

# BRG REPORT

## Factsheet 6: The Changing Dynamics of Crisis Communication: Evidence from the Aftermath of the 2011 Tsunami in Japan

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*Purpose:* The Swiss Federal Office for Civil Protection (FOCP) has tasked the Center for Security Studies (CSS) at ETH Zurich with compiling factsheets on Critical Infrastructure Protection and on risk analysis to promote discussion and provide information about new trends and insights.

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## INTRODUCTION

On 11 March 2011, a 9.0 undersea earthquake occurred at 14:46 (local time) off of the east coast of Tohoku, 400km north of Tokyo.<sup>1</sup> Documented as the country's most powerful recorded earthquake (and one of the five most powerful earthquakes in the world), it triggered a significant tsunami that slammed into Japan's coast, with waves ranging between 3 to 10 meters high (or more),<sup>2</sup> devastating coastal communities. However, what started off as a natural disaster, soon morphed into a much more complex crisis. As the tsunami made its way through communities – causing over 15,000 casualties, uprooting lives to regional shelters, and losses in power and water supply – it dealt significant blows to the regions infrastructure. This was particularly the case with some of the nuclear power plants lining the coast that were ill-equipped to deal with the scale of such a natural disaster, with the most considerable damage at Fukushima I Daiichi Nuclear Power Plant. As first responders reached affected communities, images of smoke billowing from damaged nuclear power plants began to circulate throughout the media – generating concerns of a possible nuclear meltdown.

While people around the world noted the “resilience and stoicism exhibited by the Japanese people”<sup>3</sup> in the face of combined crisis caused by a natural disaster (earthquake and tsunami) and human error (ill-

preparedness at nuclear power plants, weak nuclear oversight), criticisms were quickly levied at the Japanese government for what was labeled as poor crisis communication. Changing and at times competing evacuation information coupled with poor crisis information coordination between government officials and the plant's private operator, Tokyo Electric Power Company (TEPCO), created the pervasive feeling that crucial information was not only being withheld from the public, but also being distorted. This, in turn, bred fear, rumors and misinformation that quickly ricocheted across the globe.

A typical crisis communication study on this case might critically examine the communication failures between public officials, first responders, and private critical infrastructure operators however there is actually another side of this story. Though the Japanese officials and TEPCO clearly struggled with coordinating crisis communication efforts and supplying crisis information to assuage concerns, at the community level, there were individuals who reported through a variety of media channels. The face behind this large body of information was not only official news outlets, but also individuals affected by the crisis. Using various information technology tools and platforms – such as computers, mobile phones, and Internet and social media – individuals transmitted, shared, and receive information on the tsunami as well as the unfolding nuclear catastrophe. For instance, the Pew center reported that during the week of March 14–18 “a full 64% of blog links, 32% of Twitter news links and the top 20 YouTube news videos were about” the crisis in Japan.<sup>4</sup> In addition, there was a vibrant crisis mapping effort that emerged nearly four hours

1 “Japan earthquake: Tsunami hits north-east”, BBC online. 11 March 2011. Available at: <http://www.bbc.co.uk/news/world-asia-pacific-12709598>

2 The range in wave height is according to various reports from the affected area. For example see: “Tsunami Information NUMBER 64 (Tsunami Observation)”, Japan Meteorological Agency, issued 18:05 JST, 13 March 2011. Available at: [http://www.jma.go.jp/en/tsunami/observation\\_04\\_20110313180559.html](http://www.jma.go.jp/en/tsunami/observation_04_20110313180559.html)

3 Yilmaz, Senol. “Fukushima Nuclear Disaster: A study of poor crisis communication”, RSIS Commentaries, No. 93, 21 June 2011. Available at: Fukushima Nuclear Disaster: A study of poor crisis communication

4 “In Social Media: It's all about Japan”, PEJ New Media Index, 14–18 March 2011. Available at: [http://www.journalism.org/index\\_report/social\\_media\\_it%E2%80%99s\\_all\\_about\\_japan](http://www.journalism.org/index_report/social_media_it%E2%80%99s_all_about_japan)

after the earthquake and subsequent tsunami so to help improve situational awareness of the disaster-affected communities and coordinate relief efforts. As described by Dunn and Giroux “crisis mapping is both a process and an outcome” that leverages the power of “crowdsourcing” using various streams of crisis information provided by individuals via mobile phones and Internet platforms that is then “verified, categorized and visualized by volunteers using satellite imagery and open source mapping platforms.”<sup>5</sup> Thus, while this factsheet will examine the crisis communication efforts of the public and private sector stakeholders in Japan, it will also focus on this novel, bottom-up effort and provide some needed insight into today’s context where the crisis communication experience is a dynamic and complex network rather than static and linear. It involves multiple actors using multiple tools and spaces (i.e. both physical and virtual) to deal with complex crises.

To analyze this trend in more detail, the next section will focus on how the characteristics of today’s complex crises as well as conventional understandings of crisis management and communication. Such characteristics include the tendency for today’s crises to have cascading, disproportionate effects as well as the impact of emerging factors relating to ICT, social media, and the broader media culture. While the former has created new challenges for crisis management, the latter is transforming the way in which crisis communication takes place – particularly as it relates to who is providing the info, through what means, and for what purpose. Building on this more conceptual discussion, section 2 returns to the Japan tsunami case study. First, we briefly look at the crisis communication efforts of the Japanese gov-

ernment and the private owner of the Fukushima Daiichi nuclear power plant, TEPCO; noting how this relationship plays into the larger discussion on public private partnerships in CIP and the specific challenges that arise when dealing with CI disruption concerning sensitive materials, such as nuclear. Second, in absence of coordination between public and private officials we turn to the bottom-up efforts that spontaneously emerged and filled a gap in crisis communication. Finally, we conclude with a discussion that uses the Japanese cases to further analyze crisis communication. We further link the adaptive, quick response shown by the Japanese people to the discussion on societal resilience. In terms of implications for Switzerland, we first emphasize the importance of risk management practices that involve working with CI operators to develop crisis scenarios and identify a communication strategy in the event of small to large-scale disruptions. Second, we suggest that it is in government’s best interest to both be aware of and adapt crisis communication plans to the changing media space.

