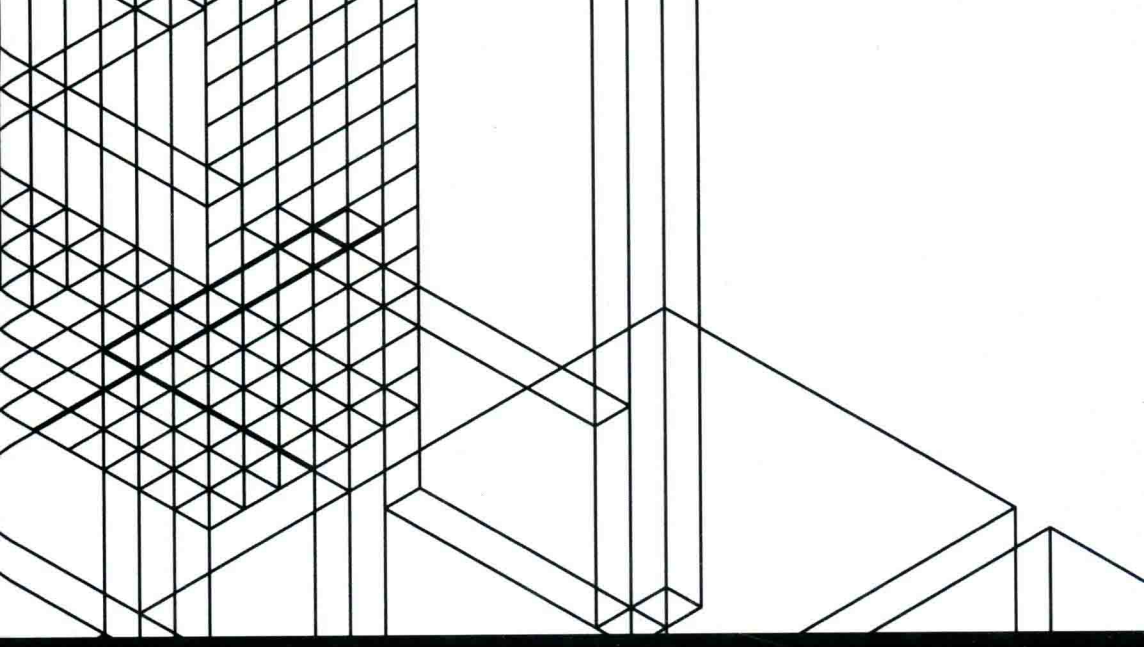
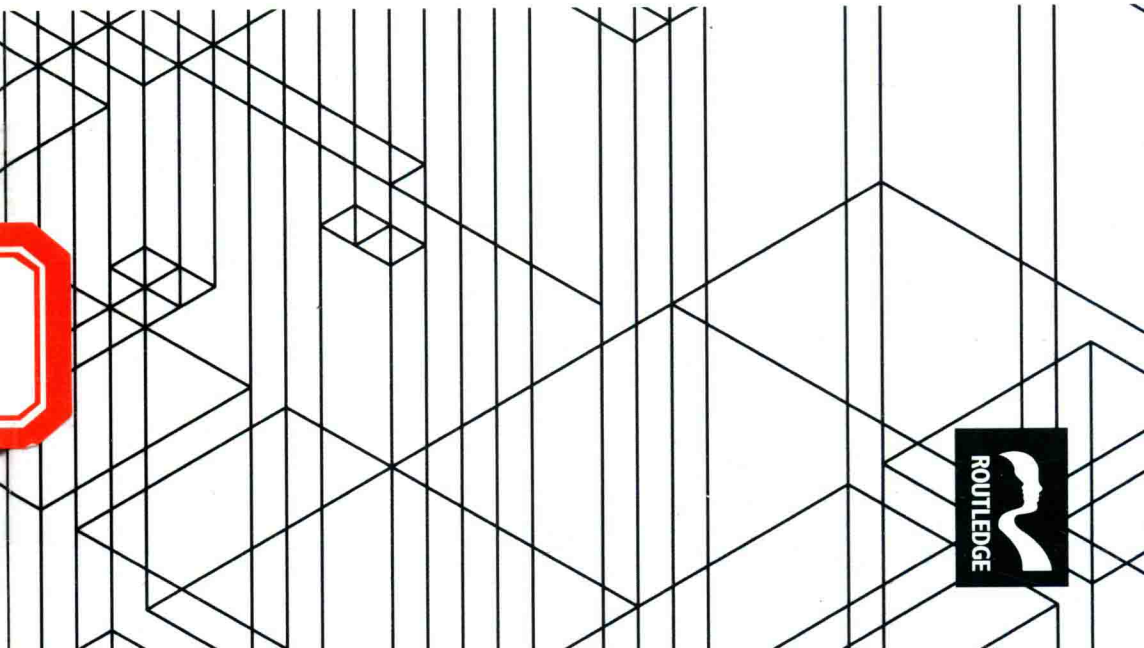


