

2020-03-06

“Flooded Timelines: The Communicative Roles & Functions of Twitter in the 2013 Calgary Flood”

Williams, Kimberlyn

Williams, K. (2020). “Flooded Timelines: The Communicative Roles & Functions of Twitter in the 2013 Calgary Flood” (Master's thesis, University of Calgary, Calgary, Canada). Retrieved from [https://prism.ucalgary.ca.
http://hdl.handle.net/1880/111727](https://prism.ucalgary.ca/http://hdl.handle.net/1880/111727)

Downloaded from PRISM Repository, University of Calgary

UNIVERSITY OF CALGARY

“Flooded Timelines: The Communicative Roles & Functions of Twitter in the 2013 Calgary
Flood”

by

Kimberlyn Williams

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE
DEGREE OF MASTER OF ARTS

GRADUATE PROGRAM IN COMMUNICATIONS STUDIES

CALGARY, ALBERTA

MARCH, 2020

© Kimberlyn Williams 2020

Abstract

This study employs directed content analysis to examine the value and communicative uses of Twitter during the 2013 Calgary Flood from multiple perspectives. Using the *Uses and Gratifications Theory* (UGT) and Houston et al.'s (2014) UGT-based, framework for social media as a theoretical lens, this study finds that Twitter was a very useful tool with several affordances. It was actively used by individual citizens and several types of organizational users, whose psychological dispositions influenced how they interacted with the platform. Given that most previous disaster social media studies are written from the perspective of disaster management organizations utilizing crisis communication, this research contributes a greater understanding of both organizations' and individuals' communicative use of disaster social media.

Keywords: crisis communication, disaster communication, disaster social media, 2013 Calgary Flood, Twitter

Acknowledgements

I would like to express sincere thanks to everyone who played a role in the successful completion of this thesis. To my committee members, Dr. Gregory Taylor, Dr. Dean Curran and, Dr. Tania Smith—thank you for agreeing to participate in the examination process and for taking the time to review my work. Dr. Smith, I must thank you specially for agreeing to be my supervisor. Your knowledge, patience, guidance and high expectations of me were invaluable; thank you for helping me to refine my research, critical thinking and writing skills. To my husband: I cannot express how grateful I am to you for supporting me over the years, and for consistently picking up the slack so that I could find time to conduct my research and write. More importantly, thank you for believing in me—even more than I believed in myself at times. To my precious boys: thank you for motivating me to complete this program, and your hilariously futile efforts to ensure mummy worked in silence. I look forward to making up for the times with you that I sacrificed to complete this thesis. To my sister: thanks for your encouragement and prayers.

Table of Contents

Abstract.....	1
Acknowledgements	2
Table of Contents	3
List of Tables	5
List of Figures and Illustrations	6
 Chapter 1: Introduction	 7
The 2013 Calgary Flood	7
Academic Context	8
The Framework of This Study	10
Thesis Overview	15
 Chapter 2: Literature Review	 16
Technological Features of Twitter	16
Studies that Identify and Classify Disaster Social Media Users and Functions.....	18
Studies of the Organizational Use of Twitter in Disasters	24
Twitter for Crisis and Disaster Communication	24
Twitter for News gathering and Reporting	30
Twitter for Non-governmental Organizations' Activities.....	32
Studies of the Non-organizational use of Twitter in Disasters.....	33
Conclusion	36
 Chapter 3: Theoretical Framework	 37
Uses and Gratification Theory.....	37
Motives behind media use.....	40
Houston et al.'s framework	43
Houston et al.'s category of media use.....	43
<i>Disaster social media users</i>	44
<i>Disaster social media functions</i>	45
 Chapter 4: Methodology.....	 50
Justification for Studying Tweets	50
Methodological Steps to Prepare the Tweets for Analysis	51
Collection of Tweets	51
Selection of Tweets	51
My position as workplace researcher.....	53
Content analysis	55
Methodological approach	56
Establishing coding categories.....	58
The use of NVivo Pro 11 software.....	62
Interpretive analysis	64

Critical analysis.....	64
Chapter 5: Key Findings and Analysis	66
What Twitter user-types were active in Calgary between June 20 and 23 of the 2013 Calgary Flood?	66
Individual citizens.....	68
Organizational user-types.....	70
What were the communicative uses or functions of Twitter between June 20 and 23 of the 2013 Calgary Flood?	74
Individual citizens.....	75
Organizational users	80
News Media	90
Private Sector Companies.....	92
Non-government organizations (NGOs) and community organizations.....	97
According to UGT, what “motives” appear to have been behind the communicative use of Twitter?	99
Information motives	101
Emotion-based motives	104
How useful was Twitter as a communication tool?	105
Chapter 6: Conclusion.....	108
Key Findings.....	108
What Twitter user-types were active in Calgary between June 20 and 23 of the 2013 Calgary Flood, and for what communicative functions did they use Twitter?	108
According to UGT, what motives appear to have been behind the communicative functions of Twitter?.....	110
How useful was Twitter as a communication tool?	110
Significance of findings.....	111
Limitations.....	111
Potential applications and suggestions for future research	113
References.....	115
Appendix A	142
Appendix B	146

List of Tables

Table 1. Twitter users: Coding categories and operational definitions	60
Table 2. Communicative functions of Twitter by user-type: Sub-coding categories and operational definitions	60
Table 3 Communicative functions of Twitter during the 2013 Calgary Flood by user-type.....	74
Table 4 Possible motives behind the communicative functions of Twitter for each user-type ..	100
Table 5 <i>Type, identity and number of Twitter users in the 2013 Calgary Flood</i>	142
Table 6 Functions of disaster social media by Houston et al (2014)	146

List of Figures and Illustrations

Figure 1 Screenshot of the coding scheme used to code communicative functions by user-type.....	63
Figure 2 Main Twitter users during 2013 Calgary Flood by percentage of total users	68
Figure 3. Screenshot of a tweet used to document the progress of the 2013 Calgary Flood.....	76
Figure 4 Governance Structure During Activated MEP	94

Chapter 1: Introduction

The 2013 Calgary Flood

Calgary is the most populous city in the Canadian province of Alberta, and the third largest municipality in Canada. In June 2013, Calgary and other Southern Alberta municipalities experienced rapid and intense flooding, due to the combination of steep, rocky terrain and sustained, heavy rainfall on the melting snowpack in the Rocky Mountains. In Calgary, the fast-moving waters claimed the lives of five residents, thousands were displaced, and many suffered property damage or loss. Businesses were also affected and public infrastructure in some areas was either damaged or destroyed. Because damage losses and recovery costs for the southern Alberta disaster were over 6 billion dollars, it was classified as Canada's second most costly natural disaster at the time.

Twitter use in the 2013 Calgary Flood provides a case study of disaster communication that can help us understand how new communications media are being used in the public response to disasters. Scholars have defined a “disaster” as “a sudden event that disrupts routines of systems in a serious way, threatens values and social goals and necessitates new ways of coping with the disruption (Quarantelli, 2005). A society's discovery of “new ways of coping,” therefore, is likely to involve communicating to deal with threatening and disruptive events. Disasters may be natural, technological or human and may produce “physical, social, psychosocial, sociodemographic, socioeconomic, and political consequences’ (Houston, Pfefferbaum, and Rosenholtz, 2012, p. 607). The psychosocial consequences of the 2013 flood are an important focal area in this study.

Academic Context

This case study coincides with increasing scholarly attention on “disaster social media,” web-based technology that allows for the participation or interaction of multiple users, that is used for communicating disaster-related information during the pre-event, event or post-event phase of a disaster. The term *disaster social media* is introduced by Houston et al (2014) in the theoretical framework they propose. Despite findings that there is a multiplicity of disaster social media users (Houston et al, 2014; Takahashi et al, 2015), most studies focus on organizations’ use of disaster social media, and the perspective of private users is “limited” (Takahashi, Tandoc and Carmichael, 2015). Heath (2013) calls this absence of “perspectives and voices other than that of the organization,” a *managerial bias*. My study addresses this managerial bias by including the perspectives of private citizens, along with the perspectives of all the other main user-types. The inclusion of private citizens’ perspectives leads to a more comprehensive view of the communicative use of Twitter.

An inquiry into messages delivered on Twitter fits within a broad and evolving research tradition in communication studies: the understanding of social media, which are “Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content” (Kaplan and Haenlein, 2010, p. 61). Within this social media environment, “users” are persons engaged in the simultaneous production and consumption of disaster social media content, and their “use” of the medium is an active, two-way process of content generation and information consumption. Twitter in particular, as a very public forum, engages “publics” as media users who communicatively interact with and affect organizations: According to Grunig (2013), publics are “People who

detect a problem, communicate about that problem and behave as a loosely structured but unified collective in a manner that affects [an] organization” (p. 400). I aim to go beyond merely a macro-level examination of who used Twitter for what purpose. I focus on Twitter use by Calgary organizations and Calgarians (individual citizens) to understand the purposes and possible motives of their communicative uses of Twitter.

Post-disaster news reports about the 2013 Calgary Flood, including Michael (2014) and Wright (2014), mention the valuable role that Twitter played in the local authorities’ efforts to keep Calgarians safe and informed. There are non-academic assessments of Calgarians’ Twitter use for communication during the flood, mainly from the perspective of the local authorities and other organizations; these assessments include Agness (2013), Kaminsky (n.d) and Yablonski (2013). As far as I am aware, no academic study makes the communicative use of Twitter during the flood explicit. As the first content analysis of tweets sent from Calgary during the 2013 Calgary Flood, my study was motivated by the desire to learn more about the communicative roles and functions of Twitter during the disaster, and not just from the perspective of the local authorities or other organizations that were involved in managing the crisis.

My academic and professional background in government communications and public relations has contributed to my interest in the communicative use of social media by government organizations and individual citizens during disasters. Most public relations studies about disasters and other types of crises are situated in crisis communication, which focuses on how organizations react to crises and inform/interact with their publics about them (Fronz, 2012). Although public safety is a priority of crisis communication because it is a vital part of *crisis management* -- a process aimed at preventing or mitigating the damaging effects of a crisis on an

organization and its stakeholders, the crisis communication paradigm is premised on a desire to advise organizations to protect their image by strategically developing and disseminating messages.

I deviate from crisis communication's image-oriented approach to disaster crises because it does not lend itself well to my goal of including multiple Twitter users' perspectives in this case study. As part of this image-oriented approach, crisis communication studies present individual citizens' disaster social media messages as potential threats to the image management efforts of governments and other types of organizations responsible for disaster management, potentially countering the stories organizations tell about the crisis and their role in it. Therefore, "instead of accepting the increasingly dynamic role the public plays in emergency communication, emergency managers and governmental officials sometimes respond with mistrust" (Pechta, Brandenburg & Seeger, 2010, p.8) of the public. I find it frustrating that citizens' perspectives are being lost and it is my position that the case study of tweets about the 2013 Calgary Flood is an opportunity to learn more about the communicative uses of Twitter from multiple perspectives. I therefore situate my work in disaster communication, which although informed by crisis communication, has additional foci beyond protecting an organisational image, like helping citizens to cope and recover from disasters, and helping affected communities understand what has happened (Houston et al, 2014).

The Framework of This Study

The general theoretical framework and paradigm of this study is the *Uses and Gratifications Theory (UGT)*, as developed by Katz and Blumler (1973). As a psychological

communication theory, it is suitable for a case study of Twitter use during the 2013 Calgary Flood because it is designed to help scholars understand how, why, and with what purpose people use media in their everyday lives, as well as rare events like crises. UGT positions media use as deliberate and driven by *motives*, which are psychological dispositions that influence people's actions. The sense of fulfilment that individuals experience from their media use is rereferred to as *gratification* by UGT researchers.

UGT is also the larger framework for Houston et al.'s (2014) *functional framework for social media use in disaster planning, response, and research*, which guides this study. The framework, which is descriptive and not prescriptive, brings together the typologies of disaster social media users and uses in disaster communication literature, and this broad focus on multiple users-types and functions makes it a good tool for analysing messages from multiple Twitter user-types during the 2013 Calgary Flood. Houston et al acknowledge that the framework may need updating or expansion, due to the evolution of social media technologies. I use the case study of messages sent on Twitter from within Calgary during the flood to adapt the framework to the local context and possibly enhance it. This was necessary because Houston et al.'s operationalisation of *disaster social media* and *disaster* was broad; meaning, they studied the communicative use of multiple types of disaster social media in several disaster contexts—both natural and manmade disasters.

Because the non-academic assessments of Twitter discussed earlier identify the municipal government as an important Twitter user, I use two publicly available documents to facilitate an understanding of how the flood was managed, the government's goals for using Twitter and its attitude towards the public's participation in emergency communication and coordination: *An*

Emergency Management Framework for Canada by the FPT Ministers responsible for emergency management (FPT-MREM, 2011), and a retrospective report published by the Conference Board of Canada, *Forewarned and Forearmed: The Calgary Emergency Management Agency and the 2013 Flood* (Vroegop, 2014).

The FPT-MREM's (2011) *Emergency Management Framework* guides the way that the three levels of government in Canada (federal, provincial, and territorial or FPT) work together to protect the safety and security of all Canadians if necessary. It is relevant to this case study of Twitter use in the 2013 Calgary Flood because it provides insight into the way the municipal government used Twitter in its official disaster management role, as well as citizens who played an important role in disaster management and communication. According to the framework, most emergencies in Canada are local in nature and are managed by the municipalities or at the provincial or territorial level territorial level. If the provincial or territorial government require resources beyond their capacity to manage the emergency or disaster, the federal government responds rapidly to their request for assistance. Because the 2013 Calgary Flood was part of the broader, 2013 Southern Alberta Flood, The City of Calgary had direct, disaster management responsibility with Calgary. The City worked closely with the Government of Alberta, the provincial government, who along with the Government of Canada, the federal government, provided financial support for disaster management and relief effort.

The *Emergency Management Framework* does not appear to reflect the mistrust that Pechta, Brandenburg & Seeger (2010) say emergency managers and governmental officials tend to demonstrate in response to the publics' involvement is disaster communication. Instead, the framework explains that good partnership based on effective collaboration, coordination and

communication is a key principle of the emergency management framework and that “all Canadians are involved in emergency management. Individual citizens, communities, municipalities, and federal, provincial, territorial governments...the private sector...” (FPT-MREM, 2011).

Forewarned and Forearmed... (Vroegop, 2014) is an independent review of the Municipal Government’s (also referred to in this study as the local authorities) response to the 2013 Calgary Flood, based on interviews with representatives from the public and private sectors, and reviews of relevant documents. The review shows that the Calgary Emergency Management Agency (CEMA), under the terms of the Alberta provincial government’s Emergency Management Act and the City of Calgary Emergency Bylaw 25M2002, coordinated stakeholders in all phases of emergency management and was the central coordinating authority for crisis communication. CEMA is an agency within the municipal government. The review also shows that social media use by the local government authorities was part of a comprehensive approach to “lead the conversation from the start, communicate reassurance, and explain decision-making to the public” (Vroegop, 2014, p. 36).

Twitter use by the provincial government is further contextualized by the public document: *Review and Analysis of the Government of Alberta’s Response to and Recovery from 2013 Floods*. This document is based on an independent review by MNP LLP that was commissioned by the Alberta Emergency Management Agency (AEMA) and the Government of Alberta. Like CEMA, AEMA was established Alberta’s Emergency Management Act; AEMA’s mandate is to lead the coordination and co-operation of all organizations involved in emergencies and disasters and it is staffed/managed by the Government of Alberta. This

document provides insight into the provincial government's disaster communication from the organization's perspective.

The object of my content analysis is a curated body of eight hundred tweets about the 2013 Calgary Flood, that were published in Calgary between June 20 and 23, 2013. This accounts for all the tweets during the *event phase* of the flood—the period of flooding in Calgary, and one of the three phases (pre-event, event, and post-event) that Houston et al (2014) conceptualize disaster social media across. I focus on this phase because information needs and availability change across disaster phase (Spence et al., 2015) and I believe that as the first empirical study of tweets, it is important to start with the most acute disaster phase. Studies of the pre-event and post-event phases would likely produce different results. The tweets were sourced from a public repository on the collaborative website, Github.com; they were uploaded by Castillo as a project file for Olteanu, Vieweg and Castillo's (2015) study, discussed later in the literature review chapter.

Based on the contexts and framework discussed above, this study's overarching question is *What were the Communicative Functions and Value of Twitter Between June 20 and 23 of the 2013 Calgary Flood?* To unpack this, these three research questions are answered in the study:

- 1) **What Twitter user-types were active in Calgary between June 20 and 23 of the 2013 Calgary Flood, and for what communicative functions did they use Twitter?**
- 2) **According to UGT, what *motives* appear to have been behind the communicative functions of Twitter?**

3) **How *useful* was Twitter in terms of the affordances of the tool?**

As the first known empirical study of the communicative uses and value of Twitter in the 2013 Calgary flood, my study contributes to the body of knowledge on disaster social media in the Western Canadian context, providing foundational evidence to both expand the field and influence further research into the relevant areas of the study.

Thesis Overview

The literature review chapter situates my study within the context of prior scholarly research on disaster communication and social media from various perspectives, explaining how they have informed my study. In the theoretical chapter, I explain and justify my use of *uses and gratifications-based* constructs as the theoretical lens for the study and, my aim to adapt Houston et. al.'s (2014) theoretical framework to the local context. The methodology chapter is a discussion of the intellectual process behind my “directed content analysis” research method, while the “results and analysis” chapter presents the main results of the study by describing the data and using the theoretical frame and social context to explain their significance. The conclusion chapter summarizes and contextualizes the main findings, identifies potential theoretical applications and recommends avenues for future research.

Chapter 2: Literature Review

The communicative use of social media during disasters is a growing area of interest, with scholars from a range of communication disciplines contributing on the body of knowledge. These disciplines include crisis communication, risk communication, emergency communication, disaster communication and more recently, crisis informatics. In this thesis chapter, I examine the dominant studies from literature searches of academic material on ‘disaster communication and social media.’ In my discussion of these studies, I detail how they inform my study of Twitter use during the 2013 Calgary Flood and how my study is situated in the literature.

This chapter is divided into four themes:

1. Studies that discuss the technological features of Twitter
2. Studies that classify disaster social media users and functions
3. Studies of the organizational use of Twitter during disasters
4. Studies of the non-organizational use of Twitter during disasters

The first theme unpacks the relevant features and functions of Twitter, while the other themes reflect the main veins of inquiry in my study. Studies that inform more than one area of the four themes listed above will be discussed under each relevant theme.

Technological Features of Twitter

Most disaster social media studies gloss over the platform’s features, mentioning them briefly in the introductory sections. A basic description of the Twitter medium as it currently exists at the time of writing is foundational to the thematic discussions in this literature review chapter, as

well as the research methodology and analysis chapters. Twitter, which is an online, microblogging and social networking service on which users post and interact with messages known as *tweets*, has approximately 330 million monthly, active users as of date.

Twitter has been receiving significant scholarly attention in the field of communication, and its communicative use during natural disasters is a growing area of study. Twitter has been differentiated from other disaster social media by its unique features and user-style conventions. Spence, Lachlan, Lin, & Greco (2015) and Pond (2016) provide useful insights on Twitter's features. Twitter gives users the ability to post, read, and respond to highly structured, short-form messages called *tweets*. Each tweet is limited to 140 characters and by default, is public—visible to anyone that accesses the platform, whether or not they are a registered user. Registered users can opt to make their tweets visible to only their followers (persons who choose to receive public tweets from other registered users), however many users choose not to limit their audience. A user that is followed can opt to follow their followers but following has no social or technical requirements of reciprocity or need for “bilateral consent” (Spence et al, 2015).

Retweeting, replying and *mentioning* are interactive features of the Twitter platform and according to Bruns and Burgess (2012), researchers have observed the emergence of style conventions around these features. These conventions are the use of *RT* to signal a retweet (that is, a repost of another user's tweet); the use of the @ symbol before the username of the person to whom the user is replying or mentioning; the use of the *hashtag* symbol (#) before keywords or phrases, which facilitates the categorization and filing of posts by topics for easy location; and the inclusion of web links or URLs.

Eriksson and Olsson (2016) explain that Twitter is especially suited to disaster communication because it is accessible through mobile devices and Twitter continuously modifies its user-interface to ensure users' needs are easily met. Hossman et al (2011) advance their key reasons for Twitter's suitability for emergency or disaster communication:

- 1) Twitter's features encourage topic-specific communication across a broad spectrum of persons, unlike the other popular disaster social medium, Facebook, which is centred around connecting friends in smaller user circles.
- 2) The simplicity of Twitter's features makes it an adaptable platform for various situations.
- 3) Twitter is widely known and used.

Cooper, Yeager, Burkle, and Subbarao (2015) conclude that because of Twitter's unique features, it may be considered a unique social media tool that facilitates rapid and accurate two-way communication.

Studies that Identify and Classify Disaster Social Media Users and Functions

Houston et al.'s (2014) study frames the communicative users and functions aspect of this study. Their framework is discussed here because it is one of several studies of disaster social media users that are relevant to my study and it offers a valuable perspective of who uses social media in disasters and for what purpose, that goes beyond the typical, organizational perspective that dominates the literature. Houston and colleagues engaged in a review of academic and non-academic sources to identify and categorize the main users and communicative functions of disaster social media. The main user-types in the pre-event, event and post-event disaster phases

were identified as *individuals, communities, organizations, governments and news media*.

Houston et al.'s framework also shows that persons mainly use social media in disasters to:

- Signal and Detect Disasters
- Send and receive requests for help or assistance
- Inform others about one's own condition and location and learn about a disaster-affected individual's condition and location
- Document and learn what is happening in the disaster
- Deliver and consume news coverage of the disaster
- Provide and receive disaster response information; identify and list ways to assist in the disaster response
- Raise and develop awareness of an event; donate and receive donations; identify and list ways to help or volunteer
- Provide and receive disaster mental/behavioural health support
- Express emotions, concerns, well-wishes; memorialise victims
- Provide and receive information about (and discuss) disaster response, recovery, and rebuilding; tell and hear stories about the disaster

These functions of disaster social media are further unpacked in the theoretical chapter of this thesis. Although their "users" and "functions" of disaster social media help illuminate this research area, Houston et al do not connect user-types to communicative functions, which is a gap that my study attempts to fill. By connecting user-types to communicative functions, my study will show specifically the types of functions that Twitter facilitated for each user-type.

Although my study is not the first empirical application of Houston et al.'s framework, it is the first application of the framework to a case in the Canadian disaster context, which is important for validation and expansion of the framework. It is especially important for Houston et al.'s macro-level framework to be applied to a micro-level, municipal disaster case study because it also allows for the expansion of the framework through the exploration of some things that would be reasonably out of scope for a macro-level study, such as the aforementioned connection between specific disaster social media users and uses, and the exploration of communicative relationships between user-types.

Takahashi, Tandoc and Carmichael (2015) conducted the first empirical application of Houston et al.'s framework of disaster social media users and uses, in their study of Twitter use during Typhoon Haiyan in the Philippines. They found that the main users of Twitter were *individuals, celebrities, journalists, news organizations, government and non-government organizations (NGOs.)* Overall, the main uses of disaster social media were for *second-hand reporting, coordinating relief and memorializing victims*. Takahashi et al.'s study also bridged the gap between user-type and uses: They found that Twitter was mainly used by individuals for memorializing and second-hand reporting; a few individuals also used twitter to coordinate relief. Celebrities mainly used Twitter to memorialize, while journalists and news organizations mainly used the platform for second-hand reporting. The Filipino Government's main use of Twitter was also to report second-hand information, while NGOs primarily used it for coordinating relief.

Takahashi et al (2015) also found that the geographic location of disaster social media users impacts disaster social media use. Twitter users outside of the Philippines used the

platform mainly for memorializing and second-hand reporting, while users within the country mainly used it for second-hand reporting and relief coordination. In their analysis of this data, Takahashi et al explained that relief coordination is an important way of participating in community, but it was difficult for persons outside of the country to do, so they engaged in memorializing and second-hand reporting as a valid alternative.

Similarly, time was found to be an important factor in disaster social media use. Relief coordination tweets increased after the storm, which Takahashi et al associated with a “reactive response” (p. 396) since this vital information could have been distributed before the storm event. Other types of tweets decreased in the post-event phase, which Takahashi et al attributed to the increase in relief-coordinating tweets.

