Facebook Usage During a Flood – a Content Analysis of Two Local Governments' Facebook Pages

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Facebook Usage During a Flood – a Content Analysis of Two Local Governments' Facebook Pages

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Abstract

During a disaster it is vital that government agencies provide timely and accurate information to the public. Lately, social media such as Facebook have become important channels for crisis communication. The purpose of this study is to identify the types of usage and topics in which users of a local governments' Facebook page engage, during a flood. A content analysis was carried out on two local governments' Facebook pages during two floods in 2013; The Bundaberg Regional Council's (BRC) and the City of Calgary's (CC). The results show that Facebook is an important channel for spreading information. Users' engagement is especially high in real-time operational information concerning road or school closures and drinking water. Also, the coordination of relief efforts such as volunteering raises a lot of interest. Important usage types and topics to communicate through a local government's Facebook page are proposed.

Keywords Facebook, Social Media, Crisis Communications, Content Analysis, Flood.

INTRODUCTION

Our society faces an increasing breadth of crises and particularly, as a consequence of global warming, natural disasters such as floods. In a time of crisis, the public rely on government agencies to provide timely and accurate information on what is happening and the recommended actions. A fast growing area of interest among researchers and practitioners is how information systems (IS) can contribute to disaster management. Lately social media have become important channels for citizen-government communication, not only in peacetime but also during disasters. Social media has proven valuable for information sharing during numerous disasters (Aisha et al. 2015; Bird et al. 2012). Also, social media enable citizens to act as volunteers (Kaufhold & Reuter 2016).

Earlier research on social media and disaster management has often focused on the use of the microblog Twitter (see e.g. Spence et al. 2015) despite the fact that Facebook has substantially more active users worldwide[1]. Facebook is a social networking site where users create a "profile" and become "friends" with other users. They can create "posts" with textual "statuses", upload videos, photos or links etc. on their own and other peoples' Facebook "walls". Furthermore, they can join "groups" or "like" the Facebook page of an organizations. Once they have "liked" a Facebook page, posts on that page become visible in the user's "newsfeed". If the page owner has allowed it they can also comment on the posts or even make posts of their own on the page.

Facebook has found its way into our daily lives to an extent that some people log on to the site habitually every time they open a web browser (Denti et al. 2012). Also many local government agencies are adopting it as an important social media tool. Facebook offers new opportunities for rapid dissemination of information and dialogue with the public and thus has the potential of contributing to traditional e-government goals such as greater transparency, participation, collaboration, and increased e-democracy (Mergel 2013). Lately, Facebook has also emerged as a complementary channel for crisis communication (Coombs 2012). Up to now, comparatively few studies have examined the content of citizen-government communication on Facebook during a disaster. For governments to be successful in their crisis communication it is vital to know what information, and in what format, the citizens consume, create and forward to others. Spence et al. (2015, p.180) argue that "[...] government agencies need to deploy information providing the specifics the public is looking for [...]. Consequently, because of its importance, there is a need for enhanced knowledge about the users or the "demand-side" of social media in general (Criado et al. 2013) and for crisis communication in particular. One way of gaining knowledge about users' needs and preferences is to examine the social media content in which users engage during a disaster, for example by sharing governments' posts on their own Facebook wall, commenting on posts or "liking" them. The purpose of this study is to identify *the types of usage and topics that engage the users of a local governments' Facebook page during a flood*.

LITERATURE REVIEW

This section discusses previous research on social media in government, and social media as a channel for crisis communications.