5 Dunn Cavelty, Myriam and Jennifer Giroux “Crisis Mapping: A Phenomenon and Tool in Complex Emergencies” CSS Analyses, No. 103. Available at: <http://www.sta.ethz.ch/CSS-Analysis-in-Security-Policy/CSS-Analysis-in-Security-Policy-Archive/No.-103-Crisis-Mapping-A-Phenomenon-and-Tool-in-Emergencies-November-2011>

# 1 CRISIS MANAGEMENT AND COMMUNICATION: TRADITION MEETS A CHANGING CONTEXT

We define crisis as an unusual or rather atypical situation that is caused by a triggering event – such as a terrorist attack, airline crash, or natural event like an earthquake – which sets in motion a set of strategic decisions as well as brings with it a certain degree of uncertainty. Framed this way, *crisis management* is not only about providing relief and mitigating damages caused by the triggering event but it is also about managing the ensuing uncertainty and the danger it poses to a social, political or economic system (whether the system is a community, a state, an organization, etc.). This conceptualization closely relates to Rosenthal et al, who define a crisis as “a serious threat to the basic structures or the fundamental values and norms of a social system – which under time pressure and highly uncertain circumstances – necessitates making critical decisions”.<sup>6</sup> Arjen Boin builds on (?) this by conceptualizing a crisis “as a period of discontinuity, marking the breaking point in a patterned process of linearity.”<sup>7</sup> He goes on to further note that a crisis can call into question the legitimacy of a government, “undermining its crisis management capacity.”<sup>8</sup> While this traditional understanding certainly holds true today, **today’s crisis experience is being confronted with a changing context.**

**First**, the aspect underscored by Boin regarding the challenges that a crisis brings for governments is especially true in today’s increasingly complex world. Characterized by a high degree of interconnection

and interdependence between social, ecological, and technical systems, the effects of today’s crises are rarely isolated or contained in the local area (?) in which they originate. The modern crisis does not remain in pre-defined borders, policy areas, and/or constraints. It is dynamic, varied and characteristically comes with an element of surprise that draw out new vulnerabilities. In turn, and reiterating Boin’s statement, governments are increasingly challenged by contemporary crises in new ways.

Illustrative of this characterization, the 2011 earthquake-tsunami event in Japan brought with it many surprises and additional, unforeseen consequences. For example, the damages to the nuclear power plants and subsequent shutdown of other power plants in the region (for security reasons) led to disruptions to the country’s power supply. This had two major impacts. First, in the face of an energy crisis, companies – particularly in the technology and automobile industry – were unable to operate and deliver parts to domestic and global partners.<sup>9</sup> For example, as the Economist noted:

“Mitsubishi Gas Chemical and Hitachi Chemical, control about 90% of the market for a specialty resin used to bond parts of microchips that go in to smart-phones and other devices. Both firms’ plants were damaged. The compact battery in Apple’s iPods relies on a polymer made by Kureha, which holds 70% of the market, and whose factory was damaged.”<sup>10</sup>

6 Rosenthal, Ariel, Michael T. Charles, and Paul T Hart. 1989. The World of Crises and Crisis Management. In “Coping with Crises: The Management of Disasters, Riots, and Terrorism”, edited by Ariel Rosenthal, M. T. Charles, and Paul T Hart. Springfield, IL: Charles C. Thomas, p. 10.

7 Boin, Arjen. 2004. Lessons from Crisis Research. In “Crises in the Twenty-First Century”, edited by Bruce W. Dayton. International Studies Review, 6. p.166.

8 Ibid.

9 Marsh, Peter. “Industry Left High and Dry”, Financial Times, 12 April 2011. Available at: <http://www.ft.com/intl/cms/s/o/d9667732-653d-11e0-b150-00144feab49a.html>

10 “Broken Links”, The Economist, 31 March 2011. Available at: <http://www.economist.com/node/18486015>

While plants did not experience long-term disruptions (production resumed for most plants within three months), the effects on global supply chains revealed a new dynamic in the crisis that added brought to light interdependencies that extended far beyond Japan's borders. Second, the near nuclear-meltdown had a clear energy policy impact, resurrecting and strengthening calls to abolish nuclear energy. For instance, nearly two months after the disaster, Germany announced plans to give up its nuclear energy.<sup>11</sup> Similarly, Switzerland suspended the approval process for three nuclear power stations in response to this event.<sup>12</sup>

**Second**, not only are crises becoming more complex, but the communication terrain is also undergoing considerable change. The characteristics of today's information society involve multiple actors, information sources and fast dissemination ways. This shift goes hand-in-hand with changes in the global media environment and the way that people communicate and exchange information. In this respect, access to mobile phones and mobile technologies coupled with the growth of social media platforms (such as Facebook, Twitter, and photo/video media sharing sites) has fundamentally altered both the global media environment and societal interactions. In short, more actors are involved in the information sharing and exchange space such that when a major crisis occurs – be it a natural disaster, terrorist attack, or other catastrophic event – the incident is not only reported by mainstream media outlets, but also via individuals who utilize mobile technology to share varying types of information to a broad, potentially global, audience. As a result, this trend has begun to transform the way that people deal and interact with

a crisis situation. This shift has particular implications for crisis communication.

Before delving more deeply into the discussion on crisis communication, it is important to differentiate it from *risk* communication. Highly uncertain circumstances coupled with time pressure in the face of danger distinguish the short-term communication characteristics of a (specific) crisis from the long-term communication characteristics and objectives of (various) risks. The purpose of crisis communication is to quickly work through and overcome the effects of an unexpected incident or catastrophic event (major shock) within the framework of crisis management efforts. In contrast, risk communication, “is always about the transmission of information about (future) hazard potentials that are difficult to assess or even elusive”.<sup>13</sup> In other words, risk communication deals with the long-term, strategic messages about certain threats and possible risks to a society. In this respect, it has an intangibility that crisis communication, which deals with the actualization of risk, does not have.

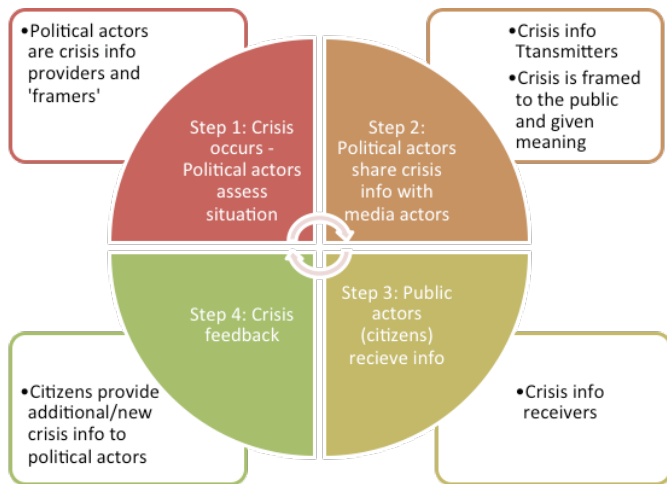
Traditionally speaking, communication during a crisis takes place in a 4-step process (figure 1) between three actors: political actors, mass media, and the public (i.e. citizens). The **first step** is when the crisis occurs. At this stage, the public actors assess the situation, which often includes consulting with private sector partners, and develop a strategy to explain the situation to the population and provide guidance on relief efforts. This kind of “meaning making” or crisis framing requires effective crisis communication between public and private actors as well as in cooperation with the mass media. The **second step** involves the interaction between the political and media actors. At this stage, political authorities' messages and

11 “Germany: Nuclear power plants to close by 2022”, BBC News, 30 May 2011. Available at: <http://www.bbc.co.uk/news/world-europe-13592208>

12 “Swiss suspend nuclear plant replacements approvals”, Reuters, 14 March 2011. Available at: <http://www.reuters.com/article/2011/03/14/nuclear-switzerland-idUSWEA833020110314>

13 Dunn, Myriam. et al. 2009. Risk Analysis: Risk Communication in the Public Sector. CRN Report, Center for Security Studies (CSS), ETH Zürich, pp. 5–6.

information are transmitted through mass media to the citizens (public). As mentioned, when the owners of affected critical infrastructures are in private hands, this is often a coordinated task of communication between the public and private crisis managers. However, regardless, of ownership crisis management is an inherently political task that brings to light the partnerships between the citizens and the government. In the **third step**, the public (i.e. citizens) receives and processes the crisis information and in the **fourth step** the public provides additional feedback to the political actors (thus returning to the first step).



