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5.2 Preparedness and response

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5.2.1 Policy and institutional architecture of preparedness and response in Europe

The DRM policy landscape has transitioned to ‘civil protection’, emphasising the importance of effective transboundary coordination and cooperation to manage transboundary disasters. This has been accompanied by a shift towards the role of policy in adaptive management and in protecting the rights of victims and survivors. Science plays an important role in better understanding the complexity of modern disasters and in devising suitable tools and approaches for preparedness and response.

5.2.1.1 Policy landscape and trends

Historically within European states, disasters were times when affected individuals had to self-organise, as external response was not systematically available, if at all. This changed in the 20th century when states started to organise loose structures of ordinary citizens intended to respond in times of crisis. For fires, this concept dates back to the Romans (Goudsblom, 2015). In recent history, the risk of aerial bombing across Europe led to a significant shift with the formation of civil defence organisations (Dynes, 1994; Van der Boom, 2000). By a decade or so after the Second World War, a transition had taken place from an essentially untrained volunteer-based response system to disaster management organisations staffed by paid professionals. Most European countries moved towards a professionalisation of disaster management and a centralised command-and-control structure (Dynes, 1994).

Command and control through civil defence centred on managing populations in the face of aggression and

on emphasising top-down methods (Alexander, 2002). During the Cold War (1948-1989), the focus on possible relocation of civilian populations under threat of nuclear attack saw civil defence administered by military and paramilitary groups. Scientific critiques of civil defence point to the possibility for such institutions to become an instrument of repression and used to ‘protect the state against its people’ (Alexander, 2002).

Science played a key role in shaping the nature of civil protection through the 1960s to 2000s. Research questioned the role of the military in emergency management and helped to shape the non-military, civilian character of emergency preparedness that emerged (Alexander, 2002). A better understanding of the complexity of modern disasters has focused attention on adaptive emergency management as well as the rights of victims and survivors. The military still has a role to play; in redefining its role in disaster preparedness and response, military forces can be used in

integrated ways with civil protection, or civil protection forces may contain pseudo-military organisations. For example, some fire brigades are partly organised along military lines, and non-governmental organisations such as the Salvation Army adopts a pseudo-military image (Alexander, 2002). Overall, ‘modern civil protection is not inherently authoritarian’ (Alexander, 2002), although the 11 September 2001 terrorist attacks altered emergency planning with a new focus on terrorist incidents and response operations in which police force or mil-

itary units would usually be the lead agency (Alexander, 2002). Concerns over the possible remilitarising of civil protection in light of efforts to prepare for possible terrorist attacks are regarded as a threat to progress made in the 2000s in expanding civilian disaster response networks (Alexander, 2002).

5.2.1.2 Institutional architecture and coordinating mechanisms

European Union members have over time been drawn closer together by policies and legislation facilitating greater interstate cooperation (Boin et al. 2014b). The risks facing Member States have become increasingly transboundary in nature and require greater cross-country collaboration to prepare and respond to crises (Boin et al. 2014a). Therefore, it has been necessary to create integrated institutions and coordinating mechanisms to manage these. We outline key institutions that have developed and explores how they have evolved and

BOX 5.4

European Union Civil Protection Mechanism

When activated, the mechanism provides support via the ERCC, which provides 24/7 capacity to monitor and coordinate response to disasters. It is directly linked with the civil protection and humanitarian aid authorities in the participating states.

The centre also acts as the central 24/7 contact point in the eventuality that a Member State activates the solidarity clause (Article 222 of the Treaty on the Functioning of the European Union) or when the European Union presidency activates the integrated political crisis response arrangements and ensures coordination with other EU services and bodies for the response (ECHO, 2016).

Recent disasters such as the west-

ern Balkans flooding (2014), the eastern Ukraine conflict (2015), the forest fires in Greece (2015) and the European refugee crisis (2015-2016) have activated the mechanism and therefore the ERCC. Twenty-eight Member States plus a number of other European countries participate, providing additional response capabilities in times when the disaster exceeds those of the state in which the crisis takes place. Assistance deployed includes technical expertise, relief and equipment items, as well as advice on preparedness measures.