Social Media in Government

Social media in government can be defined as "a group of technologies that allow public agencies to foster engagement with citizens and other organizations using the philosophy of Web 2.0" (Criado et al. 2013, p. 320). Social media is potentially a tool for increasing openness and transparency in government and facilitating citizen collaboration and participation (Mergel 2013). Criado et al. (2013) claim that social media is becoming one of the major trends in e-government, both in research and in practice. In particular, Facebook has had a remarkable spread since its introduction, initially among individuals and lately also among enterprises and government agencies. A study of local governments in Europe reports that the Facebook adoption rate is as high as 90% in some regions (Bonsón et al. 2015). An important function of a local government's Facebook page may be to spread information about local events (Magnusson et al. 2012). Many local governments allow citizens to post information on their official Facebook page (Bonsón et al. 2015) despite the risk introduced from user-generated content. Fear of criticism or misinformation may be exaggerated as Reuter et al. (2011) claim that there is a self-regulation mechanism in social media where the community corrects itself. Opening up

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[1] See for example: www.statista.com

for users to post information enables an organization to learn about their users' needs and to take advantage of the community's collective knowledge. A recent study of a Swedish municipality's Facebook page found that users mainly use the page to request information and they also frequently share information and express opinions (Bellström et al. 2016).

Mergel (2013) suggest a framework to measure social media interactions in the public sector where the overall missions of transparency, participation and collaboration are broken down into goals, tactics and examples of social media mechanism that can be utilized to measure them. The most advanced strategy, 'the networking tactic', strives to achieve true collaboration with the users by a high degree of interactivity. Mergel suggests that this tactic's efficiency can be observed in users' sharing of page owner posts on Facebook for example, or in users making their own posts on an organization's Facebook page. So far relatively little is known about what content people prefer on governments' Facebook pages. Hofmann et al. (2013) conclude from their study of German cities that posts that contain photos or videos are four to five times more "liked" or "commented" than those without. Bonsón et al. (2015) report in their study of local European governments that photos create most engagement along with textual status updates.

Social Media and Crisis Communication

For organizations to succeed in using social media for crisis communication it is vital to actively use social media for daily (two-way) communication before a crisis occurs, and to incorporate social media into the crisis communication plans (Veil et al., 2011, Coombs 2012). During a crisis, Veil et al (2011) observes that interaction is essential to address misinformation and establish the organization as a credible source. Veil et al. (2011) report that responding to users' posts is important for the organization to reassure their users that they care about the issue and will try to address their concerns. They further stress that the information provided should be accurate and honest, and that the organization also needs to consider emotional aspects (Veil et al., 2011). Coombs (2012) classifies crisis response information into instructing information, adjusting information, and reputation management. Instructing information, that helps people make decisions and take protective actions, is vital when lives or health is in danger. Adjusting information is important for people to be able to understand and deal with what is happening, i.e. physiologically "coping" with the situation. As for reputation management the purpose is to repair the relationship with the organization's users, when this becomes necessary as a result of the crisis or its handling (Coombs 2012).

Houston et al. (2014) identifies social media uses or functions for social media across three disaster phases: pre-event, event, and post-event. They include social media in general and users of different kind: governments, individuals etc. During the event phase a number of functions are identified as shown in the left column of Table 1, although some of them stretched over more than one phase. A similar typology, also grounded in earlier research (among them Houston et al. 2014), is presented by Takahashi et al. (2015), see Table 1. Takahashi et al. used their framework to classify tweets about Typhoon Haiyan during November 2013. The users (tweeters) were citizens, news organizations, journalists, celebrities, non-government organizations and government sources. The most common usage was reporting on the situation in second-hand (43.4 %), followed by memorializing (memorializing victims, along with well-wishes, prayers and expressions of sympathy) (32.3 %). Also coordinating relief efforts was common (14.6 %). The remaining categories only raised a few percentages each (Takahashi et al. 2015). Finally, Fosso Wamba and Edwards (2014) list contributions of social media identified from a case study of the New South Wales (NSW) state emergency service (SES) in Australia. Twitter, Facebook and YouTube were mainly used in the studied organization, although differences in usage between these applications are not discussed. In the response phase, which corresponds Houston et al.'s (2014) event phase, several utilities are listed, see the right column in Table 1.