**Figure 1:** 4-Step Traditional crisis communication process

However, if the political actors fail to provide crisis info and lack an effective communication strategy (mis-steps within step 1 and 2), then it can undermine trust in public authorities' information policy and, in the end, also damage its credibility and the legitimacy of political institutions. To avoid such mis-steps, Boin et al identify three critical factors for the effectiveness of political authorities' crisis communication efforts:<sup>14</sup>

**First, prior to a crisis (pre-event), crisis communication plans should be developed.** In other words, this is the 'preparedness' phase in which communication plans and contingency strategies should be formulated<sup>15</sup> and tested. This step is important as it provides a point of orientation in the first critical phase of an acute crisis; a point when there is a risk for the authorities to handle the situation in a reactive way, without strategy and coherence. To mitigate this risk, not only should plans be developed but also a spokesperson and a deputy should be identified and given a protocol to follow when interacting with the media (i.e. the public). Indeed, this communication element is particularly critical in today's information hungry environment where content is shared quickly and across multiple media pathways, thus presenting more opportunities for rumors and/or contradictory information.

**Second, during the crisis phase, it is important to have a plan in place that coordinates incoming and outgoing information.** This step builds on the previous 'preparedness' step and is especially important in the case of critical infrastructures breakdowns, which are mostly characterized by multi-actor governance.

<sup>14</sup> Boin, Ariel et al. 2005. *The Politics of Crisis Management. Public Leadership under Pressure*. Cambridge University Press, Cambridge, pp. 72–78.  
<sup>15</sup> Haruta, Amon and Kirk Hallahan. 2003. *Cultural Issues in Air-line Crisis Communication: A U.S. – Japan Comparative Study*. Special Issue: *Public Relations and Communication Management*, 13 (2), p. 4.



In such cases, crises become even more complex and are characterized by the challenge to coordinate crisis info can become greater due to the different actors and responsibilities involved. Lack of coordination between relevant public and private crisis managers can lead to contradictory information that may exacerbate a crisis. Coordination among the acting authorities is thus decisive to avoid crisis communication failures resulting from information chaos.

**The third and final point also refers to the crisis phase where authorities must maintain a sense of control and professionalization when disseminating information.** This occurs by ensuring that the spokesperson works closely with crisis managers (from both the public and private domain) to gather information and then frame and communicate the relevant info to the media, which then shares it with the broader public.<sup>16</sup> Of course, a significant aspect of this is effective public relations (PR) – in other words, having a spokesperson that can provide a sense that authorities have the situation ‘under control’, even if it may be chaotic. As we will also show in the following section – in the case of the Japan it was not always clear who the spokesperson of the crisis was nor was it clear that the government authorities and private CI owners were working together to manage the crisis.

Against this backdrop, we now turn to the case study and draw from the general guidance and framework provided in this section to evaluate the crisis communication efforts in the Japanese case. After highlighting the shortcomings at the political level, we then look more closely at the efforts that emerged at the community level that showcase the changes in the information terrain, which is impacting the traditional crisis communication process.

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<sup>16</sup> Ibid. pp 76–78; see also Falkheimern, Jasper and Mats Heidi. Multicultural Crisis Communication: Towards a Social Constructionist Perspective. In: *Journal of Contingencies and Crisis Management*, Vol. 14(4), December 2006, p. 181.

## 2 UNPACKING THE 2011 JAPAN CRISIS

Shortly after the Great Tohoku earthquake and subsequent tsunami struck Japan, images of devastated communities circulated throughout the global media. With it came public scrutiny on the unfolding disaster. As emergency response crews performed search and rescue operations and sought to re-establish services, such as electricity, officials also had to quickly address the damages at Fukushima Daiichi power plant. It thus came as no surprise when Japanese prime minister Naoto Kan referred to this disaster as the worst since the Second World War. To examine the crisis communication efforts, this section will begin with a discussion on the traditional communication efforts led by political actors – in this case the Japanese government as well as Tokyo Electric Power Company (TEPCO), Japan’s largest electric power provider and the operator of the Fukushima Daiichi nuclear facility – and then turn to the bottom-up efforts that reveal the more unique, contemporary elements of this case.

### 2.1 Crisis Communication at the Political Level: Errors and Missteps

Though Chief Cabinet Secretary Yukio Edano was applauded for his constant updates and off-the-cuff question and answer sessions, it was not until four days after the tsunami that government officials and TEPCO finally began to coordinate communication. By that time, the political damage was already done as “disjointed and incomplete information released in those first few critical days created grave mistrust in both the company and the government.”<sup>17</sup> Conse-

quently, people living anywhere from 5km to 20km or more near the affected Fukushima plant fled<sup>18</sup> – many of whom were not advised but feared radiation contamination. Labeled “nuclear refugees” many were “driven not just by suspicion of the government but also by a deep fear of radiation”.<sup>19</sup> As one resident stated to the New York Times, “[w]e might be overreacting, but we also know Tokyo Electric” — the plants’ operator — “is not telling us everything.”<sup>20</sup>

Once the tsunami reached land, the first report of a significant nuclear incident did not occur until 5 hours later at 20:15. Shortly after, at 22:00, the Japanese government initiated a 3km evacuation around the plant. This grew to 10km by 07:00 the following day and then to 20km on 13 March, 3 days after the initial incident. Needless to say, the daily changes in evacuation distances coupled with disparate and confusing information coming from both government officials and TEPCO, conveyed a feeling that the incident was spiraling out of control. For example, while the government initiated its first of three evacuation calls, TEPCO released a press statement indicating that radiation monitors detected a “departure from normal”, though this was called into question when evacuation distances were increased to 10km and then 20km. Making matters worse, TEPCO’s subsequent interactions with the media not only provided little information to quell alarm, but also had executives who were unable to answer media ques-

17 Ropeik, David, Poor Risk Communication in Japan is Making the Risk Much Worse, *Scientific American*, 21 March 2011. Available at: <http://blogs.scientificamerican.com/guest-blog/2011/03/21/poor-risk-communication-in-japan-is-making-the-risk-much-worse>

18 Allen, Nick. “Japan: the ‘nuclear refugees’ who may never go home”, *The Telegraph*, 23 March 2011. Available at: <http://www.telegraph.co.uk/news/worldnews/asia/japan/8400756/Japan-the-nuclear-refugees-who-may-never-go-home.html>

19 Fackler, Martin, Radiation Fears and Distrust Push Thousands from Homes, *New York Times*, 17 March 2011. Available at: [http://www.nytimes.com/2011/03/18/world/asia/18displaced.html?\\_r=1&hpw](http://www.nytimes.com/2011/03/18/world/asia/18displaced.html?_r=1&hpw)

