikely	-	-
Neither Unlikely nor Likely	-	-
Somewhat Likely	1 (20%)	6 (50%)
Extremely Likely	3 (60%)	4 (33.3%)

Table 74: CNR 8 (Q8.3)

Q8.4: Do you feel that the owner of this Twitter account (or Facebook page) understands your situation?

	Interviewees
--	--------------

	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	1 (20%)	1 (8.3%)
Somewhat Unlikely	-	-
Neither Unlikely nor Likely	1 (20%)	-
Somewhat Likely	1 (20%)	7 (58.3%)
Extremely Likely	2 (40%)	4 (33.3%)

Table 75: CNR 8 (Q8.4)

Q8.5: Do you feel that the owner of this Twitter account (or Facebook page) will provide misleading information intentionally?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	2 (40%)	9 (75%)
Somewhat Unlikely	-	2 (16.6%)
Neither Unlikely nor Likely	-	-
Somewhat Likely	3 (60%)	-
Extremely Likely	-	1 (8.3%)

Table 76: CNR 8 (Q8.5)

Q8.6: Do you feel that the owner of this Twitter account (or Facebook page) will make efforts to correct any false rumor or misinformation as soon as it comes to his/her notice?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	1 (20%)	3 (25%)
Somewhat Unlikely	1 (20%)	1 (8.3%)
Neither Unlikely nor Likely	2 (40%)	-
Somewhat Likely	-	4 (33.3%)
Extremely Likely	1 (20%)	4 (33.3%)

Table 77: CNR 8 (Q8.6)

CNR 9

This CNR was only shown to interviewees.

Q9.1: Do you feel that the owner of this Twitter account (or Facebook page) has prior experience in crisis response?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	-	3 (25%)
Somewhat Unlikely	-	2 (16.6%)
Neither Unlikely nor Likely	-	1 (8.3%)
Somewhat Likely	1 (20%)	2 (16.6%)
Extremely Likely	4 (80%)	4 (33.3%)

Table 78: CNR 9 (Q9.1)

Q9.2: Do you feel that the owner of this Twitter account (or Facebook page) is capable of helping you respond to hurricane Irma?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	2 (40%)	2 (16.6%)
Somewhat Unlikely	-	4 (33.3%)
Neither Unlikely nor Likely	1 (20%)	2 (16.6%)
Somewhat Likely	1 (20%)	2 (16.6%)
Extremely Likely	1 (20%)	2 (16.6%)

Table 79: CNR 9 (Q9.2)

Q9.3: Do you feel that the owner of this Twitter account (or Facebook page) has your best interests in mind?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	1 (20%)	4 (33.3%)
Somewhat Unlikely	1 (20%)	3 (25%)
Neither Unlikely nor Likely	-	1 (8.3%)
Somewhat Likely	-	3 (25%)
Extremely Likely	3 (60%)	1 (8.3%)

Table 80: CNR 9 (Q9.3)

Q9.4: Do you feel that the owner of this Twitter account (or Facebook page) understands your situation?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	2 (40%)	2 (16.6%)
Somewhat Unlikely	1 (20%)	3 (25%)
Neither Unlikely nor Likely	1 (20%)	1 (8.3%)
Somewhat Likely	-	4 (33.3%)
Extremely Likely	1 (20%)	2 (16.6%)

Table 81: CNR 9 (Q9.4)

Q9.5: Do you feel that the owner of this Twitter account (or Facebook page) will provide misleading information intentionally?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	3 (60%)	8 (66.6%)
Somewhat Unlikely	-	-
Neither Unlikely nor Likely	-	-
Somewhat Likely	1 (20%)	4 (33.3%)
Extremely Likely	1 (20%)	-

Table 82: CNR 9 (Q9.5)

Q9.6: Do you feel that the owner of this Twitter account (or Facebook page) will make efforts to correct any false rumor or misinformation as soon as it comes to his/her notice?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	3 (60%)	5 (41.6%)

Somewhat Unlikely	-	1 (8.3%)
Neither Unlikely nor Likely	1 (20%)	2 (16.6%)
Somewhat Likely	1 (20%)	1 (8.3%)
Extremely Likely	-	3 (25%)

Table 83: CNR 9 (Q9.6)

CNR 10

This CNR was only shown to interviewees.

Q10.1: Do you feel that the owner of this Twitter account (or Facebook page) has prior experience in crisis response?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	5 (100%)	8 (66.6%)
Somewhat Unlikely	-	1 (8.3%)
Neither Unlikely nor Likely	-	2 (16.6%)
Somewhat Likely	-	1 (8.3%)
Extremely Likely	-	-

Table 84: CNR 10 (Q10.1)

Q10.2: Do you feel that the owner of this Twitter account (or Facebook page) is capable of helping you respond to hurricane Irma?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	5 (100%)	11 (91.6%)
Somewhat Unlikely	-	-
Neither Unlikely nor Likely	-	-
Somewhat Likely	-	1 (8.3%)
Extremely Likely	-	-

Table 85: CNR 10 (Q10.2)

Q10.3: Do you feel that the owner of this Twitter account (or Facebook page) has your best interests in mind?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	5 (100%)	7 (58.3%)
Somewhat Unlikely	-	1 (8.3%)
Neither Unlikely nor Likely	-	2 (16.6%)
Somewhat Likely	-	1 (8.3%)
Extremely Likely	-	1 (8.3%)

Table 86: CNR 10 (Q10.3)

Q10.4: Do you feel that the owner of this Twitter account (or Facebook page) understands your situation?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)

Extremely Unlikely	5 (100%)	9 (75%)
Somewhat Unlikely	-	1 (8.3%)
Neither Unlikely nor Likely	-	2 (16.6%)
Somewhat Likely	-	-
Extremely Likely	-	-

Table 87: CNR 10 (Q10.4)

Q10.5: Do you feel that the owner of this Twitter account (or Facebook page) will provide misleading information intentionally?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	2 (40%)	4 (33.3%)
Somewhat Unlikely	-	-
Neither Unlikely nor Likely	-	6 (50%)
Somewhat Likely	-	1 (8.3%)
Extremely Likely	3 (60%)	1 (8.3%)

Table 88: CNR 10 (Q10.5)

Q10.6: Do you feel that the owner of this Twitter account (or Facebook page) will make efforts to correct any false rumor or misinformation as soon as it comes to his/her notice?

	Interviewees	
	Experts (N = 5)	Members of the Public (N = 12)
Extremely Unlikely	2 (40%)	6 (50%)
Somewhat Unlikely	1 (20%)	1 (8.3%)
Neither Unlikely nor Likely	1 (20%)	4 (33.3%)
Somewhat Likely	1 (20%)	1 (8.3%)
Extremely Likely	-	-

Table 89: CNR 10 (Q10.6)

Appendix F: QUALITATIVE ANALYSIS

Affinity Diagram (Survey Responses)

To determine the factors that influence the trustworthiness of CNRs profiles, I first wrote each open-ended survey response on a sticky note. To distinguish responses visually, I used pink, blue, and yellow-colored sticky notes to write 'I do not trust,' 'I might trust,' and 'I trust' responses respectively. I also used blue, red, gold, and green-colored star-shaped stickers to visually identify my research participants as male, female, expert, and members of the public respectively. I then organized all these sticky notes on a large sheet of sticky note. This helped me determine some common themes that appeared across a number of survey responses. This exercise was also helpful in determining some of the signs that made a CNR look trustworthy (or not trustworthy) and in developing code book.

Preliminary findings from Affinity Diagram-

1. Resources that appeared trustworthy were the ones that-
 - a. provided crisis-related information,
 - b. provided timely crisis-related updates all throughout the hurricane,
 - c. included multimedia (pictures, videos, or maps) to report the status of the hurricane,
 - d. had clear description of their owners and/or administrators and their intentions,
 - e. had large following and good reviews,
 - f. had professional tone and graphics,
 - g. seemed to have a benign interest, and
 - h. were linked to authoritative and/or familiar resources.
2. Resources that appeared not-so-trustworthy were the ones that-
 - a. provided irrelevant information,
 - b. provided little to no information about the hurricane,
 - c. did not provide a list of actionable items,
 - d. aimed to solicit money,
 - e. were open to public and were not much moderated,
 - f. had limited to no disclosure of their administrators and their intentions,
 - g. lacked professionalism in their tone or profile organization,
 - h. seemed insensitive to the situation, and
 - i. were not linked to authoritative resources.



Figure 28: Affinity Diagram.

Dedoose Coding

After developing my codebook, I uploaded all the open-ended survey responses and interview transcriptions on Dedoose. Next, I coded all the documents using my codebook.