Earlier research on social media usage during disasters has mostly examined Twitter (Aisha et al. 2015). A valuable feature with Twitter is that users can categorize the content in posts by so called hashtags that enable users to search and find posts within the same topic. For example, the hashtag #PrayforthePhilippines was used during the Typhon Haiyan (Takahashi et al. 2015). While Twitter has a strict limitation for the number of characters in a post, it is possible to add photos and videos. Aisha et al. (2015) point out that social media may be used significantly differently in different types of disasters. The same may be true for different social media tools. In this study we focus on Facebook and floods.

Usage of social media (Houston et al. 2014, p. 8)	Usage of Twitter (Takahashi et al. 2015, p. 395).	Contributions of social media (Fosso Wamba and Edwards 2014, p. 10)
Signal and detect disasters	Reporting on the situation (second-hand reporting)	Provide media information on significant jobs to direct enquiries
Send or receive requests for help or assistance	Expressing well wishes and memorializing	Real-time sharing of operational information, such as what needs to be done, what has been done or number of volunteers in the field
Inform others about one's own condition and location, learn about a disaster-affected individual's condition and location	Coordinating relief efforts (donations, volunteering etc.)	Push important safety messages
Document and learn what is happening in the disaster	Reporting on the situation from a personal perspective	Provide links to important information on roads to be avoided or weather conditions
Deliver and consume news coverage of the disaster	Discuss causes	Provide information on evacuations or isolations
Provide and receive disaster response information; identify and list ways to assist in the disaster response	(Re-)connect community members	Provide visualization of response activities through maps, images and video
Raise and develop awareness of an event, donate and receive donations; identify and list ways to help or volunteer	Criticizing the government	Engage in intelligence gathering from the community on the scope of the disaster
Provide and receive disaster mental/behavioural health support	Request help	Communicate directly with the community to dispel myths or rumours
Express emotions, concerns, well-wishes; memorialise victims	Providing mental counselling	
Provide and receive information about (and discuss) disaster response, recovery, and rebuilding; tell and hear stories about the disaster		
Implement traditional crisis communication activities		

Table 1. Social media usage during disasters.

Research on local governments' Facebook usage during floods is relatively rare but there are some examples (see e.g. Aisha et al. 2015; Bird et al. 2012; Kaufhold and Reuter 2016). In the Aisha et al. (2015) study of social media usage during the 2014 flood in Malaysia, Facebook was the most popularly used social media application (compared to Twitter, Instagram and blogs). With its widespread adoption and easy access through smartphones, Facebook is an important complementary channel for disaster information, especially among the younger users (Aisha et al. 2015). One advantage is that news from Facebook pages that a user "likes" is automatically presented in the users' newsfeed, without the users having to actively search for it (Bird et al. 2012). There are also obvious shortcomings. Facebook is not a suitable channel for reaching all citizens and it cannot replace traditional channels such as mass media. Many still prioritize other information sources in a crisis (Ryan 2013). Facebook

and other social media also suffer from the fact that they were not constructed for crisis communications (Reuter et al. 2011). An obvious disadvantage with Facebook as a crisis communication channel (as opposed to Twitter) is that it is not possible to structure the content in topics, geographical areas, events etc., neither is the content searchable. Important information might thereby be lost in the news feed. Nonetheless, Facebook has proven valuable as a complementary channel for crisis communication.

Bird et al. (2012) studied the use of Facebook pages during the floods in Queensland and Australia 2010/11. They found that people mainly used Facebook to get information about the status in the users' own community, followed by information on family's and friend's communities. Additional motives were to share information or to offer help (Bird et al. 2012). Practically all of the respondents in Bird et al.'s (2012) study found the information on Facebook useful and Bird et al. argue that Facebook (p. 32) "can be used to effectively and efficiently disseminate emergency information on: the occurrence of hazards; location of evacuation centres and road closures; fundraising opportunities; volunteering; and reassuring people about the safety of family and friends". Ryan (2013) interviewed 27 persons from two affected communities in the aftermath of recent floods about what information they looked for during the flood. Similar to the results in Bird et al. (2012), people sought information to find out if family and friends were okay, and information about road closures. Spence et al. (2015) detected only a few topics (or information types) in their study of tweets prior to Hurricane Sandy. The topics concerned information on cancellations, evacuations, food and shelter, and how to locate others. They also found that humour was used, perhaps as a coping mechanism (Spence et al. 2015).