20 Ibid.

tions.<sup>21</sup> As one Miki Ito noted, “[d]uring crucial early press conferences the company did not put forward a key spokesperson and did not set a firm agenda. This resulted in mixed and ill-coordinated messages and by using vague language and little specific data, TEPCO failed to convey precise and critical information, which added to confusion among journalists. In turn, this led to considerable fear and anxiety among the public.”<sup>22</sup> Meanwhile, the Japanese Ministry of Economy, Trade and Industry, which oversees nuclear power plants in Japan, was widely absent from information dissemination. According to David Lochbaum, head of the Union of Concerned Scientists’ Nuclear Safety Program, this lack of information activities was because the Japanese officials were not getting operational critical information of the plant’s status – such as info on the water levels and temperatures.<sup>23</sup>

Overall, one can see the tensions that emerged between the main actors in this case – specifically between the Japanese government and TEPCO. In absence of a clear crisis communication plan and coordination protocol, the media and the public at large were given disjointed, often competing information. Accordingly, the credibility and legitimacy of the public and private actors (i.e. government officials and TEPCO) quickly came under intense criticism as this information deficit gave way to an opening for the broader international community to speculate on the severity of the crisis. The United States for example, provided competing evacuation information and advised US citizens to remain at least 80km

away from the affected area.<sup>24</sup> Adding to the alarm, the International Atomic Energy Agency (IAEA) accused Japan of not being forthcoming about what was happening at the plant. In sum, it was apparent that in addition to the unfolding physical disaster (i.e. damaging towns and causing shortages in water and electricity supply, etc.), Japan was also experiencing a *communication* and *management* crisis vis-à-vis the nuclear plant breakdowns. In fact, the fear of a nuclear meltdown was particularly compelling for international media and overshadowed other areas affected by the tsunami.

The lack of quick, consistent and coordinated information provided an opening for more criticism that was aimed not only at the handling of the crisis by public and private actors but also at the nuclear industry as a whole. Reports surfaced that the disaster at Fukushima came after decades of flawed safety reports that “underestimated earthquake risk in Japan’s atomic power industry.”<sup>25</sup> Katsuhiko Ishibashi, a seismology professor at Kobe University, became a particularly vocal critic and resigned in 2006 “from a government panel on reactor safety, saying the review process was rigged and unscientific.”<sup>26</sup> Looking back at cases of nuclear accidents reveals that the poor reaction to the nuclear crisis was not entirely unique. Given the potential deadly and contaminating nature of nuclear materials, it is obvious that the public tends to be easily alarmed by nuclear accidents. In turn, governments tend to be more cau-

21 Fukase, Atsuko. “Tepco Versus the Media”, Wall Street Journal Blog, Japan Real Time, 16 March 2011. Available at: <http://blogs.wsj.com/japanrealtime/2011/03/16/tepc-versus-the-media>

22 “IPREX Tokyo Partner Says Japanese Crisis Communication Will Change Forever”, Business Wire, 31 March 2011. Available at: <http://www.businesswire.com/news/home/20110331005591/en/IPREX-Tokyo-Partner-Japanese-Crisis-Communication-Change>

23 See <http://blogs.marketwatch.com/disasterinjapan/2011/03/18/scientist-on-japans-weak-crisis-communications>

24 Though in all fairness, there was also competing information and advisories within the United States. For example, the Surgeon General suggested people in California should buy potassium iodine (see: <http://www.nbcbayarea.com/news/local/Surgeon-General-Buying-Iodine-Appropriate-118031559.html>) while the CDC said the opposite. (see: <http://emergency.cdc.gov/radiation/japan/ki.asp>).

25 Clenfeild, Jason. “Japan Nuclear Disaster Caps Decades of Faked Reports Accidents”, Bloomberg News, 18 March 2011. Available at: <http://www.bloomberg.com/news/2011-03-17/japan-s-nuclear-disaster-caps-decades-of-faked-safety-reports-accidents.html>

26 Ibid.

tious when dealing with nuclear incidents so to prevent panic and alarm and potentially transforming a minor incident into a major one. But as we show in the following discussion, this logic no longer works in today's information abundant environment.

## 2.2 Crisis Communication at Public Level: A Growing Role at the Grassroots

Immediately after the earthquake and the subsequent tsunami struck the Japanese east coast, information communication technology (ICT) played an important role in how affected communities and individuals dealt with the unfolding crisis. Suspicious of the political actors and the lack of information, people used the Internet to fill the crisis communication gap. Blogs provided the platform to “release and share emotional responses” and ask for support; social platforms like Twitter and Facebook provided a platform to share and receive on-the-ground info on emergency response and relief efforts; and video and photo-sharing sites offered a visual medium that documented the effects of the tsunami.<sup>27</sup> Overall, ICT and social media platforms were used in the following three primary ways: 1) share personal stories during a crisis; 2) criticize the political actors in charge of managing a crisis and sharing info; and 3) share and provide crisis information. In the following sections, we discuss these applications in more details.

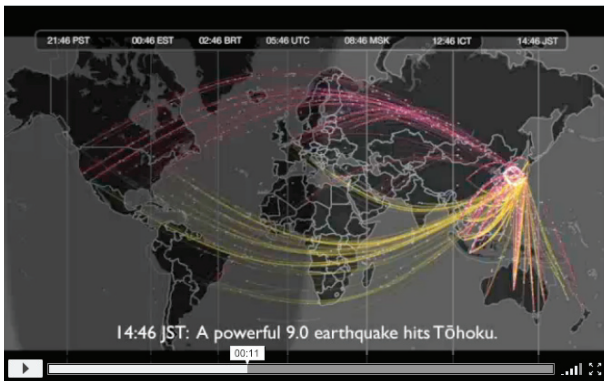


**Figure 2:** Three primary ways in which new media tools (mobile phones, Internet, social media platforms, etc.) are used in crisis communication experience

**First, people used new media to share images and provide information as the disaster unfolded.** In the aftermath of the earthquake, affected community members and interested individuals used social media to post initial reactions. For instance, this was first seen in the various YouTube videos that were shared by individuals in the tsunami-affected zones, many of whom were first at the scene before emergency crews could arrive. For mainstream media channels this immediate, on-the-ground feedback from those living in the affected region allowed them to broaden the reporting of the crisis, while first responders and traditional reporters struggled to gain access to this area. People also used Facebook, Twitter and other social media to share immediate reflections. For example, people using twitter (which restricts posts to 140 character maximum) shared things such as “I hear the tsunami alarm, I’m gonna escape” and “I can see people in the flames and smoke.”<sup>28</sup>

<sup>27</sup> Ibid.

<sup>28</sup> These quotes were captured in a 2011 study on the use of twitter during the disaster. See: Acar, Adam and Yuma Muraki (2011), Twitter for Crisis Communication: Lessons Learned from Japan’s Tsunami Disaster, International Journal, Web Based Communities, 7 (3), p. 397.



*Image 1: Screen shot of a video that shows the volume of tweets @replies*

Image 1 is a screen shot of a video that shows the volume of tweets @replies traveling into and out of Japan following earthquake. Replies directed to users in Japan are shown in pink; messages directed at others from Japan are shown in yellow.