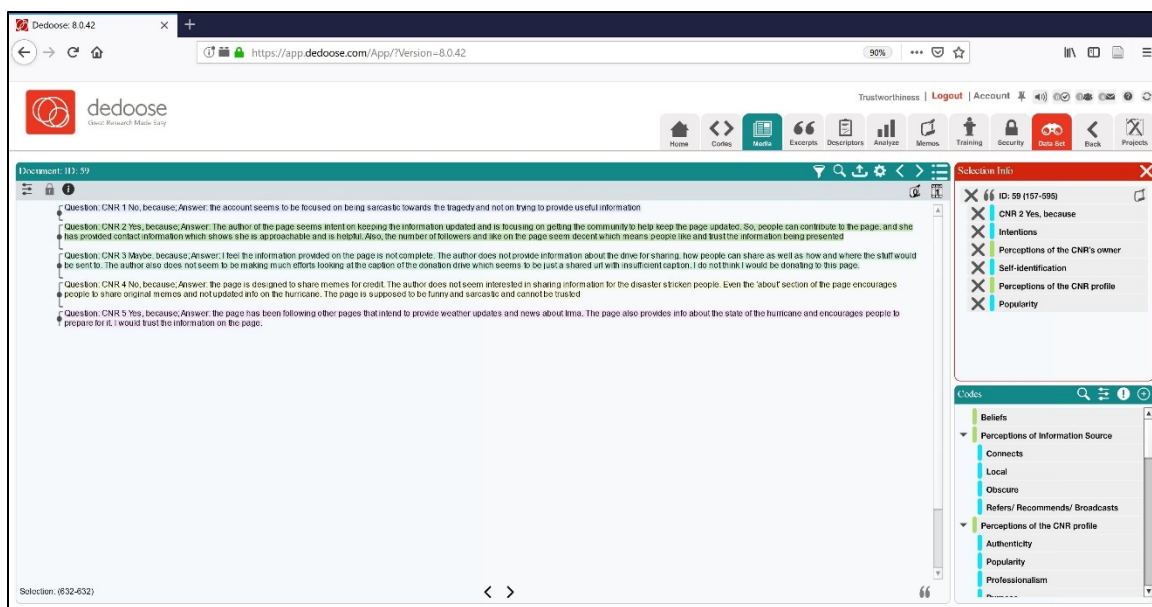


Figure 29: SID 59's Survey Response Codes.

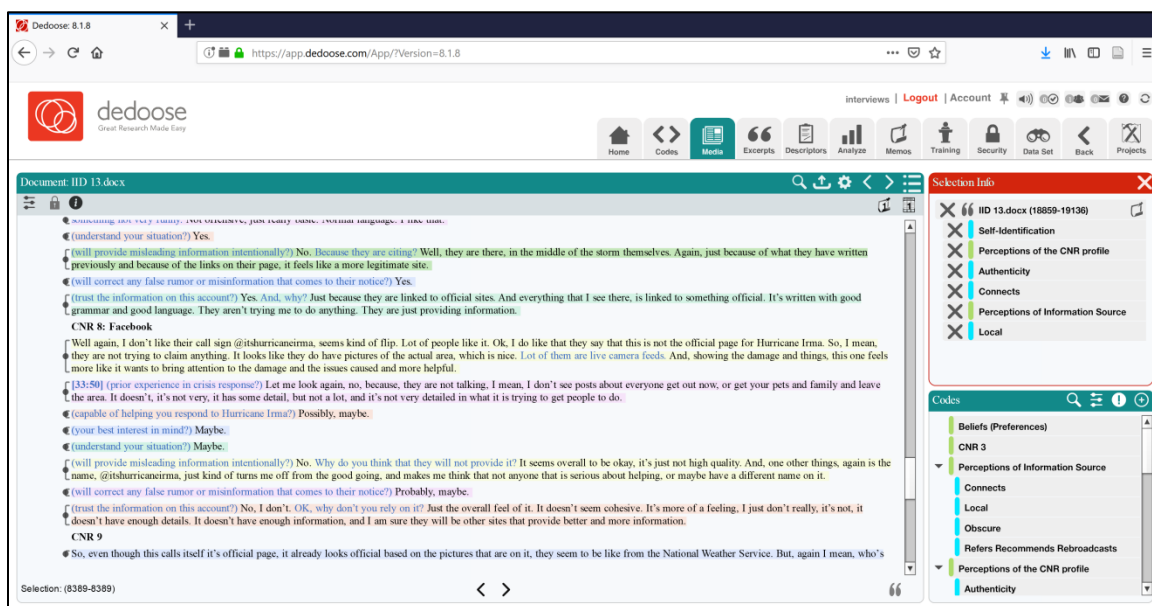


Figure 30: IID 13's Interview Codes.

Appendix G: QUANTITATIVE ANALYSIS (using MS Excel)

Perceptions of CNRs by Gender

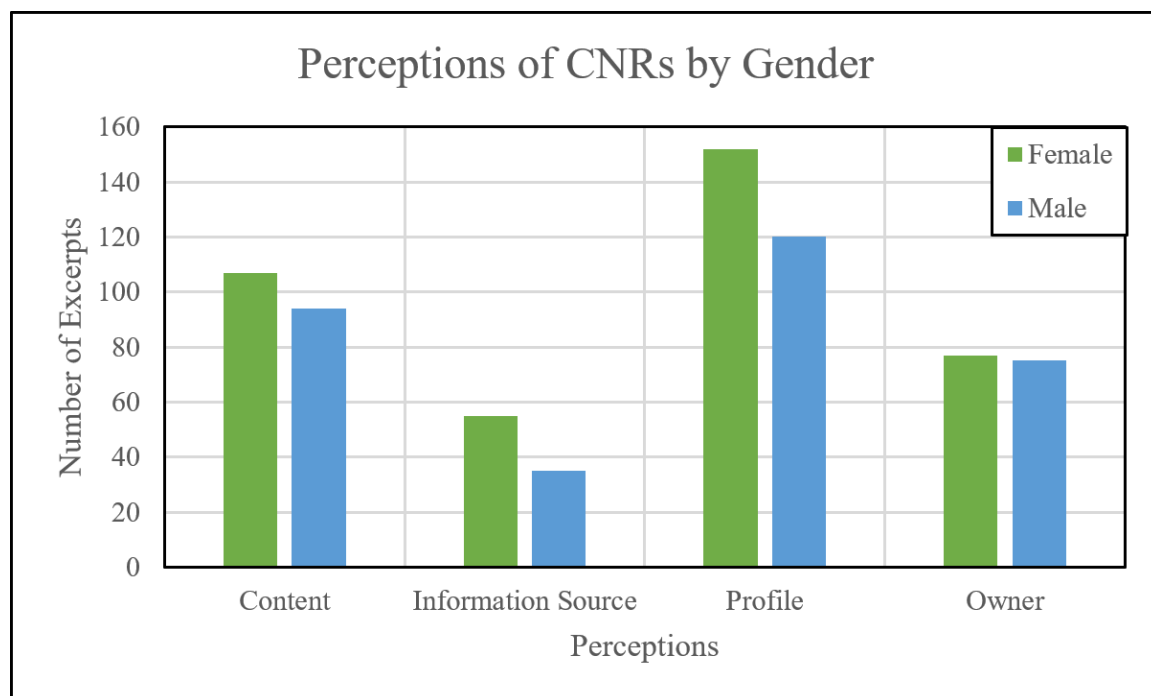


Figure 31: Perceptions of CNRs by Gender.

Perceptions of CNRs by Age

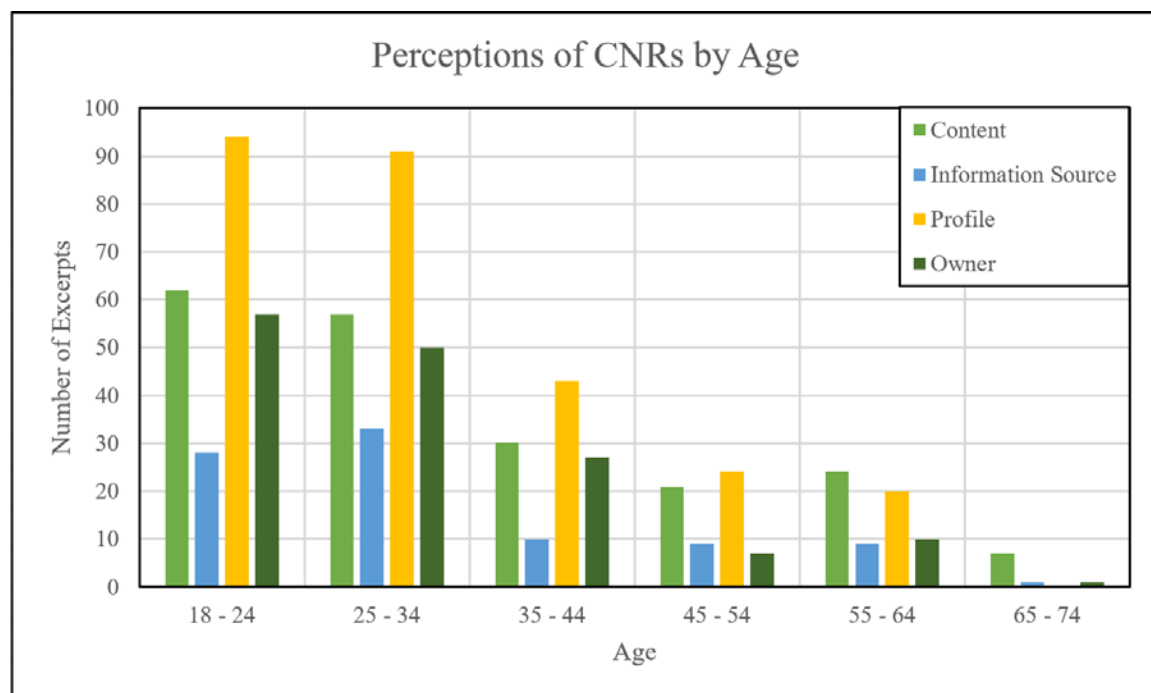


Figure 32: Perceptions of CNRs by Age.

