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Storm Warnings: Time Sensitive Proximity

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Weather reporting professionals' reliance on ground-level information is increasingly common, and specifically evident in weather media reporting. Weather-predictive tasks during high risk severe weather events are carried out for the common good of the community by virtual teams. Should we be concerned with the use of "other-generated" information outside the auspices of these professionals and their systems? Severe weather predictors are responsible for producing the early warnings that inform people in harms way and potentially save lives. In some areas these professionals work in distributive teams engaging across systems.

Core team members include broadcast media meteorologists, local emergency management, and meteorologists within the National Weather Service. Team members represent complimentary yet distinctly differing disciplinary approaches where each team member serves as a subject matter expert. Yet no team member holds expertise in a discipline concerned with validation of information. Teams extend understanding of an event by looking to external sources of situationally relevant (Wilson, 1973) information such as storm spotters, publicly generated photos and comments posted to online social media (OSM), and communication with community partners. Situationally relevant OSM, specifically Twitter, provides insight to the information behavior of this team. Without guidance from a professional with expertise in identifying quality information, particularly in an environment where anyone has the potential to contribute (mis)information, how do these teams decide, under pressures of limited time, which information to use? Here we examine the role of proximity and how it impacts decisions on potentially life-saving information sharing in time-sensitive information environments: proximity within the team (shared knowledge state) and proximity to the event (hashtag) specifically are addressed. We examine these phenomena in the context of an integrated warning team (IWT) in the U.S. mid-west to inform our ideas.

Team members have two tasks that hinge on proximity: generate a precise forecast rapidly and within a very dynamic environment; generate a document that is most likely to reach – both physically and conceptually – an audience in the proximity of the dangerous weather. Of particular interest in this paper is the negotiation of interactions between team members and their combined efforts to validate data – publicly generated images and comments posted to Twitter during a severe weather event.

Indicators of quality, credibility, and trust were identified within Tweets posted during a severe weather event on June 26, 2018 to the severe weather hashtag, #kswx, to the accounts of or mentioning the accounts of the core IWT partners in the Wichita NWS county warning area (Boettcher, 2019). The severe weather event on June 26, 2018, prompted over fifty Tweets to investigate and allowed for investigation into situationally relevant information quality. Investigative and interpretive elements of weeding out false information, irrelevant

information, or misinformation in Twitter by the IWT during severe weather events is critical to increase proximity to the event and the formulation of situational awareness and respond to the ongoing event.

The Cognitive Authority Framework–Quality Information Source (CAF-QIS) framework (Bonnici, 2016) provides systematic and structured content analysis of Tweets, yet focus group participant discussion revealed that indicators of credibility and trust are not systematic and structured in OSM when seeking information to enhance situational awareness of ongoing severe weather events. Consideration of OSM information user proximity (Bonnici & O’Connor, 2018) to the information environment is needed to connect time-sensitive Tweets to the point of use.

Credibility, validity, and trust of the Tweet content, content creator, and relationship between the Tweet and the team through an information environment specific hashtag, #kswx, contribute to information quality to be useful in their work as an IWT during an ongoing severe weather event. Tweets identified as credible, valid, or trustworthy were described as “actionable” by multiple participants with verbal discussion among the participants to identify these indicators.

Participant 2: “These are great actionable reports for us, location, time, photo evidence.”





While reviewing the same Tweet referenced by the participant above, a summary was provided by a participant that reflected several comments by focus group participants.

Participant 9: “And see this comes back to past history, you know, and, and trust. And Beth is one that we, we know, we trust, and would act immediately upon the information she provides.”




Results of focus group analysis indicate the core partners of the team utilize Twitter to enhance situational awareness and seek indicators of credibility and

trustworthiness to validate Tweets posted during severe weather events. Focus group participants described the investigative process to identify cognitive authority in OSM and focused on content creator, location, photos and videos, and time as indicators of importance and quality. Twitter posts must include indicators of credibility and trustworthiness within the sphere of interest of the team. However, participants indication of the influence of authority was inconclusive as participants did not consistently convey the indicators that were of primary importance. Of the emergent themes, content creators received the most discussion of what is deemed important when considering a Tweet for situational awareness. Content creators are not always familiar to the team but known authors and those with specific backgrounds gained credibility more quickly than others. Even when the content creator was known (proximal familiarity?), participants may seek further evidence to validate the Tweet.