In 2013, legislative changes placed greater emphasis on preparedness (through the mechanism), including the establishment of a voluntary pool of pre-committed response capacities. In addition, EU funding

helps address caps and temporary shortcomings in preparedness and response planning, including ‘improving the quality of and accessibility to disaster information, implementation of prevention measures, raising of public awareness of risks and disaster management, supporting Member States in risk assessment and hazard mapping based on guidelines, encouraging research to promote disaster resilience and reinforcing early warning tools’ (ECHO, 2016).

Source: ECHO (2017)

how they respond to the challenges of Europe's changing risk environment. Crises in the future will be increasingly transboundary, transcending geographic and political borders and affecting multiple vital elements of infrastructure, and will not be contained in time (Ansell et al., 2009; Ansell et al., 2010; Boin and Ekengren, 2009; Boin and Lagadec, 2000). Recognising this, the European Security Strategy (ESS) declares: 'the EU's commitment to combat a variety of security threats, including failed states, energy security, terrorism, global warming and disasters. The ESS adopts a comprehensive view, explicitly linking internal and external threats, civilian and military capacities and natural and man-made disasters' (Boin and Ekengren, 2009). This points to the importance of effective cooperation between regional, national and international communities.

The UCPM, established in 2001, seeks to enhance and strengthen cooperation and coordination between Member States and to jointly respond to major emergencies — including pooling capabilities (Morsut, 2014). The mechanism has evolved from preparedness for response, and response, to include preparedness and prevention, and in supporting international relief efforts, for example to the 2004 Indian Ocean tsunami and the 2010 Haiti earthquake (Morsut, 2014).

Evidence points to the value of information sharing in disaster response, with studies showing that failure to do so '... during interagency disaster response has a negative influence on collective decision-making and actions' (Bharosa et al., 2010). This has been recognised by European mem-

bers, including the Dutch Ministry of the Interior and Kingdom Relations (Bharosa et al., 2010). The UCPM promotes a coordinated response to disasters across Europe (see Box 5.4) supporting countries when capacity is surpassed. However, empirical evidence is sparse on the challenges and obstacles to effective coordination and information sharing, limiting understanding of the means to address barriers between community, agency and individual levels (Bharosa et al. 2010).

Overall, Europe's approach to preparedness and response can be categorised as a 'networked approach' reflecting the complexity of recent disaster events (Boin et al., 2014a). Europe's recent experience with disasters that cross traditional geographic and policy boundaries — referred to as 'transboundary crises' — include the bovine spongiform encephalopathy crisis in 1996; the Erika and Prestige tanker disasters in 1999 and 2002, respectively, with devastating environmental, social and economic impacts; flooding in central and eastern Europe in 2002; and fires in southern Europe in 2003 (Boin et al., 2014a). Throughout 1990 and 2000 the European Union developed its transboundary coordination and cooperation in response to different crises, harnessing European capacity and leading to the establishment of several agencies: the European Food Safety Authority, the European Maritime Safety Agency and three European financial supervisory authorities (Boin et al., 2014a). The development of tools, approaches and institutions has therefore been largely reactive, whereby 'The EU developed all of this capacity in a punctuated and fragmentary manner: with

each crisis, Member States invested additional authority in the Union's budding crisis management apparatus. There is, in other words, no institutional blueprint' (Boin et al., 2014a). It can therefore be characterised as a 'network' or governance approach (Boin et al., 2014a).

This networked approach is supported by a number of tools, including the ERCC in Brussels (Box 5.4) and a Common Emergency Communication and Information System, which facilitates communication between the ERCC and national authorities. These centres seek to align with the European Union's core values — respect for human dignity, liberty, democracy, equality, the rule of law and human rights.

Progress over the past 20 years has seen research initiatives move from a focus on cross-border cooperation between Member States to methodological development. The latter includes hazards such as earthquakes, floods and landslides, as well as more effective management plans linked to EWSs employing those new technologies (Papatheodorou et al., 2014). Papatheodorou et al. (2014) note that '... harmonisation of methodologies used to assess ELF Hazards (earthquake, landslide, flooding), easy or even free access to reliable and accurate harmonised data and reliable and accurate hazard maps on a local scale are needed in order to effectively design preventive measures, to plan an effective management strategy and finally to raise public awareness'.