Perceptions of CNRs by Education

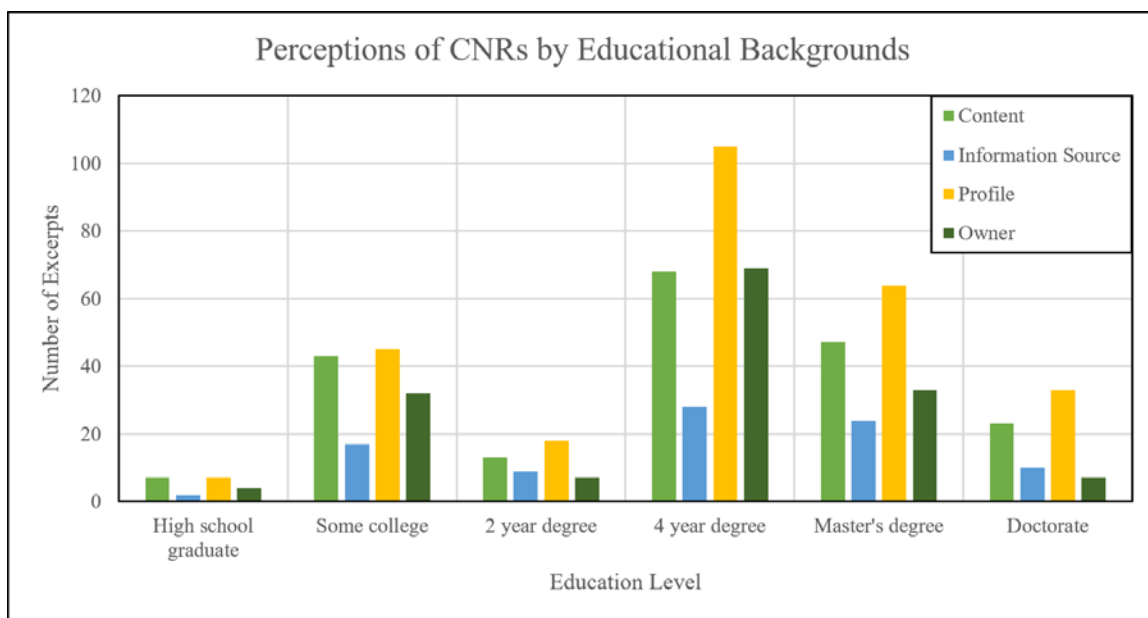


Figure 33: Perceptions of CNRs by Education Level Completed.

Perceptions of CNRs by Expertise

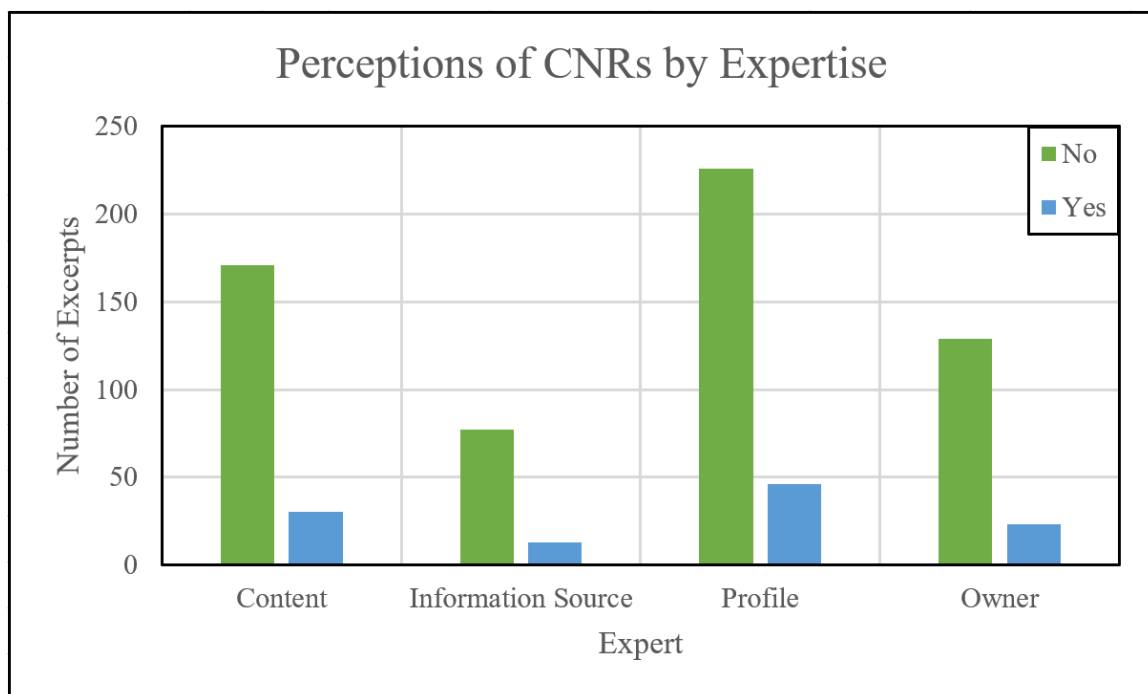


Figure 34: Perceptions of CNRs by Expertise.

Perceptions of CNRs by Comfort Level Using Facebook

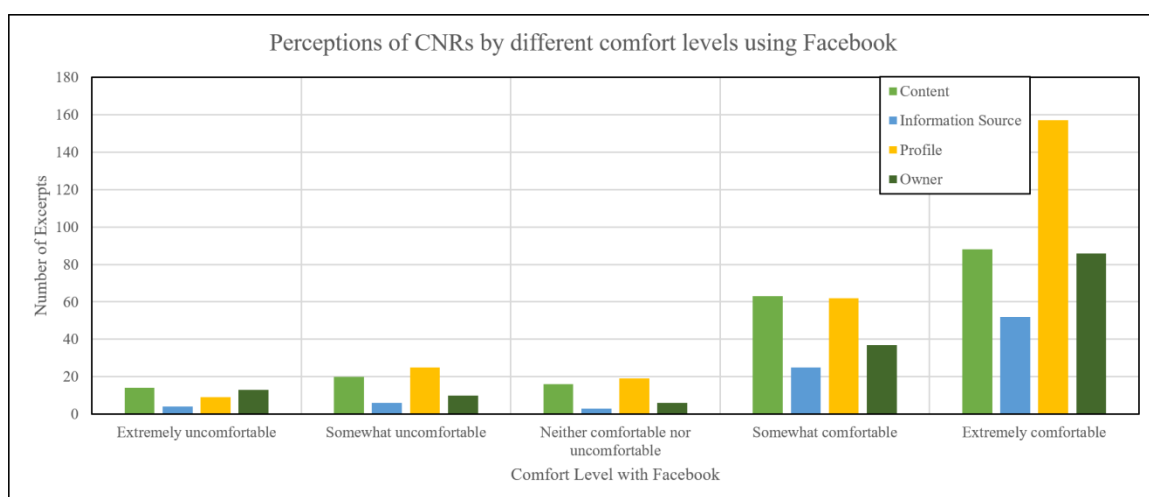


Figure 35: Perceptions of CNRs by Comfort Levels when using Facebook.

Perceptions of CNRs by Comfort Level Using Twitter

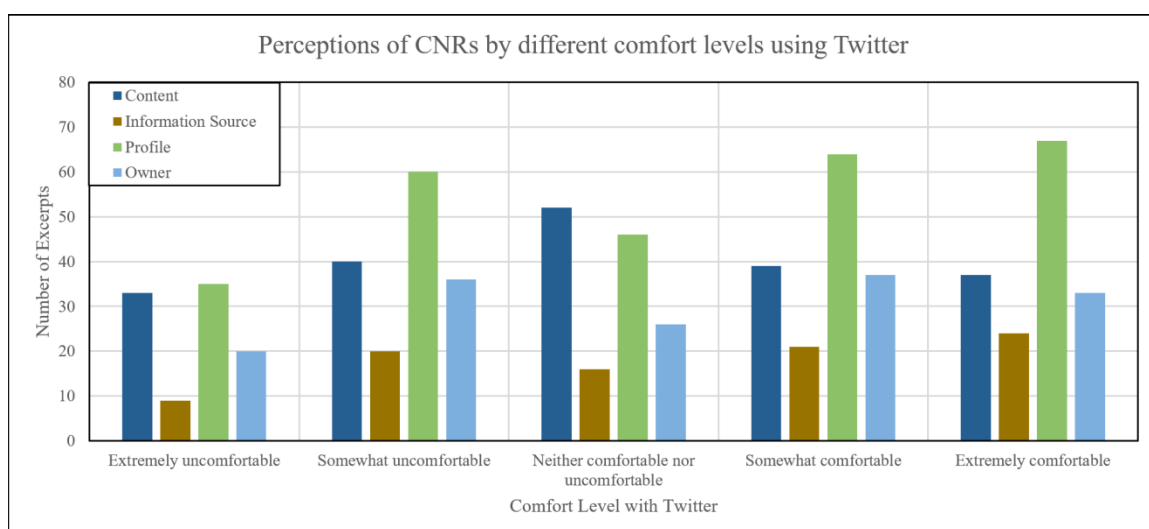


Figure 36: Perceptions of CNRs by Comfort Level using Twitter.