Takahasi et al.’s (2015) study, like mine, uses Houston et al.’s (2014) framework to investigate Twitter use in a disaster. However, the type of disaster they studied, and the socio-cultural contexts of their disaster, are different from the 2013 Calgary Flood. Disaster type and socio-cultural context are important variables in a study of disaster social media use (Olteanu, Vieweg & Castillo, 2015) so it is worth studying Twitter use in the 2013 Calgary Flood to explore how these variables played out. Takashi et al.’s study also highlights the importance of contextualizing disaster social media use in the disaster’s temporal phase, reinforcing the value of my choice to focus on the “event” phase in this study of the 2013 Calgary Flood.

A 2014 study by Kongthon, Haruechaiyasak, Pailai, & Kongyoung classified the types of messages tweeted during a major flood in Thailand. The results of Kongthon et al.’s study show that the Thai mainly used Twitter during the disaster for *situational announcements and alerts*, *support announcements*, *requests for assistance*, and *requests for information*. These uses are

closely related to the uses that Houston et al (2014) and Takahashi et al (2015) observed. For example, Kongthon et al.'s (2014) classification of *situational announcements and alerts* could also apply to tweets across several of Houston et al.'s (2014) categories such as the *provide and receive disaster warnings* and *learn about a disaster-affected individual's condition and location*. Kongthon et al.'s category of *requests for assistance* and Houston et al.'s (2014) *send and receive requests for help or assistance* category are also closely related. Because Kongthon et al. has an *other* category, it appears that there may have been room for a more rigorous analysis of disaster social media uses—resulting in the classification of the tweets placed in the *other* category.

Kongthon et al.'s (2014) study also highlights the importance of contextualizing data within the disaster phase when studying disaster social media. They noted that the number of tweets in each category increased in the first two weeks of the disaster, and gradually decreased after the fourth week. Little analysis of this finding is offered, but the increase and the decrease in disaster social media use correlates with Takahashi et al.'s (2015) findings.

Kongthon et al.'s work also identifies who the influential Twitter users were—individual and organizational users; their main source of information were citizens, and not emergency management organizations. This finding is an important indication of the primacy of individual users as sources of information during disasters, underscoring the value of my study's focus on *users* and *uses*. Kongthon et al.'s category was not informed by the dominant typologies in communication studies, which are reflected in Houston et al.'s framework—yet the users identified in both studies are similar; which validates Houston et al.'s category as a reasonable frame for this type of study.

The number of social media usage studies from the perspective of the user is “limited” (Takahashi et al., 2015, p. 392). Lovari and Parisi (2015) contributed to this limited body of work by administering online questionnaires to digital publics who have interacted with Italian, public administrators on municipal Facebook pages. The researchers found that not all users are active and have therefore developed a category of active users: *likers*, *mono interaction users*, *multi-interaction users* and *full interaction users*, that fosters a better understanding of users. Likers simply use Facebook’s *like* feature to like or follow the municipality’s Facebook pages and do not necessarily carry out any other activity on the pages. Mono-interaction users carry out one activity, multi-interaction users carry out two or three activities while full interaction users “carry out the full spectrum of Facebook activities” (Lovari and Parisi, 2015 p. 208).

Lovari and Parisi’s (2015) category contributes to the body of knowledge on how citizens interact with municipalities’ social media pages, which is relevant to my focus on the communicative relationship between the municipal government and individual citizens’ use of Twitter. Their findings highlight the fact that social media users are non-homogenous; active and passive use is a key differentiating factor, and the level of activity further sub-divides active users. Like Lovari and Parisi’s study, this study of the 2013 Calgary Flood focuses on active users. However, the focus of the 2013 flood case study is on developing or refining a category based on the identity of the user, not on users’ level of activity, which highlights my unique contribution. In addition, Lovari and Parisi did not study social media use in a disaster context, and the social media platforms and socio-cultural contexts they chose to analyze were different from Twitter; which further underscores the value of my study as one which further explores public users’ interactions with government users in very different contexts.

Studies of the Organizational Use of Twitter in Disasters

My observation that there are significantly more studies of the organizational use of social media during crises than studies of individuals' use of social media during crises has also been made by Austin, Liu, & Jin (2012); and Takahashi et al. (2015). The literature on the communicative use of Twitter by institutions and their actors focuses mainly on disaster management organizations' communication; news organizations' news gathering and reporting activities; NGOs crowdfunding; and relief coordination.

Twitter for Crisis and Disaster Communication

A crisis, as explained in the introductory chapter of this thesis, is as “an unpredictable event that threatens important expectancies of stakeholders and can seriously impact an organisation's performance and generate negative outcomes” (Coombs, 2015, p. 3). Since 1986, communication scholars have developed different crisis classification systems (Meyers and Holusha, 1986; Lerbinger, 1997; Mitroff and Anagnos, 2001; Coombs 2015), and of relevance to this study is the classification of crises into two main types—disasters as social crises, and organizational crises. Although this study focuses on a social crisis caused by a disaster, the literature review also includes studies of organizational crises because as Coombs (2015) explains, the treatment of both types overlaps in the literature. Organizational crisis studies are relevant to this study because large-scale societal crises like disasters are managed by public organizations (Olsson, 2014).

Since the founding of the crisis communication field almost twenty years ago, the body of scholarly literature has been predominantly focused on the successful management of the communication function (Benoit, 1997; Reynolds & Seeger, 2005; Ulmer, 2011); success being

defined as the maintenance of the organization and a favourable operating environment—to which, a positive public image or reputation is central.

Roshan, Warren and Carr (2016) have offered a recent assessment of the way that large organizations use social media for crisis communication. Their study illuminates the way that organizations respond on social media during a crisis, as well as the type of information that they provide. Roshan et al have found a gap between the actual practice of organizational crisis communication and theoretical frameworks of crisis communication. For example, crisis communication literature recommends that organizations respond to stakeholders' messages and provide crisis updates via social media, but Roshan et al have found that only fifteen percent of the 17 organizations studied, do this.

In examining organizations' crisis response strategies, which are "the actual responses an organization uses to address a crisis" (Coombs 2015, p. 144), Roshan et al have found that the organizations' response strategies are grounded in Coombs' (2014) *postures of crisis response strategies: denial, diminishment, rebuilding and bolstering* postures. Using the *denial* posture means that the organization responds in a way that minimizes its culpability for the crisis; and using the *diminishment* posture means the organization tries to diminish its responsibility for the crisis or the damage perceived. With the *rebuilding* posture, the organization offers some form of compensation or apology to stakeholders to improve its reputation; while use of the *bolstering* posture means the organization responds in way that may strengthen its reputation.

Roshan et al (2016) have found that organizations affected by floods and other types of disasters (classified by Coombs, 2015 as *victim* organizations) are inclined to use the *bolstering posture* in isolation from the other postures. According to Roshan et al, the use of the *bolstering*

posture alone is supported by researchers, Kim and Liu (2012) who recommend that victim organizations use bolstering strategies in isolation from other postures to build positive connections between the organisation and stakeholders. However, Coombs (2015) recommends that *victim* organizations use the bolstering posture as “supplemental” (p. 149) to other postures or run the risk of appearing egocentric. This conflict between findings and advice offered to organizations underscores the need for empirical research to better understand how organizations’ communicative activities reflect their interpretation of, and response to, their operating environment.

Roshan et al (2016) also examined the type of crisis communication content organizations share, using Sturges’ (1994) communication content model. They classify the crisis communication content that organizations disseminated as either *instructing information*, *adjusting information* or *internalising information*. *Instructing* information is designed to advise stakeholders how to physically protect themselves in a crisis, while *adjusting* information is sympathetic or explanatory and helps stakeholders cope psychologically. *Internalizing* information is information that stakeholders internalize, which results in them formulating an image about the organisation. Organizations managing natural disasters usually disseminate internalizing information, and while the outcome of using this type of information was positive for some organizations, it wasn’t for others, leading Roshan et al to deduce that organizations’ prior crisis reputation plays an important role in the way that stakeholders receive crisis information.

Roshan et al.’s study underscores the reputation focus of crisis communication theory and practices. It shows that the craft of crisis communication involves the strategic manipulation of

information to achieve a favourable public image. This relates to my study's aim to understand the communicative use of Twitter by organizations during the 2013 Calgary flood. However, Roshan et al did not study municipal organizations—one of the organizations that news reports suggest were a key Twitter user in the 2013 flood; and the socio-cultural contexts they studied are different from that of the 2013 flood. Therefore, there is room for my study to explore the municipal government's Twitter use for crisis communication.

Like Roshan et al (2016), Kim and Liu (2012) also used Sturges' (1994) communication content model to examine the type of information shared within organizations' crisis communication; focusing on differences in the way that American government organizations and private organizations responded to the 2009 H1N1 flu pandemic. They have found that government organizations mainly provided *instructing* information, while private organizations provided more *internalising* information. Based on the dominant crisis communication theories, government organizations did not share enough *adjusting* information, which goes against the “basic communication duty of the government (which) is to provide for the public good, including addressing concern for publics (Liu & Horsley, 2007 as cited in Kim & Liu, 2012, p. 81).

Kim and Liu's (2012) findings provide a hypothesis to test during my inquiry into the municipal government's communicative use of Twitter during the 2013 Calgary Flood. They suggest that bolstering reputation may be less important to public organizations than providing public safety information. My study would therefore be necessary to determine if this finding is replicated in the case of the 2013 Calgary Flood.

Studying the Calgary Flood context is also necessary, due to geo-political differences that would make extrapolation of evidence illogical; Kim and Liu have studied a federal government organization in America, while this study looks at a municipal government organization in Canada. Based on the emergency management framework for the United States of America, the local level of government (counties and municipalities) would be equivalent to the municipal/local government level in Canada, but there may be differences in how emergencies are managed at the Canadian and American local levels. My study is better positioned to offer insight into Canadian municipal governments' crisis communication. Moreover, crisis type is an important variable, and it is possible that my study of a natural disaster-related crisis will yield different results from Kim and Liu's (2012) study of a flu pandemic crisis.

A study into social media use during Japan's 2011 earthquake by Cho, Jung and Park (2013) reveals how the Japanese Government used Twitter. The disaster spurred several government offices to begin using Twitter, and they quickly gained many Japanese followers. Cho et al. believed that the number of followers the government gained was indicative of the fact that Japanese citizens were interested in receiving official information. Government Twitter use was limited to the sharing of "one-sided official" (p. 36), repetitive messages about the earthquake, and each government office focused on specific types of earthquake-related messages. For example, the Office of the Prime Minister focused on anti-earthquake measures, encouraging the public and publicizing press conference schedules, while the Financial Services Agency focused on financial related information such as financial fraud warnings, that were opportune at the time of disaster.

Cho et al.'s (2013) study reiterates that citizens' information needs increase in disasters and that citizens expect governments to use social media as a key information tool. However, there is a need for additional studies like mine to understand the communicative use of Twitter by governments and citizens in Western Canadian disasters.

Spence, Lachlan, Lin, & Greco (2015) conducted a study of the content and frequency of information that emergency management and government agencies tweeted before hurricane Sandy made landfall in the United States of America. Their study is framed by the recurring idea in crisis communication literature that crises unfold and dissipate in stages or phases. The study is specifically framed by Fink's (1986) "crisis life cycle" model. Spence et al explain that the *prodromal stage* is the first of four stages and, in this stage, the public receives some indication of the nature of the impending crisis; symptoms of the crisis may also begin. The *acute stage* is the second stage, and it usually begins with a "trigger event" (p. 175) that causes damage to individuals and, or organizations. The *chronic stage*, the third stage, is associated with the reputational decline of organizations or communities associated with the crisis and their struggle to return to pre-crisis normalcy. The *termination stage* is the fourth and final one, and in it, the crisis is resolved and seemingly irrelevant to stakeholders. Spence et al.'s study focuses on the stages leading up to the chronic stage, which they say receive less attention from researchers.

Spence et al. (2015) have observed a decrease in tweets that contain *usable information* (such as evacuation, food and shelter information) while tweets with *affective displays* (tweets with "expressions of fear, the magnitude of the storm, the extent to which it threatened life or property, or unspecified indications of worry or fear" [p. 179]) increased sharply. They believe that this is cause for concern because there is a risk of losing the "availability of information" (p.

182) concerning tangible steps that the public can take to reduce harm to themselves and their property. Their finding that there was a scarcity of information during the storm (the acute stage) is also noteworthy because it speaks to natural disasters' ability to disrupt communication systems. However, a few tweets were detected that had information about locating missing persons, food and shelter; evacuation efforts and information on cancellations. The researchers state that no tweets relevant to healthcare were found in this stage, suggesting that such information was necessary or expected of governments to provide.

Overall, Spence et al.'s 2015 work highlights the importance of contextualizing disaster social media use by disaster phase because information needs and availability change as the disaster event progresses, and accordingly, my study focuses on the event or acute phase of the 2013 Calgary Flood—June 20-23. Spence et al.'s study further illuminates the body of work on disaster social media use; juxtaposed with other government, crisis communication studies, it reveals that government organizations differ from one another in their disaster social media use. It is therefore important to study different disaster social media contexts, which my study does.

Twitter for News gathering and Reporting

There are very few studies that focus exclusively on how news organizations and journalists (as organizational actors) use Twitter in disasters. However, very valuable information has been gleaned from the few studies that exist on this topic.

In Dailey and Starbird's (2014) study, they examine Twitter use by local journalists in New York's Catskill Mountains, during the early response period of Hurricane Irene. Local journalists led a group of individuals in the responsible gathering and broadcasting of critical information, as well as the coordination of relief efforts. Dailey and Starbird found that the

network of social connections played an important part in bridging gaps in event coverage and information access.

Dailey and Starbird (2014) highlight the transformative effect that social media is having on journalism practices, and they explain that there is a new paradigm in which citizens are co-information producers instead of just mere consumers. They cite work by Deuze (2005) and Gillmor (2006) as evidence that journalists' new role as co-producer with citizen journalists has contributed to an identity crisis in the profession and the demise of traditional news outlets. Citizen journalists are also seen as having the potential to compete with or replace professional journalists. In response, journalists are using new tools and adapting their existing work practices to remain competitive.

Dailey and Starbird's (2014) study is useful to my study because it contextualizes the disaster communication landscape and the relationship between individual citizens and journalists. It is also useful because this study examines Twitter use by journalists during the 2013 Calgary Flood. Because socio-cultural differences impact disaster social media use, my study would contribute to an understanding of Twitter use by journalists in a Canadian disaster.

Muralidharan, Rasmussen, Patterson and Shin (2011) have studied media organizations' use of Facebook and Twitter during the 2011 earthquake in Haiti. They observed that that most of news organizations' posts on Facebook and Twitter supported their core function—news. Muralidharan et al also found that Twitter was used more as a disaster communication tool than Facebook but they did not explain the reason for this finding.

Gaining readership appears to be an important focus of news organizations' Twitter use, as Muralidharan (2011) et al. found that news organizations used negative emotions to increase

readership. Their study also explored the way that news was framed on Twitter. Muralidharan et al. have found that the dominant message frame news organizations used was *conflict*, which the researchers associated with sensationalism—also used to gain attention/readership. This is relevant to my study because it shows that the survival of the organization is important to news organizations and that Twitter as a tool for gaining readership, supports this. My case study of Twitter use in the 2013 Calgary Flood is designed to show how news organizations in Calgary may have used Twitter as a tool to increase readership/viewership, thereby contributing to this body of work on Twitter use for news gathering and reporting; specifically in the Canadian context.

Twitter for Non-governmental Organizations' Activities

Few studies have explored non-governmental organizations (NGOs') use of disaster social media. Muralidharan, Rasmussen, Patterson and Shin's (2011) study of Twitter use in the 2010 Haiti earthquake, discussed above, also considered NGO's Twitter use. They cited studies by Paul (2001) and Waters et al. (2009) as evidence that NGOs and other social welfare organizations generally use social media for public interaction and to share information about their programs and services. During the Haiti disaster, NGOs mainly tweeted updates on relief efforts, which often included links to photographs and videos.

Gurman and Ellenberger (2015) also studied Twitter use in the 2010 Haiti earthquake. Their study made the communicative functions of Twitter for NGOs explicit, showing that NGOs use social media in disasters as an open communication pathway for updates, relief and aid.

Wukich & Steinberg's (2013) studied NGOs disaster social media use in four American disasters—The Boston Marathon bombing; The West, Texas fertilizer plant explosion; The Midwest spring flooding in Peoria, Illinois; and The Moore, Oklahoma tornado. They found that the involvement of NGOs in disaster efforts was not only local but cut across local, state and national jurisdictions. Using the Red Cross as an example, the researchers demonstrated that not-for-profits were innovatively using disaster social media to both receive and disseminate information. However, Wukich & Steinberg observed a shortcoming in NGOs Twitter use—their limited use of Twitter hashtags—a self-organizing information network activity that may influence users' behaviour and promote resilience. This minimized NGOs role in the information network so their publics did not regularly retweet information in their own network.

Together, these studies of NGOs' disaster social media use inform my study with empirical evidence that NGOs use social media to further their core function—aid coordination activities. The value of Twitter hashtags as a tool to increase visibility for messages was also made explicit; this will be further explored through my case of Twitter use in the 2013 Calgary Flood. No studies of NGO use in the Canadian context were found, so it is reasonable to inquire how NGOs used Twitter in the Canadian context, during the 2013 Calgary Flood.

Studies of the Non-organizational use of Twitter in Disasters

From a synthesis of results from several disaster social media studies, Spence et al. (2015) have provided a useful overview of how individuals use disaster social media. According to Spence et al, disaster social media has evolved into a community-based phenomenon, collaborative and interactive in nature; therefore, individuals not only use disaster social media to

consume content but to also produce it (Spence et al, 2015). Mobile devices allow individual citizens to easily access disaster social media sites from within disaster zones. Through their collation and dissemination of disaster information, individual citizens sometimes act as *citizen-journalists*—sharing valuable, new information with other disaster victims and official crisis managers (Palen et al. 2010 as cited in Spence et al., 2015). Disaster social media platforms also mimic physical disaster zones where people converge to help make sense of the situation and facilitate volunteerism.

Olteanu, Vieweg & Castillo's (2015) study focused on the communicative use of Twitter in a thousand crisis situations, including the 2013 Alberta Floods (which, as explained in the introductory chapter of this thesis, an event that included the more specific 2013 Calgary Flood). The researchers found that although each disaster situation was unique, some commonalities were evident. These commonalities included the distinction between users as *eyewitnesses* (denoted by terms such as citizen reporters and members of the community) and *outsiders* (denoted by terms like sympathizers, distant witness, outsider and non-local). Olteanu et al explain that eyewitness information originates from either witnesses of the event, response or recovery operations; or from persons closely associated with them. On the other hand, outsider information originates from individuals who are not personally impacted or have personally witnessed the disaster. These categories suggest that disaster social media users should be contextualized by proximity to the disaster because it has implications for the way disaster social media is used.

Olteanu et al. (2015) have also identified different information types and users. Their category of messages consists of messages about sympathy and emotional support; affected

individuals; donations and volunteering; caution and advice; infrastructure and utilities. Their category of message sources consists of traditional and/or internet media; outsiders (people who are not impacted by the event); eyewitness accounts; government; NGOs and businesses

Olteanu et al.'s (2015) study provides empirical evidence of disaster social media users and uses—key variables in this case study of the communicative use of Twitter in the 2013 Calgary Flood. Floods were the most frequent type of disaster in their dataset, and the fact that the 2013 Alberta Floods was one of the crises studied, makes the results more relevant to this case study of the 2013 Calgary Flood. However, Olteanu et al.'s study was conducted at a macro level, across different crisis phases and could not reasonably focus on the Calgary Flood; thus my study complements theirs by providing a more focused micro-level analysis. Olteanu et al.'s study is based on a range of crisis types, including manmade and natural disasters.

Cho, Jung and Park's (2013) content analysis of tweets in the 2011 Japan Earthquake Twitter is focused on how Twitter is changing the locus of crisis communication—decentralizing organizations in the crisis communication process, resulting in the information flow changing from top-down or linear to networked. Cho et al found that individual citizens preferred peer-to-peer communication and peer-generated information over traditional and official/government information. This is relevant to my study whose scope includes Twitter use by government users and individual citizen users; it explores citizens' information sources and is positioned to determine if Twitter is changing the locus of crisis communication in the Calgary context.

Cho et al. (2013) also illuminate the pattern of Twitter usage across disaster periods. The researchers divided the study period into four ten-hour increments— the reasons for the division were not explained. Tweets of an emotional nature that focused on safety concerns were

common in the first ten-hour period. Cho et al have also found that individual users mainly tweeted their personal experiences in the forty-hour period immediately following the earthquake and opinion sharing mainly took place within the thirty to forty-hour period after the earthquake. The researchers explain this pattern: they claim that the rise in tweets related to safety concerns implies that insufficient information contributes to emotional responses. They interpreted that once individuals have the necessary safety information, they turn their attention to other types of tweets. Opinion tweets do not immediately begin because according to Cho et al., individuals are careful to adequately comprehend the situation before they form and express their opinion. Cho et al.'s (2013) study shows that there is a connection between individuals' information needs and the availability of information/the types of messages tweeted. This justifies my study's inquiry into the motives behind the types of messages tweeted in the 2013 Calgary Flood.

Conclusion

This chapter demonstrates that Twitter as a disaster social medium has unique features and style conventions that cannot be sufficiently understood from blanket studies of disaster social media. A growing body of literature classifies the users and functions of disaster social media. These studies have categorized a multiplicity of organizational and non-organizational users; the media serves various functions for each type of user. Despite the popularity of Twitter as a disaster social medium, no study applies existing typologies of disaster social media *users* and *uses* to the Canadian context, which I do here.

Chapter 3: Theoretical Framework

The theoretical framework for this study was developed from Houston et al.'s (2014) functional framework of disaster social media, which is based on the *Uses and Gratification Theory* (UGT). Consequently, UGT is considered the foundation of my framework. These theories were selected because they best suit my research of Twitter's communicative use during the 2013 Calgary Flood—UGT is suitable for broadly explaining media use in crisis situations, while Houston et al. provide a focused UGT approach to social media use in disaster-type crisis (*disaster social media*).

Uses and Gratification Theory

The Uses and Gratification Theory (UGT) is the foundation of the theoretical framework of this study. Its assumptions and principles form the basis of the research questions, methods, and analysis. UGT is also the larger framework of the specific theory that guides this study—Houston et al.'s (2014) *Functional Framework for Social media use in Disaster Planning, Response, and Research*. UGT addresses the aims of investigation more broadly, while Houston et al. provide a focused UGT approach to *disaster social media users and uses* (or *functions*).

UGT is a psychological communication perspective that may be used to understand how, why, and with what purpose people use media in their everyday lives (Liu, 2015). Its applicability extends beyond the study of everyday media use to “unusual situations such as national and personal crises” (Dotan and Cohen, 1976 p. 401). As an audience-based theoretical framework, UGT is grounded in the assumption that individuals choose media and content to fulfill their social and psychological needs and wants. Behind these needs and wants are

motives—general dispositions that influence people’s actions taken for the fulfillment of a need or want and behavior. The sense of fulfilment that individuals experience from their media use is rereferred to as *gratification* by UGT researchers.

UGT has a long history in the study of communication, yet scholars cannot agree on the origin or founder of the theory (Liu, 2015). Contemporary communication scholars accept UGT as a sub-tradition of media effects research. According to Stacks, Salwen and Eichhorn (2019), its historical origins can be traced back to Lasswell’s (1948) model of communication, which encourages inquiry into who uses media, how, and with what effect. The early development of UGT represented a departure from the traditional focus on the effects that media have on people, and the belief that people were mindlessly controlled by media. UGT is therefore credited with the shift in focus toward media users and their agency in communication and media studies.

According to Rubin 2008, the key elements of UGT include

- the psychological and social environment;
- the needs and motives of communication;
- communicative behaviour and their outcome or impacts;
- media and users’ expectations of media; as well as
- functional alternatives.

To narrow the focus sufficiently for a master’s thesis, I have focused on the “needs” and “motives” concepts within UGT, as well as “communicative behaviour.”

This study is grounded in these assumptions presented by Katz, Blumler & Gurevitch (1974), which also form the basis of contemporary UGT:

1. *All communicative behaviour, including media use is goal-directed, purposive, and motivated.*

Media users are believed to be active, have agency and, their communicative behaviour is based on a deliberate decision to achieve a specific outcome.

