Leveraging Crisis Informatics Experts: A co-creating approach for validation of social media research insights

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ABSTRACT

Validation of findings is a challenge in practice-based research. While analysis is being conducted and findings are being constructed out of data collected in a defined period, practitioners continue with their activities. This issue is exacerbated in the field of crisis management, where high volatility and personnel turnover make the capacity to attend research demands scarce. Therefore, conducting classic member validation is logistically challenging for the researcher. The need for rigor and validity calls for alternative mechanisms to fulfill requirements for academic research. This article presents an approach for validation of results of a qualitative study with public organizations that use social media as a source of information in the context of crisis management. The unavailability of original interview-objects to validate our findings resulted in an alternative validation method that leveraged experts in crisis informatics. By presenting our approach, we contribute to encouraging rigor in qualitative research while maintaining the relationship between practice and academia.

Keywords

Card sorting workshop, practice-based research, crisis informatics, support information system, validation.

INTRODUCTION

What happens when participants are no longer available to validate the findings in a research study? In qualitative research validation plays an important role in reducing research bias and ensuring trustworthiness of results (Lincoln & Guba, 1985; Mason, 2017; Pyett, 2003). One of the most common methods of validation is member checking or member validation (Bygstad & Munkvold, 2007; Doyle, 2007) where, in ensuring the co-creation of knowledge, findings and constructs involve the research participant in checking and confirming the results (Doyle, 2007). With the current fast paced work environments, volatile job markets, and lengthy research projects, it is challenging to perform member validation beyond sharing interview transcripts. Research analysis and theorizing does not go at the same pace as practice when it comes to continued performance and evolution. Without a doubt the objectives of practice and academia are different, but the need for rigor and validity calls for alternative mechanisms to fulfill requirements for academic research. This issue is exacerbated in the field of crisis management, particularly in the public sector, where attention is placed on managing the crisis at hand and service continuity (Tapia & Moore, 2014).

During 2021-22, we conducted a quantitative study about the use of social media in public service organizations (PSOs) in the context of crisis management. At this time, the world was experiencing COVID-19, a pandemic crisis that restricted access to interview-objects physically and in general. Responding to the pandemic and the parallel events that happened during this period took all the attention and resources of PSOs, time to dedicate to other activities was scarce. Therefore, few participants responded to our call for participation. By the time we concluded our analysis, the demand for services from PSOs remained high. Lack of time, burnout and other job opportunities made it challenging for us to present and discuss our findings with our original participants.

This article presents results of a workshop performed to validate results of our study explaining how PSOs transition between steady-state and crisis periods using social media as a support information system. During the

workshop, the results of the analysis were presented, and through card sorting activities (Wood & Wood, 2008) and open discussions, participants were encouraged to validate our process of classification and sorting of our data. Thus, we formulate the following research question:

How can propositions in crisis informatics research be validated in a workshop with subject matter experts by using card sorting methodologies?

The remainder of this article is structured as follows. First, we present a background of the research project. Then we describe the workshop design focusing on our use of card sorting as a methodology. Thereafter, we present our findings followed by a discussion. Finally, we draw a conclusion including future avenues of research.

RESEARCH PROJECT BACKGROUND

The main objective of the research project is to explore experiences of use of social media as a source of information (or social media listening) in public service organizations (PSOs) located in different operational, geographical and strategic contexts. Despite the different nature of the PSOs, they share the need to continue to provide services to their communities whether in normal, steady-state times or times of crises. Even though social media can be a rich source of insights for the management of crises (Hiltz et al., 2011; Hughes & Palen, 2009; Hughes & Palen, 2012), adoption and integration to the core functions of a PSO continues to be a challenge (Anson et al., 2017; Eismann et al., 2018; Hiltz et al., 2020; Hiltz et al., 2014). As a support system for the management of crises, social media listening can be understood as the extraction, classification, analysis, and reporting of insights from social media channels or other publicly available information. Social media is used systematically to ask for assistance, disseminate public warnings, sharing multimedia and directly engage with other users (Lindsay, 2011) and all this creates a story of a crisis that is revealed when monitoring the social media conversation between users that express their needs, wants, and perceptions as replies to organizations or in conversations with other social media users (Meesters et al., 2016). Moreover, while social media as a source of information could enable the possibility to detect crises before they are declared official by response authorities (Stieglitz et al., 2018), the nature of the data portrays crisis events as isolated; knowledges as modifiable, categorizable, and extractable; and local situations interpreted by those working remotely in front of a technology device (Burns, 2015).