Routledge Studies in Surveillance

BIG DATA, SURVEILLANCE AND CRISIS MANAGEMENT

Edited by
Kees Boersma and Chiara Fonio



Big Data, Surveillance and Crisis Management

Edited by Kees Boersma and Chiara Fonio

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Big Data, Surveillance and Crisis Management represents an urgently needed and profoundly relevant contribution to the emerging body of scholarship about the role data and information technologies now play in how crises now unfold and how we respond to them. The voices in this volume are at the front lines of both practice and research in the multiple, interconnected fields that comprise the area of crisis informatics. We would do well to carefully and closely listen to what they are saying about how digital data is changing an already volatile world.

Dr. Nathaniel Raymond, *Director Signal Program on Human Security and Technology, Harvard Humanitarian Initiative (HHI) of the Harvard T.I. Chan School of Public Health*

Kees Boersma and Chiara Fonio undertake a major challenge in their edited book, *Big Data, Surveillance and Crisis Management*, in addressing both the positive and negative aspects of integrating the increasing amounts of digital data available from diverse sources into crisis management. On the positive side, advanced technologies provide access to many more sources of information about an emerging event in near-real time. On the negative side, this same access may compromise rights of privacy and lead to hasty judgments from unverified sources. The authors address this challenge of credibility by examining both the design and use of algorithms to mine the range of data sources and the uses of these methods of analysis in actual crisis situations. This problem warrants serious consideration, and the editors and their co-authors in this thoughtful book present a timely assessment.

Louise K. Comfort, *Professor of Public and International Affairs and Director, Center for Disaster Management, University of Pittsburgh*

This volume brings together two central concerns of our time – big data and crisis management – to provide us with crucial ways of thinking about our changing information environment. It provides a thoughtful and sophisticated exploration of both the potentials and pitfalls of data collection that will be of interest to a range of fields including data ethics, crisis management, and surveillance studies. The issues it explores are only likely to become more pressing with the passage of time, the development of the technology, and the direction in which the world seems to be headed.

Mark Andrejevic, *Professor of Media Studies Pomona College, Monash University*

This volume is essential reading for everybody engaged in the humanitarian sector. Building on the vast potential of new uses of information, social media and big data in humanitarian responses, the book systematically raises the pitfalls, dilemmas and ethical issues related to the use of big data in crisis response.

Dorothea Hilhorst, *Professor of Humanitarian Aid and Reconstruction at the International Institute of Social Studies of Erasmus University Rotterdam*

Big Data, Surveillance and Crisis Management

Big data, surveillance, crisis management. Three largely different and richly researched fields, however, the interplay amongst these three domains is rarely addressed.

In this title, the link between these three fields is very much explored in a consequential order through a variety of contributions and series of unique and international case studies. Indeed, whilst considering crisis management as an 'umbrella term' that covers a number of crises and ways of managing them, the reader will also explore the collection of 'big data' by governmental crisis organisations. However, this volume also addresses the unintended consequences of using such data. In particular, through the lens of surveillance, one will also investigate how the use and abuse of big data can easily lead to monitoring and controlling the behaviour of people affected by crises. Thus, the reader is invited to join the authors in their debate of how big data in crisis management needs to be examined as a political process involving questions of power and transparency.

An enlightening and highly topical volume, *Big Data, Surveillance and Crisis Management* will appeal to postgraduate students and postdoctoral researchers interested in fields including Sociology and Surveillance Studies, Disaster and Crisis Management, Media Studies, Governmentality, Organisation Theory and Information Society Studies.

Kees Boersma is an Associate Professor in the Faculty of Social Sciences of the VU University, Amsterdam.

Chiara Fonio is currently working at the Joint Research Centre with a contract as CA (Contractual Agent).

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1 **Big Data, Surveillance and Crisis Management**
Edited by Kees Boersma and Chiara Fonio

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Alessandro Burato graduated in Philosophy from the Università Cattolica del Sacro Cuore di Milano, and earned a Master of Science in Risk Analysis at King's College London. Throughout all his course of studies he has been keen on risks and emergencies communication and management processes. He studied the use of media and the role of communication in emergency situations. He is senior researcher at ITSTIME (Italian Team for Security, Terroristic Issues and Managing Emergencies), a research group of the Sociology Department of Università Cattolica del Sacro Cuore. He is editor of *Countering Radicalisation and Violent Extremism among Youth to Prevent Terrorism* (NATO Science for Peace and Security Series) and author of a chapter of the same book titled 'Crisis Management and Violent Radicalization: The Neglected Role of Risk Communication'.