*Image 2: Screen shot of a video that shows the volume of information shared across Twitter*

Image 2 is a screenshot of a video that displays worldwide re-tweets of tweets originating in Japan following the earthquake. Senders' original tweets are shown in red, tweets re-tweeted by their followers in the hour after the event is displayed in green.<sup>29</sup>

<sup>29</sup> For the full videos see: <http://blog.twitter.com/2011/06/global-pulse.html>

In another example, CNN's iReport was inundated with videos (many of which were created with cell phones) and information that individuals sent in to share the immediate effects of the tsunami. While more generally referred to as 'citizen journalism', CNN refers to those submitting content on its iReport<sup>30</sup> site as "iReporters". Immediately following the tsunami, iReport had roughly 2 million visitors per night as people used the site to share and receive information. More broadly, according to iReport's participation Director Lila King, there are waves of reports during a crisis situation: the first wave comes from individuals in the crisis zone who, with the help of ICT, immediately share photos or video of the damages and after-effects, while the second wave involves those inside and outside of the crisis zone who provide diverse content, such as video diaries, that further reflect on the crisis experience.<sup>31</sup> For example, following the earthquake/tsunami, people share information on how it is to live through this type of disaster – information that can be useful for viewer sensitization to such types of crises. This re-mediaization of content by the mainstream news organization, in turn, resulted in further visibility of crisis info that came from disparate (and unverified) sources. For crisis managers, this means that anyone with a functioning cell phone can provide information from the ground that could potentially compete with the information being provided by the political authorities.

**Second, web-based tools and platforms can be used to criticize the government's response to a crisis.** For Japan, this criticism emerged as the nuclear disaster unfolded. For example, the anti-nuclear protests

<sup>30</sup> CNN launched iReport in 2006 and since then 753,000 people have registered iReporter accounts and around 800,000 videos and images have been uploaded. The site averages 2.1 million unique visitors a day. See: <http://ireport.cnn.com>

<sup>31</sup> Owens, Simon. "How CNN's iReport enhanced the network's coverage of the Japan earthquake and its aftermath", Niemen Journalism Lab, 22 March 2011. Available at: <http://www.niemanlab.org/2011/03/how-cnns-ireport-enhanced-the-networks-coverage-of-the-japan-earthquake-and-its-aftermath>

in Japan's streets gathered a respectable number of people, but made more noise on the photo-sharing site Flickr<sup>32</sup> and were followed live on the online platform Ustream<sup>33</sup> by those who could not join. Kazuyoshi Saito also posted a song to YouTube entitled "It was a lie all along", which was directed against government and TEPCO. It generated well over 1 million views coupled with an online debate about the crisis response and communication efforts.<sup>34</sup>

Extracted lyrics from "It was a Lie all Along":

"Walk around this country and you'll find 54 nukes  
The textbooks and the PSAs [public service announcements] kept telling us, "They're safe."  
They fooled us, and their excuse is, "We didn't anticipate this."  
Now there's a ticklish black rain falling from that big old sky.  
It was a lie all along. Now the cat's out of the bag.  
It was really just a lie. "Nuclear power is safe."  
It was a lie all along.

And now the spinach isn't safe to eat.  
It was really just a lie. They knew things were bad.  
There's no stopping the radiation that's swirling in the wind.  
How many people have to be exposed before this country's government notices?  
Found any good water since you left your town behind?  
Tell me the truth. On second thought, forget it." There's nowhere left to run.

It was BS all along. TEPCO, and HEPCO  
CHUBU and KYUSHU. Their rose-colored glasses have broken."

32 See: <http://www.flickr.com/photos/sandocap/5606363080>

33 See: Yaqui Iwakami – <http://iwakamiyasumi.com>

34 See: <http://www.youtube.com/watch?v=bo1yohRgfyc&feature=related>

**Third, ICT and social media are increasingly used to provide critical crisis information to the public.** Rather than simply sharing personal stories, this type of information is targeted and serves a specific purpose that aims to aid response and recovery efforts – and ultimately mitigate effects. Twitter also played a rather prominent role for crisis communication efforts. In a study<sup>35</sup> that looked at "earthquake" related tweets on 11 March 2011 from 14:45 to 24:00 (i.e. the day of the earthquake and tsunami), researchers found that most messages in the disaster area were:

- ◆ warnings
- ◆ help requests
- ◆ reports about the environment (fires, damages, etc.)

Both officials and citizens were active providers of information using the twitter platform. Many individuals used twitter to ask for help – for example one tweet stated "we're on the 7<sup>th</sup> floor of Inawashiro Hospital but because of the risen sea level we're stuck, Help us!"<sup>36</sup> Individuals also used twitter to alert US Ambassador John Roos about a situation, where 80 patients needed to be transferred from Kyoritsu hospital. "It took just two brief messages of about 100 letters each to alert Roos to the plight of 80 patients" at the hospital and within an hour the tweets had mobilized troops to be sent to assist those in need.<sup>37</sup>

In another example, and one that highlights the combined power of individual activism coupled with satellite imagery, residents near Fukushima organized a council to measure radiation levels. This information was then published on a "radiation map that is twice as precise as the one released by the government, mak-

35 Acar, Adam and Yuma Muraki (2011), Twitter for Crisis Communication: Lessons Learned from Japan's Tsunami Disaster, International Journal, Web Based Communities, 7 (3), pp. 392–402.

36 Ibid, p. 397.

37 Sternberg, Steve, "The World to the Rescue", USA Today, 13 April 2011. Available at: [http://www.usatoday.com/NEWS/usaedition/2011-04-12-1Ajapansocialmedia12\\_CV\\_U.htm](http://www.usatoday.com/NEWS/usaedition/2011-04-12-1Ajapansocialmedia12_CV_U.htm)

ing it the most up-to-date and detailed radiation map available for the area.”<sup>38</sup> As one resident stated: “We can’t keep on relying only on the government. We decided to do what we could by ourselves, hoping we can return to normal life as soon as possible.”<sup>39</sup> The council also distributed the map (Image 3) to area residents.

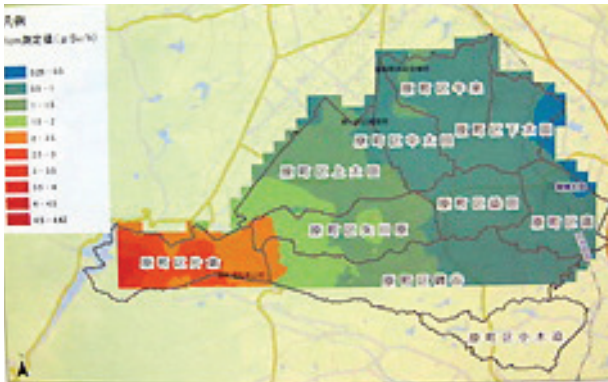


Image 3: Picture of the Community-generated radiation map

In another remarkable and dynamic mapping example, 4 hours after the earthquake, using the Usha-

hidi<sup>40</sup> platform, the private company Georepublic Japan launched “Sinsai.info”, an online crisis mapping platform that allowed people in Japan to report and communicate crisis information (Image 4). Roughly 200 volunteers received reports (via SMS, twitter, email, etc.) from people on the ground requesting assistance and/or providing crisis information. This information was then aggregated and visualized on a mapping platform (Figure 3 illustrates the process). The first report was received at 22:00 and soon became the go-to crisis map on the complex disaster in Japan. Within 6 days, over 4,000 reports were being mapped – in other words “over 600 reports per day, or one report almost every two minutes for 24 hours straight.”<sup>41</sup> By 11 April, Sinsai.info had approved and uploaded nearly 10’000 reports (with another 10’000 in the queue waiting for approval), reported 1.2 million page views, and had become the premier crisis reporting and mapping platform that was used by Yahoo Japan, Google, Japanese government officials, and others.<sup>42</sup>

