Illuminating the Dark Side of Knowledge

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Last year, 2019, was the 10-year anniversary of the L'Aquila earthquake in the Abruzzo region in central Italy. 308 people were killed, 70,000 were made homeless and around 56 villages were partially destroyed (Alexander, 2010) (Hooper, 2009). In the aftermath of the earthquake thousands of people relocated to Rome and neighbouring areas, some permanently, others in "new towns" under the CASE project (Alexander, 2010) (Fiorino, 2015). Despite relocating the G8 summit to the city in 2009 in an attempt to redistribute disaster funds to the area, much of the city centre remains unrestored. Still, in 2019 only between 30% and 60% of buildings in the historic centre have been reconstructed (Il Fatto Quotidiano, 2019) – see figures 1 and 2 below.

Figure 1. Ubiquitous cranes dot the skyline in L'Aquila, Italy. Credit: Julie Dugdale, October 2019.

Figure 2. Reconstruction continues in L'Aquila, Italy. A side street off the main thoroughfare. Buttressing on the buildings on the right-hand side of the alley. Credit: Julie Dugdale, October 2019.

The L'Aquila earthquake also had a deep impact on the academic community when in 2010 six scientists of the National Major Risks Commission were indicted for multiple manslaughter. An amateur earthquake scientist informed the authorities that the observed large increases in radon emissions indicated an imminent large earthquake. The National Major Risks Commission responded, categorically stating that there was no danger and that a major tremor was unlikely (Alexander, 2018). Although 3 years later the scientists were exonerated, the L'Aquila trial had shaken the academic community as it had effectively held scientists responsible for failing to give adequate warning of the earthquake. While the academic community has recovered from the initial verdict, L'Aquila has not. Although physical and economic recovery has been slow, the social recovery has been much slower.

In the post-disaster phase in the crisis management life-cycle there is traditionally a heavy focus on the physical restoration of a city. The emphasis tends to be on structural recovery; re-establishing roads, power and communication infrastructures, reconstructing buildings, and ensuring the continuity of operations. While these activities are essential, the social element is all too often neglected.

Rebuilding a city also means reconstructing the social fabric in order to restore the community spirit. In this sense structural rebuilding policies in the aftermath of a disaster should bear in mind how they can support and reconstruct the social community. This can of course be by rebuilding iconic city monuments since these can help to reestablish a sense of social identity (Alexander, 2012) (Biron, 2019). However, attention should also be paid to ensuring that shops, community centres and colleges, coffee bars, and sports centres, etc. are up and working as soon as possible. This, along with promoting cultural events, reestablishing markets, and trying to get people back into their own homes and establishing old routines, as soon as possible, will help

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to conserve and strengthen social interaction and social cohesion.

The question for us is how can technology help to rebuild the social fabric of society after a disaster? Firstly, technology, via social media communities stricken by a crisis. This "crowd-voicing" serves the community by giving it a feeling of unity and empowerment.

By listening to the social sentiments, authorities can perform a more accurate needs assessment, adjusting their reconstruction policies to the requests of the population. However, the technology should be appropriate to the context. This was the case in the makeshift camps that were set up after the 2010 Haiti earthquake. One hundred and forty suggestion boxes were placed next to information booths, one of which received 900 letters over 3 days. This scheme, set up by the International Organisation for Migration, gave a chance to homeless Haitians to spell out their needs to the outside world (Kaussen, 2011) (Sontag, 2010).

Many victims of disaster experience changes to their psychological well-being. In a study looking at how people engaged with the "Tassie Fires – We can Help" Facebook page set up in response to the 2013 bush firesin so uthern Tasmania, Australia,, Paton and Irons found that the page was vital to many victims' psychological well-being (Paton and Irons, 2016). Good mental health and well-being are linked to social cohesion (Yu et al. 2019).

Developing a community spirit and socially regenerating devasted city centres is aided by social media. In the case of L'Aquila, parents of small children coordinated through a Facebook page, agreeing to meet in a local park so that their children could play together; the ultimate goal was to bring life back to the centre.

What we have tried to show in this introduction is that the effects of disaster can last for many years. They can affect not only the economic and structural elements of city life, but can completely change the social fabric of society. ICT has a supportive role to play in helping citizens rebuild their communities and give life to destroyed city centres. In this sense, we would urge further research into how ICT can rebuild the social fabric after a disaster.