Social media as a tool to take an active part of the response work is discussed in Kaufhold's and Reuter's (2016) study of the 2013 European floods. Their study focuses on the use of social media by "digital volunteers", i.e. individuals involved in "real and virtual self-help activities that are initiated and coordinated in the context of social media" (Kaufhold & Reuter 2016, p. 2). Kaufhold & Reuter (2016) found that Facebook was used for community engagement and several local and subject-specific groups emerged. Spence et al. (2015, p. 181) discuss peoples' information seeking behaviour on Facebook in a similar light: "The ability to take action or perceived self-efficiency during a crisis has the ability to bring about a sense of empowerment, which allows an individual to feel control in the situation".

RESEARCH DESIGN

Our study is exploratory in character since few studies exist of local governments' Facebook usage for citizen communication during floods. The research method applied is content analysis. Patton (2002:453) claims that content analysis enables the researcher to identify recurrent themes in textual material as it "takes a volume of qualitative material and attempts to identify core consistencies and meanings". First the selection of cases is described. Then, data collection and analysis are discussed.

Selection of Cases

The criteria for the selection of cases in this study include: a) a flooding event severe enough to activate a state of emergency or equivalent, affecting a large number of people and stretching over at least a week. Further, b) that the local government actively used their official Facebook page for crisis communication during the event. A criterion is also that c) the events took place approximately during the same period of time to be able to compare usage and Facebook features but d) potentially offering a broad spectrum of usage and topics within the context of "floods" by taking place in different geographical locations, concerning organizations of different sizes and where the disasters had partly different causes and effects. Finally, out of convenience only English speaking countries are considered. Two organizations and their official Facebook pages that met these criteria were chosen: The Bundaberg Regional Council (BRC) in Australia and The City of Calgary (CC) in Canada.

Data Collection and Analysis

Data were collected for the response (acute) phases of the floods with the Facebook API Netvizz. The Netvizz application enables the extraction of data from Facebook groups or pages. Data can be exported in standard file formats (Rieder 2013). In Netvizz an overall measurement for "engagement" in a post is the sum of all user comments, likes for the post itself, likes for comments on the post and shares of the post. Data were downloaded in April 2015[2] for the period Jan. 25 to Feb. 5 2013 for Bundaberg

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[2] Printouts from the actual Facebook pages had been taken in June 2014.

and for Jun. 20 to Jul. 5, 2013, for the City of Calgary. This corresponds to the periods during which a disaster management alert (BRC) or a state of emergency (CC) was declared. A total number of 441 postings were collected from the BRC's Facebook page and a total of 718 from the CC's Facebook page. See *Table 2* where page owner posts are posts made by the BRC and the CC respectively, on their own Facebook page, while user posts are posts on BRC's and CC's Facebook pages made by the public or other organizations.

Organization	Statistical data				
	Page owner posts	Page user posts	Total no. of posts	Page owner % of posts	Page user % of posts
Bundaberg Regional Council	216	227	441	49 %	51 %
The City of Calgary	293	425	718	41 %	59 %

Table 2. Number and distribution of Facebook posts.

Data were collected and analysed in a multi-method approach similar to the one applied in Hofmann et al. (2013). Frequencies in posts and engagement – measured as the sum of shares of posts, comments on posts, likes on posts, and likes on comments on posts – were compiled automatically by Netvizz, along with the overall category of the post (event, link, photo, status). The fifty posts that ranked highest in engagement, for page owner and users post respectively were then manually coded to identify and classify the text in posts into usage types (intents) and topics. The coding process was in line with Miles and Huberman's (2004) recommendations for iterative coding and followed what Hsieh and Shannon (2005) describe as *directed content analysis.* Key concepts in prior research were used for an initial coding scheme (see e.g. Table 1). The goal of directed content analysis is to validate and extend existing, but incomplete, theoretical frameworks or theory (Hsieh and Shannon 2005), which is also a goal for this study. A first "read-through" was carried out using the initial coding scheme as a starting point. Next, a refined coding scheme with operational descriptions of each usage type and topic was developed from a subset of the usage types and topics in earlier research. The posts were then coded into one or more categories according to the coding scheme. Posts that did not fit the codes formed new categories and some earlier categories were also adapted or refined. A small number of posts were not possible to code at all as they at some point had been removed from Facebook. A final iteration was carried out to critically review the previous coding. Furthermore, to study if specific engagement measurements had significantly different results; data were also sorted and examined in order of the most frequently shared, most commented, and most "liked" page owner and page user posts.

