

4.4

Good practices and innovation in risk communication

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4.4.1 Introduction

In this chapter we deal with the thorny issue of innovations and ‘best practices’ in risk communication. Individual examples of best practice developed from both research and by enlightened practitioners (c.f. Coleman, 2013) are not difficult to find. Seeger (2006) identified the following ten ‘best practices’ in risk communication:

1. Process approaches and policy development for and responding to crisis are critical to success.
2. Pre-event planning, creating teams, fact-finding protocols, messaging and delivery are vital.
3. Partnerships with the public.
4. Listen to others’ concerns.
5. Exhibit honesty, candor and openness.
6. Collaborate and coordinate with credible sources.
7. Meet the needs of the media and remain accessible.
8. Communicate with compassion,

concern and empathy.

9. Accept uncertainty and ambiguity.
10. Provide messages of self-efficacy by issuing specific information telling people what they can do to reduce harm; these messages can help restore some sense of control over an uncertain and threatening situation (Seeger, 2006).

This was developed further by (Heath, 2006) who suggested two further best practices:

1. Realise that crisis response is a narrative and that you are telling a story.
2. Be committed and able to deliver on the promise to be the first and best source of information.

In the early 2000s these issues were seen as best practice and, given the relative paucity of research in this area, are easily identified. The complexity, scale and scope of both man-made and natural disasters now demand new types of response and have led to a blossoming of research and development activity to address these

societal challenges. Equally, both the role of new technologies and new communication patterns have enabled new forms of practice to emerge. The best practice discussed by Seeger (2006) and Heath (2006) remains relevant but has now been embedded into processes and protocols discussed elsewhere in this chapter. We refer, therefore, to ‘innovation’ and ‘emerging practice/improving practice’ rather than ‘best practice’.

Innovation can be described as the process of moving knowledge gained in research to the development of a physical product or changing the way things are done which can improve the quality of life. However, innovation and risk do not necessarily make good allies. Innovation by its nature suggests levels of uncertainty and risk (HM Government Office of Science, 2014); it is therefore unsurprising that different authors (Kasperson, 2014; Renn, 2014; Árvai, 2014; Pigeon, 2014) have agreed that risk communication practices and processes have changed little over the last few years

(Kasperson, 2014). Furthermore, Pidgeon (2014) points out that increasingly complex, more frequent and costly disruptive events require scrutiny of both emerging technologies and changing risk identities in society to develop the strategic capacity to address these fundamental risk communication problems ‘in appropriate methods for situating ‘values’ in public and stakeholder engagement and in fostering citizen deliberation for the wider public good’. However, by surveying the evidence from current research about what works, the relationship between public sector organisations and private citizens in fostering innovation in risk communication can be tested and its effectiveness determined (HM Government Office of Science, 2014).

Innovation has been categorised in a variety of different ways from process innovation, product or service innovation, governance innovation or conceptual innovation (De Vries et al., 2015). We focus on the following three aspects of innovation and improving practice in risk communication by identifying particular issues and areas of innovation which are challenging either for practice or areas of intense activity.

Firstly we deal with innovation and practice in the process of risk communication, focusing on one of the more significant areas of the former: new emergent approaches that reorientate practice around communities and new and evolving decentralised approaches. Secondly, we look at new communication patterns, emphasising the challenges of communicating with millennials and of cross-border communication. The third chapter of

this chapter pays particular attention to technology infrastructure concerning innovations which allow rich media channels to be utilised. The final chapter discusses the challenges faced in embedding these innovations into practice.

4.4.2 Risk communication and citizen participation

Research indicates that messages need to be culturally adapted to different country settings. Investigated by the current EU BeSeCu project as well as by the EU E-COM@EU project, findings indicate that cultural differences extend from mere age differences to a national context with regard to the most popular social media tools and national norms for communication style and tone.