Social media listening contributes to the fulfilment of objectives in organizations such as PSOs (Kallinikos et al., 2012), by addressing information requirements that are aligned with missions and processes of the organization; planned actions; stakeholder interests the context of operation such as demographics and location, and the unique characteristics of the crisis at hand such as magnitude, reach, and type (Chroust & Aumayr, 2013; Hiltz et al., 2020; Imran et al., 2015). Information requirements contribute to situational awareness and sense making; enable two-way conversations; and promote the discovery of events with the potential for early warning (Markenson & Howe, 2014; Moßgraber et al., 2018; Pogrebnyakov & Maldonado, 2018). In the management of crises, the organizational, technological, and environmental contexts around the PSO influence the adoption, design, improvements, and the continuity of services (Stieglitz et al., 2018), the quality and trust in information extracted from social media (Avery, 2017; Tapia & Moore, 2014), patterns of integration of systems, and collaboration patterns within the PSOs and across organizations (Ehnis & Bunker, 2020; Fathi et al., 2019; Hughes & Palen, 2012; Hughes & Tapia, 2015). The fulfillment of objectives and in turn decision-making happens under conditions of pressure and uncertainty (Thapa et al., 2017). Social media as a source of information addresses uncertainty by contributing to the understanding of the situation at a given time and throughout the crisis lifecycle (Conrado et al., 2016; Pogrebnyakov & Maldonado, 2018; Yates & Paquette, 2011). Therefore, action is enabled that in the PSOs context is translated as the continuity of services even in periods of crises.

The exploratory nature of our object of inquiry made a qualitative approach appropriate for our study. We conducted semi-structured interviews with PSOs that were using social media, and designers and developers of analytics software and services. The latter with the objective to understand the reasoning behind design decisions of software that supports social media listening. Our results yielded a clear distinction between use of social media during steady-state times and crisis response times (Herrera et al., 2023), we formulated a continuity framework that illustrates the transitions between states. However, we noticed differences in how processes of use of social media changed when transitioning between stages. Some PSOs experienced chaos while others experienced a close to seamless transition. Therefore, we formulated attributes that explain the experience of transitioning between stages. To ensure the validity and closeness of our assumptions, the framework and attributes were the objects for validation through a co-creation workshop.

WORKSHOP DESIGN AND EXPERIENCE

A workshop was conducted during ISCRAM 2022, a leading information systems and crisis management

conference on in May of 2022. The main purpose of the workshop was to discuss and validate the findings of our study involving social media use in PSOs in the context of crisis management. The study is inspired by previous studies with crisis management organizations and public health officials (Hughes, 2014; Hughes & Palen, 2012).To do so, we leveraged card sorting activities (Wood & Wood, 2008). Participants who were interested, signed up for participation via the conference organizers. We didn't have prerequisites for participation as attendees of these conferences are usually researchers and practitioners in the intersection of information systems and crisis informatics. A total of 17 experts participated in the workshop. Our participants were experts in crisis informatics working with topics of social media, artificial intelligence, and big data. Fields of expertise included engineering, emergency management, cybersecurity, public health, capacity building, and social sciences.

We chose workshops to validate our findings because it is a method of creative problem solving where participants become part of the research process and data-production (Ørngreen & Levinsen, 2017). In our case, participants and researchers relate to a specific area of interest while contributing to the production of validated data. The workshops were moderated and facilitated by two researchers from the Centre for Integrated Emergency Management (CIEM) at University of Agder, Norway. To provide a comfortable environment that promotes dialogue and discussions among all our participants, we refrained from recording video or audio. Instead, the moderators documented the workshop progress through photos and notetaking.