Appendix H: QUANTITATIVE ANALYSIS (using R)

Including the required libraries

```
library(janitor)
library(tidyverse)
library(dplyr)
library(furniture)
library(plyr)
library(corrplot)
```

Reading in the data

I read my data (a csv file) using read.csv.

```
setwd("C:/Users/apch0/Desktop/R")
myData <- read.csv("TrustSurveyData.csv")
```

Cleaning (and formatting) the data

1. I copy my data, so that no changes are made to the original data.
2. I clean all the variable names and remove all the empty rows and columns.
3. I remove all the unnecessary columns.
4. I delete the first two rows as it has redundant informaton as headers.

```
myDataCopy <- myData %>%
  janitor::clean_names() %>%
  janitor::remove_empty("rows") %>%
  janitor::remove_empty("cols") %>%
  dplyr::select(-start_date, -end_date, -status, -ip_address, -duration_in_seconds, -fi
nished, -recorded_date, -response_id, -recipient_last_name, -recipient_first_name, -rec
ipient_email, -external_reference, -location_latitude, -location_longitude, -distributi
on_channel, -user_language, -q1_1_id, -q1_1_name, -q1_1_size, -q1_1_type, -q3_8_1_text,
-q3_8_2_text, -q3_8_3_text, -q4_8_1_text, -q4_8_2_text, -q4_8_3_text, -q5_8_1_text, -q5
_8_2_text, -q5_8_3_text, -q6_8_1_text, -q6_8_2_text, -q6_8_3_text, -q7_8_1_text, -q7_8
_2_text, -q7_8_3_text, -q9_1, -q5_8_3_text_topics) %>%
  filter(row_number() != 1 & row_number() != 2)
```

5. I provide meaningful names to some of the columns.

```
myDataCopy <- myDataCopy %>%
  dplyr::rename("prior_exp_1" = "q3_2",
               "capable_to_help_1" = "q3_3",
               "best_interests_1" = "q3_4",
               "understands_situation_1" = "q3_5",
               "provide_misinfo_1" = "q3_6",
               "correct_misinfo_1" = "q3_7",
               "trust_1" = "q3_8",
               "prior_exp_2" = "q4_2",
               "capable_to_help_2" = "q4_3",
               "best_interests_2" = "q4_4",
               "understands_situation_2" = "q4_5",
               "provide_misinfo_2" = "q4_6",
               "correct_misinfo_2" = "q4_7",
               "trust_2" = "q4_8",
               "prior_exp_3" = "q5_2",
               "capable_to_help_3" = "q5_3",
               "best_interests_3" = "q5_4",
               "understands_situation_3" = "q5_5",
               "provide_misinfo_3" = "q5_6",
```

```

"correct_misinfo_3" = "q5_7",
"trust_3" = "q5_8",
"prior_exp_4" = "q6_2",
"capable_to_help_4" = "q6_3",
"best_interests_4" = "q6_4",
"understands_situation_4" = "q6_5",
"provide_misinfo_4" = "q6_6",
"correct_misinfo_4" = "q6_7",
"trust_4" = "q6_8",
"prior_exp_5" = "q7_2",
"capable_to_help_5" = "q7_3",
"best_interests_5" = "q7_4",
"understands_situation_5" = "q7_5",
"provide_misinfo_5" = "q7_6",
"correct_misinfo_5" = "q7_7",
"trust_5" = "q7_8",
"gender" = "q8_1",
"age" = "q8_2",
"educ" = "q8_3",
"expert" = "q8_4",
"comf_Facebook" = "q8_5",
"comf_Twitter" = "q8_6")

```

6. I delete all the rows with missing values.

```
myDataCopy <- na.omit(myDataCopy)
```

7. I create new variables that hold numeric values instead of text. This will be useful in performing statistics.

```

myDataCopy <- myDataCopy %>%
  dplyr::mutate(priorExpBin1 = dplyr::case_when(prior_exp_1 == "Extremely unlikely" ~ 1
,
                                                    prior_exp_1 == "Somewhat unlikely" ~ 2,
                                                    prior_exp_1 == "Neither likely nor unli
kely" ~ 3,
                                                    prior_exp_1 == "Somewhat likely" ~ 4,
                                                    prior_exp_1 == "Extremely likely" ~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(capableToHelpBin1 = dplyr::case_when(capable_to_help_1 == "Extremely un
likely" ~ 1,
                                                    capable_to_help_1 == "Somewhat unlikely
" ~ 2,
                                                    capable_to_help_1 == "Neither likely no
r unlikely" ~ 3,
                                                    capable_to_help_1 == "Somewhat likely"
~ 4,
                                                    capable_to_help_1 == "Extremely likely"
~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(bestInterestsBin1 = dplyr::case_when(best_interests_1 == "Extremely unl
ikely" ~ 1,
                                                    best_interests_1 == "Somewhat unlikely"
~ 2,
                                                    best_interests_1 == "Neither likely nor
unlikely" ~ 3,
                                                    best_interests_1 == "Somewhat likely" ~
4,
                                                    best_interests_1 == "Extremely likely"
~ 5))

```

```

myDataCopy <- myDataCopy %>%
  dplyr::mutate(understandsSituationBin1 = dplyr::case_when(understands_situation_1 ==
"Extremely unlikely" ~ 1,
understands_situation_1 == "Somewhat un
likely" ~ 2,
understands_situation_1 == "Neither lik
ely nor unlikely" ~ 3,
understands_situation_1 == "Somewhat li
kely" ~ 4,
understands_situation_1 == "Extremely l
ikely" ~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(provMisInfoBin1 = dplyr::case_when(provide_misinfo_1 == "Extremely unli
kely" ~ 1,
provide_misinfo_1 == "Somewhat unlikely
" ~ 2,
provide_misinfo_1 == "Neither likely no
r unlikely" ~ 3,
provide_misinfo_1 == "Somewhat likely"
~ 4,
provide_misinfo_1 == "Extremely likely"
~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(CorrectMisInfoBin1 = dplyr::case_when(correct_misinfo_1 == "Extremely u
nlikely" ~ 1,
correct_misinfo_1 == "Somewhat unlikely"
~ 2,
correct_misinfo_1 == "Neither likely no
r unlikely" ~ 3,
correct_misinfo_1 == "Somewhat likely" ~
4,
correct_misinfo_1 == "Extremely likely"
~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(trustBin1 = dplyr::case_when(trust_1 == "No, because" ~ 1,
trust_1 == "Maybe, because" ~ 2,
trust_1 == "Yes, because" ~ 3))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(priorExpBin2 = dplyr::case_when(prior_exp_2 == "Extremely unlikely" ~ 1
,
prior_exp_2 == "Somewhat unlikely" ~ 2,
prior_exp_2 == "Neither likely nor unli
kely" ~ 3,
prior_exp_2 == "Somewhat likely" ~ 4,
prior_exp_2 == "Extremely likely" ~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(capableToHelpBin2 = dplyr::case_when(capable_to_help_2 == "Extremely un
likely" ~ 1,
capable_to_help_2 == "Somewhat unlikely
" ~ 2,
capable_to_help_2 == "Neither likely no
r unlikely" ~ 3,
capable_to_help_2 == "Somewhat likely"
~ 4,
capable_to_help_2 == "Extremely likely"
~ 5))

```

```

myDataCopy <- myDataCopy %>%
  dplyr::mutate(bestInterestsBin2 = dplyr::case_when(best_interests_2 == "Extremely unli
    ikely" ~ 1,
    best_interests_2 == "Somewhat unlikely"
    ~ 2,
    best_interests_2 == "Neither likely nor
    unlikely" ~ 3,
    best_interests_2 == "Somewhat likely" ~
    4,
    best_interests_2 == "Extremely likely"
    ~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(understandsSituationBin2 = dplyr::case_when(understands_situation_2 ==
    "Extremely unlikely" ~ 1,
    understands_situation_2 == "Somewhat un
    likely" ~ 2,
    understands_situation_2 == "Neither lik
    ely nor unlikely" ~ 3,
    understands_situation_2 == "Somewhat li
    kely" ~ 4,
    understands_situation_2 == "Extremely l
    ikely" ~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(provMisInfoBin2 = dplyr::case_when(provide_misinfo_2 == "Extremely unli
    kely" ~ 1,
    provide_misinfo_2 == "Somewhat unlikely"
    ~ 2,
    provide_misinfo_2 == "Neither likely no
    r unlikely" ~ 3,
    provide_misinfo_2 == "Somewhat likely"
    ~ 4,
    provide_misinfo_2 == "Extremely likely"
    ~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(CorrectMisInfoBin2 = dplyr::case_when(correct_misinfo_2 == "Extremely u
    nlikely" ~ 1,
    correct_misinfo_2 == "Somewhat unlikely"
    ~ 2,
    correct_misinfo_2 == "Neither likely no
    r unlikely" ~ 3,
    correct_misinfo_2 == "Somewhat likely" ~
    4,
    correct_misinfo_2 == "Extremely likely"
    ~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(trustBin2 = dplyr::case_when(trust_2 == "No, because" ~ 1,
    trust_2 == "Maybe, because" ~ 2,
    trust_2 == "Yes, because" ~ 3))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(priorExpBin3 = dplyr::case_when(prior_exp_3 == "Extremely unlikely" ~ 1
    ,
    prior_exp_3 == "Somewhat unlikely" ~ 2,
    prior_exp_3 == "Neither likely nor unli
    kely" ~ 3,
    prior_exp_3 == "Somewhat likely" ~ 4,
    prior_exp_3 == "Extremely likely" ~ 5))