Governments (national, regional and local), emergency management (responder) organisations and other public service bodies are traditionally risk averse and mostly rely on communication methods that reflect a view that aims to align lay perceptions with expert views of severity (Árvai, 2014) rather than participatory models that recognise local citizen expertise and knowledge. Further, Höppner et al. (2012) suggest that within the current pan-European communication practices, knowledge on the (target-specific) suitability of different communication forms is rarely translated into the field. There has been, however, a recent paradigmatic shift in disaster risk management moving from a top-down focus to what has been termed a ‘people-centred approach’. While this

approach is still emergent and contested (Scolobiget et al., 2015), it has led to a range of innovative practices and approaches, such as the alignment of people-centred decentralised approaches. The development of digital technologies and social media platforms (e.g. the use of social media in the Haiti earthquake, the Queensland floods in Australia and Hurricane Sandy in the United States) has led to new ways of delivering better targeted, actionable risk information to diverse publics across multicultural, multiagency and multi-jurisdictional boundaries.

Communication needs to be culturally and context specific while it engages citizens “as sensors” and contributors in the unfolding “story”.

Due to its popularity and collaborative, participatory, decentralised and accessible nature, social media allows information to pass quickly to multiple publics and organisations; thus extending the reach of emergency responder organisations, enhancing risk communication, improving situational awareness and furthermore providing traceable geographical and temporal data for monitoring disaster events in real time (OECD, 2012). Related research also indicates, however, that despite the shift from mass media to social media as a complementary platform and the several different identified uses and functions (preparedness, warning and informing, pre-

event signal detection, connecting communities, developing resilience and aiding recovery), social media is still emergent (Houston et al., 2015).

To address these issues there has been considerable investment by the EU through its seventh framework programme for research and technological development (FP7) and Horizon 2020 frameworks in risk communication research. An innovative, groundbreaking project — PetaJakarta.org — combines different sources of data and citizen participation to produce real-time intelligence-led information to create a shared situational awareness and to promote resilience (Holderness and Turpin, 2016).

PetaJakarta is an example of applying new concepts such as geosocial intelligence frameworks, and demonstrates an evolutionary process from passive spatial and temporal data mining techniques to ‘big crowdsourcing’. Geosocial intelligence frameworks rely on a deep understanding of the information ecosystem within which social media platforms operate. The challenge in gathering ‘intelligence’ is to extract knowledge from the ‘noise’ generated by such platforms so that users, governments and other actors can make ‘actionable decisions in a time-critical manner’ (Holderness and Turpin, 2015). Four principles underlie such frameworks:

1. Reliable, free and open-source software that enables the gathering, sorting and displaying of useful disaster-related information.
2. ‘Big crowdsourcing,’ wherein users on a social media platform are actively encouraged to share information relevant to a given situation or anticipated scenario.

3. A participatory approach and co-management that values the peer-to-peer sharing of situational information within the same platform that is used by government agencies and first responders who can transparently monitor and cross-check the data being shared.
4. Open data, so that all users can inspect the software, review the system and develop complementary tools and technologies that further enhance resilience within the information ecosystem.

This ‘people as sensors’ paradigm (which echoes the work of Scolobig et al. 2015) was used by PetaJakarta to contact many more Twitter users than any human could hope to do and allowed the network of users to grow organically through linking to personal networks. The map used by both citizens and government agencies created a reciprocal communication interface between citizens, the PetaJakarta project and the government. By engaging with government civil defence agencies and noting their operating procedures, including interaction between Twitter accounts @petakjt and @BPBDJakarta to disseminate (retweet) key information, the project was seen as credible and legitimate by other government departments and the public. Major challenges for this project were:

- how to ensure the verification of very big crowdsourced data; and
- how to engage citizens to participate actively in sharing their data.

Verifying the data acquired from Twitter was of critical importance to the project. User-generated reports were cross-checked in a number of different ways: by cross-referencing data

with tweets from the same location; Twitter feeds from government agencies; electronic media such as television reports and internet news sites; and by recognising active users who frequently tweet reliable information.