The Workshop Experience

The workshop started with an introduction to the topic, a conceptualization of the organizational view of social media use and the process of analysis of the interview data from PSOs (Herrera et al., 2023). We presented our data analysis formulated as attributes that provide an overview of how organizations behave during transitions between periods of crisis and non-crisis. Our data sources were 21 semi-structured interviews with PSOs using social media, software designers and developers. Our informants were working in civil protection, government offices and police. At the workshop, we demonstrated the process of attribute finding, clustering and classification that followed a thematic analysis approach (Clarke & Braun, 2014) that included an inductive approach to coding, theme identification and classification. We presented 11 attributes that reflect the experience of transitions using social media as information source (see Appendix 1 for our proposed definitions) which were the starting point for our activities (Table 1).

Anticipation and foresight	Experience and craft	Adaptive capacity	Learning
Governance	Contextual knowledge	Uninterrupted and cyclical	Agility
Team dynamics	Organizational dynamics	External dynamics	

Table 1. Organizational Attributes of Continuity and Transitions (definitions in Appendix 1).

Then participants went through interactive activities using user elicitation methodologies such as open and closed card sorting (Spencer, 2009; Wood & Wood, 2008). In between the activities, sharing plenary sessions and breaks were administered.

Card Sorting Activities

We chose card sorting as a method because of its dynamic and unifying nature. Card sorting is a method developed to identify how people sort and categorize knowledge with the help of cards representing concepts (Wood & Wood, 2008). This makes it a suitable method to trace our data analysis process and validate our propositions. We conducted open card sorting activities where participants are asked to categorize items representing their best judgement, and closed card sorting activities which used some preliminary guidance (Wood & Wood, 2008) (Figure 1).

- Activity 1: in groups of 3-5 experts, participants were asked to consider our 11 attributes and group them into categories based on their judgement. They were given cards with the 11 main attributes defined and some blank cards if they wished to add more attributes to make the groups complete.
- Activity 2: in the same groups, participants were asked to sort the main attributes into our pre-defined categories presented later in the results.

Each activity was followed by a sharing session where each group presented the reasoning behind their choices. In our last sharing session, the discussion was focused on building a common classification.
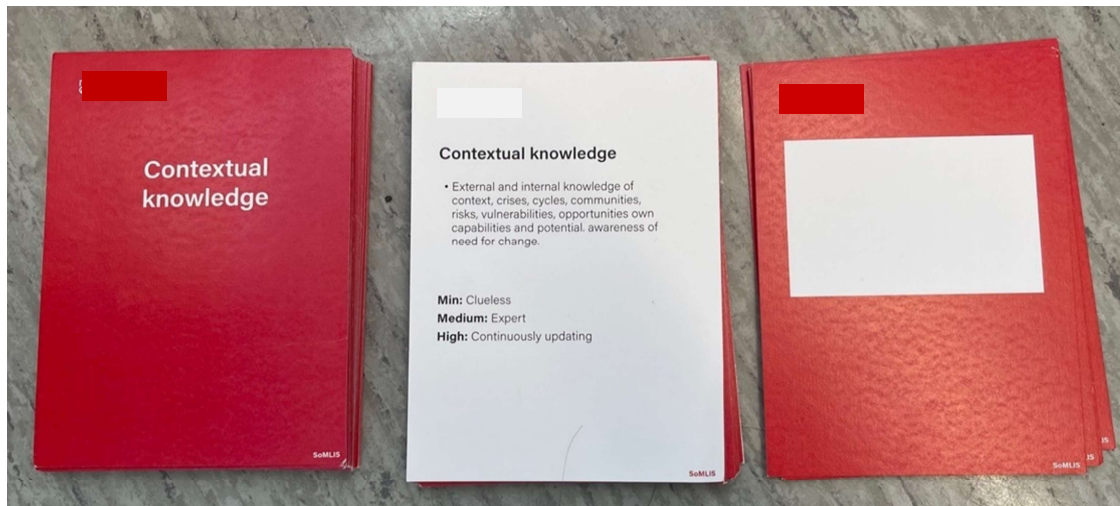
Figure 1. Cards stacks with definitions and blank cards.