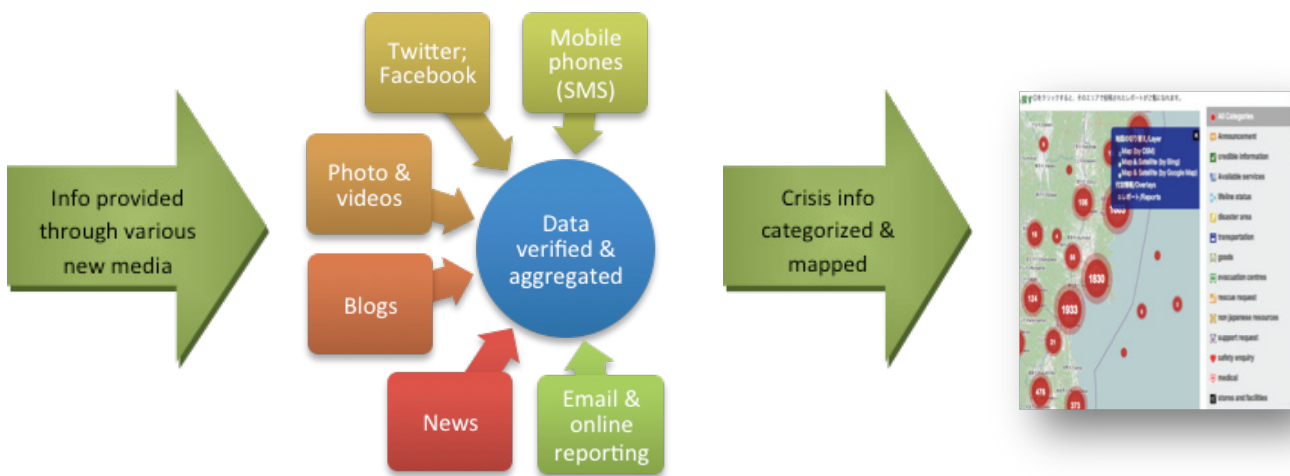


Figure 3: The process of crisis mapping

38 Residents near Fukushima nuclear plant make own radiation map, clean contaminated areas”, The Mainichi Daily News, 27 September 2011. Available at: <http://japan.resiliencesystem.org/residents-near-fukushima-nuclear-plant-make-own-radiation-map-clean-contaminated-areas>

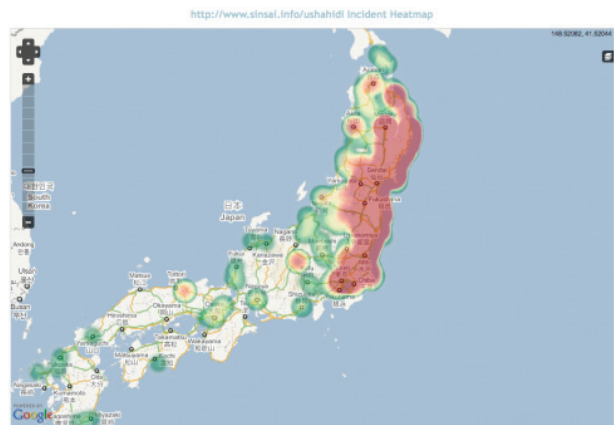
39 Ibid.

40 www.ushahidi.com

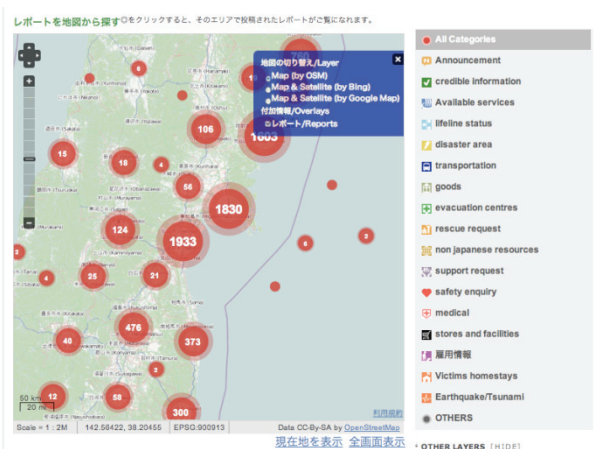
41 Mier, Patrick. “Live Crisis Mapping: Update on Libya and Japan”, iRevolution. 17 March 2011. Available at: <http://irevolution.net/2011/03/17/crisis-mapping-libya-and-japan>

42 Seki, Hal. “Crisis Mapping Japan”, Ushahidi Blog, 20 April 2011. Available at: <http://blog.ushahidi.com/index.php/2011/04/20/crisis-mapping-japan>

Categories were created (see bar on the right side of figure 7) to organize the data that included info on available shelters, food stores, road closures and other damages to infrastructure, rescue requests, and other relevant data. It is worth emphasizing that the Japanese government was in no way involved in creating this platform. Rather this was a bottom-up process that began with an individual (non-state actor) organizing volunteers and deploying a crisis map using an open-source mapping platform. According to Sinsai.info managing director Hal Seki, the success of this effort can be attributed to the quick and well-organized efforts of the volunteers, the ubiquity of ICT and new media in Japanese culture that made reporting accessible to local residents. As the number of reports increased, Sinsai.info popularity also grew, which thus encouraged more reporting. Overall, this vibrant bottom-up effort was a notable component to the novel crisis communication efforts within the crisis-affected community.<sup>43</sup>



*Image 5: Heat map that provided another way to visualize the density and severity of the affected areas (red symbolizes the areas that were most severely affected).*



*Image 4: Sinsai.info crisis map*

<sup>43</sup> In a follow-up report, we will continue this discussion on crisis mapping by looking at the behavioral and emergent attributes of this phenomenon.