EMIPIRCAL CASES of STUDY

Here we describe the two case studies and provide with facts about the two events, and their related Facebook usage.

The Bundaberg Regional Council and the 2013 January Flood

In the wake of the tropical storm Oswald, eastern Queensland in Australia experienced exceptionally heavy rainfalls in January 2013, causing widespread flooding from rivers and creeks (Queensland government n.d.). The most extreme level was recorded in Bundaberg, a coastal region with close to 94 000 inhabitants at the time. The level in the Burnett river set a new record by half a meter and strong winds and falling trees resulted in power outage for many homes (Queensland government n.d.). Also a number of tornados took place. Over 2000 homes were damaged and at least 1670 inhabitants were evacuated (Queensland government n.d.). A disaster management alert for the Bundaberg region was declared Friday January 25. The flood peaked January 29 of and the clean-up processes could start. The Bundaberg Regional Council's Facebook page was started in March 2008. It is not possible to get historical data on how many people that followed or "liked" the page in January 2013 but a printout from January 2014 shows that 7400 people issued "likes" for the page at the time. The BRC allowed users to make posts on their Facebook page at the time of study.

The City of Calgary and the 2013 June Flood

In June 2013 the province of Alberta experienced Canada's costliest natural disaster ever, affecting one quarter of the province, the city of Calgary included (Arthurs 2015). In three days, from June 19, Calgary had over 200 millimetres of rainfalls. When the Bow and Elbow rivers flooded from the extreme

rainfalls and an immense winter snow melting from the mountains, the grounds were already saturated from a rainy spring. A state of emergency was declared in June 20. Approximately 80 000 were evacuated, 6000 homes damaged and 4000 businesses were damaged or impacted by evacuation or power loss (ibid.). The business district was inaccessible for days due to water and power outages. A large number of roads, train or bus lines were closed. A printout shows that there were 24 852 people liking The City of Calgary's Facebook page[3] June 24, 2013, that is, in the midst of the studied disaster.

RESULT AND ANALYSIS

First, the frequency of posts and statistics of engagement for both Facebook pages are presented. Then the identified usage types and topics are discussed.

Frequency of Posts and Engagement Over Time

The analysis of engagement over time shows that the frequency of posts had a noticeable peak during the third to fifth day in Bundaberg (January 27-29) and the second and third day of the disaster in Calgary (June 21-22). A total of 63 posts were made at BRC's Facebook page in January 28 while the record at the CC's Facebook page is 147 posts in June 21. As shown in Figure 1, sharing of posts, represented by the purple line, peaked during these same periods.
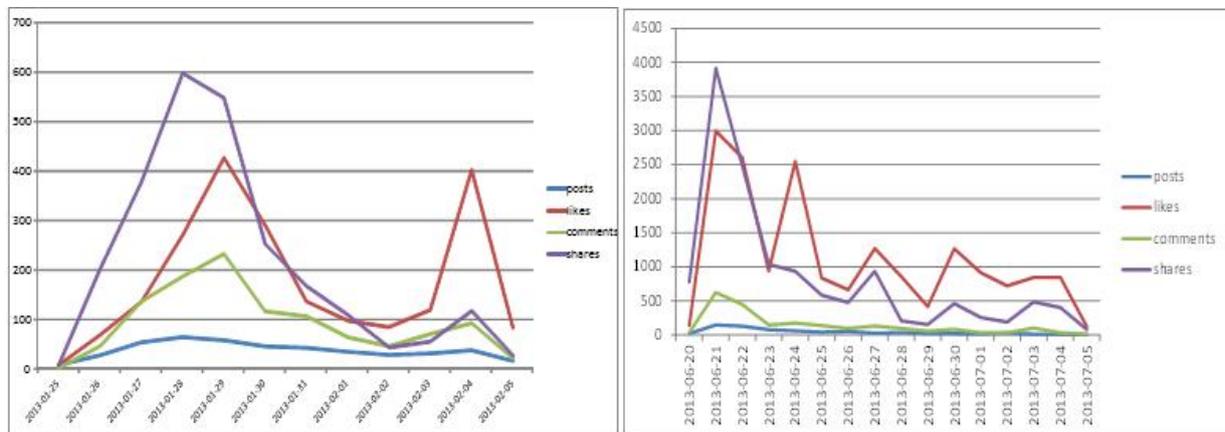