Content analysis of the above Tweet revealed authority, coverage, currency, objectivity, and glyphicality were present in the screenshot (Bonnici, 2016). Authority was conveyed within the Tweet through the inclusion of a pre-existing severe weather hashtag, #kswx, the Wichita NWS username, and inclusion of usernames referencing storm chasing implying authority of the content creator. Coverage was conveyed through video evidence of the ongoing severe weather event in the Tweet. Currency was conveyed through the identification of location within the Tweet, the date and time of the Tweet were within the timeframe of the severe weather event, and time was indicated within the text of the Tweet. Objectivity was conveyed through a textual description of the cloud formation shown in the video provided within the Tweet. Glyphicality was conveyed through the use of multiple storm chaser related usernames in the text of the Tweet. The image above viewed by focus group participants included a video with a few seconds of lowering rotating clouds. Participants quickly began to discuss the time of the Tweet as compared to their recollection of the severe weather situation. The participants were in agreement that the Tweet was accurate. Confirmation of the time was discussed in relation to the location indicated within the Tweet. This image was described as “accurate” and “valid” (Participant 9) and Participant 9 “would act immediately upon this” due to inclusion of the video, location, time, and a content creator “that I would not question.”

Time-Sensitive Proximity Conceptualized

Content Analysis CAFQIS Framework	Focus Group	Tweet
<p>Authority, Coverage, Currency, Objectivity, Glyphicality</p>	<p>Video, Time, Location, Content Creator</p>	 <p>Time lapse of brief funnel/possible tornado about 5 mins ago / approx 2 S of Potwin #kswx @foreverchasin @stormchasrbryce @NWSWichita</p> <p>6:42 PM - 26 Jun 2018</p> <p>17 Retweets 51 Likes</p> <p>https://twitter.com/skewy11/status/1011756676461006849</p>
<p>Pre-existing severe weather hashtag inclusion</p> <p>Inclusion of Wichita NWS username</p> <p>Usernames referencing storm chasers</p> <p>Video evidence of severe weather</p> <p>Location identified in text</p> <p>Date and time of the post within the timeframe of the severe weather event</p> <p>Textual description of cloud formation in the video</p>	<p>Time confirmed in relation to text reference to location</p> <p>Known content creator</p>	

In summary, a cross comparison of the content analysis and focus group analysis revealed commonalities as well as differences, however, more similarities were identified than differences. The CAF-QIS framework (Bonnici, 2016) provides quality indicators with clear definitions that can be applied consistently across Tweets. Application of the framework during content analysis revealed researcher interpretation of the framework influenced identification of quality indicators. The participants identified indicators found within the CAF-QIS framework (Bonnici, 2016) but referenced the elements of the quality indicators specifically. The focus group participants spoke of content creators, location, photos and videos, and time. Similar to that of the content analysis, participant identification of credibility and trustworthiness indicators are influenced by the interpretation of participants description of credibility indicators. Credibility and trustworthiness contributed to identification of valid Tweets in the focus group whereas quality indicators were identified within the CAF-QIS framework.

Participants investigated content of Tweets to identify authority but confirmed content creators are not always known. When known authors post Tweets during severe weather, the source is trusted until such time as trust is lost. Although not stated as an indicator of quality, credibility, or validity, the researcher observed participants reference indicators of glyphicality. For example, participants discussed hashtags and noted severe weather hashtags relevant to neighboring states indicating the individual potentially storm chases in the neighboring state as well as Kansas. Participants also discussed usernames within Tweets as they may indicate storm chasing experience or location within specific media coverage areas. Words in all caps and emojis were also discussed by participants, though participants indicated these visual cues were described as noncontributors to situational awareness.

Participants seek second-hand knowledge during severe weather events and include Twitter as a viable source of valid situationally relevant information increasing the team's proximity to the time-sensitive information environment. However, information within Twitter is not taken at face value. Even Tweets considered valid by the IWT are compared to environmental conditions indicated on radar or observed in the natural environment. This comparison is a continual, dynamic, ongoing process throughout the duration of the severe weather event whether the participant actively views the radar after viewing a Tweet, or references radar by memory while the severe weather event is still ongoing. Our examination suggests that determining credibility of severe weather information does occur despite the absence of any single member of the team having expertise in a discipline concerned with validation of information.

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