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Contents

Chapter 1

Big data, surveillance and crisis management

Kees Boersma and Chiara Fonio

Introduction: dealing with information in crisis management

Today, societies face many potential threats that can turn into crisis situations. Crises (emergencies) upset society, and put its critical infrastructures under stress (Quarantelli 1998; Comfort et al. 2010).[1] Once a crisis occurs organizations, both public and private, are supposed to "fight" the crisis and form coalitions with other agencies and local communities. Since crises are often characterized by multiple causes, ambiguity of effects and various means of resolution, as well as by a shared belief that decisions must be made swiftly (Pearson and Clair 1998; Van der Vegt et al. 2015), information management is a vital component of preparedness, response and relief. An adequate and effective information management that supports crisis organizations requires processes to collect, analyze and share information about the crisis situation, and about the coordination between the responding organizations. When a crisis occurs, information managers start to collect and produce standard information products to support the coordination of the response operation (Comfort et al. 2004; Oh et al. 2013).

In addition to the data collected, shared, analyzed and used by official organizations, administrations and mainstream media, citizens inform themselves and others about crisis situations through social media platforms, generating bottom-up information networks (Palen 2008; Hughes and Palen 2009; Yates and Paquette 2011). All these actions contribute to the "explosion" in the amount of data and information at times of disasters, which is a challenge for responding organizations to deal with. For example, because crisis information may become outdated soon as crisis conditions change, crisis response needs the management of information flows and networks to build an effective crisis response organization (Pan et al. 2012). Crisis responders then rely on traditional information systems such as enterprise resource systems, but since digital data are practically ubiquitous, the emerging information networks form potentially useful additional sources for the organization of the crisis response. Together, they create a crisis information ecology of dynamic information streams (Turoff et al. 2004;

Van de Walle et al. 2009). Information ecology traditionally refers to the total information environment of organizations (Davenport and Prusak 1997) – to understand the characteristics of this ecology is of crucial importance to grasp how people really use information, how they search for it, modify it, share it, or even ignore it. Crisis information management implies that data can be translated into "actionable" information to increase the quality of the crisis response (Boersma et al. 2012; Wolbers and Boersma 2013). In a crisis situation the information ecology leads to a crisis information paradox: on the one hand the (governmental) responding organizations and administrations want to stay *in control* by harvesting and integrating the various and heterogeneous data sources in their information management systems, on the other hand the complex nature of the information ecology make an authoritarian response structure virtually impossible.

With the increased availability of data for effective crisis response, new challenges are added to the burden of crisis management. There are serious concerns related to the (lack of) information standards and accountability mechanisms (Turoff 2002), information overload (Hiltz and Plotnick 2013), the lack of interoperability between the information and communication technologies used by the first responders and the communication sources used by citizens (Truptil et al. 2008), and underdeveloped (big) data analytical skills by the users of crisis information. At the same time, crises, disasters and social disruptions are seen as opportunity windows to create legitimacy to collect and analyze citizens' data on a large scale (Fonio et al. 2007). In other words, the use of crisis information systems, i.e., networks of hardware and software, to create, collect, filter, process and distribute data is not neutral, but related to the way crisis information management is organized and legitimized.

The big data debate in crisis and disaster management

Increasingly, crisis information management includes the processing and use of *big data* by (governmental) responding organizations in order to try to control the crisis situation. Big data refers to a quantitative increase of the size of the datasets that can be used for analytical purposes by a wide range of actors, including academics, marketers, governmental bodies, educational institutions and – in the context of this book – crisis managers (boyd and Crawford 2012; Shelton et al. 2014). One of the most widely accepted ways to describe big data is the "three Vs" (volume, variety and velocity) of information (McAfee et al. 2012). "Volume" refers to the generation and collection of data, and implies that the data volume becomes increasingly larger. "Velocity" addresses the timeliness of the data, and the speed of data collection, analysis and use to maximize its utility; finally, "Variety" indicates the various types of data, including semi-structured, unstructured, validated and unvalidated, raw and analyzed data and its technical sources, such as audio, video, webpage and text (Mayer-Schönberger and Cukier 2013;

Chen et al. 2014). Potentially the use of big data will change the way responding organizations make sense of the crisis situations, respond to it and make decisions concerning the crisis response.