Figure 1. Statistics per day, page owner and users. BRC to the left, CC to the right.

The BRC's Facebook page had 597 shares in January 28 and a total of 2509 shares while the CC's Facebook page had as much as 3915 shares in June 21 alone, and an impressive total of 13396 shares. The large number of shares suggests that both organizations were successful in building what Mergel (2013) call true collaboration with its user. The liking of posts had two obvious peaks in Bundaberg; one in January 28-30 and a second on February 4 with two popular posts (one from the government, one from a user) expressing gratitude to waste collectors. Also a user post suggesting a sticker system for cars enabling habitants and workers to pass queues of sightseers and a page owner post telling that abusive posts will be removed raised many likes on February 4. Overall, the trend was that the engagement decreased slowly over time in both cases.

Identified Usage Types and Topics in the Posts

The analysis of the qualitative content in the 50 posts that created most engagement was divided into type of usage of, or function of, the post and the topic(s) or theme(s) the post concerned. The identified usage types for page owners are displayed in Table 3 in descending order of frequency. Only usage types identified in at least three posts is included. Moreover, a few posts were coded as "other" (which are not included in the results). Although this study strove to identify, rather than to count frequencies of usage types, the total number of identified occurrences is presented in the table to demonstrate each usage type's importance in the two studied cases. The page owners' efforts to share real-time operation information and situational updates, and to coordinate or share information on relief efforts respectively were the actions that created most engagement in both cases, although in different order.

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[3] There is no information on the City of Calgary's Facebook page on when it was started.

Usage type	Description	Theoretical reference
Share real-time operational information and situational updates (34)	Information on roads, public transports, power, water supply, schools, waste collection etc.	Fosso Wamba and Edwards (2014), Houston et al. (2014)
Coordinate or share information on relief efforts (22)	Information on needs of volunteers or donations, and how to help out.	Houston et al. (2014), Takahashi et al. (2015)
Share information on evacuations (12)	Information on, or instructions about how and where to evacuate and how and when to re-enter.	Fosso Wamba and Edwards (2014)
Push important safety messages (11)	Information on, or instructions for, personal safety or health (for example to boil water).	Fosso Wamba and Edwards (2014)
Request or offer help (10)	Request help from volunteers. Request information on flood levels, photos etc. Offer citizens help with clean-up etc.	Houston et al. (2014)
Reassure/confirm/correct earlier information (9)	Share information to help people adjust to the situation and/or trust earlier information such as assuring the water quality or dispel rumours.	Fosso Wamba and Edwards (2014), Houston et al. (2014)
Express, or appeal to, emotions (6)	Thanking volunteers, citizens, and employees. Express pride of the city/region. Evoke a "we-feeling".	Houston et al. (2014), Takahashi et al. (2015)

Table 3. Page owners' usage.