```

```

myDataCopy <- myDataCopy %>%
  dplyr::mutate(capableToHelpBin3 = dplyr::case_when(capable_to_help_3 == "Extremely un
likely" ~ 1,
                                                    capable_to_help_3 == "Somewhat unlikely
" ~ 2,
                                                    capable_to_help_3 == "Neither likely no
r unlikely" ~ 3,
                                                    capable_to_help_3 == "Somewhat likely"
~ 4,
                                                    capable_to_help_3 == "Extremely likely"
~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(bestInterestsBin3 = dplyr::case_when(best_interests_3 == "Extremely unl
ikely" ~ 1,
                                                    best_interests_3 == "Somewhat unlikely"
~ 2,
                                                    best_interests_3 == "Neither likely nor
unlikely" ~ 3,
                                                    best_interests_3 == "Somewhat likely" ~
4,
                                                    best_interests_3 == "Extremely likely"
~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(understandsSituationBin3 = dplyr::case_when(understands_situation_3 ==
"Extremely unlikely" ~ 1,
                                                    understands_situation_3 == "Somewhat un
likely" ~ 2,
                                                    understands_situation_3 == "Neither lik
ely nor unlikely" ~ 3,
                                                    understands_situation_3 == "Somewhat li
kely" ~ 4,
                                                    understands_situation_3 == "Extremely l
ikely" ~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(provMisInfoBin3 = dplyr::case_when(provide_misinfo_3 == "Extremely unli
kely" ~ 1,
                                                    provide_misinfo_3 == "Somewhat unlikely
" ~ 2,
                                                    provide_misinfo_3 == "Neither likely no
r unlikely" ~ 3,
                                                    provide_misinfo_3 == "Somewhat likely"
~ 4,
                                                    provide_misinfo_3 == "Extremely likely"
~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(CorrectMisInfoBin3 = dplyr::case_when(correct_misinfo_3 == "Extremely u
nlikely" ~ 1,
                                                    correct_misinfo_3 == "Somewhat unlikely"
~ 2,
                                                    correct_misinfo_3 == "Neither likely no
r unlikely" ~ 3,
                                                    correct_misinfo_3 == "Somewhat likely" ~
4,
                                                    correct_misinfo_3 == "Extremely likely"
~ 5))

```

```

myDataCopy <- myDataCopy %>%
  dplyr::mutate(trustBin3 = dplyr::case_when(trust_3 == "No, because" ~ 1,
                                             trust_3 == "Maybe, because" ~ 2,
                                             trust_3 == "Yes, because" ~ 3))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(priorExpBin4 = dplyr::case_when(prior_exp_4 == "Extremely unlikely" ~ 1,
                                             prior_exp_4 == "Somewhat unlikely" ~ 2,
                                             prior_exp_4 == "Neither likely nor unlikely" ~ 3,
                                             prior_exp_4 == "Somewhat likely" ~ 4,
                                             prior_exp_4 == "Extremely likely" ~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(capableToHelpBin4 = dplyr::case_when(capable_to_help_4 == "Extremely unlikely" ~ 1,
                                             capable_to_help_4 == "Somewhat unlikely" ~ 2,
                                             capable_to_help_4 == "Neither likely nor unlikely" ~ 3,
                                             capable_to_help_4 == "Somewhat likely" ~ 4,
                                             capable_to_help_4 == "Extremely likely" ~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(bestInterestsBin4 = dplyr::case_when(best_interests_4 == "Extremely unlikely" ~ 1,
                                             best_interests_4 == "Somewhat unlikely" ~ 2,
                                             best_interests_4 == "Neither likely nor unlikely" ~ 3,
                                             best_interests_4 == "Somewhat likely" ~ 4,
                                             best_interests_4 == "Extremely likely" ~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(understandsSituationBin4 = dplyr::case_when(understands_situation_4 == "Extremely unlikely" ~ 1,
                                             understands_situation_4 == "Somewhat unlikely" ~ 2,
                                             understands_situation_4 == "Neither likely nor unlikely" ~ 3,
                                             understands_situation_4 == "Somewhat likely" ~ 4,
                                             understands_situation_4 == "Extremely likely" ~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(provMisInfoBin4 = dplyr::case_when(provide_misinfo_4 == "Extremely unlikely" ~ 1,
                                             provide_misinfo_4 == "Somewhat unlikely" ~ 2,
                                             provide_misinfo_4 == "Neither likely nor unlikely" ~ 3,
                                             provide_misinfo_4 == "Somewhat likely" ~ 4,
                                             provide_misinfo_4 == "Extremely likely" ~ 5))

```

```

myDataCopy <- myDataCopy %>%
  dplyr::mutate(CorrectMisInfoBin4 = dplyr::case_when(correct_misinfo_4 == "Extremely u
nlikely" ~ 1,
~ 2,
r unlikely" ~ 3,
4,
~ 5))
  correct_misinfo_4 == "Somewhat unlikely"
  correct_misinfo_4 == "Neither likely no
  correct_misinfo_4 == "Somewhat likely" ~
  correct_misinfo_4 == "Extremely likely"

myDataCopy <- myDataCopy %>%
  dplyr::mutate(trustBin4 = dplyr::case_when(trust_4 == "No, because" ~ 1,
trust_4 == "Maybe, because" ~ 2,
trust_4 == "Yes, because" ~ 3))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(priorExpBin5 = dplyr::case_when(prior_exp_5 == "Extremely unlikely" ~ 1
,
prior_exp_5 == "Somewhat unlikely" ~ 2,
prior_exp_5 == "Neither likely nor unli
kely" ~ 3,
prior_exp_5 == "Somewhat likely" ~ 4,
prior_exp_5 == "Extremely likely" ~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(capableToHelpBin5 = dplyr::case_when(capable_to_help_5 == "Extremely un
likely" ~ 1,
" ~ 2,
r unlikely" ~ 3,
~ 4,
~ 5))
  capable_to_help_5 == "Somewhat unlikely
  capable_to_help_5 == "Neither likely no
  capable_to_help_5 == "Somewhat likely"
  capable_to_help_5 == "Extremely likely"

myDataCopy <- myDataCopy %>%
  dplyr::mutate(bestInterestsBin5 = dplyr::case_when(best_interests_5 == "Extremely unl
ikely" ~ 1,
~ 2,
unlikely" ~ 3,
4,
~ 5))
  best_interests_5 == "Somewhat unlikely"
  best_interests_5 == "Neither likely nor
  best_interests_5 == "Somewhat likely" ~
  best_interests_5 == "Extremely likely"

myDataCopy <- myDataCopy %>%
  dplyr::mutate(understandsSituationBin5 = dplyr::case_when(understands_situation_5 ==
"Extremely unlikely" ~ 1,
likely" ~ 2,
ely nor unlikely" ~ 3,
kely" ~ 4,
likely" ~ 5))
  understands_situation_5 == "Somewhat un
  understands_situation_5 == "Neither lik
  understands_situation_5 == "Somewhat li
  understands_situation_5 == "Extremely l

```

```

myDataCopy <- myDataCopy %>%
  dplyr::mutate(provMisInfoBin5 = dplyr::case_when(provide_misinfo_5 == "Extremely unlikely" ~ 1,
                                                    provide_misinfo_5 == "Somewhat unlikely" ~ 2,
                                                    provide_misinfo_5 == "Neither likely nor unlikely" ~ 3,
                                                    provide_misinfo_5 == "Somewhat likely" ~ 4,
                                                    provide_misinfo_5 == "Extremely likely" ~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(CorrectMisInfoBin5 = dplyr::case_when(correct_misinfo_5 == "Extremely unlikely" ~ 1,
                                                       correct_misinfo_5 == "Somewhat unlikely" ~ 2,
                                                       correct_misinfo_5 == "Neither likely nor unlikely" ~ 3,
                                                       correct_misinfo_5 == "Somewhat likely" ~ 4,
                                                       correct_misinfo_5 == "Extremely likely" ~ 5))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(trustBin5 = dplyr::case_when(trust_5 == "No, because" ~ 1,
                                             trust_5 == "Maybe, because" ~ 2,
                                             trust_5 == "Yes, because" ~ 3))

```

8. I add an extra column with row ID.

```

myDataCopy <- myDataCopy %>%
  mutate(id = row_number(progress))

```

Knowing my research participants

1. GENDER

Table below shows that this dataset consists of 52 females (49.5%) and 53 males (50.4%).

```

myDataCopy <- myDataCopy %>%
  mutate(gender = case_when(gender == "Female" ~ "Female",
                            gender == "Male" ~ "Male")) %>%
  filter(complete.cases(gender)) %>%
  mutate(gender = forcats::fct_drop(factor(gender)))

furniture::tableF(myDataCopy, gender)

##
## -----
##  gender  Freq  CumFreq  Percent  CumPerc
##  Female  52    52       49.52%  49.52%
##  Male    53    105      50.48%  100.00%
##  -----

```

2. AGE

Table below shows that majority of the participants in this dataset belong either to the 18-24 (30.4%) or 25-34 (29.5%) age group.

```
myDataCopy <- myDataCopy %>%
  mutate(age = case_when(age == "18 - 24" ~ "18 - 24",
                        age == "25 - 34" ~ "25 - 34",
                        age == "35 - 44" ~ "35 - 44",
                        age == "45 - 54" ~ "45 - 54",
                        age == "55 - 64" ~ "55 - 64",
                        age == "65 - 74" ~ "65 - 74")) %>%
  filter(complete.cases(age)) %>%
  mutate(age = forcats::fct_drop(factor(age)))

furniture::tableF(myDataCopy, age)

##
## -----
##   age      Freq CumFreq Percent CumPerc
## 18 - 24  32    32    30.48%  30.48%
## 25 - 34  31    63    29.52%  60.00%
## 35 - 44  16    79    15.24%  75.24%
## 45 - 54  11    90    10.48%  85.71%
## 55 - 64  13   103    12.38%  98.10%
## 65 - 74   2   105     1.90% 100.00%
## -----
##
```