For example, a serious challenge at times of crisis is to create a "common operational picture" of the situation and of the actions and interactions of others involved in the crisis management (Wolbers and Boersma 2013). Crisis managers can use big data analytics to create improved operational pictures (Wukich 2015). Another example is the use of *social media* data by crisis management organizations as part of early warning systems (Culotta 2010), and for crowd control and monitoring (Trottier and Schneider 2012; Boersma 2013; Procter et al. 2013). There is growing evidence that social media data can contribute to a better understanding of the situation and eventually to a more adequate and robust crisis management (Yin et al. 2012; Cassa et al. 2013). The use of social media data in crisis management, its intended and unintended consequences, is a central issue in the first part of this book (Chapters 2, 3 and 4). Because of the promising character of social media data governmental administrations, private organizations and non-governmental organizations invest a lot in crisis management information systems that can harvest valuable data from social media sources. For example, *Twitcident* is a tool used by professionals in emergency control rooms to follow what (relevant) data citizens post on Twitter for the purpose of maintaining security in urban environments (Boersma et al. 2016).

The use of big data for any purpose should not be taken for granted as it requires adequate data and information management (Pries and Dunnigan 2015). Databases can indeed generate patterns that have *predictive* power for the crisis operations but not necessarily and automatically *explanatory* power (Andrejevic 2014). It is the extraction of structured data from unstructured inputs that is the most challenging and the biggest gap in the understanding of those who want to use big data in the context of crisis response (Castillo 2016). The availability of big crisis data does not always entail, let alone guarantee, effective crisis management.

However, Floridi (2012) argues that becoming data-richer by the day cannot be perceived as a fundamental problem per se. Big data undoubtedly represents an opportunity in disaster management, especially since "digital humanitarians" appeared on the scene. From the 2010 Haiti earthquake onward, disaster response has been redefined by new players, namely digital volunteers who have supported search and rescue efforts through, for instance, the generation of maps or the interpretation of large amounts of data (Mulder et al. 2016). Digital humanitarians – as they are labeled – form a "crowd" that provides various services, such as building situational awareness from social media or generating maps, while using information and communication technology (Link et al. 2014). Digital humanitarians have played a vital role in verifying the accuracy of information shared in social media during crises and, in some cases, they have actively shaped disaster response in the aftermath of a major event by helping first responders' organizations (Burns 2014).

The rise of big crisis data has been explored in the context of humanitarian response, in particular during, or in the aftermath of, a natural disaster (Meier 2015; Castillo 2016). Increasingly, a sheer amount of data is generated through social media during crises: when a major disaster strikes, a "digital nervous system" (Meier 2015: 27) reacts through various synapses encapsulated in various forms of communication, from tweets to pictures posted on social media. While, in this specific context, the expression "big crisis data" does not have a negative connotation but instead refers to data generated by affected communities and used for the purpose of helping them, it is worth noting that a disaster can turn into a "big data crisis" if first response organizations do not have the capacity to deal with potential valuable information shared in social media. As emphasized by the International Federation of Red Cross et al. in 2005 "people need information as much as water, food medicine or shelter. Information can save lives, livelihood and resources. Information bestows power." Therefore, in current practices of disaster management, it is essential to ensure a proper use of social media during crisis to respond to the information needs of the communities affected by disasters.

It means that the use of big data at times of crisis (and the outcome of the digital humanitarians' actions for that matter) is not without problems. Like any hype in information and communication technology it asks for a critical analysis: it can trigger processes of change, but also easily can become an empty promise (Meijer et al. 2009). A real epistemological problem with big data, according to Floridi, is detecting small and meaningful patterns. This is of particular relevance in the field of crisis management and raises questions that seem to remain unsolved, such as to what extent real-time big crisis data can enhance disaster response instead of turning into a big data crisis due to the challenges of working with new data sources. Hence, the debate on the use of big data is concerned with methods used to make sense of data (namely, detecting meaningful small patterns) and decisions made upon the interpretation of patterns. Big crisis data is subject to interpretation and bias like any other data sources (boyd and Crawford 2012). In addition, humanitarianism has been critiqued as a social relation that often privileges people from the global North: data and technologies often reify social and power relations, worldviews and epistemologies (Elwood and Leszczynski 2013; Burns 2015).

In sum: big crisis data should not be considered as a magic bullet which can save lives just because they are available.

Surveillance crisis management: the intended and unintended consequences of big data in use

Whereas in the creation of common operational pictures the use of crisis data from social media and other data sources is promising but problematic in itself for various practical and more fundamental reasons (because of the reasons addressed above), in this edited volume we are in particularly interested in the