2. *People select and use media to satisfy felt needs or desires.*

The “specific outcome” that media users seek is the fulfilment of psychological or felt needs, of which they are fully aware and presumably, able to articulate.

3. *Many social and psychological factors mediate communicative behaviour.*

Users’ predispositions, environment, and interpersonal interactions guide, filter, and contribute to their media use (Rubin, 2008).

4. *There are functional alternatives to the various forms of communication, so media compete for selection, attention, and fulfilment of people’s needs or wants.*

According to Katz, Blumer & Gurevitch (1974), the needs that media can fulfill are “but a segment of the wider range of human needs, and the degree to which they can be adequately met through...media...varies” (p. 511). Users have options for the fulfilment of their psychological needs in various forms of media and functional alternatives; Rubin (2008) suggests that interpersonal relationships are one example of a functional alternative to media. It is reasonable to think that users are best positioned to determine what functional alternatives to media there are, since they are based on their personal, psychological needs.

Motives behind media use

UGT researchers further expound the motives for media use, breaking them down into five types, which they posit relate to five core human needs: *Cognitive, Affective, Personal Integrative, Social Integrative and Tension free*. These explain the subjectively perceived needs individuals would be able to state if asked about their reasons for using media generally.

Cognitive motives are connected to the intellect and include the need for information, knowledge and facts; they also relate to curiosity and understanding of the social environment. Affective motives relate to the desire for experiences that are pleasurable; whether aesthetically, emotionally or otherwise pleasurable. Personal integrative motives include dispositions related to self-confidence, personal integrity and social status. Social integrative motives relate to family relationships and social interactions. Tension free motives encompass the need to escape stress or tense situations.

The proliferation of social media and internet communication technologies have sparked an interest in understanding the uses and gratifications of online communication. Social media offers a range of features for interpersonal communication, making it a suitable space for users to fulfill at least some of their cognitive and socio-affective needs in disasters. Nebaum et al (2014) theorize that online communication affords persons a greater level of freedom to actively fulfill their perceived needs, due to increasingly enhanced opportunities for interactivity and individual selectivity that the Internet offers, as well asynchronicity—the freedom to communicate at one’s convenience. They explain that a key takeaway of the UGT approach is that individuals will use social media in varying ways, depending on the informational need at any given point, and they

theorize that passive and active social media usage may be related to different dimensions of the informational need that individuals perceive.

Based on these assumptions, Neubaum et al (2014) have expanded the media use motives in UGT by connecting motives to social media usage patterns in disaster-type crises. This framework within UGT is referred to as the *disaster-related uses and gratifications of social media*. The disaster-related uses and gratifications of social media consist of the *information gathering* motive that has been broadly explored in the literature, as well as the *sharing* and *observation of emotions* motives.

The information gathering motive is premised on the need for immediate and accurate information that disaster type crises produce. Because the information gathering motive is well expounded in the literature, there are several positions on the types of information needs people experience during disasters; several of these theories overlap or are extensions of previous propositions. Nebaum et al (2014) highlight Thelwall and Stuart's (2007) proposition that there are three distinct information needs in a disaster: general information about the course of the disaster, personal information to verify family or friends' wellbeing, as well as the need to use information (to communicate with others). Social media is theorized to fulfill the first of these three needs—general information needs—rather than the other two.

Emotions are not well explored in the literature as motives for disaster social media use; therefore, Nebaum et al (2014) expand the motivational view of disaster social media by exploring the active sharing of emotions and the passive observation of emotions, through content analysis of social media postings, qualitative interviews, and an online survey. *Social sharing* has been steadily identified in a notable line of research, and Nebaum et al define it as

the expression of one's internal state or feelings to another. Social sharing is a means for persons to regulate the extraordinary emotional states caused by disaster-type crises. Nebaum et al further explain that the level of social sharing is commensurate to the level of emotional impact that people feel; therefore, the greater the level of impact, the greater the level of social sharing. Also, that disaster social media users are more inclined to share negative emotions.

The social sharing process is premised on the idea that a negative emotional event will stimulate specific cognitive needs such as the need to find clarification and meaning, and specific socio-affective needs like the need for empathic reactions and social integration.

The idea that social sharing via disaster social media use is driven by emotional needs leads to the question of whether users subjectively experience gratification. Nebaum et al (2014) state that it is unclear if disaster social media sharers experience any gratification from the process; however, there is evidence in offline situations that gratification depends on the listener's reaction. If the listener addresses the sharer's cognitive needs; for example, by positively reframing the negative experience, long-term emotional recovery may be experienced. If the listener addresses the sharer's socio-affective needs; for example, by showing empathy, temporary emotional relief may be experienced.

The *observation of emotions* motive is based on the perspective of the listener or recipient of social sharing. A central idea of this motive is that social media enables listeners to passively receive information without interacting with the persons sharing it, and that exposure to emotional content elicits emotional responses. Nebaum et al (2014) theorize that there are several reasons why disaster social media users subject themselves to emotionally charged content. The first reason is to better understand the impact of the disaster at the micro/individual level; social

media is better suited for this than traditional media because it facilitates more intimate and personal information. Another reason is to mentally organize the disaster procedure and make sense of the physical and psychological impacts on persons impacted.

Houston et al.'s framework

Houston et al.'s (2014) functional framework for social media use in disaster planning, response, and research was used to frame my study because it is most suitable for a study of multiple stakeholders' use of Twitter to communicate in a disaster. It is extremely important to explore multiple stakeholders' perspectives in my study, and no other framework that facilitates multiple perspectives in the disaster social media context was found.

Houston et al.'s conceptual framework was developed at a macro level, with the aim of describing all types of natural disasters and disaster social media. It is therefore a suitable frame of analysis for this study, and should be broad enough to encompass the general features of a micro-level case study. By applying it at the micro level in this case study, I can also explore local nuances in more detail than Houston et al could reasonably study in a large-scale study because they aimed to generalize. Insights from the micro-level can be used to build upon the framework to ensure it is truly inclusive of cases such as the one I investigate. To frame specific areas of my case study that Houston et al.'s macro-level study cannot reasonably address, I draw on theoretical concepts from other UGT scholars in the frame of analysis. This is not unusual, as scholars often combine constructs to refine their analyses (Seeger et al, 2013).

Houston et al.'s category of media use

Motives for media use have given rise to repertoires of motives for specific contexts, referred to in the literature as *typologies of media use*. According to Neubaum et al (2014),

typologies in the social sciences help researchers to organize complex behaviour into characteristic patterns or types to better understand the nature and consequences of the types.

Houston et al expand the repertoire of UGT motives with a category of disaster social media users and functions. They identified and categorized the main users of disaster social media and the communicative functions of disaster social media, across the *pre-event*, *event* and *post-event* disaster phases. The theoretical framework of my study is based on Houston et al.'s typologies of the *event* phase only (see Appendix B) because my study is focused on the communicative use of Twitter only during the event of the 2013 Calgary Flood—June 20-23.

Disaster social media users

According to Houston et al.'s (2014) framework, the main users of disaster social media are *individuals, communities, organizations, governments, and news media*. They caution that the concept of *user* is no longer confined to the consumer of disaster social media content, as users were found to produce social media content as well as consume content. This change in conceptualization of a *user* is the result of social media's capacity for "two-way synchronous communication" (Houston et al, 2014, p. 5).

The category of *individuals* includes private citizens and other disaster social media users who use disaster social media independently, rather than on behalf of another entity like an organisation. These persons tend to reside in the same geographic location affected by the disaster. Groups of individuals band together to form two types of communities based on either a common geographic location or based on shared values, experiences and interests. Disaster

social media plays an important role in both types of communities, facilitating the connection/communication between individuals.

The category of *organisations* classifies structured groups of individuals that are either responding to the disaster, affected by it, or observing the disaster outside of the affected areas. Houston et al theorize that organisations using disaster social media are most likely disaster response entities, affected businesses, and organizations that coordinate volunteers or aid.

Houston et al (2014) explain the *government* category as classifying groups of people with the authority to govern at the federal, state, and local level. Because this classification is based on the American system of government, I have adapted it to the Canadian context—groups with the authority to govern at the federal, provincial and municipal level. Types of government users of disaster social media usually include emergency management and public safety agencies.

News media, as a category, covers organisations of varying sizes, traditional or new in nature such as newspapers, broadcast networks and international news organisations.

Disaster social media functions

Houston et al.'s (2014) UGT framework of disaster social media functions acknowledges the simultaneous productive and consumptive roles that disaster social media users play; therefore, each function of disaster social media in the framework is from the perspective of the content creator as well as the content consumer. The following is their category of disaster social media uses:

- *Signal and Detect Disasters*

Over the last decade, disaster social media users have demonstrated an inclination to share their experiences during or immediately after a disaster. By doing this, they signal to other users within or outside of their geographic location that a disaster is occurring, impending or has just occurred. Conversely, social media is often the first indication that citizens have of an impending disaster and a useful tool for emergency responders to detect a disaster. Houston et al. (2014) cite work by Ford (2011) and Kang (2011) that showed that individuals in the eastern US learnt about the 2011 Virginia Earthquake event on Twitter before experiencing it in their location. Similarly, data visualisation tools have shown earthquake-related tweets moving across the US faster than the earthquake's seismic waves (Honan, 2011 and Lotan, 2011 as cited in Houston et al, 2014).

- Send and receive requests for help or assistance

Disaster social media facilitates victims' requests for help from other citizens or emergency responders and facilitates coordination of assistance. The prevalence of disaster social media as a channel for help is due in part to its reliability. Citizens have an expectation that emergency managers will monitor social media during disasters, and emergency responders systematically use social media as a tool to receive victim's request for help.

- Inform others about one's own condition and location and learn about a disaster-affected individual's condition and location

During a disaster, individuals are concerned about the wellbeing of family and friends in the affected area. Disaster social media has become an essential tool for persons in affected areas to share their condition and provide updates on their surroundings. Facebook has even developed a Safety Check feature where users can mark themselves safe during an emergency.

- Document and learn what is happening in the disaster

Disaster social media serves as a tool for organizations and individuals to document the progression/impact of a disaster, and to understand it from the documented view of others. This function of disaster satisfies the need for information that the high level of threat and uncertainty in disaster causes. Social media is best positioned to satisfy this need because it is more dependable and speedier than traditional media in disasters. Twitter has been found to be especially useful for this disaster social media function.

- Deliver and consume news coverage of the disaster

The deliver and consume news coverage function bears some similarity to the document and learn function because they are both centred around investigation and documentation, however the deliver and consume news function is focused on coverage from a journalist perspective. Houston et al (2009) explain that disaster social media is a core component in the traditional news coverage of modern disasters, broadening the reach of traditional coverage. Citizens and organizations play a key role in broadening the reach of traditional news coverage by sharing it in their own networks.

- Provide and receive disaster response information; identify and list ways to assist in the disaster response

During a disaster, people are generally interested in how the authorities are managing or responding to the disaster and learning how they can help persons affected. Social media facilitates timely progress and needs updates from crisis managers and citizens will further amplify the messages by sharing in their personal networks. In some cases, some social media users act as information brokers, collating disaster response details for other users to access or use.

- Raise and develop awareness of an event; donate and receive donations; identify and list ways to help or volunteer

This function of disaster social media has two key components: awareness and coordination. In the area of awareness, disaster social media enables individuals and organizations to list specific ways that others can help to alleviate the impact—usually through monetary or other forms of donations, including volunteer hours. It also facilitates promotion of events that support disaster relief, whether a volunteer cleanup event or fundraising event. Houston et al (2009) premise that awareness of the disaster's impact can be necessary to stimulate donations or volunteerism, however in some cases, individuals are already motivated to support so the need for additional awareness is small.

In terms of coordination, some disaster social media platforms facilitate donations to disaster relief funds, however the most common use of disaster social media for coordination is the collaborative exchange of information to create an event. A key benefit of disaster social media is that it enables people outside of the disaster zone to participate in disaster relief efforts.

- Provide and receive disaster mental/behavioural health support

The *provide and receive disaster mental/behavioural health support* function of disaster social media facilitates the interconnectedness of people affected by the disaster and access to mental and behavioural support information. Overall, the use of disaster social media to provide/receive mental and behavioural support is associated with attitudes and feelings associated with improved mental and behavioural health.

- Express emotions, concerns, well-wishes; memorialise victims

Disaster social media allows users within and outside of the disaster zone to express their emotions about the impact and memorialise victims, if relevant. Emotions that are expressed on disaster social media range from concern for affected persons, grief and remembrance of victims.

- Provide and receive information about (and discuss) disaster response, recovery, and rebuilding; tell and hear stories about the disaster

This function of disaster social media signals the ending of the event phase and is characterized by continued engagement about the disaster response, disaster experiences, recovery and rebuilding. Social media is particularly suited to this function because it allows persons to continue discussing the disaster and collaborating longer than traditional media does.

- Implement traditional crisis communication activities

Disaster social media also serves to implement traditional crisis communication, which is centred around repairing the organization's reputation and returning the organization to operational normalcy. Although organizations may demonstrate public listening and engage in two-way communication with its publics, Houston et al (2014) posits that the *implement crisis communication* function is the only one-way, communicative function. This is because the purpose of traditional crisis communication is to protect the organization's reputation and social media is used as a tool to complement traditional media during a crisis.

Chapter 4: Methodology

In this chapter, I discuss the methodological basis and the process of the *directed content analysis* that I used to study Tweets in the 2013 Calgary Flood. I begin with data selection, by justifying the decision to use Tweets as the primary information source. I then explain the methodological steps that I took to prepare the Tweets for content analysis, narrate the directed content analysis process, and demonstrate why it was the most suitable research method for my study.

Justification for Studying Tweets

I used Tweets as the primary source of data for the reasons outlined below:

- Tweets have “a unique level of authenticity” (Hesse-Biber and Leavy, 2011, p. 28) because they are the actual text of their authors and have not been interpreted or influenced by researchers. Other data sources that could be considered suitable for my study cannot claim this level of authenticity because they are hinged on their authors or researchers’ ability to objectively and correctly recall how twitter was used over a period of several days. It is reasonable to think that this would be very difficult, given the thousands of tweets that flooded Twitter daily and humans’ inability to separate their observations from personal prejudices and other psychological conditions.
- Tweets are published with a date and timestamp, enabling researchers to reconstruct the flow of information as it occurred over real time—time is an important consideration in disaster communication studies.

Consideration was given to *interviewing* as a research method for this study; however, several reasons for its unsuitability were identified. One of the main reasons is the nature of the research questions. It would not have been very feasible to recruit a representative sample of interview subjects within each user category that fits the demographics of the population of users, when each user within a category is also unique. Interviews were also unsuitable for the research context because political and social concerns would likely influence interviewees' willingness or ability to participate.

Methodological Steps to Prepare the Tweets for Analysis

Collection of Tweets

Tweets during the 2013 Calgary Flood are stored by Twitter as historical data, which, according to Twitter's terms, means data older than three weeks. Historical data is sold through designated partners of Twitter, but because of the prohibitive cost and limited financial resources for my study, purchasing the dataset of tweets was not an option. I chose to acquire the dataset from a public repository on the collaborative website Github.com. It was uploaded by Castillo as a project file for Olteanu, Vieweg and Castillo's (2015) study, discussed in the literature review chapter.

Selection of Tweets

Because Olteanu, Vieweg and Castillo (2015) et al studied the entire 2013 Alberta Flood disaster, of which the Calgary Flood was a part, the dataset that I obtained on Github.com was not limited to tweets made during or about the 2013 Calgary Flood. The dataset consisted of

4632 tweets that spanned several phases of the Alberta Floods between June 20 and July 15, 2013. Several important considerations were therefore made in the process of selecting tweets for analysis; these were mainly to select tweets made about the 2013 Calgary flood from within Calgary, and to select tweets made during the *event* phase of the disaster. The main steps in this selection process are sequentially outlined below:

- Selection of Tweets between June 20 and 23, 2013.

As Houston (2012) explains, distinguishing between disaster phases is not exact because of the way that they transition into each other. However, based on historical data about the flood's progression and Houston's contextualization of disaster phases, I am confident that these dates encompass the event phase.

- Selection of Tweets with the hashtag #YYCFLOOD

This hashtag was the most popular one used to index tweets about the 2013 Calgary Flood. It was often used in combination with other hashtags, mainly #ABFLOOD, but being that YYC¹ is only associated with Calgary, it was an important signifier of tweets made about the Calgary disaster.

- Selection of Tweets about the 2013 Calgary Flood

This step involved interpreting the text using historical information and knowledge of the Calgary culture, ensuring that they were specifically about the disaster in Calgary and not the general Southern Alberta Flood—or flooding in other Southern Alberta cities.

- Selection of Tweets made within Calgary

¹ YYC is the airport code of the Calgary International Airport. It had acquired the status of a nickname for Calgary.

To better ensure that the final dataset consisted of tweets made from users in Calgary, tweets were selected on the basis that their author's location was listed as Calgary, or the author's self description suggested that they live in Calgary.

Based on my own judgement about the value of some tweets to the study, tweets made outside of Calgary by the following users were selected:

- The Provincial Government
- The Federal Government
- Insurance Bureau of Canada
- Established media companies and Canadian journalists

Within the *Emergency Management Framework for Canada* (discussed in Chapter 1 of this thesis), the provincial and federal governments play an important role in disaster management, so excluding their tweets from the study would eliminate valuable perspectives from the narrative. Tweets from the Insurance Bureau of Canada were selected because insurance is a major concern for property owners during disasters, and tweets from news sources outside of Calgary were included because Calgarians demonstrated some level of reliance on them. It is my belief that Tweets from these organizations contribute to a more comprehensive understanding of Twitter's communicative function during the 2013 Flood.

My position as workplace researcher

As explained in the introductory chapter, my research interest was influenced by my public relations and government communications background. I chose the research questions and determined the scope of the thesis as a Calgarian, interested in understanding the communicative

use of Twitter during a local disaster. During the study, I became employed by The City of Calgary, one of the organizations whose Twitter use I analyze in the study. I therefore became an *insider or workplace researcher*—a researcher who, while retaining their established role in a community, adds to it the role of insider researcher for a specific purpose and duration (Gibbs, 2007).

The position of workplace researcher is complex, as the researcher is dually obligated to the workplace and the rigours of the research practice. They must maintain their integrity in the workplace, causing no harm to the organization; whilst ensuring that results are “validated, meaningful and worthwhile...presented in a correct manner for their impact to be realised without damaging more vulnerable others.” (Gibbs, 2007). To navigate this complexity, I drew on the value of *practical wisdom*, which Gibbs explains, is not just rationality but also the desire to be consistently ethical when making research decisions. The key research decisions connected to my research of the City’s Twitter use were to:

1. Ensure that documents and other forms of knowledge or information gained through my employment with the City of Calgary did not inform my understanding of tweets, their context or implications for the crisis communication paradigm. Instead, only the publicly available sources, cited in this study, were used.
2. Acknowledge that the results are not infallible although sound judgement was used.
3. Make a valid contribution socially and to the field of communication.

The study was designed to make a social contribution by providing empirical evidence to inform disaster communication planning, and ultimately, improve public safety. As the first, empirical study of the communicative uses of Twitter in the 2013 Calgary flood, the study was also designed to contribute to the body of knowledge on disaster social media in the Western Canadian context; this will prove foundational evidence to both expand the field and influence further research into the relevant areas of the study.

I was not a City of Calgary employee during the coding process, so my employment did not impact the way that Tweets were interpreted, coded and analyzed. As a City employee, I can however, sympathize more with communicative decisions made by the organization but tried not to let this impact the study.

Content analysis

This study employs content analysis, as do more than half of crisis communication studies (Ha & Riffe, 2015). Content analysis, according to Krippendorff (2004), is “a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use” (p. 18). *Inference*, as further expounded by White and Marsh (2006), is a very important concept in concept analysis and is the process of using “analytical constructs, or rules of inference, to move from the text to the answers to the research questions” (p. 27). According to White and Marsh, “analytical constructs” or “rules of inferences” may be derived from existing theories or practices, expert knowledge and experience; and according to

Krippendorff, 2004 as cited in White and Marsh, previous research. I will expound on the *inference* process in this study, further in this chapter.

Data quality was the main reason that content analysis was identified as the most suitable research method for this study. Because tweets about the 2013 Calgary Flood were made several years ago, a research method that did not rely on subjects' ability to recall exactly what they said and on what date during the disaster was preferred. Mair (2018) explains that content analysis eliminates the need for *participant recall* and the risk of *recall bias*—disadvantages of other research processes that are not based on the analysis of recorded, communicative messages. Individuals are generally unable to accurately recall information, even a short time after the communication occurred, or may be biased in how they recall the situation and the communication messages, factors which negatively impact the quality of research data. It follows that analyzing the actual discussion will be more accurate than asking a participant to recall details of the discussion. Mair also explains that content analysis facilitates “richer data” (page 3) because the objects of analysis are the communicative messages themselves, which would be more detailed than obtained through methods like survey.

Methodological approach

I have chosen to combine *quantitative* content analysis (QCA) and *qualitative* content analysis (QLCA). I therefore take a *mixed methods* approach, which is broadly understood as “research in which the investigator collects and analyzes data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or a program of inquiry” (Tashakkori and Creswell, 2007). To differentiate QCA and QLCA simplistically, QCA transforms observations of categories identified into quantitative/statistical

data, while QLCA is focused on deriving meaning from these categories observed (Hsieh and Shannon, 2005). Quantitative data derived from this process included the number of users in each user-type and the percentage of total tweets per user-type; qualitative data derived included the identification of a dominant user-type and the *motives* behind tweets made by each user-type.

A quantitative filter is helpful in making priority decisions. While something might be lost, like the perspective of a minority user or a minor communicative function, it would not be feasible for the scale of a master's thesis to include all communicative functions or users—only the major ones.

I used the directed method of qualitative content analysis. The main difference between a directed content analysis and other forms of content analysis is the scheme behind the coding process—the process of labeling, compiling and organizing your data. In a directed content analysis, the initial coding scheme and relationships between codes (labels) is pre-determined, unlike other forms of content analysis. I used several of Houston et al.'s (2014) categories in their framework as codes in this study, because one of the main goals was to adapt their framework to the Calgary context and enhance it; the directed method of qualitative content analysis is most suitable when prior theory or research could benefit from further description to validate or theoretically extend the framework or extend it in a new context (Hsieh & Shannon, 2005).

I remain confident in the strengths of the directed content analysis and that it is the most suitable method for this study; however Hsieh and Shannon (2005) believe that there is a limitation to this method—researchers approach the data from an informed perspective, so they are more likely to find evidence that is supportive rather than non-supportive of a theory.

However, the fundamental premise of my approach is that the ethic of application justifies the method. I believe in the usefulness and applicability of Houston et al.'s (2014) framework, which is an important criterion for enhancing it; that is, unless my research demonstrates otherwise.

Establishing coding categories

The sequential steps I followed in the directed content analysis were typical of other directed content analyses; these are outlined and discussed below:

- 1) Researchers start by identifying key variables from existing theory or prior research as initial coding categories (Potter & Levine-Donnerstein, 1999 as cited in Hsieh & Shannon, 2005).

I identified Twitter *user-types* and *communicative functions* as the initial coding categories from Houston et al.'s (2014) theoretical framework, in which disaster social media *users* and the *communicative functions* as key variables. These categories were also necessary to answer the research questions.

- 2) Operational definitions for each coding category are then developed (Hsieh & Shannon, 2005).

I developed operational definitions for each category (see Table 1 and 2), again using Houston et al.'s (2014) theoretical framework.

- 3) After the operational definitions are developed, one strategy researchers may follow is to begin coding immediately with the predetermined codes, and data that does not fit within the pre-determined codes are identified and later analyzed

to “determine if they represent a new category or a subcategory of an existing code” (Hsieh & Shannon, 2005, p. 1282).

I analyzed the tweets using my knowledge of the cultural context and historical flood information, coding them using the initial codes from Houston et al.’s (2014) theoretical framework.

My coding scheme deviated slightly from Houston et al.’s framework. Houston et al.’s framework includes *users* and *communicative functions* but does not connect the two; I coded the Tweets in a way that ensured the communicative functions of Twitter were made explicit for each user-type. This involved the development of a system of main codes and sub-codes like a folder and sub-folder system. Because some of the tweets did not fit in these initial sub-coding categories, I developed five additional ones. Table 1 below shows the main codes (Twitter users) and their operational definitions, while Table 2—also below, shows the final sub-codes (communicative functions).