To engage as many citizen users as possible, a community inclusion strategy was designed to use concise, action-oriented messages such as ‘See a flood. Tell Us’ and also to adopt a user-centric approach by encouraging users to retweet any messages received from the project to their own personal networks. The big crowdsourcing element of the project was also emphasised by highlighted messages promoting the benefits of greater use of PetaJakarta such as ‘The more people use PetaJakarta, the better the map will be’ (Holderness and Turpin, 2015). The strategy sought to highlight the community resource element of the project by adopting a non-moralising, opt-in approach to include citizens as partners in the sharing of real-time information and situational awareness regarding flooding rather than just being the recipients of emergency or information messages.

The example of the PetaJakarta project demonstrates how innovative participatory, collaborative approaches can be extended to gather real-time information through the use of social media platforms and open-source software. Furthermore, the utility of the concept of a Geosocial intelligence framework appears to be transferable given the global nature of the social media platform and the availability of the open-source software, making the concept adaptable to the European context.

4.4.3 New communication patterns

This chapter looks into the use of social media and mobile technologies in the communication process with younger (millennial) demographics. Messages, urgency and level of planning change with the stage in the disaster cycle and planned versus reactive settings are highlighted. The place of such media in a wider set of media used in a range of disaster settings is examined and discussed, as are the opportunities to extend messages from traditional media to include, and take advantage of, newer forms of communication.

Eurostat statistics suggest that younger people are more likely, in Europe as elsewhere, to have access to more up-to-date smartphones as well as to information via tablets and gaming consoles. Furthermore, younger people are less likely to engage with traditional channels such as radio and broadcast media/print press and more likely to make use of social media such as Twitter, regarding this as a legitimate source of information, more than older citizens would (Bruns and Burgess, 2014).

Conflicting previous research (such as Austin et al. 2012) has implied that traditional media was preferred — at least a few years earlier — as a credible source of information, and similarly (according to Vihalemm et al. 2012), the trust in traditional media outlets has been seen to rest upon the belief that communication institutions have the proficiency to assess and estimate information to obtain an adequate

overview of a situation and to calculate risks and make decisions when broadcasting.

Even though decreasingly, information is still sought through traditional mass media sources (namely from broadcasting companies), to some extent regarded as more credible sources of information. According to the findings of a survey of 1 034 citizens across 30 European countries, only 13 % of respondents perceived information on social media to be more accurate than that of traditional media channels. In fact, nearly half (44 %) of the respondents did not agree with this statement (Reuter and Spielhofer, 2016).

To this extent, there have been implications that — through its social, interactive, local, rapid, unfiltered and timely qualities as well as convenience and personal nature — social media serves as a medium leading towards providing relevant information (Posetti, 2012; Austin et al., 2012). This is also supported by the previously mentioned survey, showing that citizens perceive information provided on social media during emergencies as more accessible than information provided via more traditional media channels such as TV, radio or media websites (Reuter and Spielhofer, 2016). The change could be explained through media convergence; the interlocking of different types of media (text, audio and video) and content (news, popular culture, etc.) on online forums (and further on social media sharing) has improved and simplified access to any kind of information via smart devices that was previously sequestered behind different media (television, radio and print press). Key social

apps such as Facebook and WhatsApp also have a useful characteristic in that it is easy to share information, and the functionality of the apps make it clear which information is more recent or has updated other information; therefore, these apps facilitate the creation of shared situation (or information) awareness.

It is important to handle the transition from traditional media to social media, while fostering trust and reducing rumours and misinformation.

A key issue is that of engaging communities and citizens rather than purely disseminating messages. This was investigated comprehensively by the Public Empowerment Policies for Crisis Management (PEP), which suggested the integration of younger citizens in responsibilities for such communication to improve relevance and access to that demographic. A related effect is the low reliance of EU communities on self-help (POP ALERT project), with ‘the authorities’ being expected to lead efforts as well as be a source of information. POP-ALERT suggests that community resilience can (and should) be strengthened, and highlights social media and messaging as key tools in engaging younger demographics as well as in providing resources such as toolkits to support such development. This is further supported by Duffy (2012), who iden-

tifies the use of social media in such efforts to improve resilience and preparedness.