3. EDUCATION COMPLETED

Table below shows that majority of the participants in this dataset had either a 4-year (36.1%) or Master's (22.8%) degree.

```
myDataCopy <- myDataCopy %>%
  mutate(educ = case_when(educ == "High school graduate" ~ "High School Graduate",
                        educ == "Some college" ~ "Some College",
                        educ == "2 year degree" ~ "2-year Degree",
                        educ == "4 year degree" ~ "4-year Degree",
                        educ == "Master's degree" ~ "Master's Degree",
                        educ == "Doctorate" ~ "Doctorate")) %>%
  filter(complete.cases(educ)) %>%
  mutate(educ = forcats::fct_drop(factor(educ)))

furniture::tableF(myDataCopy, educ)

##
## -----
##   educ      Freq CumFreq Percent CumPerc
## 2-year Degree    7     7     6.67%   6.67%
## 4-year Degree   38    45    36.19%  42.86%
## Doctorate      13    58    12.38%  55.24%
## High School Graduate 4    62     3.81%  59.05%
## Master's Degree  24    86    22.86%  81.90%
## Some College    19   105    18.10% 100.00%
## -----
##
```

4. EXPERT

Table below shows that majority of the participants in this dataset were members of the public (83.8%).

```
myDataCopy <- myDataCopy %>%
  mutate(expert = case_when(expert == "No" ~ "No",
                             expert == "Yes" ~ "Yes")) %>%
  filter(complete.cases(expert)) %>%
  mutate(expert = forcats::fct_drop(factor(expert)))

furniture::tableF(myDataCopy, expert)

##
## -----
## expert Freq CumFreq Percent CumPerc
## No      88    88      83.81%  83.81%
## Yes     17   105     16.19%  100.00%
## -----
```

5. COMFORT LEVEL WITH FACEBOOK

Table below shows that almost half of the participants (49.5%) in this dataset were extremely comfortable using Facebook.

```
myDataCopy <- myDataCopy %>%
  mutate(comf_Facebook = case_when(comf_Facebook == "Extremely uncomfortable" ~ "Extrem
ely uncomfortable",
  comf_Facebook == "Somewhat uncomfortable" ~ "Somewhat uncomfortable",
  comf_Facebook == "Neither comfortable nor uncomfortable" ~ "Neither comfortable nor un
comfortable",
  comf_Facebook == "Somewhat comfortable" ~ "Somewhat comfortable",
  comf_Facebook == "Extremely comfortable" ~ "Extremely comfortable")) %>%
  filter(complete.cases(comf_Facebook)) %>%
  mutate(comf_Facebook = forcats::fct_drop(factor(comf_Facebook)))

furniture::tableF(myDataCopy, comf_Facebook)

##
## -----
## comf_Facebook Freq CumFreq Percent CumPerc
## Extremely comfortable 52 52 49.52% 49.52%
## Extremely uncomfortable 7 59 6.67% 56.19%
## Neither comfortable nor uncomfortable 9 68 8.57% 64.76%
## Somewhat comfortable 29 97 27.62% 92.38%
## Somewhat uncomfortable 8 105 7.62% 100.00%
## -----
```

6. COMFORT LEVEL WITH TWITTER

Table below shows that there is an even distribution across the comfort level when using Twitter.

```
myDataCopy <- myDataCopy %>%
  mutate(comf_Twitter = case_when(comf_Twitter == "Extremely uncomfortable" ~ "Extremel
y uncomfortable",
  comf_Twitter == "Somewhat uncomfortable" ~ "Somewhat uncomfortable",
  comf_Twitter == "Neither comfortable nor uncomfortable" ~ "Neither comfortable nor unc
omfortable",
  comf_Twitter == "Somewhat comfortable" ~ "Somewhat comfortable",
  comf_Twitter == "Extremely comfortable" ~ "Extremely comfortable")) %>%
  filter(complete.cases(comf_Twitter)) %>%
  mutate(comf_Twitter = forcats::fct_drop(factor(comf_Twitter)))

furniture::tableF(myDataCopy, comf_Twitter)
```

```
##
## -----
##   comf_Twitter      Freq CumFreq Percent CumPerc
##   Extremely comfortable      22   22    20.95%  20.95%
##   Extremely uncomfortable      15   37    14.29%  35.24%
##   Neither comfortable nor uncomfortable      22   59    20.95%  56.19%
##   Somewhat comfortable      24   83    22.86%  79.05%
##   Somewhat uncomfortable      22  105    20.95% 100.00%
## -----
```

Perceptions of trustworthiness of CNRs

1. Crisis Named Resource 1 (CNR 1)

Most participants (87.6%) do not trust CNR 1.

```
furniture::tableF(myDataCopy, trustBin1)

##
## -----
##   trustBin1 Freq CumFreq Percent CumPerc
##   1         92   92      87.62%  87.62%
##   2         10  102      9.52%  97.14%
##   3          3  105      2.86% 100.00%
## -----
```

2. Crisis Named Resource 1 (CNR 2)

Most participants either trust (40%) or somewhat trust (50.4%) CNR 2.

```
furniture::tableF(myDataCopy, trustBin2)

##
## -----
##   trustBin2 Freq CumFreq Percent CumPerc
##   1         10   10      9.52%  9.52%
##   2         53   63     50.48% 60.00%
##   3         42  105     40.00% 100.00%
## -----
```

3. Crisis Named Resource 3 (CNR 3)

More than half of the participants (53.3%) do not trust CNR 3.

```
furniture::tableF(myDataCopy, trustBin3)

##
## -----
##   trustBin3 Freq CumFreq Percent CumPerc
##   1         56   56     53.33% 53.33%
##   2         37   93     35.24% 88.57%
##   3         12  105     11.43% 100.00%
## -----
```

4. Crisis Named Resource 4 (CNR 4)

Most participants (91.4%) do not trust CNR 4.

```
furniture::tableF(myDataCopy, trustBin4)

##
## -----
## trustBin4 Freq CumFreq Percent CumPerc
## 1          96   96      91.43%  91.43%
## 2           7  103      6.67%  98.10%
## 3           2  105      1.90% 100.00%
## -----
```

5. Crisis Named Resource 5 (CNR 5)

Most participants either trust (52.3%) or somewhat trust (41.9%) CNR 2.

```
furniture::tableF(myDataCopy, trustBin5)

##
## -----
## trustBin5 Freq CumFreq Percent CumPerc
## 1           6    6       5.71%  5.71%
## 2          44   50      41.90%  47.62%
## 3          55  105      52.38% 100.00%
## -----
```

Demographics and Trustworthiness

To determine any existing correlation between a demographic variable and trustworthiness of Crisis Named Resources (hereafter CNR), I create new demographic variables to hold numeric values.

```
myDataCopy <- myDataCopy %>%
  dplyr::mutate(AgeBin = dplyr::case_when(age == "18 - 24" ~ 1,
                                          age == "25 - 34" ~ 2,
                                          age == "35 - 44" ~ 3,
                                          age == "45 - 54" ~ 4,
                                          age == "55 - 64" ~ 5,
                                          age == "65 - 74" ~ 6))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(EducBin = dplyr::case_when(educ == "High School Graduate" ~ 1,
                                          educ == "Some College" ~ 2,
                                          educ == "2-year Degree" ~ 3,
                                          educ == "4-year Degree" ~ 4,
                                          educ == "Master's Degree" ~ 5,
                                          educ == "Doctorate" ~ 6))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(ExpertBin = dplyr::case_when(expert == "No" ~ 1,
                                              expert == "Yes" ~ 2))

myDataCopy <- myDataCopy %>%
  dplyr::mutate(ComfFacebookBin = dplyr::case_when(comf_Facebook == "Extremely uncomfortable" ~ 1,
                                                    comf_Facebook == "Somewhat uncomfortable" ~ 2,
                                                    comf_Facebook == "Neither comfortable nor uncomfortable" ~ 3,
                                                    comf_Facebook == "Somewhat comfortable" ~ 4,
```

```

table" ~5))
myDataCopy <- myDataCopy %>%
  dplyr::mutate(ComfTwitterBin = dplyr::case_when(comf_Twitter == "Extremely uncomforta
ble" ~1,
comf_Twitter == "Somewhat uncomfortab
le" ~2,
comf_Twitter == "Neither comfortable
nor uncomfortable" ~ 3,
comf_Twitter == "Somewhat comfortable
" ~ 4,
comf_Twitter == "Extremely uncomforta
ble" ~5))

```

1. Correlation between participants' age and their perceptions of trustworthiness of different Crisis Named Resources

There seems to be a weak correlation between participant's age and his/her perceptions on the trustworthiness of CNRs.

```

myDataCopy %>%
  select(AgeBin, trustBin1, trustBin2, trustBin3, trustBin4, trustBin5) %>%
  set_names(c("Age", "Trust \nCNR 1", "Trust \nCNR 2", "Trust \nCNR 3", "Trust \nCNR 4",
"Trust \nCNR 5")) %>%
  cor(use = "pairwise.complete.obs", method="spearman") %>%
  corrplot(type="upper", diag=FALSE, sig.level = 0.05, addCoef.col = "black")

```

2. Correlation between participants' education and their perceptions of trustworthiness of different Crisis Named Resources