Table 1. Twitter users: Coding categories and operational definitions

Twitter User-type Category	Operational Definition
Individual User-type	
Individual Citizen	Calgarians that used Twitter on their own behalf and not on behalf of any organization or group.
Organizational User-types	
News Media	Journalists, bloggers and organizations whose primary role during the flood was to gather and deliver news.
The Municipal Government/Local Authorities	Organization or organizational actor (individual) that had an official role in the municipal government.
The Provincial Government	Organization or organizational actor (individual) that had an official role in the provincial government.
The Federal Government	Organization or organizational actor (individual) that had an official role in the federal government.
Private sector companies	Companies that operate for profit.
NGOs and community groups	Structured groups of people or organizations whose primary focus is social or community improvement.

Table 2. Communicative functions of Twitter by user-type: Sub-coding categories and operational definitions

Category		Operational Definition
Individual User-type		
1	Signal and detect Disasters.	Tweets that indicate a flood is occurring or imminent.
2	Send and receive requests for help or assistance.	Tweets that request items or services to alleviate a situation brought about by the flood.
3	Inform others about one's own condition and location and learn about a disaster-affected individual's condition and location.	Tweets that communicate one's personal experience in the flood.
4	Document and learn what was happening in the disaster.	Tweets that record the flood's progression and other activities taking place as a result of the flood.

5	Share safety instructions, clarifications, warnings or operational updates from crisis managers. ¹	Tweets that share safety and operational response updates given by official crisis managers (the government).
6	Share own (unverified) safety instructions. ²	Tweets from unofficial sources that provide safety information
7	Express emotions, concerns, well-wishes; memorialise victims.	Express emotions, concerns, well-wishes; memorialise victims.
8	Raise and develop awareness of an event; donate and receive donations; identify and list ways to help or volunteer.	Tweets to promote fundraising events and other activities to support disaster relief.
9	Provide and receive disaster response information; identify and list ways to assist in the disaster response.	Tweets that share information on the official response (from the government) and outline tangible and intangible ways to support the response.
10	Provide and receive disaster mental/behavioural health support.	Tweets that provide information for persons to help themselves and their families psychologically cope.
11	Provide and receive information about (and discuss) disaster response, recovery, and rebuilding; tell and hear stories about the disaster.	Tweets that outline changes to normal operations or routines to manage the disaster situation; as well as Tweets about people's experiences in the flood.
12	Provide and receive information about missing pets and property. ³	Tweets seeking to reunite missing pets and property with their owners.
13	Deliver and consume news coverage of the disaster	Tweets that share news from established media houses/journalists about the flood (information must be timely and new).
Organizational User-types		
14	Provide and receive disaster response information; identify and list ways to assist in the disaster response.	<i>*See row 9</i>
15	Deliver and consume news coverage of the disaster.	<i>*See row 13</i>
16	Provide and receive self-help information.	Tweets that provide information/links that flood victims and others can use to help themselves manage or respond to the disaster.
18	Document and learn what was happening in the disaster.	<i>*See row 4</i>

19	Provide safety instructions, warnings or operational updates (crisis manager). ⁴	Tweets that share safety and operational response updates.
20	Share safety instructions, clarifications, warnings or operational updates from crisis managers.	Tweets that share safety and operational response updates given by official crisis managers.
21	Implement traditional crisis communication activities.	Tweets sharing information designed to influence public perception of the organization.
22	Provide and receive information about (and discuss) disaster response, recovery, and rebuilding; tell and hear stories about the disaster.	<i>*See row 11</i>
23	Inform customers about the business' or organization's condition. ⁵	Tweets that share information about how the organization was impacted/is being impacted.
24	Express emotions, concerns, well-wishes; memorialise victims	<i>*See row 7</i>
25	Provide and receive self-help information	Tweets that provide information/links that flood victims and others can use to help themselves manage or respond to the disaster.
26	Raise and develop awareness of an event; donate and receive donations; identify and list ways to help or volunteer.	Tweets to promote fundraising events and other activities to support disaster relief.

Notes 1, 2, 3, 4 & 5 Coding categories identified in this study

The use of NVivo Pro 11 software

The coding process was facilitated by the research software, NVivo Pro 11. Upon completion of the coding process, I used the software to run numerical queries to inform the analysis process; the first round of which helped to eliminate low quantity communicative functions. The software enabled systematic and thorough analysis of a large quantity of tweets, and reliably/quickly yielded numbers for quantitative analysis. Another, more obvious motivation for using NVivo

was that computer aided content analysis reduces the costs and significant length of time it would take to complete content analysis solely “by hand” (Krippendorff, 2013, p, 208).

Figure 1 below is a screenshot from the coding project in NVivo Pro 11; it illustrates the main code/sub-code scheme employed. In this case, the individual citizen user-type was the main code; the nodes below the user-type are the communicative functions sub-codes. When an instance of any communicative function was identified, it was selected (by clicking the buttons to the left of each function or node—the coding instance was then recorded by NVivo.

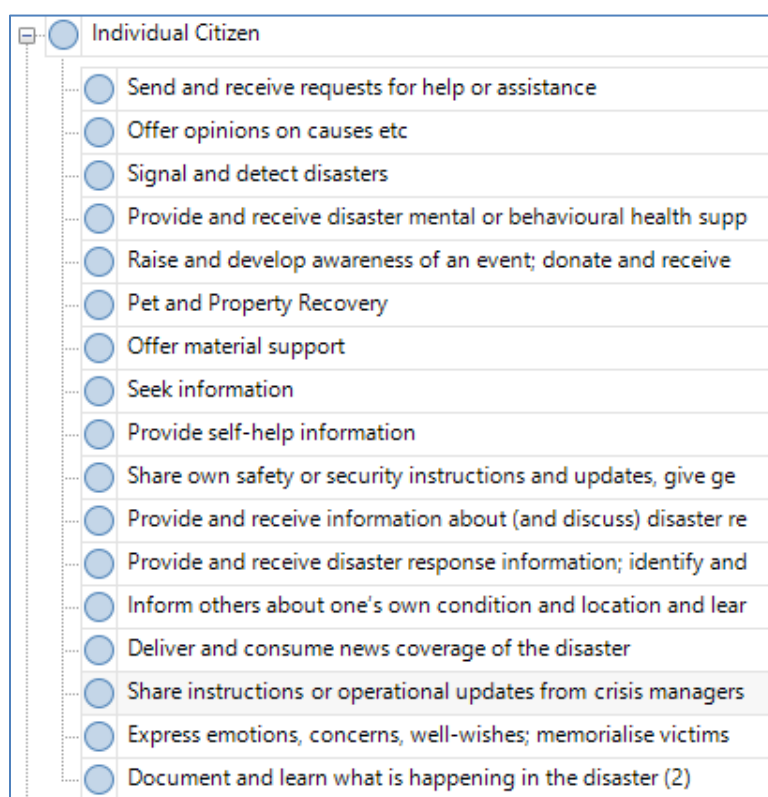


Figure 1 Screenshot of the coding scheme used to code communicative functions by user-type.

Interpretive analysis

When the coding process was completed, I drew inferences from the results and the theoretical framework for presentation in the results and analysis chapter of the thesis. Because the *user-types* had already been identified and tested in the coding process, the process of answering the research question, “what Twitter user-types were active in Calgary between June 20 and 23 of the 2013 Calgary Flood, and for what communicative functions did they use Twitter?” entailed listing the user-types and applying a quantitative filter to the communicative functions that emerged for each. The quantitative filter allowed me to keep the results to the scale of a master’s thesis: where multiple communicative functions were identified, only the top three most frequent functions per user were chosen.

Critical analysis

The use of UGT and my knowledge of Calgary culture and the 2013 flood enabled me to interpret motives behind the tweets, as well as the usefulness of Twitter—answering the research questions “according to UGT, what *motives* appear to have been behind the communicative functions of Twitter?” and “how useful was Twitter as a communication tool?” In doing so, I faced what Jacques Derrida (as cited in Macklin & Whiteford, 2012), called *aporia* (impossible puzzles and paradoxes), which is an inevitable feature of the qualitative research process. For example, determining the usefulness of Twitter felt like a necessary outcome of the research but also an impossible puzzle; as there were numerous ways that *usefulness* could be inferred. This was compounded by the fact that (to the best of my knowledge) there are no previous studies that

connect motives to communicative functions or identify the *usefulness* of disaster social media. Similarly, drawing conclusions after the analysis was completed brought more *aporia* to the fore—like whether the goal of enhancing Houston et al.’s (2014) framework was met or how.

Answering the research questions and drawing conclusions from the results therefore required me to use practical rationality to “make leaps across a knowledge void” (Macklin & Whiteford, 2012), which involves evaluating several factors and taking into consideration people’s beliefs, interests, and norms, in addition to the specific demands of a particular context to arrive at a sound practical judgement (Bernstein, 1983 as cited in Macklin & Whiteford, 2012). By exercising practical rationality, I am cognizant that my answers to the research questions represent only plausible way of understanding the subject, as practical judgement does not result in definitive answers (Macklin & Whiteford, 2012).

Chapter 5: Key Findings and Analysis

In this chapter, I discuss the main results of my content analysis of Tweets about the 2013 Calgary Flood. The analysis is framed by the *Uses and Gratifications Theory* (UGT), which positions Twitter use as deliberate and motivated by the need to fulfill specific psychological needs. It is also framed by Houston et al.'s (2014) UGT-based framework of disaster social media, which classifies the communicative functions of social media; and is contextualized by Canada's Emergency Management Framework. These findings inform a deductive analysis of the possible implications for the paradigm of crisis communication in Chapter 6. The key findings are organized by research question.

What Twitter user-types were active in Calgary between June 20 and 23 of the 2013 Calgary Flood?

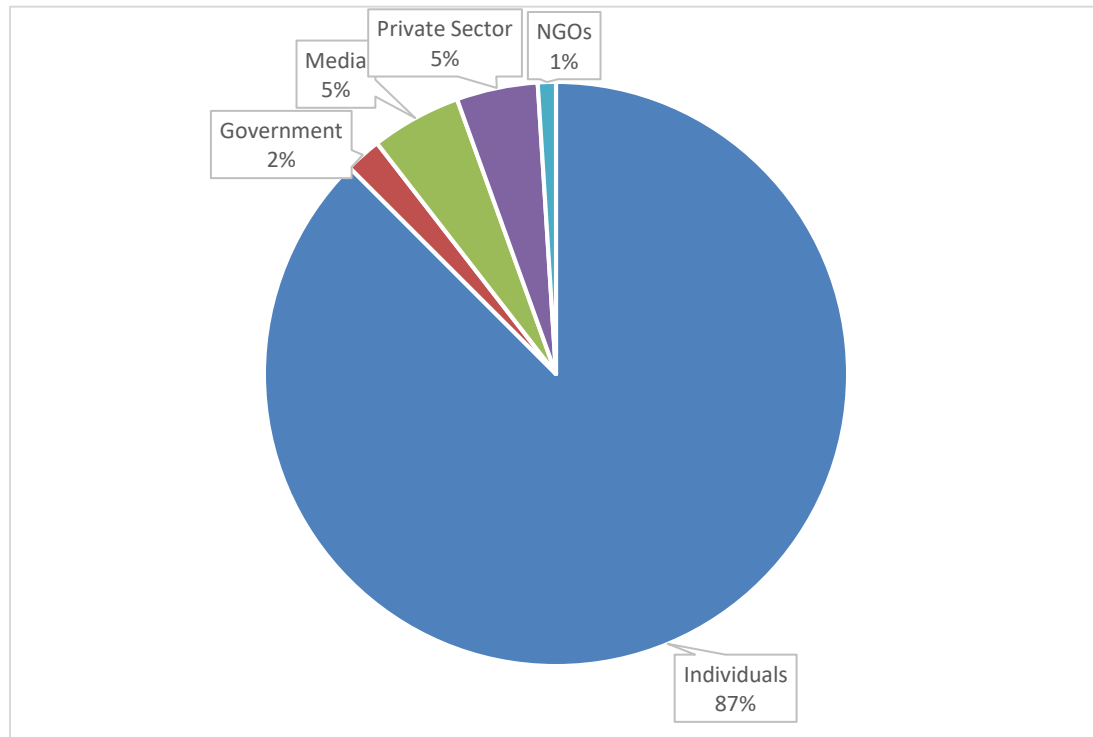
As explained in the introductory chapter of this thesis, disaster social media are web-based technologies that facilitate the two-way process of content generation and information consumption. Therefore, based on the activities of tweeting (content generation) and engagement with tweets through the *like*, *retweet* and *comment* features (information consumption), there were almost 800 Twitter users communicating about the 2013 Calgary Flood during its event phase. I classified all Twitter users according to user-type and subsumed all user-types under the main classifications of *individual* (private citizens or individuals that did not use social media on behalf of an organization) or *organizational* (structured groups of people that were either affected by the disaster, responding to it or external of it). This classification system facilitates a

micro-level analysis of each user-type, as well as my research focus on the organizational and individual use of Twitter.

My goal in answering this research question was to go beyond identifying user-types and to explain the significance of the findings, including why these types of users manifested during the flood. However, analyzing the user-types in isolation of the communicative actions they took was more challenging than I anticipated. This was because UGT is designed to explain the communicative actions that media users take, and not *users* as an object of analysis. I was not able to find a disaster communication theory that explains disaster social media users because the field has not yet developed beyond the *four-channel model*— an untested, descriptive framework seeking to characterize the primary actors in the communication process—the media, public, first responders and other response agencies; the network links, and the four dynamics of emergency communication—information flowing from agency to agency; agency to public; public to agency; and public to public (Sellnow & Seeger, 2013). I therefore chose to use Vroegop's (2014) review and the FPT-MREM's (2011) *Emergency Management Framework* to explain the role of each user-type during the flood, to help fill analytical gaps.

Five main user-types were identified in the Calgary Flood: one type of individual user and four types of organizational users; shown in figure 2, below.

Figure 2 Main Twitter users during 2013 Calgary Flood by percentage of total users



These user-types are discussed below, and Appendix A provides a detailed table of the number of users in each category and their public identity:

Individual citizens

Individual citizens accounted for 87.5% of Twitter users during the flood, which means that this was the largest user-type during the 2013 Calgary Flood. Some of the tweets made by individual citizens included “RT @AreSiewer: Just personally spoke to an officer. Inglewood is under mandatory evacuation. #yycflood” (Ellinor, June 23, 2013) and “RT @cityofcalgary: Please note #yyc water is still safe for drinking. #yycflood” (Jenn, June 21, 2013). It was not surprising that

individual citizens were the dominant Twitter users during this period of the 2013 flood because it is in keeping with an emerging and complex set of observations about how social media have changed the disaster communication landscape, discussed in the literature review chapter of this thesis.

As a user-type, individual citizens formed part of the Calgary populace whose safety and security were protected by the government as part of the government's "fundamental" (FPT-MREM, 2011, p. 9) role during the flood; they formed part of the target audience on Twitter for government communication that sought to explain and guide immediate response actions to minimize impacts and to maintain safety and security. However, individual citizens' role in the disaster management process was much more than a "target audience on Twitter for government communication," as they are considered one of the emergency management partners with the government. According to Vroegop (2014), citizens were expected to contribute to community resiliency—the idea that citizens who have been empowered by the government to manage their own situation and place themselves on the path to recovery, can reduce the demand for municipal resources and better enable the government to focus first on the most vulnerable parts of the society.

See Appendix A for some of the users classified in this *individual citizen* user category. Although the user-type may appear amorphous, it was not possible to reasonably subdivide it because unlike organizations who typically used their public description (in the 'user description' field) to explain the type of organization they were, individual citizens' public descriptions of themselves were often limited and arbitrary. For example, @linsybyster described him or herself as "writer; unschooler; lover of tiny houses; thrift shop fiend; composter; music collector; foodie;

pragmatist; runner; dreamer,” while @RrrichardZach’s self description was “Trust me, I’m a logician.”

Organizational user-types

Organizational users constituted 12.5% of total Twitter users during the flood. These users belonged to one of four organizational user-types: 1) *news media*, 2) *government*, 3) *private sector companies*, and 4) *non-profits and community organizations*:

1) Government

The government user-type is a classification of users that had a formal role in the federal, provincial or municipal government at the time of the disaster. Between June 20 and 23 of the 2013 Calgary Flood, the government’s role was response, which according to the FPT-MREM (2011), meant they acted during or immediately before the disaster to manage its consequences through public communication and other activities like search and rescue and evacuation to minimize suffering and losses.

Although the government user-type had 18% of organizational Twitter-users, its users comprised just 2% of total Twitter users. This could suggest that the government was not a dominant user; especially given that individual citizens were the largest user-type. However, the local authorities/municipal government sub-type became a dominant user by successfully establishing itself on Twitter as the crisis information authority, doubling its followers to 84,000 during the flood (Vroegop, 2014). This dominance was reflected in tweets like “watch out 4 #yycflood rumors tonight, easy to get caught up in them. Be sure info is from official sources ie @cityofcalgary @CalgaryPolice,” (Braun, June 21, 2013).

The number of Twitter users in each level of government decreased by level of flood responsibility. Eight Twitter users were affiliated with the municipal government, the City of Calgary and Calgary Police Service included. Six Twitter users were affiliated with the provincial government; these users included Alison Redford (Alberta Premier) and Fred Horne (Alberta Health Minister). Two users were affiliated with the Federal government—Stephen Harper (Prime Minister of Canada; and Member of Parliament, Calgary SW), and Jason Kenney, (Minister of Citizenship, Immigration and Multiculturalism; and Member of Parliament, Calgary SE). This decrease by responsibility level was directly related to the governance structure in place for the management of the flood because, as explained in the introductory chapter, Twitter was a communication tool to support the government's disaster management efforts. The management of the flood was also explained in the introductory chapter—the flood was directly managed by the local authorities, who worked closely with the provincial government which had oversight of the province-wide flood emergency (the 2013 Alberta Floods). The federal government had no direct disaster management involvement but provided financial support. Therefore, the provincial and federal governments would be expected to communicate less often about the flood via Twitter than the municipal government.

2) Media

This user-type applies to journalists and organizations whose primary role during the flood was to gather and deliver news. With approximately 40 users, the media was the largest organizational user-type, responsible for 45% of organizational twitter users but just 5% of total Twitter users. Users in the media category included the Calgary Journal, which was a local,

community newspaper; Global Calgary, a television news organization in Calgary; and Aisling Tomei, who was a journalist at CTV Calgary, another television news organization.

Despite its seemingly insignificant size (5% of Twitter users), it was found that the media was a very important Twitter user. Houston et al (2014) explain that the media can powerfully influence individuals' disaster knowledge, attitudes, and behaviour, and that Twitter's technological capability for audience response and participation augments the media's impact. The local authorities placed a high level of importance on fostering a good, working relationship with the media—allowing journalists into the Emergency Operations Centre (EOC) to access briefings from the local authorities and providing them with police radios to stay abreast of what the law arm of the authorities was doing. This provided the city's leadership with a strong connection to the public and facilitated situational awareness and information flows with critical stakeholders and subject matter experts (Vroegop, 2014), illustrated by tweets from the media like “standing by at the emergency operations centre - waiting to hear from @nenshi. Aide says they do have news #yycflood” (660 News, June 22, 2013).

3) Private sector companies

The *private sector* company user-type describes companies that operate for profit, like the pub *The Unicorn* and the restaurant *NOtable*. Private sector companies accounted for 22% of organizational users and 4.5% of overall users and were responsible for tweets like “RT @660News: Deer Run and Riverbend will be evacuated close to midnight #yycflood” (Pho Tien Giang, June 21, 2013) and “Please spread the word. All flood workers and emergency crew come get a hot meal. #yycflood #feedthepeople” (Anju Restaurant, June 22, 2013).

Although the number of private companies on Twitter appears small in the context of total number of users, their role in the 2013 flood was significant. They were a valuable part of the society that the local authorities were responsible for protecting, and The City of Calgary demonstrated this in activities before the disaster to augment the private sector's disaster preparedness through business education and the formalizing of business continuity plans (BCPs) and emergency response plans (Vroegop, 2014). Private sector companies (both business and industry) are also valuable partners with the government in disaster management (FPT-MREM, 2011); the local authorities worked closely with select organizations who they invited into the EOC to support the execution of the Municipal Emergency Plan (Vroegop, 2014). The private sector was also positioned as having disaster management resources to share with authorities, and these appear to have included response vehicles, field generators and heavy pumps (Vroegop, 2014).

4) Non-Governmental Organizations (NGOs) and community groups

NGOs are structured groups of people or organizations operating independently of the government, with a primary focus on social or community improvement. Organizations in this category included the Red Cross in Alberta and the Calgary Drop-In and Rehab Centre Society, who were responsible for tweets like “RT @RedCrossAB: Thank you so much @FountainTire for providing lunch to our volunteers and staff #calgarystrong #yycflood” (Red Cross in Alberta, June 23, 2013).

NGOs and community groups were not a dominant user-type during the June 20-23 period of the flood, as it only accounted for 13% of organizational users and 1% of total users. However, like all the other user-types identified, it is presented by the FPT-MREM (2011) and

Vroegop (2014) as a valuable partner in disaster management. NGOs were among the invited stakeholders to the EOC, helping the local authorities develop a broad perspective on the flood response and recovery efforts (Vroegop, 2014).

What were the communicative uses or functions of Twitter between June 20 and 23 of the 2013 Calgary Flood?

There was a total of eight communicative uses of Twitter during the flood, and Table 3 below lists them by user-type:

Table 3 Communicative functions of Twitter during the 2013 Calgary Flood by user-type

Type of Twitter user	Main communicative function(s)	Percentage of total tweets per user-type
Individual User-type		
Individual Citizens	<ul style="list-style-type: none"> • Document and learn what was happening in the disaster. • Express emotions, concerns, well-wishes; memorialise victims. • Share and receive safety instructions, clarifications, warnings or operational updates from crisis managers. 	<ul style="list-style-type: none"> • 30% • 25% • 16%
Organizational User-type		
The Municipal Government/local Authorities	<ul style="list-style-type: none"> • Share and receive safety instructions, clarifications, warnings or operational updates from crisis managers. • Implement traditional crisis communication activities. 	<ul style="list-style-type: none"> • 80% • 20%
The Provincial Government	<ul style="list-style-type: none"> • Share and receive safety instructions, clarifications, warnings or operational updates from crisis managers. 	<ul style="list-style-type: none"> • 80%

	<ul style="list-style-type: none"> • Implement traditional crisis communication activities. 	<ul style="list-style-type: none"> • 20%
The Federal Government	<ul style="list-style-type: none"> • Share and receive safety instructions, clarifications, warnings or operational updates from crisis managers. • Implement traditional crisis communication activities. 	<ul style="list-style-type: none"> • 50% • 50%
News media	<ul style="list-style-type: none"> • Deliver and consume news coverage. 	<ul style="list-style-type: none"> • 95%
Private sector companies	<ul style="list-style-type: none"> • Share and receive safety instructions, clarifications, warnings or operational updates from crisis managers. • Express emotions, concerns, well-wishes; memorialise victims. • Implement traditional crisis communication activities. 	<ul style="list-style-type: none"> • 30% • 16% • 13%
Non-Governmental Organizations (NGOs) and community organizations	<ul style="list-style-type: none"> • Provide and receive disaster response information; identify and list ways to assist in the disaster response. 	<ul style="list-style-type: none"> • 96%

Individual citizens

1) Document and learn what was happening in the disaster

Thirty percent of individual citizens used Twitter to *document and learn what was happening in the flood*, and most tweets that served this function included photographs of the disaster's progression, like Figure 3 below. The photograph showed flooding in an area of Calgary and the individual user tweeted "yeah so this used to be a golf course once. #yycflood." (Virji, June 23, 2013); signalling that a flood was taking place.

Yeah so this used to be a golf course once.
#yycflood



Figure 3. Screenshot of a tweet used to document the progress of the 2013 Calgary Flood.