Initiatives such as EFAS support improved preparedness to flooding in transnational European river basins

(Thielen et al. 2009). Starting with a 2003 prototype, local water authorities were provided with 3-10 days advance notice of medium-range and probabilistic flood forecast information. Initiatives such as these involve collaboration with national hydrological and meteorological services linking research, action and continual development of a model supported by information exchange and linking meteorologists with national water authorities. When initiated, EFAS was one of the few flood warning systems

in existence to utilise ensemble prediction systems to increase predictability of floods and enhance preparedness capacity (Thielen et al., 2009). The importance of cross-border cooperation is especially important for flood hazards, providing means to strengthen knowledge, information and selection of cost-effective mitigation strategies. The lack of a legal framework for cooperation, of capacity and resources and of differing institutional structures and public awareness present challenges to

be addressed (Papatheodorou et al., 2014). Effective cross-border action is limited without comparable pan-European methodological approaches to hazard assessment and risk mapping (Papatheodorou et al., 2014).

5.2.1.3 Developing effective early warning systems

EWSs form an important part of DRM and are essential features of

BOX 5.5

European community urgent radiological information exchange (Ecurie)

In the wake of the Chernobyl accident, Council Decision 87/600/Euratom was adopted. This decision essentially obliges a Member State to notify the European Commission without delay in the event of enacting measures to protect its population from the effects of an event with radiological consequences. This legislation was the legal basis for what became known as the 'European community urgent radiological information exchange', or Ecurie, and was a major step forward in the field of radiological emergency preparedness in Europe.

The information to be shared not only covers the basic characteristics of the event itself but also the foreseeable development of the emergency and its potential effects, the

results of radiological monitoring in the affected country and the measures taken to provide information to the general public. On receipt of such a notification, the European Commission promptly forwards the information to all Ecurie contact points. The intention is for the system to provide a continuous flow of information during the emergency. In the years since, the system has matured both in terms of stakeholder network and operational status. A new information exchange software application, 'Web-Ecurie', was developed and first made operational in 2012, replacing its predecessor, which was based on point-to-point secure email communication. Users only require internet access in order to enter the application, which may be used on a variety of platforms.

Submitted information is organised in a modern status board arrangement. 'Event' or 'National' status boards allow for either a broad or a country-specific view, with particular focus on the display of national protective measures.

Much attention has been and continues to be given to harmonising the underlying procedures and technology with that of the International Atomic Energy Agency, and the transfer of valuable experience gained over the decades in Europe to countries and regions outside the European community is actively being pursued.

Source: De Cort et al. (2015)

UCPM (Alfieri et al., 2012). Greater recognition of the role of EWSs have contributed to the move from an ex post response towards a culture of risk prevention and preparedness (Alfieri et al., 2012). The shift to greater stakeholder participation in preparedness and response (described earlier in this chapter) can be seen in more accessible and open information in EWSs including the ability of systems to be accessed remotely and stakeholders to input data that improves the quality of early warnings (Alfieri et al., 2012).

EWSs provide timely warnings to minimise loss of life and to reduce economic and social impact on vulnerable populations (Garcia and Fearnley, 2012). In 2006, the UNISDR platform for the promotion of early warning published the Global survey of early warning systems, identifying existing capacities and gaps in EWSs in over 23 countries with 20 international agencies (United Nations, 2006). The report advocates that an EWS should be ‘people centred’ (i.e. community based) and should include many systematic approaches and diverse activities spanning four key elements: risk knowledge, monitoring and warning service, dissemination and communication, and response capability (Basher, 2006). The operation of an EWS presents numerous challenges due to variations in scale (global, national, regional or local), temporality (rapid onset or slow onset and frequent or infrequent), function (safety, property or environment) and hazard (weather, climate and geohazards).

An EWS needs to fit within the broader mitigation and preparedness

actions of the DRM cycle. Researchers and other stakeholders frequently work independently on EWS subsystems in a multitude of non-coordinated strategies with no structure or linking, compromising the effectiveness of the EWS. An effective EWS can only be achieved once stakeholders recognise their relative contribution and work together to link efforts in order to achieve effective DRM.

With the increasing impact of global warming on extreme natural hazards, EWSs are increasingly required to cater for multiple hazards (Basher, 2006) or even cascading hazards (Pescaroli and Alexander, 2015). This is reflected in the SFDRR — and its European signatories — which aims to ‘substantially increase the availability of and access to multihazard EWSs and disaster risk information and assessments to the people by 2030’ (UNISDR, 2015). This requires a greater examination of the role of EWSs as a whole within preparedness strategies.