There seems to be a weak correlation between participant's educational background and his/her perceptions on the trustworthiness of CNRs.

```

myDataCopy %>%
  select(EducBin, trustBin1, trustBin2, trustBin3, trustBin4, trustBin5) %>%
  set_names(c("Education \nCompleted", "Trust \nCNR 1", "Trust \nCNR 2", "Trust \nCNR 3",
"Trust \nCNR 4", "Trust \nCNR 5")) %>%
  cor(use = "pairwise.complete.obs", method="spearman") %>%
  corrplot(type="upper", diag=FALSE, sig.level = 0.05, addCoef.col = "black")

```

3. Correlation between participants' expertise and their perceptions of trustworthiness of different Crisis Named Resources

There seems to be a weak correlation between participant's expertise and his/her perceptions on the trustworthiness of CNRs.

```

myDataCopy %>%
  select(ExpertBin, trustBin1, trustBin2, trustBin3, trustBin4, trustBin5) %>%
  set_names(c("Expertise", "Trust \nCNR 1", "Trust \nCNR 2", "Trust \nCNR 3", "Trust \n
CNR 4", "Trust \nCNR 5")) %>%
  cor(use = "pairwise.complete.obs", method="spearman") %>%
  corrplot(type="upper", diag=FALSE, sig.level = 0.05, addCoef.col = "black")

```

4. Correlation between participants' comfort level with Facebook and their perceptions of trustworthiness of different Crisis Named Resources

There seems to be a weak correlation between participant's comfort level with Facebook and his/her perceptions on the trustworthiness of CNRs on Facebook.

```
myDataCopy %>%
  select(ComfFacebookBin, trustBin2, trustBin3, trustBin4) %>%
  set_names(c("Comfort Level \nwhen using Facebook", "Trust \nCNR 2", "Trust \nCNR 3",
"Trust \nCNR 4")) %>%
  cor(use = "pairwise.complete.obs", method="spearman") %>%
  corrplot(type="upper", diag=FALSE, sig.level = 0.05, addCoef.col = "black")
```

5. Correlation between participants' comfort level with Facebook and their perceptions of trustworthiness of different Crisis Named Resources

There seems to be a weak correlation between participant's comfort level with Twitter and his/her perceptions on the trustworthiness of CNRs on Twitter.

```
myDataCopy %>%
  select(ComfTwitterBin, trustBin1, trustBin5) %>%
  set_names(c("Comfort Level \nwhen using Twitter", "Trust \nCNR 1", "Trust \nCNR 5"))
%>%
  cor(use = "pairwise.complete.obs", method="spearman") %>%
  corrplot(type="upper", diag=FALSE, sig.level = 0.05, addCoef.col = "black")
```

Factors that influence the trustworthiness of Crisis Named Resources

1. Correlation across the trustworthiness of different Crisis Named Resources

It appears that participants who trust CNR 1 also tend to trust CNR 4. Similarly, participants who trust CNR 2 also tend to trust CNR 5. Additionally, participants who trust CNR 4 do not tend to trust CNR 5.

```
myDataCopy %>%
  select(trustBin1, trustBin2, trustBin3, trustBin4, trustBin5) %>%
  setNames(c("Trust \nCNR 1", "Trust \nCNR 2", "Trust \nCNR 3", "Trust \nCNR 4", "Trust
\nCNR 5")) %>%
  cor(use = "pairwise.complete.obs", method="spearman") %>%
  corrplot(type="upper", diag=FALSE, sig.level = 0.05, addCoef.col = "black")
```

2. Factors that influence the trustworthiness of Crisis Named Resource 1

It appears that when participants think that CNR 1 would provide misinformation intentionally, they tend not to trust it.

```
myDataCopy %>%
  select(trustBin1, priorExpBin1, capableToHelpBin1, bestInterestsBin1, understandsSitu
ationBin1, provMisInfoBin1, CorrectMisInfoBin1) %>%
  setNames(c("Trust \nCNR 1", "has prior \nexperience", "capable \nto help", "has best
\ninterests", "understands \nsituation", "will provide \nmisinformation", "will correct
\nmisinformation")) %>%
  cor(use = "pairwise.complete.obs", method="spearman") %>%
  corrplot(type="upper", diag=FALSE, sig.level = 0.05, addCoef.col = "black")
```

3. Factors that influence the trustworthiness of Crisis Named Resource 2

It appears that when participants think that CNR 2 would provide misinformation intentionally, they tend not to trust it.

```
myDataCopy %>%
  select(trustBin2, priorExpBin2, capableToHelpBin2, bestInterestsBin2, understandsSituationBin2, provMisInfoBin2, CorrectMisInfoBin2) %>%
  setNames(c("Trust \nCNR 2", "has prior \nexperience", "capable \nto help", "has best \ninterests", "understands \nsituation", "will provide \nmisinformation", "will correct \nmisinformation")) %>%
  cor(use = "pairwise.complete.obs", method="spearman") %>%
  corrplot(type="upper", diag=FALSE, sig.level = 0.05, addCoef.col = "black")
```

4. Factors that influence the trustworthiness of Crisis Named Resource 3

It appears that when participants think that CNR 3 would provide misinformation intentionally, they tend not to trust it. Also, when participants think that CNR 3 is either capable to help them to respond to crisis or has their best interests in mind, they tend to trust it.

```
myDataCopy %>%
  select(trustBin3, priorExpBin3, capableToHelpBin3, bestInterestsBin3, understandsSituationBin3, provMisInfoBin3, CorrectMisInfoBin3) %>%
  setNames(c("Trust \nCNR 3", "has prior \nexperience", "capable \nto help", "has best \ninterests", "understands \nsituation", "will provide \nmisinformation", "will correct \nmisinformation")) %>%
  cor(use = "pairwise.complete.obs", method="spearman") %>%
  corrplot(type="upper", diag=FALSE, sig.level = 0.05, addCoef.col = "black")
```

5. Factors that influence the trustworthiness of Crisis Named Resource 4

It appears that when participants think that CNR 4 would provide misinformation intentionally, they tend not to trust it.

```
myDataCopy %>%
  select(trustBin4, priorExpBin4, capableToHelpBin4, bestInterestsBin4, understandsSituationBin4, provMisInfoBin4, CorrectMisInfoBin4) %>%
  setNames(c("Trust \nCNR 4", "has prior \nexperience", "capable \nto help", "has best \ninterests", "understands \nsituation", "will provide \nmisinformation", "will correct \nmisinformation")) %>%
  cor(use = "pairwise.complete.obs", method="spearman") %>%
  corrplot(type="upper", diag=FALSE, sig.level = 0.05, addCoef.col = "black")
```

6. Factors that influence the trustworthiness of Crisis Named Resource 5

It appears that when participants think that CNR 5 would provide misinformation intentionally, they tend not to trust it.

```
myDataCopy %>%
  select(trustBin5, priorExpBin5, capableToHelpBin5, bestInterestsBin5, understandsSituationBin5, provMisInfoBin5, CorrectMisInfoBin5) %>%
  setNames(c("Trust \nCNR 5", "has prior \nexperience", "capable \nto help", "has best \ninterests", "understands \nsituation", "will provide \nmisinformation", "will correct \nmisinformation")) %>%
  cor(use = "pairwise.complete.obs", method="spearman") %>%
  corrplot(type="upper", diag=FALSE, sig.level = 0.05, addCoef.col = "black")
```

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 Adviser: Dr. Amanda Lee Hughes.
 Committee Members: Dr. Daniel W. Watson, Dr. Curtis Dyreson,
 Dr. Breanne K. Litts, and Dr. Victor Lee.

M.S., Computer Science Dec 2014
 Utah State University, Logan, UT, USA GPA 3.76
 Thesis: "Online Media Use and Adoption by Hurricane Sandy
 Affected Fire and Police Departments."
 Adviser: Dr. Amanda Lee Hughes.
 Committee Members: Dr. Daniel W. Watson and Dr. Kyumin Lee.

B.E., Computer Science Jun 2012
 Lakshmi Narain College of Technology, Bhopal, MP, IND 74%

AWARDS

- Honorable Mention Summer School Project Award, Computational Social Science Summer School, Los Angeles, CA, USA (2018).
- Honored as 'ISCRAM 2018 Social Media Chair' at Rochester Institute of Technology, Rochester, NY, USA (2018).
- Outstanding Graduate Researcher in the Computer Science Department Award, USU, UT, USA (2018).
- USU RGS Graduate Student Travel Award for ISCRAM 2018 at Rochester, NY, USA (2018).
- Outstanding Engineering Graduate Scholar in the College of Engineering Award, USU, UT, USA (2018).
- Doctoral Researcher of the Year in the College of Engineering Award, USU, UT, USA (2018).
- Computer Science Department Research Assistantship Award, USU, UT, USA (Spring 2018).

- USU RGS Graduate Student Travel Award for CHI 2017 at Denver, CO, USA (2017).
- USU RGS Graduate Student Travel Award for ISCRAM 2015 at Kristiansand, Norway (2015)

HONORS

- Accepted to the 2019 Consortium for the Science of Sociotechnical Systems (CSST), New Brunswick, NJ.
- Finalist for 'USU International Student of the Year.'
- Finalist for 'Best Doctoral Student Paper Award' at ISCRAM 2018, Rochester, NY, USA (2018).
- Accepted to ISCRAM 2018 Doctoral Consortium, Rochester, NY, USA (2018).
- Finalist for 'USU Doctoral Researcher of the Year' at Robin's Awards (USU's most prestigious awards), USU, UT, USA (2018).
- Judge for a Poster Presentation session at USU Student Research Symposium, UT, USA (2018).
- Accepted to Computational Social Science Summer School (13% acceptance rate), Los Angeles, CA, USA (2018).
- Nominated for 'Best Student Paper' at ISCRAM 2016, Rio De Janeiro, Brazil (2016).
- Social Media Chair for ISCRAM 2015, Kristiansand, Norway (2015).
- Invited Guest Speaker at three USU International Teaching Assistant workshops (2014 – 2015).