Workshop Results and Analysis

Our main data sources were observations of participants captured digitally through images taken during the activities and the discussions in the workshop. In addition, we took notes to record the highlights of the discussions. Moreover, since the main objective of card sorting was to reach consensus, a final classification set that reflected our changes was digitally registered in an image. The results of our card sorting activities and discussions are presented in the following section.

FINDINGS AND DISCUSSION

This section presents the results of the card sorting activities contrasted with our data analysis (Figure 2). We offer explanations of similarities and differences that informs our future research activities.

Figure 2. Group work in card sorting activity.

Open Card Sorting

With this activity, we wanted to validate our analysis by having workshop participants trace our classification process and observe if they reached similar propositions. Three groups were tasked with attribute sorting by categories according to their knowledge and expertise. Table 2 summarizes the results which reflect the different approaches for categorization. We found that the classifications of Expert Group 1 (EG1) and Expert Group 3 (EG3) distribute the attributes quite similarly while Expert Group 2 (EG2) differs from their approach. We observe that for EG1 and EG3 *Flexibility* and *Resilience* contain the same attributes while for EG2 these attributes were

distributed between the categories of *Adaptability* and *Situational Awareness*. Likewise, attributes concerning knowledge, learning and experience were classified under one category by EG1 and EG3. EG2 placed these attributes between *Situational Awareness* and *Competences*. Figure 2 illustrates an example of the group discussions.

Expert Group 1 (EG1)		Expert Group 2 (EG2)		Expert Group 3 (EG3)	
Flexibility		**Adaptability**		**Resilience**	
	Agility		Uninterrupted and cyclical		Agility
	Adaptive capacity		Agility		Adaptive capacity
	Anticipation and foresight		Adaptive capacity		Anticipation and foresight
Relationships and access to resources		**Situational Awareness**		**Collaboration (External/Internal)**	
	Organizational dynamics		Anticipation and foresight		Organizational dynamics
	Team dynamics		Context knowledge		Team dynamics
	External dynamics	**Organization**			External dynamics
Knowledge and Learning			Team dynamics	**Knowledge Acquisition**	
	Learning		Organizational dynamics		Learning
	Experience and craft		Governance		Experience and craft
	Contextual knowledge		External dynamics		Contextual knowledge
Process		**Competencies**		**Business Continuity**	
	Uninterrupted and cyclical		Experience and craft		Uninterrupted and cyclical
	Governance		Learning		Governance

Table 2. Open card attribute sorting by expert groups.

Figure 3. Example of open card sorting classification.

All expert groups assigned the attributes that included dynamics in the title to the categories of *Organization*; *Relationships and Access to Resources*; and *Collaboration*. The participants perceived the *dynamics* word as a clue for categorization, however none of the groups proposed this concept as a category. The emphasis on relationship building is reflected in the choices of classification for EG1 and EG3 while EG2 evidenced a preference to consider attributes as requirements that satisfy the fulfilment of a category that leads to transitioning in between steady state and crisis events.

The continuity nature of service provision from PSOs is reflected in the EG1 and EG3 assigned categories of *Process and Business Continuity*. The governance attribute was located under these categories by EG1 and EG3 while EG2 placed the attribute under the *Organization* category together with the d*ynamics attributes* previously discussed. This result suggests the increasing importance of governance for the sustained operation of PSOs beyond strategy.

Knowledge and Learning	Action and Performance	Collaboration and Support

Table 3. Main categories proposed by the workshop organizers.

During the following discussion session, we revealed our main categories (Table 3) and analyzed the similarities and contrasts. All expert groups had four categories while we had three. The knowledge category was present in EG1 and EG2 as well as the relational nature for the collaboration category. After the discussion workshop chairs and participants agreed that the original classification was more compelling, since the workshop organizers are more acquainted with the data and had more time for analysis. This original classification was therefore the starting point for the next activity.