Once a disaster has occurred, the emphasis shifts from preparedness messages to messages designed to update and inform. There has been significant EU action to develop appropriate infrastructure, which allows connectivity and access to information during the course of a disaster that may have compromised such communication systems (IDIRA and PPDRTC, for example). For many people in such a situation, the priority becomes the ability to ‘track’ the disasters and gauge the likelihood of being affected. For example, residents in a flood area not yet affected by floodwater need to know whether they are in an area where they should stay put, prepare for the eventuality of evacuation or evacuate.

Another interesting notion is how the source and form of crisis information affects the public’s information-seeking behaviour. Based on their study on such behaviour during crisis situations, Austin et al. (2012) suggest that people are more likely to use the same type of media to seek information as that from which they initially heard about the crisis. Their findings extend to the channel complementarity theory, which proposes that users of a medium that serves a particular functional need are also more likely to choose other media relevant to serving that particular function or need (Dutta-Bergman, 2006).

Similarly, previous research has established that the effectiveness of crisis communication is positively influenced when the social position of

the communicator or the channel is ‘close’ to the recipients’ everyday lives (Trumbo and McComas, 2008; Lachlan et al., 2007). Furthermore, the public’s implicit or inherent presumptions regarding the source or channel of information may affect further information behaviour (e.g. seeking more information about threats or ignoring it) (Vihalemm et al., 2012). Bird et al. (2012), for example, highlight the use of Facebook groups — both official and community generated — in the Queensland floods in Australia. In this setting, the ability to trust the messages received is key and information is likely to be sought, particularly by younger people, from multiple channels in order to ‘cross-reference’ advice and information (EU public empowerment policies project). The issue of trustworthiness of messages also needs to be highlighted. Credible sources are needed to convey messages and should take advantage of the ‘spotlight’ period of public attention at the height of a disaster to ensure effective messages are disseminated. This issue of trust is specifically addressed by the E-COM@ EU project.

Post-incident preparedness messages can be continued and will have, for a period of time, a higher level of attention, especially with regard to the specific type of incident that has occurred, although, depending on the nature of the disaster, communication systems may be affected over a very short or an extended period of time (e.g. in the case of infrastructure damage after a flood or earthquake).

Cool et al. (2015) highlight the role of social media with younger citizens in post-disaster risk communication after Typhoon Haiyan in the Philippines

as well as the lack of an infrastructure of social media use during the disaster itself. Yasuda et al. (2016) highlight the role of in-school projects in preparing younger citizens in the same setting, as do Schiavo et al. (2016) in a broader health-promotion context.

Communication with younger demographics shares one key issue with wider issues of communication; the requirement for a capable and resilient infrastructure to support communication. This is being addressed both as a technical issue (e.g. provision of resilient broadband —PPDRTC project) and through effective middleware to improve collaboration among message providers (e.g. Disaster and IDIRA). In terms of preparedness, such communication capability is available to many people (and arguably especially to younger people) for most of the time through 4G wireless networks, broadcast media and targeted project interventions.

Cyber security is also raised as a risk factor by projects including the EU public empowerment policies project, as is the quality of information sources feeding into messages — especially at the reaction stage; EU Proactive project being an example of a technical approach to this issue. The need to take a multidisciplinary and multi-channel approach to communication rather than targeting specific groups — such as younger people — solely via a ‘preferred’ channel is highlighted by the EMBRACE project. Furthermore, studies related to crisis communication in real-life situations (e.g. Greater London area riots in 2011 and the swine flu epidemic in 2010) have highlighted the role of proactive and interactive methods of commu-

nication as well as timely reaction in both enabling trust and increasing communicational reach.