BRC and CC responded to inquiries, and posted reassuring or correcting information. This is important as it insures the users that the information is accurate and that the government is engaged in their concerns (Veil et al. 2011). The organizations also occasionally requested help or information from the user thereby applying strategies that enable citizen participation and collaboration (Mergel 2013). Regarding usage types, our findings are essentially in line with previous research. However, two usage types in particular resulted in high engagement: real-time sharing of operational information and coordination of relief efforts. Such posts were often shared and liked. The latter might suggest that crisis brings out the best in people and potentially also, that the act of volunteering and donating increases the sense of control and self-efficiency in an otherwise distressing situation (Spence et al. 2015). Information on evacuations, important safety messages, and reassuring information, for example about the water quality, were frequently shared and liked. Also, emotional expressions, such as expressions of gratitude towards the response workers, gained many likes. One of these is a post from the BRC including a photo of waste collection trucks heading out for work and a text ending: "Massive effort lads". This was one of few posts that contained a photo, a fact that other researchers report to be a success factor for gaining likes and comments (Bonsón et al. 2015; Hofmann et al. 2013). Adjusting information that helps people cope psychologically is also important in a crisis according to Coombs (2012). Humour is a coping strategy found in previous studies (Spence et al. 2015). A post that highly engaged the users strived to calm (adjust) people, used humour to confirm that the zoo animals in Bundaberg were safe: "All bird aviaries are safe and secure and the ducks are having a fabulous time".

We found very little engagement for user posts, in general. Few posts were shared and liking was limited. Many posts had (a few) comments however. A cluster-sampling indicates that both page owners and other users strived to answer user requests. A description of the users' types of usage, found in at least three posts, is presented in Table 4. Requests for information clearly dominate in the sample, perhaps indicating that many were interested in the same information and strived to control the situation (Spence et al. 2015). Two identified categories are not apparent in the reviewed crisis or disaster communication literature. These are to express opinions or ideas and to criticizing fellow-citizens or businesses, for example for not complying with a water ban. Using a government's Facebook page to express opinions was also found in Bellström et al.'s (2016) study. Some of the posts that expressed opinions created engagement, among those a suggestion for developing a multisport complex to replace a current flooded facility.

Usage	Description	Theoretical reference
Request information (51)	Asking for operational or situational information etc.	Ryan et al. (2013), Houston et al. (2014)
Share information (12)	Information on how to contribute to relief efforts, correcting misinformation etc.	Houston et al. (2014), Bird et al. (2012)
Express opinion/ideas (9)	Suggestions on how to facilitate current or future situation.	
Criticize the government (8)	Complaints regarding crisis handling or preparedness.	Takahashi et al. (2015)
Offer to help (8)	Offer to volunteer or donate or ask for information on how to.	Houston et al. (2014), Takahashi et al. (2015), Kaufhold and Reuter (2016)
Express, or appeal to, emotions (7)	Thanking the government, its employees or volunteers. Praising the community and well-wishes in general.	Houston et al. (2014), Takahashi et al. (2015)
Request help (6)	Ask for help for others, help with clean-up and to locate pet.	Houston et al. (2014), Takahashi et al. (2015)
Criticize others (4)	Complaints on fellow-citizens' or businesses' actions.	

Table 4. Page users' usage. (Frequency is given in bracket).

As for topics being used in the communications listed in *Table 3* and *Table 4*, there were no major differences between page owners' posts and users' posts. Knowledge about the topics that engage users is important as it will help government agencies decide on the information to spread or request (Spence et al. 2015). The topics found in this study are divided into five categories:

> *Situation updates* – initial warnings and state of emergency declarations, updates of situation in specific areas, flood maps etc.