Closed Card Sorting

With our main categories disclosed, we asked our expert groups to sort the 11 attributes into our categories, which results are displayed in Table 4.

	Workshop organizers		EG1		EG2		EG3
Knowledge and learning							
	• Contextual knowledge • *Anticipation and Foresight* • Learning • *Governance* • *Experience and craft*		• Contextual knowledge • Anticipation and Foresight • Learning		• Contextual knowledge • Anticipation and Foresight • Learning • *Feedback*		• Contextual knowledge • Learning • *Experience and craft*
Action and performance							
	• Uninterrupted and cyclical • Agility • Adaptive capacity		• *Experience and craft* • Uninterrupted and cyclical • Agility • Adaptive capacity		• *Experience and craft* • Uninterrupted and cyclical • Agility • Adaptive capacity • *"If things go wrong"* • *Response scheme*		• *Anticipation and Foresight* • Uninterrupted and cyclical • Agility • Adaptive capacity • *Governance*
Collaboration and support							
	• External dynamics • Organizational dynamics • Team dynamics		• *Governance* • External dynamics • Organizational dynamics • Team dynamics		• *Governance* • External dynamics • Organizational dynamics • Team dynamics		• External dynamics • Organizational dynamics Team dynamics

Table 4. Closed card attribute sorting by expert groups compared to the research team propositions.

Anticipation and foresight, experience and craft, and *governance*, attributes originally placed by the research team under *Knowledge and learning*, received a different classification when expert groups revealed their propositions in our discussion. Colors are used to trace these attributes that deviates from the initial categorization.

Furthermore, new attributes were added such as *feedback, "if things go wrong" and response scheme*. Feedback was deemed important by workshop participants as part of constant improvement of the social media use activities and the technology performance in relation to the needs of the response. With "if things go wrong" and "response scheme", workshop participants saw the need of contingency plans and strategies to mitigate the unexpected, such as the appearance of cascading or parallel crisis events or contextual shifts with the crisis at hand that might have not been foreseen by established processes and protocols. These additions reflect the need for preparedness, standardization, and constant improvement in managing crises to ensure continuity among transitions, leaving little room for improvisation.

Discussion and Consensus

After the card sorting activities, the participants and workshop facilitators discussed the reasoning behind the classifications (Table 5). *Anticipation and foresight* were left under *Knowledge and Learning* because of the role of this attribute in cognition, understanding, and prediction. These are attributes characteristic of situational awareness (Endsley, 2017). Likewise, *experience and craft* were also left under the same category as an attribute of knowledge that enables processes, actions, relationships, and collaborations.

Knowledge and Learning	Action and Performance	Collaboration and Support	*Tools and Technology*
Learning	Agility	Team dynamics	*TBD*
Experience and craft	Uninterrupted and cyclical	Organizational dynamics	
Contextual knowledge	Adaptive capacity	External dynamics	
Anticipation and foresight	*Governance*	*Governance*	
Feedback	*"If things go wrong"/response scheme*		

Table 5. Final classification after deliberations with all participants.

The participants couldn't agree on the placement of *Governance* which beyond the operational importance discussed earlier, also is an enabler of continuity and formalization of relationships and ongoing collaboration dynamics.

The additional attributes proposed reflect the need for preparedness and constant improvement in managing crises to ensure continuity among transitions. Also, the disagreements between placements could reflect a need for additional analysis to refine and support the attributes classifications and definitions. Moreover, two of the participants (from different groups) stated that there could be a *supervision layer* that oversees the main attributes layer. This is an interesting idea worth for further exploration both from organizational and technical perspectives.

The workshop participants felt strongly that the attributes needed a fourth main category labelled as *Tools and Technology* because there wasn't an explicit mention of technology in the definitions. This could be an indicator of a weakness in explicitly stating the sociotechnical nature of the attributes in the definitions (see Appendix). This new category could be an indicator to analyze social media use, in this context of information source, as a system of systems (Bunker et al., 2018; Cavallo, 2014) aligned within the boundaries of the PSO and the boundaries of the different phases of crisis management. As social media systems support transitions, behaviors in the system of systems manifest dynamically, which affect response, reactions, and overall performance in crisis management. The need for a system of systems approach is aligned to the additional attributes that emerged from the workshop.