These studies emphasise the importance of interaction and participation in online communication rather than merely relying on one-way information dissemination. Prompt reaction and interaction can prove to be pivotal in avoiding a communicational void (especially from the public authorities) — and in preventing such a void from being filled by other actors — as well as in establishing dialogue and trust towards citizens, but also in increasing communicational reach through shares, likes and recommendations (Denef et al., 2013; Tirkkonen and Luoma-Aho 2011). A further risk issue in the use of social media — therefore disproportionately affecting younger citizens — is the potential (Alexander, 2014) for inaccurate information. Rumours, either naïve or malicious, can be rapidly and widely disseminated in advance of accurate information, and can potentially reduce its impact or fully eclipse it when it does come. For example, according to a study by Gupta et al. (2013), rumours and fake content covered 29 % of the most viral content on Twitter, while 51 % of the content was generic opinions and comments and only 20 % relayed true, factual information.

A recent study also found echo effects (i.e. the dissemination of older tweets with fake information) but also self-correcting mechanisms of social media communities when verifying and dispelling online rumours during crises (Jong and Dücker, 2016). There are also imbalances in national contexts; Mudhavanu et al. (2015),

for example, highlighted the lack of involvement of younger citizens in disaster risk communication in Zimbabwe.

4.4.4 Technology Infrastructure

A key area for technological innovation in DRM relates to the social and technical challenges concerning personalisation while achieving a shared situational awareness among the emergency services and citizens. Shared situation awareness refers to information that is shared, including updates of the information among a group of people, for example as achieved by projects discussed above. Shared situational awareness is often defined for team performance (e.g. Cuevas et al., 2011), yet is also relevant in crisis management (e.g. Van De Ven et al., 2008; Wolbers and Boersma, 2013). Personalisation is directly related to cultural and contextual diversity in Europe, including multilingualism, the EU-wide mobility of its citizens and serving citizens experiencing a disability or requiring special needs (e.g. deafness, speech impairment, etc.). A number of EU FP7 and Horizon 2020 projects are currently addressing these aspects to enable rich(er) communication between emergency services and citizens, including bidirectional voice, real-time text, video and data: ‘total conversation’ with rich data (personal, medical and location data). A non-exhaustive overview can be found in the appendix.

Current communication means that rely mainly on voice calls via land-

lines or mobile phones as services for exceptional cases are only partially supported by SMS, email, fax and text relay. The advent of social apps and the wide availability of smart devices enable the implementation of a total conversation model that combines audio, real-time text, video and data-sharing to serve all citizens, including those experiencing a disability and requiring special needs. However, typical challenges encountered are related to standardisation and customisation: standardisation is necessary to ensure European-wide accessibility to emergency services, while customisation is necessary to allow the implementation of specific apps, products and services for specific audiences.

Another open challenge is multilingualism and multicultural personalisation (Stephens and Malone, 2009). Each European country (and beyond) hosts many citizens who do not speak the native language, including tourists, expats and immigrants, but also citizens who use sign language (i.e. due to speech or hearing impairments). During crises, effective and efficient communication is of utmost importance, and having control over the quality of translations of communications is also an applicable challenge to emergency services (Manso et al., 2016). The operators and first responders engaging in dialogue with citizens may need automated support in communicating effectively with citizens with different language proficiencies and cultural backgrounds (Manso et al., 2016). Projects such as NEXES, Insign and SignSpeak address the challenge of fostering communication with (national and international) sign language users.

Technical standardisation may be hampered or fostered by the current developments of regional and national ‘emergency apps’. Examples of national apps with integration into the emergency services’ systems and work processes include the BurgerNet app. (n.d.), the WhereAREU app. (n.d.), Greater Manchester Police app. (n.d.), and others. A possible disadvantage is a plethora of special-purpose apps that only function within a specific region. Other apps, such as the BurgerNet app., have functionality for cross-border cooperation and pave the way for standardisation efforts. An innovation investigated by the NEXES project is to provide standardisation to the ‘back-end’ of these apps through providing reusable libraries. This ensures flexibility by app. developers to build any desired app. with a harmonised integration with emergency services. An advantage of such an innovation is that, potentially, such apps can function everywhere in Europe and beyond.

Enable communication between many parties through different (non-) digital media, securing proof of origin, tamper proof contents and discovery of updated information.