The document and learn what was happening in the disaster use was a collective response to a rare and dangerous event in which citizens responded to the threat and uncertainty brought by the flood by seeking and sharing information on its progression and disaster management activities, as seen in this tweet “just saw a c-117 on approach for yyc. CAF #yycflood” (Kennedy, June 22, 2013). In his tweet, Kennedy was sharing that he spotted what he believed to be a Canadian Armed Forces (CAF) aircraft about to land at the Calgary International Airport; the aircraft would have been assumed to be transporting soldiers/resources to support the government’s disaster management activities. Conceptual considerations from Rodriguez et al., 2007; Palen, 2008; Liu et al., 2008 and Palen et al, 2009 (discussed by Houston et al., 2014) explain the *document and share communicative function* as a collective information gathering and sharing process in response to the uncertainty and threats that typically result from a disaster. In this process, users function as information brokers or hubs, gathering, organizing and sharing links to disaster-related information.

2) Express emotions, concerns, well-wishes; memorialise victims

Calgarians used Twitter to express a range of emotions, concerns and well-wishes during the flood. Almost 25% of tweets from individual citizens served this communicative function. The emotions that were expressed appeared to be mainly amazement about the magnitude of the flood, concern about fellow Calgarians in the flood's path; as well as well-wishes and gratitude for the emergency/crisis management team and the mayor.

Tweets that expressed emotion included the following:

“Wishing I had a hovercraft to go deliver @TimHortons coffee to @CalgaryPolice @Nenshi @aldojohnmar and other #yycflood heros. THANK YOU ALL!” (Henry, June 23, 2013).

A few Tweets also displayed anger and frustration with behaviours that were perceived as inconsistent with the values of good citizenship; these behaviours included disobeying Calgary Police's requests to limit unnecessary use of the water supply during the flood, disregard for safety warnings, and price gouging. Below is a Tweet that expressed frustration with a citizen that allowed his/her sprinklers to remain on during the rain induced flood:

RT @bigbadtref: “@dansgoodside: Really, Jesus? Do you really think now is the time for sprinklers?! #yycflood <http://t.co/1ixcFeLLvU>” (Devenis, June 23, 2013).

Despite the gravity of the disaster situation, tweets displaying humour were also observed such as “...go home, water. You're drunk. #yycflood.” (Brunette, June 21, 2013).

Individual citizens expressed their emotions on Twitter as a means of coping with the flood. Neubaum, Rösner, Pütten, & Krämer (2014) explain that individuals affected by disaster commonly experience extraordinary emotional states and engage in social sharing of emotions as a means of self-regulation. This behavioural tendency is based on a human need to express

internal states to others after an emotional event and has been steadily identified in a notable line of research, including different methodologies such as autobiographic or experimental studies.

3) Share and receive safety instructions, clarifications, warnings or operational updates from crisis managers

During the flood, 16% of tweets that individual users shared in their social networks were messages from the local authorities, mainly providing safety instructions, clarifying misinformation and providing answers to common questions and concerns related to the disaster. This June 23, 2013 tweet by Thomson fulfilled the function of *sharing safety instructions, clarifications, warnings or operational updates from crisis managers*: “RT @coreywilson: This really made me laugh. Love mayor @nenshi. Stay off the rivers!! #yycflood #YYC. Thomson’s tweet included a meme with the quote from Mayor Nenshi (below) at a media avail that went viral:

“I can't believe I actually have to say this, but I'm going to say it. The river is closed. You cannot boat on the river. I have a large number of nouns that I can use to describe the people I saw in a canoe on the Bow river today. I am not allowed to use any of them. I can tell you, however, that I have been told that despite the state of local emergency, I'm not allowed to invoke the Darwin law...” (Nenshi, as cited by Dhawan, June 24, 2013).

In this quote, Mayor Nenshi was making a pop culture reference, loosely structured around Darwin’s Law of Evolution to express his indignation towards citizens placing themselves in danger by boating during the flood.

In addition, this tweet from Alderman, John Mar, was retweeted thirty-two times by individual citizens; demonstrating how much citizens' tweets were informed by the local authorities' messages: "Please, please, please, stay off of the rivers, pathways and foot bridges in affected areas...#yyc #yyccc #yycflood." (Mar, June 20, 2013).

By sharing the local authorities' crisis messages in their own twitter networks, Calgarians demonstrated that they deemed the messages credible and useful and were recommending the messages to other citizens. Disaster social media and risk communication concepts developed by scholars such as Starbird et al, 2010; Starbird and Palen, 2010 and Kim, 2014 indicate that all information on Twitter does not have equal merit, and Twitter users perceive information from official crisis managers as highly credible and useful. For that reason, a lot of the information shared during a disaster originates from local media and emergency management agencies. These communication concepts also position Twitter features like retweeting, as an informal recommendation system, allowing users to share information they think is valuable.

By using Twitter to *share and receive safety instructions, clarifications, warnings or operational updates from crisis managers*, Calgary citizens acted as mediators or a social bridge between the local authorities and persons affected by the disasters; this would have enabled more persons to access the information they needed to interpret the disaster situation and to take protective actions. Because users' decision to mediate the message is essential to the successful diffusion of messages, Calgarians' mediation of the authorities' messages might have helped Twitter users who needed effective communication methods supported by peer citizens.

Despite political and other differences that may have been felt or expressed before the 2013 flood, Calgarians' use of Twitter in the June 20-23 period of the flood indicated that they were in

solidarity with the local authorities and working towards a common goal. As Whittaker, McLennan, & Handmer (2014) explain, citizens sharing and receiving information from the local authorities may be further understood as a demonstration of cohesiveness during disasters and contribution to the management of disaster-induced challenges.

Organizational users

Twitter use varied by organization type. Government organizations had a legal responsibility for disaster management, so their messages were focused on public safety and keeping citizens updated on important developments, while private organizations and the news media mainly amplified government crisis messages and discussed impacts on their businesses.

The Municipal Government

The Municipal Government, also referred to in this case study as the local authorities mainly used Twitter for two reasons:

- 1) Share safety instructions, clarifications, warnings or operational updates; and receive related questions**

Eighty percent of tweets from The Municipal Government, also referred to as the *local authorities*, was to *share safety instructions, clarifications, warnings or operational updates; and received related questions*. This is because disaster management and public safety was the key mandate for the local authorities and Twitter was a two-way communication tool to support this mandate. Twitter helped the local authorities to receive information from citizens and to share information with them that would help them remain safe during the flood and better understand the situation. For example, this tweet from the local authorities shared information that would help citizens in specific neighbourhoods know that there was impending danger and how to

respond: “Mandatory evacuations have been ordered for the following: Mission, Elbow Park, Stanley Park, Roxboro, Rideau and Discovery Ridge #yycflood” (City of Calgary, June 20, 2013).

Tweets from the local authorities that *shared safety instructions, clarifications, warnings or operational updates; and received related questions* helped Calgarians understand what to expect during the flood and to cope with the uncertainty that the flood caused. Tweets like “power has been shut off in evacuated communities for the safety of citizens and first responders. #yycflood” (Calgary Police, June 21, 2013) and “reminder: All City Recreation facilities will be closed at least until end-of-day Sunday, June 23, 2013 #yyc #yycflood” (City of Calgary, June 22, 2013), helped Calgarians to know what to expect of their publicly owned utility service and public recreation facilities during the disaster. As mentioned previously in this chapter, citizens experience disaster-induced uncertainty (Palen, 2008; Liu et al., 2008 and Palen et al, 2009) and information on what to expect and how to cope helps alleviate the uncertainty that they feel (Houston et al, 2014).

The local authorities’ Twitter use helped to improve the quality of information circulating during the flood. This Tweet from the police was in response to a rumour about the well being of animals at the Calgary Zoo, “clarifying a rumour for #yyc. There are NO zoo animals being sheltered at the Courts. #yycflood” (Calgary Police, June 21, 2013). Similarly, this tweet from the City of Calgary sought to quell rumours of poor water quality caused by flooding, “there is NO boil water advisory in place. Our water treatment plans are uncompromised and quality remains high #yycflood” (City of Calgary, June 21, 2013). As Houston et al (2014) explain, disaster reporting and curation by unknown individuals and organisations sometimes raises

concerns about the accuracy of information and rumours—inaccurate information affects citizens’ decisions during emergencies (Conrado et al, 2016). Efforts by the local authorities to correct the misinformation circulating during the 2013 flood demonstrated what Houston et al say is social media’s capacity to correct erroneous information.

Although the authorities referred to “rumours” in their previously discussed tweets, no tweets sharing rumours about zoo animals were identified from a key word search of the data set, using search terms like “boil,” “water,” “zoo,” “animals” and “courts.” This June 21 tweet from HSCA Farmers’ Market, which mentions a boil water advisory, appears to share a rumour: “RT @SnowHydro: Boil Water Order for Calgary <http://t.co/hMss1wHfTV> #yyc #waterquality #boilwater #yycfloods.” However, the hyperlink in the tweet was to a water quality page on Alberta Health Service’s website (the provincial health authority), which showed that there was no boil water advisory in place. The tweet may be considered ambiguous or misleading and had the potential to contribute to rumours about the water quality in Calgary during the flood.

As part of their use of Twitter to *share safety instructions, clarifications, warnings or operational updates; and received related questions*, the local authorities utilized the two-way communication functionality of Twitter to directly address Calgarians’ concerns. Calgarians generally asked the local authorities questions by replying to their tweets. For example, on June 22, 2013, von Spronsen replied “@cityofcalgary @CalgaryPolice Is there a map somewhere that has all of the evacuated areas outlined?” to The City of Calgary’s tweet, “Downtown Evacuation Zone extended (12 and 11 ave. from 14 st. SW to Centre Street) #yyc #yycflood @calgarypolice,” also on June 22, 2013. The Calgary Police Service answered Von Spronsen’s question on June 22, 2013: “@dougvs this is not an official map but may help answer your

question in the short term: <http://bit.ly/1c1GDtJ> #yycflood.” The two-way functionality of Twitter has contributed to an increasing level of public expectation for disaster management authorities to exhaustively monitor and respond to social media feeds, which the local authorities found to be a challenge during the flood (Vroegop, 2014). For this reason, some citizens’ comments/questions were not addressed by the local authorities. The City of Calgary tweeted, “due to flooding a closure of the two eastbound lanes on Memorial Dr between 5A St and Centre St NW is planned. #yycflood,” and RQ’s (June 20, 2013) comment on their tweet “@cityofcalgary will some eastbound traffic on memorial be redirected to the westbound lanes?” went unanswered.

2) Implement traditional crisis communication activities

The definition of *crisis communication* in this study is adapted from Houston et al.’s (2014) framework, which explains it as one-way communication designed to restore organizational normalcy, influence public perception, and regain and repair image and reputation. “One-way communication,” in this context, does not mean the absence of two-way communication between the organization and citizens, but that the communication function is solely focused on protecting or bolstering the organisation’s image—“The overall crisis communication process may involve listening to the public and talking to communities, thereby being a two-way process...but the function of crisis communication is focused almost entirely on protecting the organisation’s image” Houston et al. The local authorities’ crisis communication tweets were considered in the context of their broader crisis communication activities, since social media was part of their comprehensive approach to lead the conversation from the start,

communicate reassurance, and explain decision-making to the public (Vroegop, 2014) — activities with an end goal of bolstering the organization's image.

Twenty percent of the local authorities' tweets served to *implement traditional crisis communication activities*. This suggests that although protecting public safety was the primary goal for Twitter use, bolstering the organization's image was also an important outcome. The importance of image bolstering is further supported by the local authorities' stated goal for social media (mentioned in the previous paragraph), to lead the conversation, communicate reassurance and explain decision-making to the public (Vroegop, 2014).

The local authorities used Twitter to "lead the conversation," which helped ensure that their narrative about the 2013 flood and their role in the management of it was dominant. This tweet from the mayor, which was retweeted fifty-eight times, may have been a part of the strategy to lead the conversations on Twitter, or at least orient citizens to the City as the official crisis information source: "The City of Calgary newsroom is also a good source for the latest releases about #yycflood" (Nenshi, June 20, 2013). Based on Calgarians' expectations around the local authorities' ethical responsibility to protect citizens, the municipal government needed to demonstrate that it was adequately responding to the disaster. Counter-narratives could emerge from any stakeholder group so the idea of leading the conversation is an important part of managing The City's reputation.

The local authorities used Twitter to reassure citizens that they were adequately managing the disaster situation, which was an important part of bolstering the organization's image. This Tweet by The City of Calgary, may have served the purpose of reassuring citizens that despite a technical website failure, the City was still in control of the situation and able to

deliver flood related news: “Due to high traffic volumes Calgary.ca is experiencing technical difficulties. For flood related news visit...” (City of Calgary, June 21). This previously discussed Tweet about the quality of the water supply could also be interpreted as reassuring citizens: “there is NO boil water advisory in place. Our water treatment plans are uncompromised and quality remains high #yycflood (City of Calgary, June 21, 2013). Similarly, this June 20, 2013 tweet from the City below, serves a dual purpose of updating/reassuring citizens and creating the image of a coordinated, disaster management effort: “Raw - media scrum with Calgary Police, Water Services & Roads - Calgary Flood from 8 p.m. #yycflood.” As previously explained in this chapter, uncertainty and threat are great during disasters, which produces a high demand for information (Houston et al, 2014). The local authorities were successful at conveying a valuable level of reassurance and demonstrating that they were in control of the crisis (Vroegop, 2014). According to Vroegop, the local authorities were successful in leading Twitter conversations. The fact that 16% of tweets that individual users shared in their social networks were messages from the local authorities shows that the authorities had some influence in the content of messages shared by other users.

Tweets explaining decision making appear to have been based on the local authorities’ desire to maintain public support. In this tweet that was originally made by the local authorities, the local authorities were explaining to the public, why only some requests for help from the municipal police service would be actioned: “RT @CalgaryPolice: Due to state of emergency with #yycfloods, we are only responding to priority calls in #yyc right now” (Sims/Beaven, June 20, 2019). Vroegop (2014) confirms that the local authorities’ communication was designed to provide a rationale and context for some of the operational decisions that were being made

during the flood, and the tweet may have been one of several that social media specialists working for the local authorities authored to provide this “rationale and context.” Vroegop also explains that social media has become an important crisis response tool that can make a significant contribution to maintaining public support. It is likely that if the public loses support or confidence in the government’s ability to adequately manage the flood, the government’s image would be directly impacted.

The use of Twitter to implement crisis communication activities appears to have positively influenced public perception of the local authorities. Multiple sentiments were expressed by citizens that signified public approval of the local authorities’ disaster management. “RT @dinnerwithjulie: I said it before but it's worth repeating: Best. Mayor. Ever. @nenshi #yycflood” (Huang, June 21, 2013) and “@nenshi you're doing great. #proud of your hard work #yycflood drink some black tea. Strongest caffeine out there! (Harvey, June 21, 2013) are two tweets that reinforced the local authorities’ narrative about themselves.

The Provincial Governments

The provincial government made fewer tweets about the 2013 Calgary Flood than the municipal government, which signifies a difference in disaster management scope between the two. As discussed in the introductory chapter, the 2013 Calgary Flood was a part of a wide scale disaster, known as the 2013 Alberta Floods and the communities directly impacted were part of a 55,000 square kilometer region in Southern Alberta. The municipalities in Alberta had primary responsibility for disaster management and the provincial government decidedly allowed municipalities to manage communication with their constituents. Because of the provincial government’s disaster management scope, their Twitter content appeared to be focused on the

wider scale disaster and the hashtag #ABFLOOD (Alberta Flood) was mainly used, except when communication was specific to citizens in the municipalities. Therefore, use of the Calgary flood specific hashtag, #YYCFLOOD was limited, which would support the finding that only a few tweets from the province used the Calgary specific hashtag, #YYCFlood.

Tweets from the provincial government level mirrored the municipal government's Twitter use—Twitter was used for the same two communicative functions, to *share and receive safety instructions, clarifications, warnings or operational updates from crisis managers*, and to *implement crisis communication activities*.

1) Share and receive safety instructions, clarifications, warnings or operational updates from crisis managers

Eighty percent of tweets from the provincial government were to *share and receive safety instructions, clarifications, warnings or operational updates from crisis managers*, who were the local authorities. Tweets that served this purpose included, “RT @cityofcalgary: Mandatory evacuation areas extended [http...#yycflood](#)” (Staff for the Office of the Premier of Alberta, June 20, 2013). The dominance of public safety tweets over other types of tweets from the provincial government signified that the organization was focused on using the social media platform to protect Albertans; the Province's focus on public safety in its communications is also confirmed by MNP LLP (2015). Because the provincial government allowed municipalities to manage communication in their municipalities, it made sense that safety instructions, warnings and updates shared by the provincial government were informed by the municipality.

2) Implement traditional crisis communication activities

Twenty percent of the provincial government's tweets appeared to be focused on casting the government in a positive light and may be classified as part of *traditional crisis communication* activities. This tweet from the Premier of Alberta appears to have been designed to influence public perception by demonstrating that the province was fulfilling its legal and ethical disaster management roles, ascribed by the emergency management framework and acts previously discussed in this chapter and the introductory chapter: "We are taking action today to help more than 100,000 Albertans displaced by #abflood #yycflood (Redford, June 24, 2013). Twenty-percent of tweets dedicated to achieving crisis communication activities indicates that public safety was the major priority for the provincial government. Nevertheless, a bolstered public image through crisis communication was still an important outcome for the organization. This is supported by MNP LLP's (2015) finding that:

The AEMA (Alberta Emergency Management Agency) officials...were divided as to the quality of the crisis communications during the flood, which was handled by members of the PAB (Public Affairs Bureau)...some officials argued the crisis communications aspect of the response was strong, particularly the development of key messages, others insisted that the PAB requires further training in crisis communications capabilities moving forward (p.67)

The Federal Government

Tweets from the federal government were found to *provide an operational update from the crisis managers*, as well as *to implement traditional crisis communication activities*.

- 1) **Share and receive safety instructions, clarifications, warnings or operational updates from crisis managers**

Fifty percent of tweets from the federal government were to *share and receive safety instructions, clarifications, warnings or operational updates from crisis managers*. Jason Kenney, who was then Minister of Citizenship, Immigration and Multiculturalism, retweeted the City of Calgary's update that its website had crashed and the alternate website for flood news: "RT @cityofcalgary: Due to high traffic volumes Calgary.ca is experiencing technical difficulties. For flood related news visit [http...](http://)" (Kenney, June 21, 2013). This suggests that although the federal government did not have direct disaster management responsibility (as explained previously in this chapter), it valued its public safety role under the emergency management framework of Canada and was using its Twitter channel to support the local authorities' efforts to keep its citizens safe.

2) Implement traditional crisis communication activities

The other fifty percent of tweets from the federal government were used to *implement traditional crisis communication activities*. In this tweet from the prime minister's account, "briefing with @Premier_Redford and @nenshi #abflood #yycflood" (Harper, June 21, 2013), the prime minister notifies his Twitter followers that he has arrived in the disaster zone and is being briefed by the premier of Alberta (the provincial government) and the mayor of Calgary (the municipal government/local authorities). The tweet appears to have served the main purpose of creating an image of competent leadership and tri-lateral cooperation. Given that the two federal representatives using Twitter were also members of parliament representing Calgary ridings (see table 5 in Appendix A for details), maintaining a good public image in Calgary would have been especially important—as this tweet from a Calgarian about the prime minister's

visit suggests: “PM is home. Proud of these leaders @pmharper: Briefing with @Premier_Redford and @nenshi #abflood #yycflood.” (Felinish, June 21, 2013).

News Media

Ninety-five percent of tweets made by the news media (hereafter called ‘the media’) were to *deliver and consume news coverage*. This would suggest that the news media used Twitter as a tool to support its core (news delivery) function. Because of Twitter’s 140-character limit, detailed news could not be shared on the platform. Instead, news organizations and journalists either tweeted salient points within the character limits, as seen in this tweet by Feist (2013): “@nenshi says high parts of Discovery Ridge may have evacuation order lifted, but residents can’t return yet. #yycflood;” or tweeted news headlines, quotes or photographs with web links to more detailed coverage on external websites: “@PMHarper visits a submerged Calgary <http://huff.to/184LPzu> #ABflood #yycflood” (HuffPostCanada, June 22, 2013). Houston et al. (2014) explains that the *deliver and consume news coverage* is like the *document and learn what is happening* function, in that both are focused on recording and learning about the flood’s progression. However, the news delivery and consumption function is specifically focused on coverage from a news or journalism perspective.

One of the main foci of tweets from the media between June 20 and 23, 2013 was giving Calgarians the information they needed to keep themselves safe and to be aware of how the crisis was being managed. This tweet would have played an important role in alerting citizens in some communities that it was time to evacuate: “BREAKING: Bowness, Sunnyside added to mandatory evacuation list ...#YYC #abflood” (Global Calgary, June 20, 2013). This tweet seems

to have provided citizens with an important update on the evacuation process: “@nenshi says 3 more communities GOING HOME LATER TONIGHT-Live Details @GlobalCalgary 6:00 #yycflood” (Bobrovitz, June 22, 2013). Similarly, this tweet that the “City says there is no concern over drinking water quality at this time; Water supply remains unchanged. #yycflood” (660NEWS, June 21, 2013), demonstrates the media’s focus on public safety.

As seen in the previously mentioned tweet about water quality, public safety and disaster management tweets from the news media were informed by the local authorities, mainly through briefings at the Emergency Operations Centre. Given the local authorities’ ethical responsibility to protect its citizens, it follows that they would be a key source of public safety news. This phenomenon during the flood, mirrors Houston et al.’s (2014) observation that disaster warnings usually originate from official government sources. Building on Rodriguez et al.’s (2007) principles, Houston et al explains that the media’s coverage of disasters impacts or shapes citizens’ perception and response. They also posit that social media has been shown to prime citizens to official sources of information and help safety messages from these sources reach a broader audience. This implies that the media has a uniquely powerful role in protecting citizens during disasters, not only enabling safety messages to reach further but also helping citizens ascribe high importance to messages from the local authorities and understand how to respond. A senior first-responder during the 2013 Calgary flood, stated that the media was as important in emergency operations “as police, fire, and EMS [Emergency Medical Services]” (Vroegop, 2014, p. 31), which supports the idea that the media played a key role.

The news media played an important role in regulating the quality of information that was shared on Twitter during the disaster. As demonstrated in the media’s tweets that were

informed by the authorities (discussed in the previous paragraph), the media's Twitter use played an important part in amplifying the local authorities' public safety messages and citizens' perspectives. Notwithstanding, the media was more than a conduit for messages from the local authorities and individual citizens; the media helped ensure that the information the public received was accurate, balanced and fair. When journalists used tweets to inform news coverage, they were bound by the Canadian Association of Journalists' ethical guidelines to rigorously apply ethical considerations including independent confirmation and transparency.

Journalists often reported on the flood's progression from a first-hand perspective, as demonstrated in this June 21, 2013 tweet from Feist, "water levels on the Bow are so high as we cross the Calf Robe Bridge on... #yycflood #yyc." However, individual citizens were a key source of first-hand information on the flood's impact and progress. As discussed under the *document and learn* communicative function in this section, citizens frequently used photographs to document and learn what was happening in the flood. Citizens' photos of their flooded environment were sometimes retweeted by the media, included in news stories or stored in photo galleries on news websites. In this tweet, a reporter marvels about the impact of the flood, documented in citizens' photographs: "Awestruck by photos being e-mailed in from Calgarians. Here's a link to the gallery: [http...#yycflood](http://...#yycflood)" (Zickefoose, June 21, 2013).

Private Sector Companies

During the 2013 flood, private sector companies used Twitter for three main purposes:

- 1) To share and receive safety instructions, clarifications, warnings or operational updates from crisis managers**

Thirty percent of private sector companies used Twitter to *share and receive safety instructions, clarifications, warnings or operational updates from crisis managers*. Their sharing of information from the local authorities was mainly done as retweets or original tweets in which they cited the local authorities as the source of the information shared; as seen in this tweet, “Unreal. Hopefully we're back soon! RT...Nenshi “Businesses may not be able to return to the core until mid next-week” #yycflood (BlueCircle Insurance, June 22, 2013). This suggests that public safety was very important to the private sector and that information from the local authorities was highly regarded.