5.2.2 Ethical, legal and social principles in preparedness and response

We review some of the core ethical, legal and social (ELSI) considerations in emergency preparedness and response. Recent efforts have begun to draw interdisciplinary research together and engage closely with practice (Campbell 2012; Boin and Eken-gren 2009) to discuss ELSI. Debates about responsible research and innovation (Nowotny et al., 2001; Von

Schomberg, 2013; Stilgoe, 2015) have brought a reflexive dimension to research and practice in DRM.

DRM is embedded in complex ethical, legal, social and political contexts, and disasters should not justify exceptions in moral standards. Shared values and principles are needed for emergency response that transcend national boundaries and strengthen social cohesion and trust before a disaster can increase the effectiveness of response.

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5.2.2.1 Legal frameworks

National legal frameworks for disaster preparedness and response in Europe are based on European Commission directives or international initiatives. As in the case of the Flood Directive (Alfieri et al., 2012), these policy developments often respond to global change or large-scale disasters. The

Flood Directive, for example, shows how major European floods have resulted in a move towards uniform protection for all European Union citizens and call on Member States to review their flood risk management approaches (Alfieri et al., 2012). Directives urging Member States to strengthen preparedness measures are often closely linked to mitigation strategies and environmental protection actions, including the Strategic Environmental Assessment (Papatheodorou et al., 2014). This is largely the case for earthquakes, floods and landslides (Papatheodorou et al., 2014).

With a shift towards a risk management approach to dealing with disasters, the legal frameworks under which preparedness and response are situated have broadened. The attraction of ‘risk-based regulation’ has been discussed by scholars reflecting on the increased adoption of ‘risk’ by policymakers — including the European Commission, which regards risk as a ‘crucial’ component of public policy, and the Organisation for Economic Cooperation and Development’s recommendation of risk-based approaches (Krieger, 2013). Disaster preparedness and response has evolved in this context of risk-based governance, regarded as a means to operate more efficiently with finite resources in a context of austerity and accountability in the context of a narrative of ‘good governance’ (Krieger, 2013).

Increased incidents of flooding and economic damage since the 1990s — and, in particular, USD 11 billion (EUR 10.1 billion) of damage as a result of the Elbe/Danube flood in 2002 and USD 4 billion (EUR 3.7 bil-

lion) in the United Kingdom in 2007 — have reinforced this paradigm shift and there has been a clear move from flood defence to flood risk management across Europe (Krieger, 2013). This can be seen in the United Kingdom’s ‘Making space for water’ (DEFRA, 2004) and Germany’s ‘Room for rivers’ approaches (Krieger, 2013). As with many EU Member States, the United Kingdom emergency management approach is ‘all hazards’ and incorporates mitigation, preparedness, response and recovery (O’Brien, 2008). Emergency management is characterised as ‘legally based, professionally staffed, well funded and organised’ (O’Brien, 2008). Reforms to United Kingdom emergency management have replaced discretion with a duty to prepare plans, standardising procedures for risk assessment and supporting a more integrated approach. Emergency management in the United Kingdom has, however, been criticised for focusing largely on institutional resilience and organisational preparedness where a greater emphasis on societal resilience and public preparedness is regarded as necessary (O’Brien, 2008). Greater emphasis on a preparedness and emergency planning that moves beyond the focus on the continuity of emergency services and commercial activities could entail greater inclusion of the public (O’Brien, 2008).

5.2.2.2 Ethics and moral standards for emergencies

Disasters are often still seen as justifying exceptional decisions. Sorrell (2002), for example, argues that in

emergencies, societies may be ‘sucked into a moral black hole’; meaning a breakdown of moral and social order that justifies the use of extraordinary powers. These positions are, however, challenged by a number of analysts. At the root of these debates are questions about whether moral standards should ever be disregarded in emergency situations.

As part of its code of ethics, the International Committee of the Red Cross (ICRC) provides detailed guidance on how to engage local populations in conflict areas in the production, protection and sharing of sensitive information (ICRC, 2013). These approaches make the case that preparation can protect societies from exceptions that go against ordinary morals, integrity and dignity, from unintended consequences or from entrusting decisions solely on experts or governments without public engagement. This resonates strongly with calls for responsible research and innovation, process-oriented, ‘post-ethical, legal and social issues’ approaches (Balmer et al., 2016) that develop forms of disclosure and ethics (Introna, 2007), collective experimentation (Petersen et al., 2016) and collaborative design (Liegl et al., 2016) to address ELSI as they emerge in DRM.