A social and technical challenge for emergency services is to engage in ‘crowdsourcing’: mobilising citizens to provide information on specific

topics and/or engage in certain actions. However, both the advantages and disadvantages of crowdsourcing concern privacy, handling information from participants with malicious intent, detecting false positives, etc. Furthermore, participant motivation and engagement are of importance, especially when frequent updates of information from crowdsourcing are required (Liu, 2014).

Although general media coverage cannot, and likely should not, be restricted, communication with and by emergency services may need to become more focussed and targeted. A challenge for risk communication is to target specific risk communication to a specific audience, possibly deliberately excluding specific citizens, e.g. unaffected citizens (Manso et al., 2016).

Another challenge concerns the party that takes the initiative. Typically, citizens take the initiative by calling emergency services in an emergency. Emergency services, however, take the initiative prior to an incident/situation in providing information to (groups of) citizens. An innovation to be investigated in social and technical implications concerns how emergency services can contact a citizen, which could be a response of ‘calling back’ or when losing connectivity (Manso et al., 2016). Alternatively, there is the case of proactive communication: initiating communication before a hazardous situation unfolds. Unexpected communication by emergency services and other authorities towards citizens may raise issues regarding privacy.

Crisis informatics (Palen et al., 2007)

is a documented phenomenon that illustrates how people in and out of the disaster go online through computers using Web 2.0 applications, cell phones and other personal devices to provide, seek and broker information in times of emergency.

For example, results found in Soteria indicate that citizens consider authorities’ presence in social media as valuable and reassuring during emergency situations (Jäntti et al. 2016). This directly implies that trust is an important facet of risk communication (Coombs and Holladay 2014). Apart from social and political aspects of trust, a number of security considerations are of importance regarding the message(s) sent by certain (trustworthy) parties (Fruth and Nett, 2014; Tanenbaum and Van Steen, 2007):

- Non-repudiation: no message can be changed or tampered with; it is the original message with original author, source location and timestamp.
- Signed: any message can be traced to its author (the originating party).
- Relationships: any message explicitly refers to another message, including an annotation of the type of relationship, such as ‘is an update of’.
- Distribution: any message can be shared and distributed, without changing the above properties.
- A challenge is to explore these technical considerations further so that messages sent by (authorised) parties can be received, inspected and shared by any recipient. Of importance is the ability to check for ‘updates’ and to have the built-in technical means to assure that citizens can be notified of updates in a timely fashion. Information-bound security approaches (Xylomenos et

al., 2014) may be of relevance.

A typical technological challenge during a crisis concerns the availability and reliability of communication networks. Numerous national and EU-funded projects (too many to list here) investigate new technologies

and solutions for telecommunication infrastructures and network robustness. Nevertheless, it is prudent to assume that communication networks may be (temporarily) disabled, congested or unavailable during a crisis. Given this assumption, a challenge is to ensure that (a) information can

be communicated to citizens and that (b) information can be inspected for authenticity and timeliness. The security considerations with regard to messages, formulated from the trust perspective, also apply to non-technical communication. Is it possible to deliver messages without using

BOX 4.1

Project overview (non-exhaustive)