Tweets made by some private sector companies during the flood demonstrated that they were logistics and communication partners with the local authorities in their disaster management mandate. Vroegop's (2014) report shows that the local authorities (through CEMA), worked closely with private companies, Atco Gas, Telus and Enmax (a private corporation whose sole shareholder is The City of Calgary) in the Emergency Operations Centre; sharing operational and safety information that would also be disseminated through their communication channels—Twitter included. This June 21, 2013 tweet from Enmax, “RT @ENMAX: CEMA has directed certain outages in the downtown core. CEMA will advise @ENMAX when it is safe to restore power. #yycflood,” demonstrates official collaboration with the local authorities. Figure 3 below, which was adapted from Vroegop's (2014) report, illustrates the governance structure in the EOC when the Municipal Emergency Plan (MEP) was activated; it shows that private sector companies were given direct oversight by the Director of CEMA:

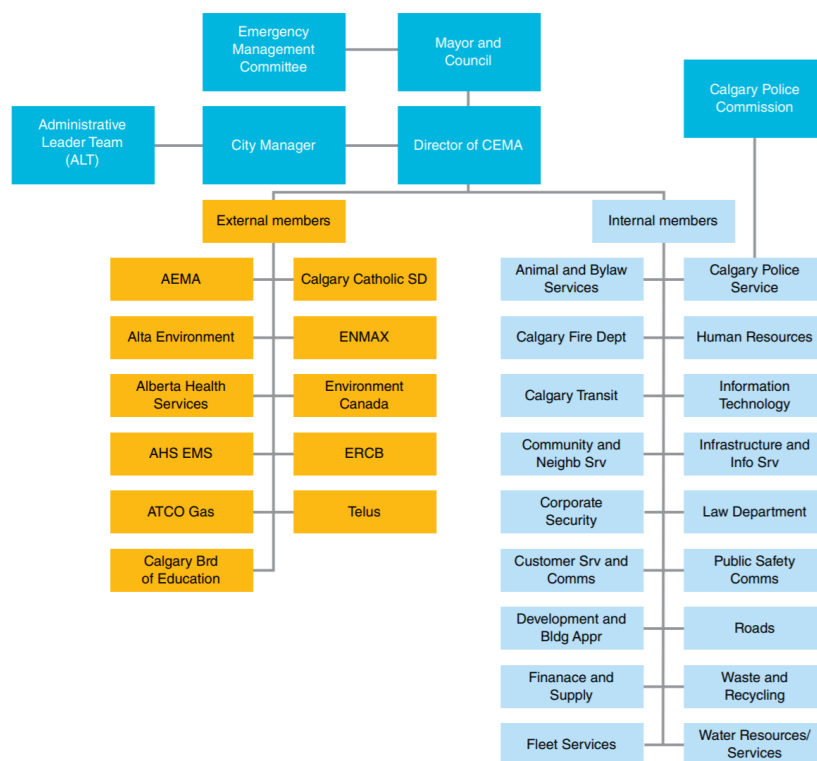


Figure 4 Governance Structure During Activated MEP

Private companies that were not included in the governance structure, illustrated in Figure 3, collaborated unofficially with the authorities by amplifying the government's Twitter messages and by extension, contributing to the maintenance of public safety. In this retweet of the City of Calgary's operational update, a local pub lets its followers know that a popular thoroughfare was flooded and that the area should be avoided: "RT @cityofcalgary: Due to flooding a closure of the two eastbound lanes on Memorial Dr between 5A St and Centre St NW is planned. #yycflood (The Unicorn, June 20, 2013). Similarly, a local restaurant retweeted the Alberta Health Service's assurance that the water supply was not contaminated during the flood: "RT @sassystuff: RT @AHS_media: City of Calgary NOT under boil water order. #yyc

#abflood” (NoTable, June 21, 2013). The Emergency Management Framework for Canada, which outlines the responsibilities and expectations of disaster management in Canada and influences policies, legislation and activities at all levels, is a useful frame of analysis for this Twitter use by private companies. In addition to positioning disaster management as a responsibility shared by governments and their partners, the framework also states that “the private sector (both business and industry) ...” (Ministers Responsible for Emergency Management, 2011, p. 6) may be partners in disaster management, and that good partnership is based on effective collaboration, coordination and communication.

2) To express emotions, concerns and well-wishes

Sixteen percent of private companies used Twitter to *express emotions, concerns and well-wishes*. Like individual citizens, private sector companies also used Twitter to express how they felt about the local authorities’ management of the disaster: “This REALLY needs to be said to the first responders. #yycflood #yycfloodhero Photo by Mark Kamachi in Bragg Creek” (Run Digital, June 23). Private organizations’ Twitter use for emotional expression could be understood from the perspective of the individual because organizational accounts are staffed by individual citizens and emotions are an expression of humanity. Therefore, we use a frame of analysis like the one we did previously in the chapter for individual citizens. This frame positions emotional expression as a common function of disaster social media channels like Twitter and draws on Houston et al.’s (2014) theory that disaster social media may be used to express emotions about the crisis and concern about persons impacted. It also draws on Neubaum et al.’s

(2014) idea that emotional expression is born from an innate need for social sharing, which enables individuals to regulate the extraordinary emotional states they experience in a disaster.

3) Implement traditional crisis communication activities

Thirteen percent of private companies used Twitter in the event phase of the flood to *implement traditional crisis communication activities*. The individuals staffing organizational accounts were using Twitter on behalf of an organization, so the emotions they expressed, reflected the official position or sentiment of the organization; these expressions were carefully managed as part of the organization's public image. The use of "we" in this June 21, 2013 tweet by Copper Brooks signifies that the sentiment expressed is the organization's, not just the individual tweeter's: "#yycflood Let us know if we can be of any assistance.....tools, storage, manpower. We're tired and wet but will do what we can to help." The tweet also suggests that the organization is impacted by the disaster, but its employees are more concerned about others affected than themselves and willing to help in the recovery effort.

Houston et al.'s (2014) framework and the crisis communication response strategies discussed in the literature review are helpful in understanding the crisis communication aspect of Twitter use by private sector companies. As mentioned in the "Individual citizens" section of this chapter, Houston et al. position disaster social media uses like "restore organizational normalcy, influence public perception, and regain and repair image and reputation" as crisis communication activities. The types of responses that organizations give are usually influenced by traditional crisis communication strategies by theorists like Coombs (2014). In cases of natural disasters where organizations are also victims, Coombs recommends a *bolstering posture* to strengthen the organization's reputation. A bolstering posture may include strategies of *ingratiation* (praising

stakeholders), as seen in this tweet “#FreeGroceries today 4-5 in #theatrium for 1st responders, police, fire, ems & military #yycflood #abflood #wearecalgary #thankyou” (PowerStart Group, June 23, 2013) and victimizing (telling the public that the organization is also a victim of the crisis) as seen in this tweet that was also discussed above: “#yycflood Let us know if we can be of any assistance.....tools, storage, manpower. We're tired and wet but will do what we can to help” (Copper Brooks, June 21, 2013).

Non-government organizations (NGOs) and community organizations

Ninety-six percent of the tweets from NGOs and social welfare organizations were used *to provide and receive disaster response information; identify and list ways to assist in the disaster response*. This tweet from the Red Cross in Alberta on June 21, 2013, is a good example of an NGO showing how they were responding to the flood: “@CalgaryPolice we have set up a family reunification line. If people are looking for their family please call 1-866-696-6484 #yycfloods.” The tweet demonstrates that through its Alberta chapter, the Canadian Red Cross was responding to a common yet traumatizing disaster impact—the physical separation of family members—by helping immediate family members re-establish contact. Houston et al (2014) frame this communicative function as meeting citizens’ need to know what is happening with disaster response and how they can help.

Similarly, the Calgary and Area chapter of United Way Canada was helping affected citizens identify and access human services, as seen in this tweet: “RT @UnitedWayCanada: Affected by the #yycflood, and looking for information on where to turn for human services? Visit...or, dial 2-1-1” (United Way Centraide Canada, June 21, 2013). Because disasters are rare events, citizens are not usually aware of the range of human service supports they can access

when a disaster strikes. As part of a broader response, the United Way's collation and sharing of human support services information helped to meet the disaster-driven need for this type of information.

Within the framework of emergency management in Canada, NGOs are also positioned as partners with the governments in providing disaster relief and related supports. The idea of disaster management being a partnership was exemplified by the local authorities tweeting about disaster response supports provided by NGOs; for example, "Concerned about family members that have been evacuated? Please contact the @RedCrossAB at 403-541-6100. #yycflood #yyc" (Calgary Police, June 21, 2013).

Although we might expect that given their core function, NGOs would use Twitter to list ways that other organizations and individual citizens could support NGO's work, this was not observed in the data. However, NGOs' Twitter accounts were tagged in several citizens and private organizations' tweets encouraging people to support NGOs relief efforts, like "RT @telus: Looking to help #abflood? Text REDCROSS (or ROUGE) to 30333 to donate \$5 in support of @RedCrossAB #yyc #yycflood" (Telus Support, June 21, 2013). The unexpected absence of these types of tweets from NGOs may also be explained by the idea that interest in volunteering and other forms of assistance from the public usually piques after the danger has passed and the period of study was the event phase of the disaster (when the danger was high).

This communicative function (provide and receive disaster response information; identify and list ways to assist in the disaster response) was identified by Houston et al (2014) and is positioned as strongly occurring in the post-disaster phase but still possible in the event phase. Houston et al (2014) suggest that an awareness of the disaster's level of impact and destruction is

helpful in motivating individuals to support relief efforts, as a full assessment of impact cannot be reasonably done until the disaster has ended.

According to UGT, what “motives” appear to have been behind the communicative use of Twitter?

To holistically understand Twitter use between June 20 and 23 of the 2013 Calgary Flood, I explore the possible *motives* behind the various Twitter uses that were identified in the previous section. As explained in the discussion of UGT theory chapter, *motives* are the psycho-social needs that people experience and use media to fulfill or gratify. *Motives* are beyond the scope of Houston et al.’s framework, so I draw on the *information motives* identified by van Leuven (2009) and the *emotional motives* identified by Nebaum et al (2014).

Table 4 connects the communicative functions of Twitter for each user-type to van Leuven (2009) and Nebaum et al’s (2014) motives. I also theorize an additional *information motive* to fill the gap in motives for crisis communication activities.

Table 4 Possible motives behind the communicative functions of Twitter for each user-type

Type of Twitter user	Main communicative function(s)	Type of Motive
Individual		
Individual Citizens	Document and learn what was happening in the disaster.	Information: Situational awareness ¹
	Express emotions, concerns, well-wishes; memorialise victims.	Emotion: Share emotions ²
	Share and receive safety instructions, clarifications, warnings or operational updates from crisis managers.	Information: Expert knowledge ¹
Organizational		
The Municipal Government/local Authorities	Share safety instructions, clarifications, warnings or operational updates; and receive related questions.	Information: Situational awareness ¹
	Implement traditional crisis communication activities	Information: Advance or repair organizational image ³
The Provincial Government	Share and receive safety instructions, clarifications, warnings or operational updates from crisis managers.	Information: Situational awareness ¹
The Federal Government	Share and receive safety instructions, clarifications, warnings or operational updates from crisis managers.	Information: Situational awareness ¹
News media	Deliver and consume news.	Information: News/emerging information ¹
Private sector companies	Share and receive safety instructions, clarifications, warnings or operational updates from crisis managers.	Information: Expert knowledge ¹
	Express emotions, concerns, well-wishes; memorialise victims.	Emotion: Share emotions ²
	Implement traditional crisis communication activities	Information: Advance or repair organizational image ³
NGOs and community groups	Provide and receive disaster response information; identify and list ways to assist in the disaster response.	Information: Situational awareness ¹

Note 1 Motives identified by Nebaum et al (2014)

Note 2 Motives identified by van Leuven (2009)

Note 3 Motive identified in this study

Information motives

The need for information was paramount in the June 20-23 period of the 2013 Calgary Flood. This was exemplified by the many questions that citizens commented on the local authorities' tweets; such as "@cityofcalgary is the entire community of Montgomery being evacuated or just Low-lying areas? Thanks." (Ravlich, June 20, 2013); and "@cityofcalgary I understand the Bow has flooded now. What is its status? Are there evacs there?" (Shriners Gait Lab, June 20, 2013).

Based on the communicative uses or functions of Twitter outlined in Table 4, there were five types of information needs that motivated Twitter use.

1) Situational awareness

Individual citizens were motivated by a felt need for *situational awareness*; situational awareness being an understanding of what was happening in the flood, and an understanding of the current and future meanings of these occurrences. Thirty percent of the tweets that individual citizens shared were to *document and learn what was happening* which satisfies van Leuven's (2009) criteria for the type of information that satisfies an individual's wish to know what exactly has happened and what might still happen. By tweeting photographs or other information for the sake of documenting what was happening, citizens would have helped other users, including governments, to better understand what was happening across the City. This meant that citizens learnt more about the disaster from others' experiences and used that information to

deduce what it meant for them in that moment and project how they would be affected in the future.

Twitter use by the local authorities was also motivated by the need to develop situational awareness. Eighty percent of the local authorities' tweets were to *share safety instructions, clarifications, warnings or operational updates; and receive related questions*. The process of *receiving related questions* would have helped them to better understand what was happening from citizens who were experiencing the disaster first-hand. Gathering situational awareness is a critical part of disaster management but Vroegop (2014) explains that using social media feeds to pull information instead of pushing it out for public consumption became a challenge for the local authorities during the 2013 flood.

The provincial and federal governments also appear to have been motivated by a need for situational awareness. The provincial and federal governments' situational awareness would have been augmented by their use of Twitter to *share and receive safety instructions, clarifications, warnings or operational updates from the crisis managers*. The province's communications to municipalities during the floods was highly dependent on the ability to develop situational awareness (MNP LLP, 2015) and given that all three levels of government were partners in the management of the flood, the local authorities would have also been a source of situational information for the federal government.

2) Expert knowledge and advice

Tweets from individual citizens and private sector companies were also motivated by a need for *expert knowledge and advice*—information from the government about how citizens can protect themselves. Sixteen percent of citizens used Twitter to *share and receive safety*

instructions, clarifications, warnings or operational updates from the local authorities—experts in disaster management, tasked with protecting public safety; while thirty percent of private companies shared the same types of messages from the local authorities. According to van Leuven (2009), knowledge and advice from experts regarding risks and mitigating actions are important during disasters. Although Calgarians would have had some understanding of what was taking place in the 2013 disaster, due to their proximity to the disaster, they needed the disaster management experts to guide their response to the events unfolding.

4) News/Emerging Information

The news media was predominantly motivated to use Twitter to access *news and emerging information*, which is based on the need to see photographs of damage and receive eyewitness accounts (van Leuven, 2009). Ninety-five percent of the news media's tweets in the June 20-23 period of the flood were to *deliver and consume news*, and as discussed in the *communicative uses* section of this chapter, the news was informed by citizens' photographs and accounts. News and emerging information is particularly important, because it can alert emergency responders and other individuals to emergency impacts that develop and expand over time (van Leuven, 2009).

5) Protect the organization's image and reputation

Twitter use by the three levels of government during the 2013 Calgary Flood was also motivated by the need to *protect the organization's image and reputation*. This is based on the fact that twenty percent of tweets from the local authorities and provincial government served to *implement traditional crisis communication activities*; while 50% of the federal government's tweets served the same function. No motive for the organizational use of disaster social media

was found in UGT to explain the motive behind the local authorities and private sector's use of Twitter during the 2013 Calgary Flood. Therefore, I deduce the motive of protecting the organization's image/reputation from dominant definitions of *crisis communication*: As a sub-specialty of the public relations profession that is designed to protect and defend an individual, company, or organization facing a public challenge to its reputation, crisis communication seeks to protect the reputation of the organization and maintain its public image during a crisis.

We classify this motive as information based, because the goal of crisis communication is achieved through the collection and dissemination of information. This is further supported by Coombs et al's (2019) explanation of crisis communication as the collection, processing, and dissemination of information required to address a crisis. Because meaning can be socially constructed, organizations ascribe great importance to the skillful application of crisis communication best practices to influence stakeholders' perception of the organization.

Emotion-based motives

Based on the communicative uses or functions of Twitter outlined in Table 4, there was one type of information need that motivated Twitter use between June 20 and 23 of the 2013 Calgary Flood.

1) Social sharing

Individual citizens and private sector companies were motivated to use Twitter to meet the need for *social sharing*—the need to express their emotions. Twenty-five percent of citizens tweeted during the 2013 Calgary Flood to *express emotions, concerns and well-wishes*, while sixteen percent of private sector companies tweeted for the same reason. Tweeting emotional

expressions constitutes *social sharing* and has been observed as a response to negative emotional experiences like disasters. It is stimulated by the need to regulate the exceptional emotions that people impacted by disasters experience (Nebaum et al, 2014). The emotions expressed by both user-types ranged from gratitude for first responders, anger about price gouging and concern about citizens in the flood's path.

How useful was Twitter as a communication tool?

The value of Twitter as a communication tool between June 20 and 23 of the 2013 Calgary Flood is based on the communicative affordances of the platform— “the possibilities for action that emerge from [...] given technological forms” (Hutchby, 2001), or the implications of individuals and organizations' interaction with the platform. Social media technologies expand the possibilities to address a range of social issues (Banikalef, Al Bataineh & Atoum, 2018). Three main affordances of Twitter were identified.

1) Public Safety Affordances

Twitter's functionality facilitates a fast and consistent stream of information, which Calgarians utilized to help keep themselves and other community members safe. The data shows that the local authorities or municipal government, who were the official crisis managers, mainly used Twitter to *share and receive safety instructions, clarifications, warnings or operational updates from crisis managers*, and that these messages were retweeted within individual citizens' networks and the networks of the provincial government, federal government and private sector

companies. The information that the news media shared in their tweets that served to *deliver and consume news coverage* was also largely informed by sources in the municipal government.

As a two-way communication tool, Twitter facilitates a conversation between message sender and recipient. The use of this feature by private citizens and the local authorities enhanced the usability of the safety messages the authorities disseminated. As discussed under the ‘Municipal Government’ sub-section of the *communicative uses* section of this chapter, there were several instances of citizens seeking to clarify information relating to the safety messages the local authorities sent. Some of these messages were answered by the local authorities and due to the overwhelming number of questions and resource limitation, others went unanswered.

Because Twitter users can freely share information, there is the potential for rumours and misinformation to be (maliciously or unintentionally) shared, which can negatively impact public safety. The local authorities’ messages helped to improve the quality of information available to Calgarians. By exposing rumours that were being shared on Twitter for what they were (like the rumours about zoo animals and water quality discussed previously in this chapter) and providing the truth, the authorities would have helped to correct misinformation and improve public safety.

2) Emotional Regulation Affordances

Twitter facilitates the sharing of user-generated content, which users may dedicate to *social sharing* during disasters. Calgarians used Twitter to share how they were feeling about several aspects of the flood—from the authorities’ management of the flood to the devastation that was taking place. It was a significant use of Twitter for private sector companies and individual citizens, as twenty-five percent of citizens’ tweets and sixteen percent of private companies’ tweets were dedicated to *expressing emotions, concerns and well-wishes*.

Emotions appeared to be high during the *event* phase of the flood (June 20-23, 2013), which was not unexpected as the disaster was still unfolding so what to expect was not always clear and neither were the full impacts. As previously discussed in this chapter, disasters evoke strong (usually negative) emotions in people impacted and engaging in *social sharing* or emotional expressions is theorized to provide psychological relief from the emotions being experienced. Therefore, Calgarians' Twitter use helped them to regulate the extreme emotional states they were experiencing because of the threats and uncertainties of the 2013 Calgary Flood.

3) Recording/Documenting Affordances

Twitter, like many other social media platforms, is a potentially useful medium for individuals and organisations to document the impact of a disaster (Houston et al, 2014). Recording information about the flood's impact was a dominant Twitter use for private citizens, with thirty-percent of their tweets being used to *document and learn what was happening in the disaster*. As previously discussed in this chapter, documenting the progression and impacts of the 2013 Calgary flood on Twitter, helped Calgarians to be aware of/make sense of what was happening. Calgarians' use of Twitter's hashtag function, made it especially easy to retrieve tweets about the flood, because they used the hashtag #YYCFLOOD in all tweets (in the data set); the hashtag function indexes keywords or topics on Twitter—allowing users to easily follow topics they are interested in.

Chapter 6: Conclusion

Key Findings

The goal of this case study of Twitter use in the 2013 Calgary Flood was to identify the communicative functions and value of Twitter in the June 20-23 period of the disaster. To avoid the *managerial bias* often present in disaster communication, I prioritized the perspectives of multiple types of users—not just the perspective of the municipal government who managed the disaster. Based on a directed content analysis of tweets made by individuals and organizations in Calgary about the flood, it was found that Twitter was actively used by several types of users and that psychological dispositions were the main motivating factors for Twitter use, influencing how each type of user interacted with the platform.

What Twitter user-types were active in Calgary between June 20 and 23 of the 2013

Calgary Flood, and for what communicative functions did they use Twitter?

The *municipal, provincial and federal governments* actively used Twitter—mainly to issue information to protect citizens, clarify concerns or rumours and manage their public image.

Twitter was also actively used by *individual citizens* to document and learn what was happening in the flood; to amplify the public safety information shared by the municipal government; and to express how they were feeling as the disaster unfolded. Twitter use by *private sector companies*, another active user-type, bore some resemblance to Twitter use by individual citizens; like citizens, private companies used Twitter to share public safety information from the municipal government and express emotions. They were also found to use Twitter as a way of bolstering their public image. Twitter was also used by the *news media* to support their core function of

news gathering and dissemination, much of their news being informed by the local authorities.

NGOs actively used Twitter to share disaster response information.

These findings demonstrate that a wide cross-section of the Calgary population was impacted by the 2013 Calgary Flood—directly or indirectly, and that Twitter was a widely used tool for various personal and organizational functions related to the flood. The types of tweets that each Twitter user-type sent were generally distinct, which justifies our approach of studying Twitter use from multiple user-perspectives. It directly challenges the *managerial bias* in disaster communication, where only the perspectives of the organization managing the crisis are included. If a managerial approach had been taken in this study, valuable perspectives would have been lost.

The findings also indicate that Calgarians had access to a high quality of information on Twitter, which was essential for good decision-making during the flood, as inaccurate information negatively affects citizens' decision-making during emergencies.

The findings also address the mistrust that emergency managers and communicators have expressed in the literature about 'unofficial' disaster social media users and their potential for promulgating rumours and malicious information. They suggest that information quality on disaster social media is enhanced when it is largely informed by credible sources such as the media and authorities. However, this does not negate the potential for misinformation to impact public safety.

According to UGT, what motives appear to have been behind the communicative functions of Twitter?

Several *motives* or psychological dispositions may have influenced how Twitter was used between June 20 and 23, 2013. Twitter use appears to have been mainly motivated by the need for expert information from the government about how citizens could protect themselves during the flood; the need to understand how the flood was unfolding and what that might mean for the future; and the need to regulate the extreme emotional states caused by the disaster. These findings reveal that Twitter users in Calgary may have perceived the aforementioned needs in response to the 2013 flood, and actively used the platform as a means of fulfillment—or gratification. They reinforce most of the functions identified by prior research, suggesting that the psychological dispositions identified may typify disaster social media users.

The findings demonstrate the value of approaching Twitter use in the 2013 Calgary Flood from a psychological-communication perspective, as it offers a way of understanding why Calgarians used Twitter the way they did and the outcomes or gratification of their communicative actions on the platform.

How useful was Twitter as a communication tool?

Based on the way that organizations and individual citizens in Calgary interacted with the technological features and functionality of Twitter during the flood, Twitter was a very useful tool with affordances in emotional regulation, documenting the disaster, and public safety. These findings demonstrate that the Calgary community perceived Twitter as a suitable space to

connect emotionally with each other to regulate their emotions, and a suitable tool for their information needs.

Significance of findings

The significance of the research findings is that they offer a comprehensive view of the communicative use of Twitter in Calgary in the *event phase* of the 2013 Calgary Flood. As mentioned in the introduction chapter, my study addresses a gap in disaster communication literature—the absence of perspectives beyond the organization managing the crisis communication—by including the perspectives of all Twitter user-types, not just the government organizations that managed the flood.

As the first empirical study of Twitter use in the 2013 Calgary Flood, the findings make the communicative roles and value of Twitter explicit and contribute to the knowledge of disaster social media use in the Western Canadian context. By identifying the *functions* or uses of Twitter for each user-type, the study also yields insights that could contribute to an enhancement of Houston et al.'s (2014) framework: Houston et al.'s framework which identifies disaster uses and users, does not connect the two variables so the way that each user-type uses disaster social media is not established.