This validation exercise reaffirms our premise that these attributes, present in all interviewed PSOs, could determine how support systems contribute to continuity. However, generalizations are difficult due to the contextual nature of social media use in the management of crises. This calls for the future formulation of measuring mechanisms to compare different experiences.

We observed some hesitation among the participants to assign classifications to the 11 attributes in the first activity. Some participants expressed that within their expertise in social media research, the transitions between crisis events hadn't been considered in depth. Thus, participants then asked for more context and time to understand and place themselves in the "shoes of the PSOs". For most of the participants, especially those in more technical fields, it was challenging to imagine a day-to-day function during steady state and transitioning through crises. Those with a more social science and organizational background were more comfortable with performing the activities.

CONCLUSION AND FUTURE WORK

The difficulty to validate our findings with the original interview objects of our study drove us to use creative thinking and formulate an alternative validation approach. Therefore, a workshop was conducted using card sorting as a methodology for validating the results of our analysis of the use of social media as a source of information in PSOs. Social media use is considered as a system that supports the continuity of service provision during transitions. Participants of the workshop were experts in crisis informatics research with keen interest in social media studies.

After open and closed card sorting activities, the preliminary analysis of results reveals a great deal of consensus in the classification of attributes that explain the behavior of the PSOs in navigating crisis management and continuity of services.

Our alternative approach worked well for us to validate our findings. In analyzing the results of the workshop, we note that we need to deepen our propositions to evidence the sociotechnical nature of social media use and a systems perspective. Therefore, future research avenues include revisiting and refining the attributes according to our data set with interviews with PSOs and designers and developers of technology tools that support social media listening. Moreover, additional workshops could be conducted with other types of experts and practitioners to contrast these results.

APPENDIX. ATTRIBUTE DEFINITIONS

The following are the definitions of the attributes distributed to workshop participants in the card sorting activities. These attributes emerged from the analysis of interviews with professionals from public service organizations using social media and, designers and developers of software to support the extraction and analysis of publicly available information.

Learning: Attaining knowledge in organizational, contextual, and technical dimensions. Training and awareness of support systems (social media teams, decision making, stakeholders, technology, community). How is awareness promoted?

Governance: Documents and general organizational cognizance that promotes managerial support and buy-in. Governance describes, frames, and provides guidance to social media processes in the organization

External dynamics: Network of collaboration and relationships with organizations with similar objectives, stakeholders, and potential capacity enhancers. Access to resources that transcend organizational boundaries and contribute to fulfillment of common objectives/operations. Formal, informal, and improvised relationships.

Contextual Knowledge: External and internal knowledge of context, crises, cycles, communities, risks, vulnerabilities, opportunities own capabilities and potential. awareness of need for change.

Uninterrupted and Cyclical: Cyclical performance, provision of services without interruptions. Response to contextual needs.

Agility: System's ability to rapidly reorganize itself to respond to changes in an uncertain and fast-phased environment.

Experience and Craft: Proficiency of techniques/procedures/strategies and ability to extract, analyse, and present insights from social media. Experience with social media, crises and the local context. Familiarity about the purpose and services of the organization.

Team dynamics Internal team collaboration and support dynamics. Ability to coordinate tasks among team members. Relationships and access to resources that support the fulfillment of tasks.

Organizational dynamics (internal): Team positioning within the organization, recognition, and collaboration networks. Leadership oversight and support. IT support and relations. Relations and coordination capabilities that when needed, can be activated to support the fulfillment of objectives and tasks. Access to resources within the organization.

Adaptive Capacity: The flexibility to experiment and adopt novel solutions and development of generalized responses to a broad class of challenges.

Anticipation and Foresight: Prediction and anticipation of events. Planning and strategizing beforehand for the unknown. Capacity building.

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