Community involvement in DRM is generally agreed to be essential and is widely promoted internationally. While states have an ethical and often legal responsibility for preparedness and response, effective action requires society as a whole to engage and the government to partner with civil society and private sector organisations. The shift towards civilian disaster preparedness and response recognis-

es that ‘disasters can only be mitigated successfully if ordinary people are empowered to take responsibility for their own safety. Disasters, therefore, are as much about democracy as they are about security’ (Alexander, 2002). Guiding principles for state interaction with society in preparedness and response have been highlighted by international agencies, including ‘empowering and inclusive participation’, ‘accessible and non-discriminatory support’ and the ‘special attention [needed for] those disproportionately affected by disasters’ (UNISDR, 2015). Indeed, emergency preparedness is considered by some as a means to ensure and safeguard democratic rights, not to circumvent them. Thus, civil protection often explicitly includes principles of equity (Wisner et al., 2004; Alexander, 2002) and the Council of Europe’s European and Mediterranean Major Hazards Agreement has published extensive guidance on the application of ethical principles to all aspects of DRM (Prieur, 2012).

Accountability, which is a key principle behind community participation and involvement, is encouraged by international, regional and national codes, charters and standards (Twigg, 1999). For international humanitarian response, the International Federation of the Red Cross/International Committee of the Red Cross has a code of conduct, a voluntary code of principles for humanitarian actors (IFRC/ICRC, 1994), while the Sphere Project has developed a set of minimum standards in core areas of humanitarian assistance (Sphere Project 2011) and the Inter-Agency Standing Committee has prepared operational guidelines on human rights and natu-

ral disasters (IASC, 2006). In Europe, the 1998 Aarhus Convention established public rights to information on the environment and associated human safety as well as to participate in relevant decision-making (UNECE, 1998). Such instruments may be linked to or supported by broader principles and agreements on human economic and social rights and to institutions that monitor and support them. The idea of a ‘right to safety’ is supported implicitly in some international covenants and charters, although it is rarely recognised in national legislation (Twigg, 2003).

Public debates regarding ethical aspects of preparedness and response are often triggered by disasters, such as the L’Aquila earthquake trial (Alexander 2014, Newberry 2010), but are also ongoing, wider discussions about social justice and vulnerability, both internationally (Wisner et al., 2004; Morrow, 2008) and within the European Union (Brisley et al., 2012; Fielding, 2007; Lindley et al., 2011).

5.2.2.3 Social capital and social cohesion

Research points to the very important role of social capital as a primary base for community disaster response and is vital in reducing the impact of disasters and facilitating recovery (Dynes, 2002; Ko and Cadigan, 2010; Murphy, 2007; Aldrich, 2012). In crises, social networks provide mutual assistance and access to support and resources, thereby reducing disaster impacts and facilitating recovery. This has been demonstrated by research in a number of countries, notably Japan and the

United States, but there is a need for further research in Europe (Comfort, 1996; Dynes, 2005; Murphy, 2007; Airless et al. 2008; Aldrich, 2012; Aldrich and Meyer, 2015; Nakagawa and Shaw, 2004; Shaw and Goda, 2004; Wallace and Wallace, 2008; Minamoto, 2010; Mimaki and Shaw, 2007).

Disasters often encourage or reinforce social capital formation (Putnam, 2000; Gordon, 2004; Shaw and Goda, 2004; Bankoff, 2007; Yamamura, 2010). Studies mostly show a strong association between , levels of social capital and post-disaster mental health outcomes, particularly a reduction in post-traumatic stress (Wind et al., 2011; Wind and Komproe, 2012; Ritchie and Gill, 2007; Adeola and Picou, 2014; Ganapati, 2012a, b). Conversely, an acute lack of social capital — social isolation — can contribute significantly to vulnerability, as documented with regards to the European heatwave of 2003 (Keller, 2015; Klinenberg, 2002; Ogg, 2005; Romero-Lankao et al., 2012).

5.2.3 Professionalization of citizen engagement in preparedness and response

At a national and regional scale, over the past decade the professionalism and coordination of preparedness for response by civil protection mechanisms, including across states, has advanced significantly. Some of these tendencies and an analysis of the changing roles of different preparedness and response actors are described below.