Limitations

The generalizability of the results is limited by the research context. As explained in the methods chapter, the sample consisted of tweets made between June 20 and 23, 2013 (the *event phase* of the Calgary Flood) by Twitter users in Calgary. The results are not generalizable across the entire

period of the flood since it has been established in the literature that disaster social media use changes across the three conceptualized phases of the flood. The study was designed for the event phase only and this has been established in the wording of the research questions and discussions in this conclusion chapter, to ensure the scope and applicability is clear to readers.

Although relevant, the analytical framework of this study did not provide as deep or rich of an explanation of all the findings as initially planned when the study was designed; specifically, findings on users, uses, motives and the value of Twitter. As previously explained in this study, the literature on social media use in crises does not reflect significant theoretical constructs, and although UGT is increasingly being incorporated into disaster social media studies, there is significant room for further development of UGT-based theories and concepts that address the relevant areas of my study. To help fill analytical gaps, I drew on sections of the Calgary Flood and Alberta Flood reports that gave contextual insights into the findings. This limitation did not impact the quality of the results but limited the wisdom derived from it.

Emotions were only partly explored in this study, as the findings show emotions expressed and not emotions felt. Exploring emotions felt requires the addition of a psychological method, and for the study to be conducted closer to the event in time—due to the limitations on human memory mentioned in the methods section. For example, notes and recommendations from psychological communication experts gathered during the disaster could be one of the texts analyzed.

The perspective of tweet recipients is not well explored in this study, due to an absence of data that would facilitate an analysis of the social network; specifically, how users were connected (such as each user's followers and friends), who received which messages and how

these messages were used (liked, retweeted, quoted or replied to). It is likely that richer data that facilitates a social network analysis can be purchased from Twitter.

As discussed in the findings and analysis chapter, no rumours were identified in the data set, only the authorities' mention of rumours circulating that needed to be addressed. It is not clear if purchasing the dataset from Twitter would have led to a richer data that included actual tweets sharing rumours, but future research could explain the absence of these tweets from the dataset and further evaluate whether the mistrust of disaster social media users in the literature is valid.

Potential applications and suggestions for future research

The results of this study have implications for disaster communication as a practice by providing empirical evidence that may inform disaster communication planning, and ultimately, improve public safety; such as the value citizens place on governments' safety messages, the powerful role that citizens play in amplifying and mediating these messages and citizens' expectations of prompt, two-way communication between themselves and their government.

The results of this study have implications for disaster communication scholarship and may inform critical assessments of longstanding assumptions in the literature—assumptions such as the primacy of organizational perspectives and that individual disaster social media users are to be mistrusted because they are a threat to the quality of information on disaster social media platforms and organizations' public image. The findings may also inform new avenues of crisis communication research, such as a comparative assessment of the communicative uses of

Twitter in other phases of the 2013 Calgary Flood, since disaster social media uses vary by disaster phase; or further exploration of the psychosocial processes behind Twitter use in the flood using other research methods, since the psycho-social processes involved in disaster communication use have hardly been explored in the literature. Each communicative function identified in this study is also an opportunity for more in-depth research, as is the communicative relationship and differences in Twitter use between organizational users and individual users.

Performing a social network analysis of Twitter use during the flood is another important opportunity for future research, as this would contribute to a broader perspective of Twitter users and uses during the 2013 Calgary Flood. Future research into Twitter users and uses beyond the existing data set is also recommended; for example, the psychological processes that influenced Twitter use, and the more passive aspects of emotions (such as emotions felt), which are limited in this study.

This study mainly focuses on the *usefulness* of Twitter from a technological perspective; however, future research of the platforms usefulness from a socio-cultural perspective can further unpack the value of Twitter during the flood.

References

- 660 News. [660NEWS]. (June 22, 2013). City says there is no concern over drinking water quality at this time; Water supply remains unchanged. #yycflood. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv
- 660 News. [660NEWS]. (June 22, 2013). Standing by at the emergency operations centre - waiting to hear from @nenshi. Aide says they do have news #yycflood. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv
- Agness, M. (2013, July 01). Calgary floods: Analysis of crisis leadership and use of social media. Retrieved February 03, 2017, from <http://melissaagnes.com/calgary-floods-analysis-of-crisis-leadership-and-use-of-social-media/>
- Anju Restaurant. [AnjuRestaurant]. (June 22, 2013). Please spread the word. All flood workers and emergency crew come get a hot meal. #yycflood #feedthepeople. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv
- Alexander, D. E. (2013). Social media in disaster risk reduction and crisis management. *Science and Engineering Ethics*, 20(3), 717-733. doi:10.1007/s11948-013-9502-z
- Austin, L., Liu, B. F., & Jin, Y. (2012). How audiences seek out crisis information: Exploring the social-mediated crisis communication model. *Journal of Applied Communication Research*, 40(2), 188-207. doi:10.1080/00909882.2012.654498
- Banikalef, A., Al Bataineh, K., & Atoum, M. (2018). Exploring Facebook affordances in natural

- disaster: Case study of the 2018 Dead Sea flash floods in Jordan. *Journal of Applied Communication Research*, 40(2), 188-207. doi: 10.14419/ijet.v7i4.25862
- Bauer, M. (2000). Classical content analysis: A review (G. Gaskell, Ed.). In M. Bauer (Ed.), *Qualitative researching with text, image, and sound* (pp. 131-151). London: SAGE.
- Benoit, W. L. (1997). Image repair discourse and crisis communication. *Public Relations Review*, 23(2), 177-186. doi:10.1016/s0363-8111(97)90023-0
- Blumler, J. G., & Katz, E. (1974). *The uses of mass communications: Current perspectives on gratifications research*. SAGE.
- Boyd, D. (2007). Why youth (heart) social network sites: The role of networked publics in teenage social life. *MacArthur Foundation Series on Digital Learning – Youth, Identity, and Digital Media Volume*. The MacArthur Foundation Digital Media and Learning Initiative.
- Bobrovitz, G. [garybtvnews]. (June 22, 2013). A busy @nenshi is in the house at EOC - Will update media at 11:30: Details @GlobalCalgary #yycflood #abflood. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv
- Bobrovitz, G. [garybtvnews]. (June 22, 2013). RT @garybtvnews: @nenshi says 3 more communities GOING HOME LATER TONIGHT-Live Details @GlobalCalgary 6:00 #yycflood @ http://t.co/Lb7ajIRgâ€¦ Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv
- Brandtzæg, P. B. (2010). Towards a unified media-user category (MUT): A meta-analysis and

review of the research literature on media-user typologies. *Computers in Human Behavior*, 26(5), 940-956. doi:10.1016/j.chb.2010.02.008

- Brettwurst. [brett_lemke]. (June 21, 2013). RT @weathernetwork: Prime Minister Stephen Harper is apparently en route to #Calgary. #yycflood. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv
- Braun, K. [kjrbraun]. (June 21, 2013). Watch out 4 #yycflood rumors tonight, easy to get caught up in them. Be sure info is from official sources ie @cityofcalgary @CalgaryPolice Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv
- Bruns, A., Crawford, K., & Shaw, F. (2012, January 31). *Crisis communication on twitter in the 2011 South East Queensland floods*. Retrieved from <http://www.cci.edu.au/floodsreport.pdf>
- Bruns, A., & Stieglitz, S. (2012). Quantitative approaches to comparing communication patterns on Twitter. *Journal of Technology in Human Services*, 30(3-4), 160-185.
- Bruns, A., & Burgess, J. (2012). Researching news discussion On Twitter. *Journalism Studies*, 13(5-6), 801-814. doi:10.1080/1461670x.2012.664428
- Bruns, A., & Stieglitz, S. (2013). Towards more systematic Twitter analysis: metrics for tweeting activities. *International Journal of Social Research Methodology*, 16(2), 91-108.
- Brunette, J. [JTBrunette]. (June 21, 2013). RT @CongoGram: Go home, water. You're drunk. #yycflood. Retrieved from

https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Bryman, A. (2001). *Social research methods*. Oxford University Press.

Calgary Flood infographic shows remarkable power of social media. (2013, September 1). *The Huffington Post Alberta*. Retrieved from

http://www.huffingtonpost.ca/2013/09/01/calgary-flood-infographic_n_3845802.html

Calgary Police Service. [CalgaryPolice]. (June 21, 2013). Power has been shut off in evacuated communities for the safety of citizens and first responders. #yycflood. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Calgary Police Service. [CalgaryPolice]. (June 21, 2013). Clarifying a rumour for #yyc. There are NO zoo animals being sheltered at the Courts. #yycflood. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Calgary Police Service. [CalgaryPolice]. (June 21, 2013). Concerned about family members that have been evacuated? Please contact the @RedCrossAB at 403-541-6100. #yycflood #yyc. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Canada's top ten weather stories for 2013. (2014, April 17). Retrieved February 03, 2017, from <https://www.ec.gc.ca/meteo-weather/default.asp?lang=En&n=5BA5EAF-1&offset=2&toc=hide>

Canadian Association of Journalists. (n.d.). Ethics guidelines. Retrieved from

<https://caj.ca/ethics-guidelines>

Capozzi, L., & Rucci, S. (2013). *Crisis management in the age of social media: Instant crisis*.

Business Expert Press.

Cho, S. E., Jung, K., & Park, H. W. (2013). Social media use during Japan's 2011 earthquake:

How Twitter transforms the locus of crisis communication. *Media International*

Australia, 149(1), 28-40. doi:10.1177/1329878x1314900105

City of Calgary. [cityofcalgary]. (June 20, 2013). Raw - media scrum with Calgary Police, Water

Services & Roads - Calgary Flood from 8 p.m. #yycflood. Retrieved from

<https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa>

/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

City of Calgary. [cityofcalgary]. (June 20, 2013). Mandatory evacuations have been ordered for

the following: Mission, Elbow Park, Stanley Park, Roxboro, Rideau and Discovery

Ridge #yycflood. #yycflood. Retrieved from

<https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa>

/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

City of Calgary. [cityofcalgary]. (June 21, 2013). Due to high traffic volumes Calgary.ca is

experiencing technical difficulties. For flood related news visit.... Retrieved from

<https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa>

/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

City of Calgary. [cityofcalgary]. (June 21, 2013). There is NO boil water advisory in place. Our

water treatment plans are uncompromised and quality remains high #yycflood. Retrieved

from

https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

City of Calgary. [cityofcalgary]. (June 22, 2013). Reminder: All City Recreation facilities will be closed at least until end-of-day Sunday, June 23, 2013 #yyc #yycflood. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

City of Calgary. [cityofcalgary]. (June 22, 2013). RT @cityofcalgary: Thank you Calgarians, Media, City staff, City partners for resiliency and tremendously large hearts. #yyc #yycflood. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Cobb, R. W., & Elder, C. D. (1997). *Participation in American politics: The dynamics of agenda-building* (2nd ed.). University Microfilms International.

Conrado, S. P., Neville, K., Woodworth, S., & O’Riordan, S. (2016). Managing social media uncertainty to support the decision making process during Emergencies. *Journal of Decision Systems*, 25(sup1), 171–181. doi: 10.1080/12460125.2016.1187396

Coombs, T., Seeger, M., & Auer, C. (2019). Ongoing crisis communication: Planning, managing and responding. In A. Schwarz (Ed.), *The handbook of international crisis communication research*. Wiley Blackwell.

Coombs, W. (2014). *Ongoing Crisis Communication*. SAGE.

Coombs, W. T. (2015). *Crisis communication*. SAGE.

- Cooper, G. P., Yeager, V., Burkle, F. M., & Subbarao, I. (2015). Twitter as a potential disaster risk reduction tool. Part III: Evaluating variables that promoted regional Twitter use for at-risk populations during the 2013 Hattiesburg F4 Tornado. *PLoS Currents*. doi:10.1371/currents.dis.b305fe1b479528fda724c6f84f546471
- Copper Brook. [CopperBrook]. (June 21, 2013). #yycflood Let us know if we can be of any assistance.....tools, storage, manpower. We're tired and wet but will do what we can to help. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv
- Dailey, D., & Starbird, K. (2014). Journalists as crowdsourcerers: Responding to crisis by reporting with a crowd. *Computer Supported Cooperative Work (CSCW)*, 23(4-6), 445-481. doi:10.1007/s10606-014-9208-z
- Davison, W. P. (1975). *Mass communication research: Major issues and future directions*. Praeger.
- Deuze, M. (2005). What is journalism? Professional Identity and Ideology of Journalists Reconsidered. *Journalism*, 6(4), 442-464. doi:10.1177/1464884905056815
- Devenis, T. [tdevenis]. (June 23, 2013). RT @bigbadtref: @dansgoodside: Really, Jesus? Do you really think now is the time for sprinklers?! #yycflood <http://t.co/1ixcFelLyU>” Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv
- Dotan, J., & Cohen, A. A. (1976). Mass media use in the family during war and peace.

Communication Research, 3(4), 393-402. doi:10.1177/009365027600300403

Effing, R., & Spil, T. A. (2016). The social strategy cone: Towards a framework for evaluating social media strategies. *International Journal of Information Management*, 36(1), 1-8. doi:10.1016/j.ijinfomgt.2015.07.009

Ellinor, T. [EllisFun]. (June 23, 2013). RT @AreSiewer: Just personally spoke to an officer. Inglewood is under mandatory evacuation. #yycflood. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Enmax. [ENMAX]. (June 21, 2013). RT @ENMAX: CEMA has directed certain outages in the downtown core. CEMA will advise @ENMAX when it is safe to restore power. #yycflood. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Enmax. [ENMAX]. (June 23, 2013). Avoid all ENMAX structures (e.g. green utility boxes, power poles etc.), where water is flowing or pooling. #yycflood.... Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Eriksson, M., & Olsson, E. (2016). Facebook and Twitter in crisis communication: A comparative study of crisis communication professionals and citizens. *Journal of Contingencies and Crisis Management*, 24(4), 198-208. doi:10.1111/1468-5973.12116

Evtex Solutions. [EvtexSolutions]. (June 21, 2013). RT @nenshi: The City of Calgary newsroom is also a good source for the latest releases about #yycflood <http://t.co/wA29b1US4g>.

Retrieved from

https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Feist, R. [ReidFiest]. (June 21, 2013). Water levels on the Bow are so high as we cross the Calf

Robe Bridge on... #yycflood #yyc.. Retrieved from

https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Felinish. [Felinish]. (June 21, 2013). PM is home. Proud of these leaders @pmharper: Briefing

with @Premier_Redford and @nenshi #abflood #yycflood. Retrieved from

https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Fink, S. (1986). *Crisis management: Planning for the inevitable*. American Management Association.

Ford, R. (2011, August 23). Earthquake: Twitter users learned of tremors seconds before feeling them. Retrieved from <http://www.hollywoodreporter.com/news/earthquake-twitter-userslearned-tremors-226481>

Fronz, C. (2011). *Strategic management in crisis communication: A multinational approach*. Diplomica-Verl.

FPT Ministers Responsible for Emergency Management (2011). An emergency management framework for Canada: Second edition. Retrieved from

<https://www.publicsafety.gc.ca/cnt/rsrscs/pblctns/mrgnc-mngmnt-frmwrk/index-eng.aspx>

Gibbs, P. (2007). Practical wisdom and the workplace researcher. *London Review of Education*,

5(3), 223–235. doi: 10.1080/14748460701661278

Gillmor, D. (2006). *We the media: Grassroots journalism by the people, for the people*. O'Reilly.

Government of Alberta. (n.d.). *Province of Alberta emergency management act*. Retrieved from <https://open.alberta.ca/publications/e06p8>

Graham, M. W., Avery, E. J., & Park, S. (2015). The role of social media in local government crisis communications. *Public Relations Review*, 41(3), 386-394.

doi:10.1016/j.pubrev.2015.02.001

Grunig, J. E. (2013). *Excellence in public relations and communication management*. Routledge.

Gurman, T. A., & Ellenberger, N. (2015). Reaching the global community during disasters: Findings from a content analysis of the organizational use of Twitter after the 2010 Haiti earthquake. *Journal of Health Communication*, 20(6), 687-696.
doi:10.1080/10810730.2015.1018566

Ha, J. H., & Riffe, D. (2015). Crisis-related research in communication and business journals: An interdisciplinary review from 1992 to 2011. *Public Relations Review*, 41(4), 569-578.

Harper, S. [@stephenharper]. (June 21, 2013). Briefing with @Premier_Redford and @nenshi #abflood #yycflood. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Heath, R. L. (2004). Telling a story: A narrative approach to communication during a crisis. In D. Millar & R. Heath (Eds.) *Responding to Crisis: A Rhetorical Approach to Crisis Communication* (pp. 167-188). Lawrence Erlbaum Associates.

- Heath, R. L. (2010). Crisis communication: Defining the beast and de-marginalizing key publics. In T. Coombs & S. Holladay (Eds.), *The Handbook of Crisis Communication* (pp. 1-13). Wiley-Blackwell.
- Heath, R. L. (2013). *Encyclopedia of public relations*. SAGE.
- Henry, C. [Cara_Henry]. (June 23, 2013). Wishing I had a hovercraft to go deliver @TimHortons coffee to @CalgaryPolice @Nenshi @aldojohnmar and other #yycflood heros. THANK YOU ALL! Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv
- Hermann, C. F. (1963). Some consequences of crisis which limit the viability of organizations. *Administrative Science Quarterly*, 8(1), 61. doi:10.2307/2390887
- Hesse-Biber, S. N., & Leavy, P. (2011). *The practice of qualitative research*. SAGE.
- Honan, M. (2011, August 24). Watch the Virginia Earthquake spread across Twitter. Retrieved April 05, 2018, from <http://gizmodo.com/5834048/watch-the-virginia-earthquake-spread-across-twitter>
- Hossmann, T., Legendre, F., Carta, P., Gunningberg, P., & Rohner, C. (2011). Twitter in disaster mode. *Proceedings of the 3rd Extreme Conference on Communication the Amazon Expedition - ExtremeCom '11*. doi:10.1145/2414393.2414394
- Houston, J. B., Pfefferbaum, B., & Rosenholtz, C. E. (2012). Disaster news. *Journalism & Mass Communication Quarterly*, 89(4), 606-623. doi:10.1177/1077699012456022
- Houston, J. B., Hawthorne, J., Perreault, M. F., Park, E. H., Hode, M. G., Halliwell, M. R., . . . Griffith, S. A. (2014). Social media and disasters: A functional framework for social

media use in disaster planning, response, and research. *Disasters*, 39(1), 1-22.

doi:10.1111/disa.12092

Houston, P. J. (2012). Public disaster mental/behavioral health communication: Intervention across disaster phases. *Journal of Emergency Management*, 10(4), 283.

doi:10.5055/jem.2012.0106

Hsieh, H., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277-1288. doi:10.1177/1049732305276687

Hutchby, I. (2001). Technologies, texts and affordances. *Sociology*, 35(2), 441-456. doi:10.1177/s0038038501000219

Insch, G. S., Moore, J. E., & Murphy, L. D. (1997). Content analysis in leadership research: Examples, procedures, and suggestions for future use. *The Leadership Quarterly*, 8(1), 1-25. doi:10.1016/s1048-9843(97)90028-x

Iyengar, S. (1991). *Is anyone responsible? How television frames political issues*. University of Chicago Press.

Jaeger, P. T., Shneiderman, B., Fleischmann, K. R., Preece, J., Qu, Y., & Wu, P. F. (2007). Community response grids: E-government, social networks, and effective emergency management. *Telecommunications Policy*, 31(10-11), 592-604.

doi:10.1016/j.telpol.2007.07.008

Jenn. [karma_jj]. (June 21, 2013). RT @cityofcalgary: Please note #yyc water is still safe for drinking. #yycflood. #yycflood. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

- Kaminsky, K., Dr. (n.d.). #YYCFlood – The role of social media during the 2013 Calgary flood.
Retrieved February 03, 2017, from <http://haznet.ca/themes/themes-technology/yycflood-the-role-of-social-media-during-the-2013-calgary-flood/>
- Kang, C. (2011, August 23). Facebook, Twitter report record earthquake messages. Retrieved from http://www.washingtonpost.com/blogs/post-tech/post/facebook-twitter-report-record-earthquakemessages/2011/08/23/gIQA4Y09ZJ_blog.html
- Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of Social Media. *Business Horizons*, 53(1), 59-68.
doi:10.1016/j.bushor.2009.09.003
- Katz, E., Blumler, J., & Gurevitch, M. (1974). Uses of mass communication by the individual. In W. Davidson & F. Yu (Eds.), *Mass Communication Research: Major Issues and Future Directions* (pp. 11-35). Praeger.
- Kennedy, S. [sysguy]. (June 22, 2013). Just saw a c-117 on approach for yyc. CAF #yycflood
Retrieved from
https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv
- Kenney, J. [jkenney]. (June 21, 2013). RT @cityofcalgary: Due to high traffic volumes
Calgary.ca is experiencing technical difficulties. For flood related news visit
<http://t.co/â€¦> Retrieved from
https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

- Kim, S., & Liu, B. F. (2012). Are all crises opportunities? A comparison of how corporate and government organizations responded to the 2009 Flu Pandemic. *Journal of Public Relations Research*, 24(1), 69-85. doi:10.1080/1062726x.2012.626136
- Kim, T. (2014). Observation on copying and pasting behavior during the Tohoku earthquake: Retweet pattern changes. *International Journal of Information Management*, 34(4), 546-555. doi:10.1016/j.ijinfomgt.2014.03.001
- Klemke, P. [Klemer31]. (June 21, 2013). RT @CalgaryPolice: Many communities having power and gas cut-off. You may not see #yycflood, but you'll have no utilities either. Please evacuate. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv
- Knobloch-Westerwick, S. (2015). *Choice and preference in media use: Advances in selective exposure theory and research*. Routledge.
- Kongthon, A., Haruechaiyasak, C., Pailai, J., & Kongyoung, S. (2014). The Role of social media during a natural disaster: A Case Study of the 2011 Thai Flood. *International Journal of Innovation and Technology Management*, 11(03), 1440012. doi:10.1142/s0219877014400124
- Krippendorff, K. (2004). *Content analysis: An introduction to its methodology*. SAGE.
- L. M., Kent. (n.d.). What is a public relations "crisis"? Refocusing crisis research. In T. Coombs & S. Holladay (Eds.), *The handbook of crisis communication* (pp. 705-712). Blackwell.
- Lariscy, R. W., Avery, E. J., Sweetser, K. D., & Howes, P. (2009). An examination of the role of online social media in journalists' source mix. *Public Relations Review*, 35(3), 314-316.

doi:10.1016/j.pubrev.2009.05.008

Lerbinger, O. (1997). *The crisis manager: Facing risk and responsibility*. Mahwah, NJ: Erlbaum.