The series of papers, presented at the mini-track on ICT for crisis and emergency management at HICSS 2020, explores new technological opportunities, the science behind them, and the challenges that we face.

The first paper by Matthew Johnson, Dhiraj Murthy, Brett Roberstson, Roth Smith, and Keri Stephens looks at an approach to solve a new class of problems in disaster management; using images from social media in near real-time. The paper is titled "DisasterNet: Evaluating the Performance of Transfer Learning to Classify Hurricane-Related Images Posted on Twitter". It is clear from this work that we are well past the stage of analysing text in social media posts. Also social media in emergency and crisis management is here to stay. The paper presents a framework to classify hurricane images according to five criteria: urgency, relevance, time period, and the presence of damage and relief motifs. What is novel is the application of transfer learning and the fact that a relatively small training data set was successfully used. The results of this work are far ranging since they mean that custom models for classifying images do not need to be built. We are happy to announce that this paper was recommended as best paper in our mini-track.

From social media we now move to information management in simulation exercises. The benefits of performing simulation exercises in terms of constructing knowledge and solidifying skills have been known for many years. The paper by Kenny Meesters and Yan Wang on "Information Management in Large-scale Disaster Exercises: An Integrated Perspective" takes a broader look at information management (IM) in this context. The authors not only look at IM from the point of simulation participants, but from that of exercise directors. By exploring the similarities and differences between these 2 points of view, the authors look at the interconnectivity and reciprocal influence of the two parts. The paper draws upon 2 well-known large-scale exercises (SimEx 2018 and TriplEx 2016) in which the authors were involved. The results show how information quality of the control aspects have a direct impact on the IM quality of the exercise itself. Moreover, the authors show how both perspectives (control of the exercise and the exercise itself) require the same skills, capabilities and, to some extent, the same tools and services to effectively manage information in order to support decision-making processes.

The third paper is by Chan Wang, Yushim Kim and Seong Soo Oh on "Epidemic Response Coordination Networks in Livings Documents". The work looks at how connections between response organisations change over time. They use the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) in 2015 in South Korea as a case study. The idea is to review the gap between the response actors that were planned to be involved in the response and those that were actually involved. The approach is to analyse different versions of epidemic response manuals that have been modified during the response. Analysing these revisions uncovers some interesting results. What comes through in this paper is how planners continually learn and adapt their response coordination plans and the actors that are, or should be, involved. Although some actors can be identified as being obviously and immediately relevant to the response coordination, what is more difficult to plan for are the emergent actors that appear as the response.

The fourth paper combines the topics of the previous two papers by looking at data produced from full-scale exercises. The paper, by Kristine Steen-Tveit, Jaziar Radianti and Bjørn Erik Munkvold is titled "Using Audio-Logs for Analyzing the Development of a Common Operational Picture in Multi-agency Emergency Response". The authors present a methodology for the analysis of real-time communication for building the common operational picture (COP), using audio-logs. The approach is not intended to be a replacement, but a complement to existing methods. The paper draws out 6 important features for a COP and importantly, it classifies communication exchanges between agencies into 14 categories.

The final paper by Catsen Siemon, David Rueckel and Barbara Krumay, concerns "Blockchain Technology for Emergency Response". Again, the focus is on communication and information exchange. However, the emphasis in this paper is on how a solid, stable communication infrastructure can be built using blockchain technology. This is one of the first papers on this relatively new technology that we have seen in this minitrack. One of the underlying concepts in blockchain technology is the assurance of trust. As the authors point out, a crucial precondition for an interpersonal and interorganisational information exchange and cooperation is trust. Indeed, the information providers in an interorganisational network will not exchange their messages without guarantee of information security features. This is where blockchain technology comes in. Following a design science approach, the paper provides a framework for adopting blockchain technology for emergency response.

The papers in this minitrack show that some problems, such as ensuring good communication and coordination still exist in crisis and emergency management. Audio logs, images from social media, and the analysis of evolving response plans can help with these issues. Information exchange and information management remain a central issue. In addition to looking at past crises, simulation exercises are of paramount value. Finally, security and trust of exchanged information can be supported by new technologies, such as blockchain.

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