The professionalism and coordination of preparedness and response by civil protection agencies has advanced significantly in recent years alongside a desire to give citizens increasing responsibility for individual preparedness and response. New social groups can emerge during a disaster to help manage emergency response measures — their role could be better harnessed if appropriately planned for informal responses.

5.2.3.1 Citizen engagement and volunteerism

Locally organised, trained and equipped responders are considered a societal asset and a means to enlist significant social capital and capability in preparedness and response. Thus, in some contexts, citizens are encouraged to play a more active role in preparedness and response. The 2014 Dutch National Council for all safety regions — the decentralised bodies responsible for disaster management — recognised the value of untrained citizens and their role in preparedness (Veiligheidsberaad, 2014).

Encouraging preparedness for rare disasters, however, remains a policy challenge. Citizens primarily prepare for incidents perceived to be a significant threat and/or the most recent disaster they encountered (Major, 1999; Tierney, 1989). Government programmes aiming to boost resilience therefore need to focus on dominant and regularly experienced risk. For example, in areas that regularly experience small earthquakes, citizens can be more easily persuaded to prepare for the risk of a more severe earthquake, but less for other risks. This raises questions about, for example, preparedness measures by citizens for flood risk in the Netherlands where the perception of flooding from the sea is low, having not occurred since 1953. In spite of government flood risk preparedness programmes, further efforts are needed to engage citizens (Engel et al., 2012).

5.2.3.2 Emergent groups

Emergencies stimulate informal responses by spontaneous, self-organising and voluntary groups and individuals from within and outside disaster-affected communities. These groups may carry out a wide variety of activities including search and rescue, first aid, damage assessment, debris removal, handling of bodies, relief supplies distribution, food provision, translation, counselling and presenting survivors' grievances (Quarantelli, 1994; Stallings and Quarantelli, 1985). This 'emergent' and 'convergent' behaviour in disasters has been documented over several decades across the world, in different cultures and under a variety of governance struc-

tures (Comfort 1996; Drabek and McEntire 2003; Dynes et al. 1990; Linnell 2014; Neal et al. 2011; Quarantelli 1993; Rodriguez et al. 2006; Whittaker et al. 2015). In some cases large sections of populations are involved (Quarantelli, 1993). Extensive flooding in Kingston upon Hull in the United Kingdom in 2007 stimulated a range of spontaneous actions by local residents, including assisting with evacuation, giving care and support to vulnerable neighbours, protecting houses against floodwater and giving medical assistance (Neal et al. 2011). Large numbers of spontaneous volunteers can present significant coordination, integration, communication and logistical and health and safety challenges to emergency managers, especially in rigid 'command and control' disaster management structures that do not plan for community engagement.

Improvisation and creativity are required to build networks and relationships between organisations and incorporate volunteers within organised efforts (Alvinus et al., 2010; Cone et al., 2003; Drabek and McEntire, 2003; Kendra and Wachtendorf, 2006; McEntire, 2002; Majchrzak et al., 2007; Uhr et al., 2008). Nevertheless, emergency volunteerism offers longer-term opportunities for more structured citizen response through training and creation of community preparedness and response teams as well as through formal voluntary organisations (Alexander, 2010; Barsky et al., 2007; Helsloot and Ruitenber, 2004; Pardess, 2005), although efforts are necessary to maintain volunteer motivation (Brand et al. 2008). Red Cross national societies are a major provider of organised volunteer sup-

port in disasters, with approximately 17 million active volunteers in 190 national societies worldwide (IFRC, 2016). Technisches Hilfswerk, a German government agency, has over 80 000 volunteers (99 % of its membership) who assist in disaster response in their own countries as well as in

others (THW, 2016).

Recognition of the contribution that social groups can make in emergency response has stimulated positive changes in state-civil society relationships for disaster planning. Yet governments sometimes resist in order

to maintain control (Jalali, 2002), and extensive government activity and spending can crowd out voluntary activity, especially where autonomous civil society is not well developed (Deng, 2009; Teets, 2009).

BOX 5.6

Digital humanitarianism and citizen mobilisation

There has been a ‘digital tsunami’ (European Commission, Future Group, 2007), with individuals, objects and environments generating vast amounts of data through self-disclosure and sensors, while advances in data processing make this data amenable to analysis for commercial, governance and security purposes — and DRM (Thrift, 2011). Together, these advances can enable improvements in preparedness and disaster response because they provide communities with more broad-based and detailed monitoring and timely feedback on their situation and support predictive modelling and more precise targeting of assistance.