> *Evacuation* – evacuation centres, and evacuation or re-entering of areas, homes, schools or workplaces

> *Infrastructure* – roads/traffic, public transport, drinking water usage and quality, power, and waste collection

> *Volunteering and donations* – volunteer work in response or recovery, caring for pets/animals, and donations of food, clothes, money, furniture, toys etc.,

> *Emotions and opinions* – praise/gratitude, well-wishes, criticism, humour, caring for family or friends and ideas/suggestions

These findings support and extend the (fragmented) results of Bird et al. (2012), Ryan (2013) Spence et al. (2015) and others. As Bird et al. (2012) report, people are interested in information on how to offer help, about road closures and the situation in specific areas, for example out of concern for family and friends (Ryan 2013). People also engage in information about evacuation (Spence et at. 2015) and in expressing well-wishes or criticisms (Takahashi et al. 2015). A finding in the CC case is that water usage and water quality were by far the most engaging topics. However, the results as a whole show that particularly traffic related issues such as road closures and relief efforts interests the users. People want to help by donating foods, clothes, furniture, money etc. sometimes to an extent that exceeds the actual needs. Turning down offers was one of the largest causes for irritation among users. One wrote:

Can someone please tell me why people are being turned away [...] People are getting PISSED OFF and soon won't want to donate. Some people do not have spare money but what they do have is things they can spare from their house and this makes them feel useful. [...].VERY DISSAPOINTED!

Overall, there were few posts criticizing the governments that raised much positive attention in likes or shares. Criticisms against the government agencies' way of handling the situation were instead often strongly disputed by other users. This supports the notion of self-regulating mechanisms (Reuter et al.

2011). Governments' may therefore not be too afraid of opening up their Facebook pages for user comments. When the Bundaberg Regional Council were criticized for diffuse or conflicting information regarding a damaged bridge many also defended them: "Seriously let them worry bout the flood first [...] give them a chance to deal with what's important first". (sic).

Finally, there are some noteworthy findings regarding media type. Overall, there were only three governmental and six user posts with photos in the entire data material. Two of these governmental posts rendered many likes, comments and shares as did one of the user posts. A majority of the governmental posts were links, while textual statuses dominated among user posts. For shares of governmental posts, textual statuses clearly dominated, while links ranked the lowest.

CONCLUSIONS AND IMPLICATIONS

We investigated citizen-government communication through two local government's Facebook pages to identify the type of usage and topics that users engage in during a flood. It can clearly be concluded from the large number of shares that Facebook can serve as an important channel for spreading information during a crisis. New information was frequently posted by the agencies, consumed and passed on by the users. A tentative conclusion is that people primarily appreciate and share information that is of common interest in many peoples' daily operations. This involves operational information about infrastructure such as roads and school closures. Co-ordination of relief efforts or information on safety or health matters like evacuations and drinking water quality seem to especially engage the users together with concerns for the common good, such as how to limit water usage. Altogether, several topics are identified and organized in five overarching categories: updates, evacuation, infrastructure, volunteering and donations, and emotions and opinions. A number of usage types for governments' and users' respectively are also identified.

This study contributes to theory building in several ways. First, it contributes to the knowledge gap on citizen-government communication through Facebook during a flood. Second, it adds to earlier research by Fosso Wamba and Edwards (2014), Houston et al. (2014) and Takahashi et al. (2015) by integrating their results and testing them in a single social media (Facebook) context. Third, by identifying and separating *usage types* (the functions Facebook serve) from *topics* (the issues that concerns people) the study proposes a refined framework that enriches scholarly understandings of social media usage. These usage types and topics may be especially important for a local government to communicate through their Facebook page during a flood. Our results indicate that a local government should be prepared to answer requirements for information, especially when several users engage in another user's post by liking or sharing it. It is particularly important to post reassuring information on, and frequently update the conditions of, roads, drinking water and other infrastructural matters with time-stamped information. Other implications involve preparation for peoples' wish to help out by planning for what type of work that potentially are suitable for volunteers, and to decide if the government should be in charge of organizing it. Separate Facebook groups could be initiated, by the government or its citizens, to handle different relief and recovery efforts. A limitation of this study is its limited sample. Information needs will likely vary between different disasters, depending on the character, demographics, societal infrastructure, etc. Ideally, our study will be followed by more cases, from other areas and types of floods. Other research approaches, such as user interviews, will be valuable, and in-depth study of all posts during an event will result in a richer understanding. While we demonstrate the importance of Facebook during a flood, further research is needed on how to interpret the actions of 'liking', 'commenting' and 'sharing' Facebook posts.

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