RESEARCH EXPERIENCE

USU Computer Science

2013-present

Adviser: Dr. Amanda Lee Hughes

Research Areas: Human Computer Interaction (HCI), Crisis Informatics, and Social Media.

USU Instructional Technology and Learning Sciences

2018-present

Adviser: Dr. Breanne K. Litts

Research Areas: Learning Sciences, Education Research, and Mobile Technologies.

USU Computer Science

Summer 2019-present

Adviser: Dr. Mahdi Al-Ameen

Research Areas: Usable Security.

PUBLICATIONS

Book Chapters

Haderlie T.M., **Chauhan A.**, Lewis W., Litts B.K. (2019). The Graduation Game: Leveraging Mobile Technologies to Reimagine Academic Advising in Higher Education. In: Zhang Y., Cristol D. (eds) Handbook of Mobile Teaching and Learning. Springer, Berlin, Heidelberg.

Chauhan A., Lewis W., Litts B.K. (2019). Location and Place: Two Design Dimensions of Augmented Reality in Mobile Technologies. In: Zhang Y., Cristol D. (eds) Handbook of Mobile Teaching and Learning. Springer, Berlin, Heidelberg.

Refereed Conference Publications

Litts, Breanne K., **Apoorva Chauhan**, Chase K. Mortensen, and Kamaehu Matthias (2019) "I'm Drowning in Squirrels!": How Children Embody and Debug Computational Algorithms Through Designing Mixed Reality Games. In Proceedings of 18th ACM Conference on Interaction Design and Children, June 12-15, 2019, Boise, Idaho, USA. **(33% acceptance rate)**

Lamarra, Julie, **Apoorva Chauhan**, and Breanne K. Litts (2019). Designing for Impact: Shifting Children's Perspectives of Civic and Social Issues Through Making Mobile Games. In Proceedings of 18th ACM Conference on Interaction Design and Children, June 12-15, 2019, Boise, Idaho, USA. **(33% acceptance rate)**

Chauhan, Apoorva and Amanda Lee Hughes (2018). Social Media Resources Named after a Crisis Event. In Proceedings of the 2018 Information Systems for Crisis Response and Management Conference (ISCRAM 2018), Rochester, NY, USA. **(Finalist in the Best Doctoral Student Paper Award Category)**

Chauhan, Apoorva and Amanda Lee Hughes (2017). Providing Online Crisis Information: An Analysis of Official Sources during the 2014 Carlton Complex Wildfire. In Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI 2017), Denver, CO, USA. **(25% acceptance rate)**

Chauhan, Apoorva and Amanda Lee Hughes (2016). Online Mentioning Behavior during Hurricane Sandy: References, Recommendations, and Rebroadcasts. In Proceedings of the 2016 Information Systems for Crisis Response and Management Conference (ISCRAM 2016), Rio De Janeiro, Brazil. **(Nominated in the Best Student Paper Category)**

Hughes, Amanda and **Apoorva Chauhan** (2015). Online Media as a Means to Affect Public Trust in Emergency Responders. In Proceedings of the 2015 Information Systems for Crisis Response and Management Conference (ISCRAM 2015), Kristiansand, Norway.

Chauhan, Apoorva and Amanda Lee Hughes (2015). Facebook and Twitter Adoption by Hurricane Sandy-affected Police and Fire Departments. In Proceedings of the 2015 Information Systems for Crisis Response and Management Conference (ISCRAM 2015), Kristiansand, Norway.

Technical Reports

Trilateral Research, Fraunhofer Institute for Open Communication Systems, Utah State University (Amanda L. Hughes and **Apoorva Chauhan**), and the Asian Disaster Preparedness Centre (2016). Comparative Review of the First Aid App. Final Report to the Global Disaster Preparedness Center. <http://preparecenter.org/resources/comparative-review-first-aid-app>.

TEACHING EXPERIENCE

Instructor, Department of Computer Science, USU

Introduction to Computer Science (CS 1400)	Spring 2017
Class of 118 students.	

Graduate Teaching Assistant, Department of Computer Science, USU

Introduction to Computer Science – CS1 (CS 1400)	Spring 2019
ST: Usable Security/Privacy (CS 6890)	Spring 2019
Introduction to Database Systems (CS 5800)	Fall 2018
Computer Security I/II (CS 5460/6460)	Fall 2017
Developing Web Applications (CS 2610)	Fall 2013
Intro Computer Science 1 (CS 1400)	Spring 2013

PRESENTATIONS AT PROFESSIONAL MEETINGS

Presentations

Litts, Breanne K., **Apoorva Chauhan**, Chase K. Mortensen, and Kamaehu Matthias (2019) "I'm Drowning in Squirrels!": How Children Embody and Debug Computational Algorithms Through Designing Mixed Reality Games. Oral Presentation at the 2019 Interaction Design and Children Conference (IDC 2019), Boise, Idaho, USA.

Chauhan, Apoorva and Amanda Lee Hughes (2018). Social Media Resources Named after a Crisis Event. Oral Presentation at the 2018 Information Systems for Crisis Response and Management Conference (ISCRAM 2018), Rochester, NY, USA.

Chauhan, Apoorva (2018). Is Information provided by Crisis Named Resources on Facebook and Twitter Trustworthy? Oral Presentation at the 2018 USU Research Week, USU, USA.

Chauhan, Apoorva and Amanda Lee Hughes (2017). Providing Online Crisis Information: An Analysis of Official Sources during the 2014 Carlton Complex Wildfire. Oral Presentation at the 2017 CHI Conference on Human Factors in Computing Systems (CHI 2017), Denver, CO, USA.

Chauhan, Apoorva and Amanda Lee Hughes (2016). Online Mentioning Behavior during Hurricane Sandy: References, Recommendations, and Rebroadcasts. Oral Presentation at the 2016 Information Systems for Crisis Response and Management Conference (ISCRAM 2016), Rio De Janeiro, Brazil.

Chauhan, Apoorva and Amanda Lee Hughes (2015). Facebook and Twitter Adoption by Hurricane Sandy-affected Police and Fire Departments. Oral Presentation at the 2015 Information Systems for Crisis Response and Management Conference (ISCRAM 2015), Kristiansand, Norway.

Posters

Chauhan, Apoorva and Amanda Lee Hughes (2019). Do People Trust Facebook Pages and Twitter Accounts Named after Crisis Events? USU Native American STEM Mentorship Program, May 2019. USU Research Week, April 2019.

Lamarra, Julie, **Apoorva Chauhan** and Breanne K. Litts (2018). Leveraging Mobile Games for Civic Engagement. USU Inclusive Excellence Symposium, October 2018.

Chauhan, Apoorva and Amanda Lee Hughes (2017). Overview of Event Based Resources on Facebook and Twitter: Fort McMurray Wildfire, May 2016. USU Research Week, April 2017.

Chauhan, Apoorva and Amanda Lee Hughes (2016). Online Dissemination of Official Information – The 2014 Carlton Complex Wildfires. USU Computer Science Industry Day, April 2016. USU Research Week, April 2016. USU Science Unwrapped, April 2016.

Chauhan, Apoorva, Dale Flamm, James Nickerson, Sarbajit Mukherjee, and Amanda Lee Hughes (2016). Haptic Guidance for Persons with Visual Impairment during Crisis Evacuations. USU Computer Science Industry Day, April 2016. USU Science Unwrapped, April 2016.

Chauhan, Apoorva and Amanda Lee Hughes (2015). Online Trust-Building Recommendations for Emergency Responders. USU Computer Science Industry Day, March 2015.

Demonstration

Chauhan, Apoorva (2018). Electronic textiles using Circuit Playground and LEDs. USU Native American STEM Mentorship Program, May 2018.

PROFESSIONAL COURSES

IDC 2019

‘Quantitative Methods for Child-Computer Interaction’ by Lisa Anthony (University of Florida).

CHI 2017

‘Introduction to Human-Computer Interaction’ by Jonathan Lazar (Towson University, MD, USA) and Simone D. J. Barbos (Pontifical Catholic University of Rio de Janeiro, Rio de Janeiro, Brazil).

ISCRAM 2015

‘Qualitative Research Methods for Crisis Informatics: Thinking Out Loud, Semi-structured Interviews, and Focus Groups’ by Dr. Starr Roxanne Hiltz (New Jersey Institute of Technology, NJ, USA) and Dr. Andrea Tapia, (Pennsylvania State University, PA, USA).

SERVICE

Committees

Social Media Chair, ISCRAM 2018 at Rochester, NY, USA.

USU Computer Science Student Representative for the Differential Tuition Oversight Committee, 2016-2017.

Social Media Chair, ISCRAM 2015 in Kristiansand, Norway.

Academic Reviewer

CSCW: 2018.

iConference: 2018, 2017, 2016, and 2015.

International Journal of Human-Computer Studies: 2015.

ISCRAM: 2018, 2017, 2016, and 2015.

ISCRAM Asia-Pacific: 2018.

USU Extension: 2017.

Student Volunteer at International Conferences

CHI 2017 – Denver, CO, USA.

ISCRAM 2015 – Kristiansand, Norway.

Student Volunteer at USU

Playful Explorations Lab (Dr. Jody Clarke-Midura)

Summer 2018.

Intensive English Language Institute (Dr. Ekaterina Arshavskaya)

Spring 2018.