- BeSeCu (Behavior, Security and Culture) project. Understanding culture in crisis behaviour.
- COMPOSITE project. Comparative police studies in the EU (www.composite-project.eu).
- DISASTER. Data Interoperability Solution At Stakeholders Emergency Reaction Novel methods to enhance cross-border emergency response (www.disaster-fp7.eu).
- E-COM@EU project. Effective communication in outbreak management (www.ecomeu.info).
- EMBRACE. Building Resilience Amongst Communities in Europe. (www.embrace-eu.org).
- HeERO 2 project. Harmonised eCALL European Pilot (www.heero-pilot.eu).
- IDIRA. Interoperability of Data and procedures In large-scale multinational disaster response actions. (<http://www.idira.eu/>).
- INSIGN. European Commission DG Justice and Consumers pilot project regarding improving communication between deaf and hard of hearing persons and the EU (www.eu-insign.eu; not online anymore)
- New information system for the national emergency response centre of Finland (http://www.112.fi/en/the_erc_reform/new_information_system)
- NEXES. NEXt generation Emergency Systems (www.nexes.eu, Manso et al., 2016)
- Online and mobile communications for crisis response and search and rescue actions ([isar.112.eu](http://www.isar.112.eu)) (Flizikowski et al., 2014; Manso and Manso, 2012)
- Online and mobile communications for emergencies ([soteria.112.eu](http://www.soteria.112.eu)) (Jäntti et al., 2016)
- PEP project. EU Public Empowerment Policies for Crisis Management (www.crisiscommunication.fi/pep).
- POP ALERT project. Solutions to better prepare European citizens and authorities during large-scale crises.
- PPDRTC project. Public Protection and Disaster Relief — Transformation Centre. Roadmap to emergency communication (www.ppdr-tc.eu).
- PROACTIVE project. Terrorism detectors. (www.proactiveproject.eu).
- Project Slándáil, which aims to build and test a prototype system for managing disaster emergencies by fusing information available in different modalities in social media with due regard to ethical and factual data provenance (www.slandail.eu)
- REACH112. Responding to All Citizens needing Help (www.reach112.eu)
- REACT. Reaction to Emergency Alerts using voice and clustering technologies (www.react-ist.net; not online anymore)
- Software to understand sign languages (www.signspeak.eu)
- Use of new communications and social media to support citizens during crisis (www.projectathena.eu) (Gibson et al., 2015)

digital communication infrastructure, while retaining these trust-enhancing aspects? The challenge here lies in allowing citizens to distribute messages using various media, including but not limited to paper, photographs, photocopy, etc.

4.4.5 Conclusions and key messages

In this subchapter we have identified a number of areas of practice, many of which reinforce existing tenets of effective practice: communication is reciprocal and risk communication is about increasing the quality, timeliness and accuracy of situational awareness. We also point out the influence of technological innovations and current innovation challenges that lie in realising total conversation and crowdsourcing capabilities, personalisation for citizens, integration with emergency services, enhancing trust in (official) communication and standardisation with and beyond the EU. Research has indicated that many of the challenges related to information sharing during major incidents transcend technology issues (Allen, Karanasios and Norman 2014). These new innovative processes can, however, be seen as a double-edged sword, bringing not only benefits but also new risks and challenges. As Liegl et al. (2016) state, it is also important to note the importance of the consideration of ethical, legal and social issues (ELSI) related to these new innovations.

Partnership

Governments (national, regional and

local), emergency management (responder) organisations and other public service bodies in disaster risk management are slowly shifting from communication methods that reflect a view that aims to align lay perceptions with expert views of severity to participatory models that recognise local citizen expertise and knowledge. A key issue is that of engaging communities and citizens rather than purely disseminating messages, that is, moving from a top-down focus to what has been termed a ‘people-centred approach’. The development of digital technologies and social media platforms (e.g. the use of social media in the Haiti earthquake, the Queensland floods in Australia and Hurricane Sandy in the United States) has led to new ways of delivering better targeted, actionable risk information to diverse publics across multicultural, multiagency and multi-jurisdictional boundaries.

Knowledge

In this context, it is wise to consider the ‘dark’ or unexplored areas of research and practice in risk communication. In a recent structured literature review of research focusing on innovation within the public sector, De Vries et al. (2015) noted that only 7 % of the literature reviewed dealt with technological process innovation and that interorganisational innovations have not been thoroughly investigated. It is perhaps interesting that much of the work discussed here deals precisely with these areas: interorganisational innovations and technologically enabled process innovation. However, it is also telling that whilst the studies we have identified discuss the nuances of the technologies and processes

to ‘improve practice’ or demonstrate ‘innovations’, they singularly fail to discuss the mechanisms by which the innovations are stabilised or grown in terms of institutionalisation, scope and function.

Innovation

The key challenges for innovation in disaster and risk communication lie not in the generation of innovative practices but in the implementation of mechanisms by which innovations and improving practice are diffused and moved from a state of emergence to wide-scale adoption. Rather than generating innovative approaches, we would suggest that embedding and diffusing innovations is the key area that both policy and practice must address.

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