Lev-On, A. (2010). Engaging the disengaged: Collective action, media uses, and sense of (virtual) community by evacuees from Gush Katif. *American Behavioral Scientist*, 53(8), 1208-1227. doi:10.1177/0002764209356251

Lev-On, A. (2011). Communication, community, crisis: Mapping uses and gratifications in the contemporary media environment. *New Media & Society*, 14(1), 98-116. doi:10.1177/1461444811410401

Leykin, D., Aharonson-Daniel, L., & Lahad, M. (2016). Leveraging social computing for personalized crisis communication using social media. *PLoS Currents*. doi:10.1371/currents.dis.b2c5870adf1b7a77af82e7d5552aabe7

Liu, B. F., & Horsley, J. S. (2007). The government communication decision wheel: Toward a public relations model for the public sector. *Journal of Public Relations Research*, 19(4), 377-393. doi:10.1080/10627260701402473

Liu, W. (2015). A historical overview of uses and gratifications theory. *Cross-Cultural Communication*, 11(9), 71-78. doi:10.3968/7415

Lotan, G. (2011, October 02). All shook up: Mapping earthquake news on Twitter from Virginia to Maine. Retrieved from <https://billhubbell.wordpress.com/2011/10/02/all-shook-up-mapping-earthquake-news-on-twitter-from-virginia-to-maine/>

Lovari, A., & Parisi, L. (2015). Listening to digital publics. Investigating citizens' voices and engagement within Italian municipalities' Facebook Pages. *Public Relations Review*, 41(2), 205-213. doi:10.1016/j.pubrev.2014.11.013

- Macklin, R., & Whiteford, G. (2012). Phronesis, aporia, and qualitative research. In E. A. Kinsella & A. Pittman (Eds.), *Phronesis as Professional Knowledge* (pp. 87–100). Brill.
doi: 10.1007/978-94-6091-731-8_7
- Mar, J. [aldjohnmar]. (June 20, 2013). Please, please, please, stay off of the rivers, pathways and foot bridges in affected areas...#yyc #yyccc #yycflood. Retrieved from
https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv
- Maier, M. A. (2018). Content analysis: Advantages and disadvantages. In M. Allen (Ed.), *The SAGE encyclopedia of communication research methods* (pp. 240–242). SAGE.
- Meyers, G. C., & Holusha, J. (1986). *When it hits the fan: Managing the nine crises of business*. Houghton Mifflin.
- Michael, W. (2014, February 17). Social media tools proved vital in 2013 floods. Retrieved from
[http://www.calgaryherald.com/technology/Social media tools proved vital 2013 floods/9517574/story.html](http://www.calgaryherald.com/technology/Social%20media%20tools%20proved%20vital%202013%20floods/9517574/story.html)
- Mitroff, I. I., & Anagnos, G. (2001). *Managing crises before they happen: What every executive and manager needs to know about crisis management*. AMACOM.
- MNP LLP. (2015, July). Review and analysis of the Government of Alberta's response to and recovery from 2013 floods. Retrieved from
<http://www.aema.alberta.ca/documents/2013-flood-response-report.pdf>
- Muralidharan, S., Rasmussen, L., Patterson, D., & Shin, J. (2011). Hope for Haiti: An analysis of Facebook and Twitter usage during the earthquake relief efforts. *Public Relations Review*, 37(2), 175-177. doi:10.1016/j.pubrev.2011.01.010

- Muralidharan, S., Dillistone, K., & Shin, J. (2011). The Gulf Coast oil spill: Extending the theory of image restoration discourse to the realm of social media and beyond petroleum. *Public Relations Review*, 37(3), 226-232. doi:10.1016/j.pubrev.2011.04.006
- Murthy, D., & Gross, A. J. (2017). Social media processes in disasters: Implications of emergent technology use. *Social Science Research*, 63, 356-370. doi:10.1016/j.ssresearch.2016.09.015
- Nenshi, N. [nenshi]. (June 20, 2013). The City of Calgary newsroom is also a good source for the latest releases about #yycflood. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv
- Neubaum, G., Rösner, L., Pütten, A. M., & Krämer, N. C. (2014). Psychosocial functions of social media usage in a disaster situation: A multi-methodological approach. *Computers in Human Behavior*, 34, 28-38. doi:10.1016/j.chb.2014.01.021
- NoTable. [NotableCalgary]. (June 21, 2013). RT @sassystuff: RT @AHS_media: City of Calgary NOT under boil water order. #yyc #abflood. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv
- Olsson, E. (2014). Crisis communication in public organisations: Dimensions of crisis communication revisited. *Journal of Contingencies and Crisis Management*, 22(2), 113-125. doi:10.1111/1468-5973.12047
- Olteanu, A., Vieweg, S., & Castillo, C. (2015). What to expect when the unexpected happens. *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work*;

Social Computing - CSCW '15. doi:10.1145/2675133.2675242

Palen, L., Vieweg, S., Liu, S. B., & Hughes, A. L. (2009). Crisis in a networked world: Features of computer-mediated communication in the April 16, 2007, Virginia Tech Event. *Social Science Computer Review*, 27(4), 467-480. doi:10.1177/0894439309332302

Palen, L., & Liu, S. B. (2007). Citizen communications in crisis. In *Proceedings of the SIGCHI conference on human factors in computing systems - CHI 07*. doi:10.1145/1240624.1240736

Palttala, P., & Vos, M. (2011). Testing a methodology to improve organizational learning about crisis communication by public organizations. *Journal of Communication Management*, 15(4), 314-331. doi:10.1108/13632541111183370

Pang, A., Hassan, N. B., & Chong, A. C. (2014). Negotiating crisis in the social media environment. *Corporate Communications: An International Journal*, 19(1), 96-118. doi:10.1108/ccij-09-2012-0064

Papacharissi, Z. (2009). Uses and gratifications. In D. W. Stacks & M. B. Salwen (Eds.), *An Integrated Approach to Communication Theory and Research* (2nd ed., pp. 137-152). Routledge.

Paul, M. J. (2001). Interactive disaster communication on the internet: A content analysis of sixty-four disaster relief home pages. *Journalism & Mass Communication Quarterly*, 78(4), 739-753. doi:10.1177/107769900107800408

Pechta, L. E., Brandenburg, D. C., & Seeger, M. W. (2010). Understanding the dynamics of emergency communication: propositions for a four-channel model. *Journal of Homeland Security and Emergency Management*, 7(1). doi:10.2202/1547-7355.1671

Perry, R. W., & Quarantelli, E. L. (2005). *What is a disaster? New answers to old questions*.

Xlibris.

Peterson, T. [ToriePeterson]. (June 21, 2013). On hour 28, you get a 2nd wind." - @nenshi.

Sending so much love to all 1st responders & city workers working on the

#yycflood. Retrieved from

<https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa>

/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Pho Tien Giang. [photianggyyc]. (June 21, 2013). RT @660News: Deer Run and Riverbend

will be evacuated close to midnight #yycflood. Retrieved from

<https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa>

/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Pond, P. (2016). The space between us: Twitter and crisis communication. *International Journal of Disaster Resilience in the Built Environment*, 7(1), 40-48.

<https://doi.org/10.1108/IJDRBE-08-2013-0030>

PowerStart Group. [TrondFrantzen]. (June 23, 2013). #FreeGroceries today 4-5 in #theatrium for

1st responders, police, fire, ems & military #yycflood #abflood #wearecalgary

#thankyou. Retrieved from

<https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa>

/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Procopio, C. H., & Procopio, S. T. (2007). Do you know what it means to miss New Orleans?

Internet communication, geographic community, and social capital in crisis. *Journal of*

Applied Communication Research, 35(1), 67-87. doi:10.1080/00909880601065722

Qu, Y., Huang, C., Zhang, P., & Zhang, J. (2011). Microblogging after a major disaster in China.

Proceedings of the ACM 2011 conference on Computer supported cooperative work - CSCW '11. doi:10.1145/1958824.1958830

Quarantelli, E. L. (2005). A social science research agenda for the disasters of the 21st century.

In R. W. Perry & E. L. Quarantelli (Eds.), *What is a disaster? New answers to old questions* (pp. 296-325). Xlibris.

Ravlich, M. [DigitalMktgMatt]. (June 23, 2013). @cityofcalgary is the entire community of

Montgomery being evacuated or just Low-lying areas? Thanks! Retrieved from

<https://twitter.com/DigitalMktgMatt/status/347898560039243777>

Red Cross Alberta. [RedCrossAB]. (June 21, 2013). @CalgaryPolice we have set up a family

reunification line. If people are looking for their family please call 1-866-696-6484

#yycfloods. Retrieved from

https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Redford, A. [PremierOfficeAB]. (June 24, 2013). RT @Premier_Redford: We are taking action

today to help more than 100,000 Albertans displaced by #abflood

<http://t.co/V8ejfqBH1Q> #yycflood. Retrieved from

https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Reynolds, B., & Seeger, M. W. (2005). Crisis and emergency risk communication as an integrative model. *Journal of Health Communication*, 10(1), 43-55.

doi:10.1080/10810730590904571

Rodríguez, H., Quarantelli, E. L., & Dynes, R. R. (2007). *Handbook of disaster research*.

Springer.

Roshan, M., Warren, M., & Carr, R. (2016). Understanding the use of social media by organisations for crisis communication. *Computers in Human Behavior*, 63, 350-361.

doi:10.1016/j.chb.2016.05.016

Rubin, A. M. (2008). Uses-and-gratifications perspective on media effects. In B. Jennings & B. Oliver (Eds.), *Media Effects: Advances in Theory and Research* (3rd ed., pp. 165-184). Routledge.

Run Digital. [RunDigitalPrint]. (June 24, 2013). This REALLY needs to be said to the first responders. #yycflood #yycfloodhero Photo by Mark Kamachi in Bragg Creek.

Retrieved from

https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

RQ. [wyzewon]. (June 20, 2013). @cityofcalgary will some eastbound traffic on memorial be redirected to the westbound lanes? Retrieved from

https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Seale, C., & Tonkiss, F. (2012). Content and comparative key word analysis. In C. Seale (Ed.), *Researching Society and Culture* (3rd ed., pp. 458-478). SAGE.

Sellnow, T. L., & Seeger, M. W. (2013). *Theorizing crisis communication*. John Wiley & Sons.

Seeger, M. W. (2006). Best practices in crisis communication: An expert panel process. *Journal of Applied Communication Research*, 34(3), 232-244. doi:10.1080/00909880600769944

- Shaw, F., Burgess, J., Crawford, K., & Bruns, A. (2013). Sharing news, making sense, saying thanks: Patterns of talk on Twitter during the Queensland floods. *Australian Journal of Communication*, 40(1). Retrieved from <https://eprints.qut.edu.au/62709/>
- Shriners Gait Lab. [@gaitlabcanada]. (June 20, 2013). “@cityofcalgary I understand the Bow has flooded now. What is its status? Are there evacs there? Retrieved from <https://twitter.com/gaitlabcanada/status/347839191092191232>
- Simms/Beaven. [callbackent]. (June 20, 2013). RT @CalgaryPolice: Due to state of emergency with #yycfloods, we are only responding to priority calls in #yyc right now. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv
- Social Media's Role in Alberta Flooding Huge: Report. (2013, July 11). *The Huffington Post Alberta*. Retrieved from https://www.huffingtonpost.ca/2013/07/11/alberta-flooding-social-media-report_n_3581620.html
- Spence, P. R., Lachlan, K. A., Lin, X., & Greco, M. D. (2015). Variability in Twitter content across the stages of a natural disaster: Implications for crisis communication. *Communication Quarterly*, 63(2), 171-186. doi:10.1080/01463373.2015.1012219
- Spicer, N. (2012). Combining qualitative and quantitative Methods. In C. Seale (Ed.), *Researching Society and Culture* (3rd ed., pp. 479-492). SAGE.
- Stacks, D. W., Salwen, M. B., & Eichhorn, K. C. (2019). *An integrated approach to communication theory and research*. Routledge.
- Staff for the Office of the Premier of Alberta. [PremierOfficeAB]. (June 20, 2013). RT

- @cityofcalgary: Mandatory evacuation areas extended <http...#yycflood>. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv
- Starbird, K., Palen, L., Hughes, A. L., & Vieweg, S. (2010). Chatter on the red: What hazards threat reveals about the social life of microblogged information. *Proceedings of the 2010 ACM Conference on Computer Supported Cooperative Work - CSCW 10*. doi:10.1145/1718918.1718965
- Starbird, K., & Palen, L. (2010). *Pass it on? Retweeting in mass emergency*. International Community on Information Systems for Crisis Response and Management.
- Stemler, S. (2001). An overview of content analysis. *Practical Assessment, Research & Evaluation*, 7(17). Retrieved from https://www.researchgate.net/profile/Steven_Stemler/publication/269037805_An_Overview_of_Content_Analysis/links/547e0aba0cf2de80e7cc402a/An-Overview-of-Content-Analysis.pdf
- Sturges, D. L. (1994). Communicating through crisis: A strategy for organizational survival. *Management Communication Quarterly*, 7(3), 297-316. doi:10.1177/0893318994007003004
- Sullivan, J. L. (2013). *Media audiences: Effects, users, institutions, and power*. SAGE.
- Sutherland, S. (n.d.). Three years later: What caused the 2013 Alberta floods? Retrieved February 03, 2017, from <https://www.theweathernetwork.com/news/articles/why-was-southern-alberta-so-vulnerable-to-flooding-in-2013/29800>
- Takahashi, B., Tandoc, E. C., & Carmichael, C. (2015). Communicating on Twitter during a

- disaster: An analysis of tweets during Typhoon Haiyan in the Philippines. *Computers in Human Behavior*, 50, 392-398. doi:10.1016/j.chb.2015.04.020
- Tashakkori, A., & Creswell, J. W. (2007). Editorial: The new era of mixed methods. *Journal of Mixed Methods Research*, 1(1), 3-7. doi:10.1177/2345678906293042
- Taylor, M., Wells, G., Howell, G., & Raphael, B. (2012). The role of social media as psychological first aid as a support to community resilience building. *The Australian Journal of Emergency Management*, 27(1), 20-26.
- The Unicorn. [unicorncalgary]. (June 20, 2013). RT @cityofcalgary: Due to flooding a closure of the two eastbound lanes on Memorial Dr between 5A St and Centre St NW is planned. #yycflood. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv
- Thelwall, M., & Stuart, D. (2007). RUOK? Blogging communication technologies during crises. *Journal of Computer-Mediated Communication*, 12(2), 523-548. doi:10.1111/j.1083-6101.2007.00336.x
- Thomson, P. [pegs_76]. (June 22, 2013). RT @coreywilson: This really made me laugh. Love mayor @nenshi Stay off the rivers!! #yycflood #YYC <http://t.co/LtfR2EAzbY>. Retrieved from https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv
- Ulmer, R. R. (2012). Increasing the Impact of Thought Leadership in Crisis Communication. *Management Communication Quarterly*, 26(4), 523-542.

doi:10.1177/0893318912461907

Ulmer, R. R. (2011). *Effective crisis communication: Moving from crisis to opportunity*. SAGE.

Ulmer, R. R. (2012). Increasing the impact of thought leadership in crisis communication.

Management Communication Quarterly, 26(4), 523-542.

doi:10.1177/0893318912461907

UN Office for Disaster Risk Reduction. (n.d.). Essential Nine: Ensure effective disaster response.

Retrieved July 31, 2019, from

<https://www.unisdr.org/campaign/resilientcities/home/article/essential-nine-ensure-effective-disaster-response>

United Way Centraide Canada. [@UWCCanada]. (June 21, 2013). RT @UnitedWayCanada:

Affected by the #yycflood, and looking for information on where to turn for human services? Visit...or, dial 2-1-1. Retrieved from

https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Virji, A. [AliVirji]. (2013, June 21). RT @rameezv: Yeah so this used to be a golf course once.

#yycflood <http://t.co/CvhrUzDL6P>. Retrieved from

https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv

Vroegop, R. (2014, July). *Forewarned and forearmed: The Calgary Emergency Management Agency and the 2013 Flood*. The Conference Board of Canada.

Wann, A. (1999). *Inside organizational communication*. Forbes.

Waters, R. D., Burnett, E., Lamm, A., & Lucas, J. (2009). Engaging stakeholders through social

- networking: How nonprofit organizations are using Facebook. *Public Relations Review*, 35(2), 102-106. doi:10.1016/j.pubrev.2009.01.006
- Webb, E. J., Campbell, D. T., Schwartz, R. D., & Sechrest, L. (1966). *Unobtrusive measures: Nonreactive research in the social sciences*. Rand McNally.
- White, M. D., & Marsh, E. E. (2006). Content analysis: A flexible methodology. *Library Trends*, 55(1), 22-45. doi:10.1353/lib.2006.0053
- Whittaker, J., Handmer, J., & McLennan, B. (2014). Building community resilience through informal emergency volunteering. In *Proceedings of the Research Forum at the Bushfire and Natural Hazards CRC*. Bushfire and Natural Hazards CRC.
- Wright, M. (2014, February 1). Social media tools proved vital in 2013 floods. *Calgary Herald*. Retrieved from [http://www.calgaryherald.com/technology/Social media tools proved vital 2013 floods/9517574/story.html](http://www.calgaryherald.com/technology/Social%20media%20tools%20proved%20vital%202013%20floods/9517574/story.html)
- Wukich, C., & Steinberg, A. (2013). Nonprofit and public Sector Participation in Self-Organizing Information Networks: Twitter Hashtag and Trending Topic Use During Disasters. *Risk, Hazards, Crisis in Public Policy*, 4(2), 83-109. doi:10.1002/rhc3.12036
- Wukich, C. (2016). Government social media messages across disaster phases. *Journal of Contingencies and Crisis Management*, 24(4), 230-243. doi:10.1111/1468-5973.12119
- Yablonski, C. (2013, October 31). The impact of social media on the Calgary flood. Retrieved from <http://www.inboundinteractive.ca/the-impact-of-social-media-on-the-calgary-flood/>
- Zaidman-Zait A. (2014) Content analysis. In: A. C. Michalos (Ed.) *Encyclopedia of quality of life and well-being research*. Springer Netherlands.

Zaremba, A. J. (2010). *Crisis communication: Theory and practice*. M.E. Sharpe.

Zickefoose, S. [pegs_76]. (June 21, 2013). Awestruck by photos being e-mailed in from
Calgarians. Here's a link to the gallery: [http...#yycflood](http://www.yycflood.com). Retrieved from
[https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa](https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv)
[/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv](https://github.com/sajao/CrisisLex/blob/71b393c964483f68014928d91eee25ec916c26aa/data/CrisisLexT26/2013_Alberta_floods/2013_Alberta_floods-tweets_labeled.csv)

Appendix A

Table 5 *Type, identity and number of Twitter users in the 2013 Calgary Flood*

Type of Twitter users	Number of users	User Name	Twitter handle
Individual User-type			
Individual Citizen	700	<ul style="list-style-type: none"> • Natalie Veldhoen • Clark L.Timmerman • Mark Eckstein • Christine Cusanelli • Richard Zach • Melanie Simmons • Zac Trolley • Ruth Myles • Irene Seto • Larry Sceviour • Ricky Doucet • Andrew Julio • Cheryl Arkison • Janice Fiori • Iain McLean • Kimberly Jones • Reg Tiangha • Suzanne Waddell • Jennifer Zacharias • Gwyn Auger • Christopher S Davis • Jen Taylor • Joelle H. • Shelley Youngblut • Cathy • Tiffany • Laura Anderson <p>Note, this is not the full list of individual citizens; the number of users in this category is significantly large and therefore, out of scope for a graduate level thesis.</p>	<ul style="list-style-type: none"> @natalieveldhoen @TimmermanClark @CornerstoneJay @ccinyyc @RrrichardZach @melsimcity @ZacTrolley @RuthMylesCH @HeySeto @travelfast53 @RickDee31 @andrewjulio @Cheryl_Arkison @starjunkie @IainNP @kimrobyn @regtiangha @SuzanneYYC @jenzacharias @magicassistant @Munlaw2 @littlemissmocha @CityGal79 @Youngblut @CathyTheRN @myDIRT @PaintedParamour

Organizational User-type			
News Media	40	<ul style="list-style-type: none"> • Calgary Journal • Aisling Tomei • CBC Calgary • Calgary Traffic (CBC) • Key of A (CBC) • CTV Calgary • Global Calgary • Global National • 90.3 AMP Radio • The Weather Network • National Post • News Talk 770 • Off the Dial • Kiss 95.9 Calgary • Calgary Sun • 660 News • Reid Fiest • 101.5 KooL FM • Erika Stark • The Huffington Post Canada • Soft Rock 97.7 • Linda Olsen • Virgin Radio Calgary • Calgary Herald • Gary Bobrovitz • Chris Bassett • Breakfast Television Calgary • CTVCalgarySports • Darren Krause • Diamond J. Terrence • Robson Fletcher • News Talk 770 • Q107 Calgary • Lyle Aspinall • The Odd Squad (Country 105) • Lauren Krugel • Ian Campbell • Dave Dormer • XL 103 Calgary 	<ul style="list-style-type: none"> @calgaryjournal @CTVAshTomei @CBCCalgary @CalgaryCommute @CBCKeyofA @CTVCalgary @GlobalCalgary @GlobalNational @ampcalgary @weathernetwork @nationalpost @NewsTalk770 @OfftheDial @kiss959calgary @calgarysun @660NEWS @ReidFiest @1015KooLFM @erikamstark @softrock977 @HuffPostCanada @softrock977 @Linda_Olsen @VirginRadioYYC @calgaryherald @garybtvnews @global_bassett @BTCalgary @660NEWS @CTVSportsYYC @Metro_DK @realDiamondJT @CBCFletch @NewsTalk770 @Q107Calgary @LyleAspinall @OddSquad @LaurenKrugel @news_ian @Dave_Dormer @XL103Calgary @girlreporter

		<ul style="list-style-type: none"> • Sherri Zickefoose 	
Government Organization			
The Municipal Government/Local Authorities	8	<ul style="list-style-type: none"> • City of Calgary • Naheed Nenshi, Mayor of Calgary • Calgary Police Service (CPS) • Constable Jeremy Shaw, Digital Communications Officer, CPS • John Mar, Alderman, Ward 8 • Druh Farrell, Councillor, Ward 7 • Shane Keating, Councillor, Ward 12 • Gian-Carlo Carra, Ward 9 Councillor 	@cityofcalgary @nenshi @CalgaryPolice @CstShaw @aldjohnmar @DruhFarrell @ CouncillorKeats @gccarra
The Provincial Government	6	<ul style="list-style-type: none"> • Alison Redford, Alberta Premier • Fred Horne, Alberta Health Minister • Linda Johnson, MLA • Calgary Region MLAs • Staff of the Office of the Alberta Premier • 511 Alberta, traveller information service, operated by the Government of Alberta 	@Premier_Redford @FredHorneMLA @LindaJohnsonMLA ABCalgaryCaucus (now @MyPCMLA) @PremierOfficeAB @511Alberta
The Federal Government	2	<ul style="list-style-type: none"> • Stephen Harper, Prime Minister of Canada and Member of Parliament, Calgary SW • Jason Kenney, Minister of Citizenship, Immigration and Multiculturalism and Member of Parliament, Calgary SE 	@pmharper @jkenney

Private sector companies	20	<ul style="list-style-type: none"> • Fountain Tire • The Unicorn • NOtaBLE • Run Digital • CopperBrook • Telus • Anju • Lou's Auto Body • Callback Corporate Entertainment • Summit Roofing • Pho Tien Giang • Carmacks Maintenance Calgary • BlueCircle Insurance • Naaco • Calgary Marriott Downtown Hotel • Insurance Bureau of Canada (IBC) • Hotel Arts • Calgary Roughnecks • Homes By Avi YYC 	<p>@FountainTire @unicorncalgary @NotableCalgary @RunDigitalPrint @CopperBrook @TELUSsupport @AnjuRestaurant @Lousautobody @callbackent @SummitroofingAB @NotableCalgary @photiangiangyyc @cmlscalgary @unicorncalgary @GOBLUECIRCLE @eatnaaco @CalgaryMarriott @InsuranceBureau @HotelArtsYYC @NLLRoughnecks @HomesByAviYYC</p>
NGOs and community groups	12	<ul style="list-style-type: none"> • Red Cross in Alberta • East Village • Neighbour Link Calgary • Calgary Drop-In & Rehab Centre Society • Volunteer Calgary • West Hillhurst Community Association • Calgary Reads • Brown Bagging For Calgary's Kids • Federation of Calgary Communities • West Hillhurst Community Association • Vecova • Brown Bagging for Calgary's Kids 	<p>@RedCrossAB @EastVillageYYC @NeighbourLink @calgarydropin @VolunteerCal @WestHillhurstCA @CalgaryReads @BrownBaggingIt @FedYYC @WestHillhurstCA @Vecova @BrownBaggingIt</p>

Appendix B

Table 6 Functions of disaster social media by Houston et al (2014)

Disaster social media use	Disaster phase
Provide and receive disaster preparedness information	Pre-event
Provide and receive disaster warnings	Pre-event
Signal and detect disasters	Pre-event → Event
Send and receive requests for help or assistance	Event
Inform others about one's own condition and location and learn about a disaster-affected individual's condition and location	Event
Document and learn what is happening in the disaster	Event → Post-event
Deliver and consume news coverage of the disaster	Event → Post-event
Provide and receive disaster response information; identify and list ways to assist in the disaster response	Event → Post-event
Raise and develop awareness of an event; donate and receive donations; identify and list ways to help or volunteer	Event → Post-event
Provide and receive disaster mental/behavioural health support	Event → Post-event
Express emotions, concerns, well-wishes; memorialise victims	Event → Post-event
Provide and receive information about (and discuss) disaster response, recovery, and rebuilding; tell and hear stories about the disaster	Event → Post-event
Discuss socio-political and scientific causes and implications of and responsibility for events	Post-event
(Re)connect community members	Post-event
Implement traditional crisis communication activities	Pre-event → Post-event