‘Digital humanitarianism’ (Starbird and Palen, 2011; Munro, 2013; Burns, 2015) can be extremely useful if addressed within a framework for resilience that places an emphasis on data ownership, community-based analytical authority and community-based data skills (Crawford et al., 2013). Social media is one aspect of the role of tech-

nology in citizen mobilisation and awareness raising.

Social media can also service self-organised mobilisation and coordination of local resources, knowledge and efforts. During the floods in Germany in 2013, for example, 29 % of Twitter messages focused on coordinating help and resources locally (Zipf, 2013). Reports from sandbag-filling stations appeared alongside calls for help and a crowdsourced map of the current need for volunteers in different places (Mildner, 2013). Lüge (2013) suggests that these examples index a shift in the use of social media for emergency management. The informational service function for official response is increasingly seriously complemented by a practical service function for self-organised community help and resources, especially for members of the public. Recent studies find that in Europe generally, social media are growing and supporting the emergence of new forms of ‘social resilience’ (Flizikowski et al., 2014, Reuter and

Spielhofer, 2016).

The use of social media in crises can give rise to rumours (Mendoza et al., 2010), vigilantism and ‘do-it-yourself’ justice (Rizza et al., 2014, Tapia and LaLone, 2014). However, attempts at structuring digital volunteer work and crisis mapping through the UN co-founded Digital Humanitarian Network (Meier, 2015) and Virtual Operations Support Teams or ‘VOST’ (St. Denis et al., 2012) have begun to create bridges between crisis mappers and formal emergency agencies (Kaminska et al., 2015). They establish networks of trust: mechanisms that combine standardisation, training, and agreed channels of communication that enhance risk governance. These include engagements around air pollution (Mosley, 2009) and radiation risks from Chernobyl where ‘descriptive standards’, ‘alignment’, ‘unblackboxing’ and ‘mobile measuring’ proved central to prevent risks from becoming ‘twice invisible’ (Kuchinskaya, 2012).

5.2.3.3 The role of social media in citizen engagement

Knowledge of crisis communication in Europe is growing rapidly (Palttala et al., 2012). A complex field in itself, crisis communication links to societal expectations over the role of public authorities to effectively communicate risk and educate citizens on effective preparedness and response. Coordination has become increasingly important, as responsibility for managing crisis moves from solely the government and emergency services to include the role of media, social media and other actors (Palttala et al., 2012). Despite differences between countries — including different levels of financial resource for public crisis communication — the growing body of evidence, a plethora of guidelines and best practice, suggests there remain gaps in ensuring communication is integrated into disaster management practice and an integral part of decision-making (Palttala et al., 2012). Gaps remain in relation to cooperation across actors, i.e. the media, with citizens and across the response network (Palttala et al., 2012).

New forms of self-help, partnership and cosmopolitan ‘digital humanitarianism’ become possible with technology. Watson and Finn (2014), for example, examine information flows between corporations and their customers during the Eyjafjallajökull eruption, the most severe global flight disruption since 9/11. This empowered improvised self-help, including self-organised information services, and support for actively coordinating alternative travel. It widened peo-

ple’s networks through ‘virtual social convergence’, and Watson and Finn (2014) conclude that ‘such activities are able to enhance citizen resilience by mobilising social capital’.

5.2.4 Conclusions and key messages

Partnership

Cooperation between regional, national and international communities is needed for preparedness and response planning given the complex and transboundary nature of modern day disasters. ELSI are dimensions of DRM that need to be addressed together with practical efforts to prepare and respond. Effective preparedness can protect societies from exceptions that go against ordinary morals, integrity and dignity, from unintended consequences and from entrusting decisions solely on experts, or governments without public engagement.

Knowledge

A move away from command-and-control approaches to managing disasters has opened up more opportunities for citizens to participate in preparedness and response. Strong bonds and trust within and between communities facilitates a more effective response in emergencies and can be harnessed by authorities. Social media can also be used to enhance self-organised mobilisation and coordination of local resources, knowledge, and efforts for disaster preparedness and response.

Innovation

Research and innovation in process-oriented approaches to ELSI will improve collective experimentation and collaborative design, to address issues as they emerge in the dynamic contexts of disaster preparedness and response.

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