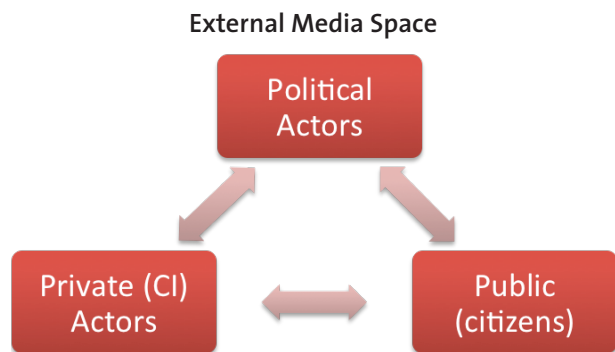


### 3 POLICY IMPLICATIONS

Crises are complex by nature, however, in today's media environment they have become even more complicated as there are more actors involved in the sharing and distributing of information. The emerging role that ICT and new social media play in today's crisis response and communication efforts was especially evident in the Japan case study. This illustrated the way in which individuals are becoming a growing source of information and thus broadening their role from being simply content consumers to also becoming content contributors. More specifically, rather than waiting for political actors and official crisis managers to provide information, individuals are using ICT as a springboard to participate in crisis communication efforts.<sup>44</sup> Depending on the crisis, granted communication lines can be damaged or overwhelmed with traffic volume and thus affect the reliability of on-the-ground crisis info reporting. In addition, the reliability of info can also come into question, regardless of the context.

Needless to say, this new media and information space is challenging traditional understandings of crisis communication protocol (highlighted in the four-step process in section 1) as well as bringing to light new tensions between actors as they adapt to the changing terrain. This is particularly the case in crisis where critical infrastructures are directly impacted and thus require coordinated communication and management efforts by private (CI) owners and political actors (i.e. government officials). In the Japan case, for instance, we saw how the government was challenged from two sides. On the one side, the public demanded information (on radiation levels, etc.) and in absence of it, new media tools were used get that information independently. The crisis map-

ping efforts are an example of community-led crisis communication. On the other side, the government was also challenged by its partners in the public sector – in this case TEPCO – who appeared to be not cooperating and/or withholding critical info from authorities in the interest of business rather than the public. Overall, as figure 9 illustrates, the contemporary media environment results in constant feedback and interaction between each actor.



**Figure 9:** Crisis Communication Actor Triangle (shows the interaction between the different actors within the media space)

However, rather than resist two-way crisis communication interaction with the citizens, governments should embrace this trend and view this development as a signal of the adaptive and resourceful attributes within societies under stress. Such attributes have been identified as components of resilience, defined as the ability of a system to endure or withstand sudden, unexpected shocks, and be able to 'bounce back' or recover quickly.<sup>45</sup> Recalling the Japanese case, for

44 Veil, Shari R. et al. A Work-In-Process Literature Review: Incorporating Social Media in Risk and Crisis Communication. In: *Journal of Contingencies and Crisis Management*, Vol. 19, June 2011, pp. 110–111.

45 For discussions on resilience see: Brunner, Elgin and Giroux, Jennifer, 2009. Factsheet: Examining Resilience: A concept to improve societal security and technical safety. Center for Security Studies; Bara, Corrine and Brönnimann, Gabriel, 2011. CRN Report: Focal Report 6 – Risk Analysis – Resilience – Trends in Policy and Research. Center for Security Studies, November; Flynn, Stephen E. "America the Resilient." *Foreign Affairs*, vol. 87, no. 2 (March/April 2008); Flynn, Stephen E. *The Edge of Disaster: Building a Resilient Nation*. New York: Random House, 2007.

example, one can see a situation where in light of tensions between the government authorities and CI operators, the public utilized the myriad information tools to express emotions (particularly outrage) but also share crisis info that was then used to create a dynamic crisis map for public use. It thus becomes clear that traditional crisis communication frameworks fall short as they do not factor in such interactions and (possible) tensions. To mend this deficit, governments need to alter their crisis communication frameworks so to incorporate the new dynamics between actors and spaces. Against this backdrop, we expand upon the three factors presented by Boin et al and outline a set of key points to guide crisis communication efforts in today's environment. We have also further distinguished the different phases of the crisis and the steps that are needed to take at each phase with an emphasis on incorporating the new media component.

#### **Pre-event (preparedness) phase:**

1. In addition to developing crisis communication plans and identifying a spokesperson, as identified by Boin et al, this phase should be adapted to the modern context by incorporating the new media environment. This means, performing a review of existing plans and determine how crisis managers (the government and the relevant private sector partners) will use new media to interact and engage the public as well as
2. Test scenarios that deal with Internet-based problems such as rumors, negative feedback that questions legitimacy, etc. Outline ways to deal with such scenarios (e.g. instructions and guidance for crisis managers).
3. Perform research that enhances understanding of how new media is being used in crisis situations – this can include performing cases studies and analysis.

#### **Event (crisis) phase**

1. Recalling that Boin et al recommended utilizing a plan that coordinates outgoing information and utilizes the spokesperson to liaise with the media, an updated strategy would factor a greater role for the public as they are not only receiving but also providing crisis information. Of course, during this phase crisis managers should share information openly and honestly with citizens (i.e. the public) as well as encourage the use of crisis maps as that aids in the crisis info coordination process. This will also provide some transparency to the crisis management effort.
2. Given the contemporary media environment and the complex interactions and interdependencies within a community/society, communicators should be flexible and accept uncertainty. This means having managers that not only know crisis communication protocol but are also adaptable. Crises are by definition abnormal and uncertain situations. Accepting this fact helps to avoid overly confident statements and it allows the authorities in charge with communication to adjust messages as more information is available.
3. Accessibility in context of a crisis situation is decisive. The crisis communicators should meet the needs of the media and be continuously open to their demands in order to assure the dissemination of accurate messages throughout the crisis.<sup>46</sup>

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<sup>46</sup> Ibid, pp. 111–112.

### Post-event phase

1. Review crisis communication efforts and examine info sharing pathways, asking questions such as: What information did the crisis managers provide and through what channels? What information was provided by the public and through what channels? Did crisis mapping efforts emerge and, if so, was it successful? What was the information exchange process between the political and public actors? Were new media platforms used and, if so, which ones?
2. Incorporate new information to crisis communication plans and revise accordingly.

### 3.1 Implications for Switzerland

In Switzerland, depending on the scale and location of the crisis, different agencies are in charge with crisis management and crisis communication. For instance, the local and cantonal authorities are responsible for warning and communicating crisis info to populations. For crises that affect the country as a whole and/or have an international dimension, the responsibility for crisis communication is with the President of the Federal Council and the relevant federal councilor. In foreign and security policy issues, which usually cut across multiple departments, responsibility for defining a strategic position and communication would fall to the entire Federal Council that is supported by Swiss federal chancellery.

Against this backdrop, the Swiss government has defined and distributed responsibilities for crisis communication among various federal agencies with specific expertise in a certain field such as technical, environmental, and health risks (e.g. pandemics, where the Federal Office of Public Health would be responsible). If a crisis arises, crisis units in the differ-

ent departments of federal administration are predefined and in special cases an organization such as an emergency task force can be activated. In emergency situations resulting from large-scale chemical accidents, dam overspill or bursts, satellite re-entry or increased radioactivity, the National Emergency Operations Center (NEOC) with the Federal Office for Civil Protection (FOCP) is responsible for dealing with the emergency situation. It alerts and informs the population in cooperation with federal chancellery about the emergency and can issue directives for adequate behaviour.

Notably, the NEOC uses different tools to communicate the relevant data to the authorities involved and to disseminate information for the population in the case of a large-scale incident. For the information management between authorities during a crisis the NEOC has developed an Electronic Situation Display (Elektronische Lagedarstellung ELD). It delivers information to the authorities affected by an incident in Switzerland and abroad in order to enable a coordinated crisis management. NEOC also cooperates with different kinds of media as well as with a network of NGOs and private partners to disseminate warning information using e.g. e-mails and other channels. Moreover, an Internet platform provides information and warning with regard to natural hazards like flooding, earthquakes, avalanche or severe weather in order to prevent large scale natural disasters. In specific case of an incident, the military staff Federal Council NEOC (Stab BR NAZ) supports the information department of the NEOC with communication experts constituting a well-equipped and competent crisis communication center.<sup>47</sup>

Despite the processes and instruments developed for crisis communication, shortcomings remain as training exercises have shown. For example, during

<sup>47</sup> See: <https://www.naz.ch/index.html> and <http://www.naturgefahren.ch>.

the strategic leadership exercise in January 2005 in preparation for a swine flu pandemic, communication channels were lacking between the authorities and the population as well as the media. Moreover, the cooperation and information exchange between federal departments and cantons as well as the neighbouring countries proved to be insufficient.<sup>48</sup> In addition, the 2009 evaluation of the management of the electricity supply identified several shortcomings in the area of crisis communication. First, there were problems connecting available information so to enhance the awareness of the unfolding situation, which resulted in uncertainty among stakeholders. Second, the crisis communication proved to be rather technocratic. In a real crisis situation, this would lead to more confusion regarding the target audience as a technocratic language is not suitable for public crisis communication. And finally, there is an ambiguity in crisis situation between private operators, Cantonal and federal authorities in view of who is responsible for information and communication during different phases of an incident.<sup>49</sup>

Overall, in the Swiss context, crisis communication efforts can be improved by not only learning from past experiences/cases but also critically analyzing strategies and plans to see if they are adapted to the modern context where new media tools and non-political actors play more of a role. To become more familiar with a phenomenon like crisis mapping, for example, government could consider supporting seminars that introduce crisis managers (both public and private) to the various ways in which non-political actors are using media tools in crisis situations and how that interacts with communication plans. In terms of exercises or scenarios, crisis mapping ac-

tivities could be introduced into crisis scenarios that would then train authorities to not only be aware of the potential emergence of such activities but also learn how to facilitate such processes.

48 Strategische Führungsausbildung (Hrsg.). Führungsübung 2005: Epidemie in der Schweiz, Schlussbericht. Schweizerische Bundeskanzlei, 2005.

49 Strategische Führungsausbildung (Hrsg.). Führungsübung 2009: Stromausfall, Bericht über die Strategische Führungsübung 2009. Schweizerische Bundeskanzlei, 2010.

## 4 BIBLIOGRAPHY

- Acar, Adam and Yuya Muraki (2011), Twitter for Crisis Communication: Lessons Learned from Japan's Tsunami Disaster, *International Journal, Web Based Communities*, 7 (3): 392–402.
- Boin, Ariel et al. *The Politics of Crisis Management. Public Leadership under Pressure*. Cambridge University Press, Cambridge 2005.
- Boin, Arjen. (2004). Lessons from Crisis Research. In "Crises in the Twenty-First Century", edited by Bruce W. Dayton. *International Studies Review*, 6.
- Clenfeild, Jason, Japan Nuclear Disaster Caps Decades of Faked Reports, Accidents, *Bloomberg News*, 18 March 2011. <http://www.bloomberg.com/news/2011-03-17/japan-s-nuclear-disaster-caps-decades-of-faked-safety-reports-accidents.html>
- Dunn, Myriam. et al. *Risk Analysis: Risk Communication in the Public Sector*. CRN Report, Center for Security Studies (CSS), ETH Zürich, September 2009, pp. 5–6.
- Fackler, Martin, Radiation Fears and Distrust Push Thousands from Homes, *New York Times*, 17 March 2011. [http://www.nytimes.com/2011/03/18/world/asia/18displaced.html?\\_r=1&hpw](http://www.nytimes.com/2011/03/18/world/asia/18displaced.html?_r=1&hpw)
- Falkheimern, Jesper and Mats Heide. Multicultural Crisis Communication: Towards a Social Constructionist Perspective. In: *Journal of Contingencies and Crisis Management*, Vol. 14, Number ,4 December 2006, p. 181.
- Haruta, Amon and Kirk Hallahan. (2003). Cultural Issues in Airline Crisis Communication: A U.S. – Japan Comparative Study. *Special Issue: Public Relations and Communication Management*, 13 (2).
- "Japan earthquake: Tsunami hits north-east", *BBC online*. 11 March 2011. Available at: <http://www.bbc.co.uk/news/world-asia-pacific-12709598>
- Marsh, Peter, Industry Left High and Dry, *Financial Times*, 12 April 2011. Available at: <http://www.ft.com/intl/cms/s/0/d9667732-653d-11e0-b150-00144feab49a.html>
- Owens, Simon, How CNN's iReport enhanced the network's coverage of the Japan earthquake and its aftermath, *Nieman Journalism Lab*, 22 March 2011. <http://www.niemanlab.org/2011/03/how-cnns-ireport-enhanced-the-networks-coverage-of-the-japan-earthquake-and-its-aftermath>
- Ropeik, David, Poor Risk Communication in Japan is Making the Risk Much Worse, *Scientific American*, 21 March 2011. <http://blogs.scientificamerican.com/guest-blog/2011/03/21/poor-risk-communication-in-japan-is-making-the-risk-much-worse>
- Rosenthal, Ariel, Michael T. Charles, and Paul T Hart. (1989) *The World of Crises and Crisis Management*. In *Coping with Crises: The Management of Disasters, Riots, and Terrorism*, edited by Uriel Rosenthal, M. T. Charles, and Paul 't Hart. Springfield, IL: Charles C. Thomas.
- Sternberg, Steve, The World to the Rescue, *USA Today*, 13 April 2011. [http://www.usatoday.com/NEWS/usaedition/2011-04-12-1Ajapansocialmedia12\\_CV\\_U.htm](http://www.usatoday.com/NEWS/usaedition/2011-04-12-1Ajapansocialmedia12_CV_U.htm)
- Strategische Führungsausbildung (Hrsg.). *Führungsausbildung 2009: Stromausfall, Bericht über die Strategische Führungsausbildung 2009*. Schweizerische Bundeskanzlei, 2010

Strategische Führungsausbildung (Hrsg.). Führungsübung 2005: Epidemie in der Schweiz, Schlussbericht. Schweizerische Bundeskanzlei, 2005.

“Tsunami Information NUMBER 64 (Tsunami Observation)”, Japan Meteorological Agency, issued 18:05 JST, 13 March 2011. Available at: [http://www.jma.go.jp/en/tsunami/observation\\_04\\_20110313180559.html](http://www.jma.go.jp/en/tsunami/observation_04_20110313180559.html)

Veil, Shari R. et al. A Work-In-Process Literature Review: Incorporating Social media in Risk and Crisis Communication. In: Journal of Contingencies and Crisis Management, Vol. 19, June 2011, pp. 110–111.

Yilmaz, Senol (2011). Fukushima Nuclear Disaster: A study of poor crisis communication. RSIS Commentaries, No. 93/2011, 21 June.