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MANAGING THE UNEXPECTED: SENSE-MAKING IN THE CHINESE EMERGENCY MANAGEMENT SYSTEM

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China built a new National Emergency Management System (NEMS) after the 2003 SARS crisis to cope with the challenges of crisis and disaster management, particularly the challenge of joint sense-making. This article investigates how the NEMS addresses joint sense-making challenges in crisis management. It explores several recent crises in China to uncover factors that undermine or facilitate joint sense-making. Our study unearths a low degree of professionalization, plans that do not match crisis events, a lack of accountability, and the absence of unified leadership. These critical factors make it hard for the newly built NEMS to establish a common understanding of a crisis. This article concludes with lessons for China's NEMS that may also be useful for other large countries.

INTRODUCTION

In recent years, emergency management systems worldwide have been put to the test by natural disasters, terrorist threats, industrial and transport disasters (Comfort 2002; Helsloot *et al.* 2012). In response, governments everywhere have reformed their institutions to improve their handling of these threats (Wise and Nader 2002; Wise 2006; May *et al.* 2011; Lodge and Wegrich 2014; Aldrich 2016; Christensen *et al.* 2016). China is no exception.

As a developing country going through rapid transitions, China has had more than its fair share of emergencies. The SARS outbreak in 2003, in particular, served as a wake-up call for China to re-examine and revamp its national emergency management policy. In the years after the SARS crisis, China's central government (the State Council) established a new National Emergency Management System (NEMS), including emergency management offices, national and local contingency plans, emergency response mechanisms, and an emergency response Law (Xue 2010).[1]

The NEMS has already been put to the test by a series of major disasters: ice storms struck southern provinces at the beginning of 2008, followed by the deadly Wenchuan earthquake that impacted southwestern provinces in May 2008. The baby milk powder scandal was exposed in 2008. The following years saw the 2010 Yushu earthquake, Gansu mudslides and the Shanghai fire, the 2011 Wenzhou train collision, the 2012 Beijing flood, the 2013 Lushan earthquake, the Qingdao oil pipeline explosion, the 2014 Ludian earthquake, the Malaysia Airlines Flight 370 disaster, the 2015 New Year stampede, the sinking of the cruise ship *Dongfang zhi Xing*, and the Tianjin port blast.

The new system's performance varied across these crises (Luo 2014; Xue and Zeng 2014). The system produced a sluggish response during the ice storm disaster, the baby milk powder scandal and the Tianjin port blast; the same system produced a rapid response to the Wenchuan and Yushu earthquakes. This variance in performance raises questions about what determines the performance of an emergency management system and what can be learned from these successes and failures in China's emergency responses. These questions are not easy to answer since it is notoriously difficult to get accurate data from crisis management systems; the Chinese NEMS is no exception, alas. Yet we can analyse

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the structure of this newly designed system in China and observe how it held up during the various crises and disasters mentioned above.

This article focuses in particular on one challenge that is common to crisis responses everywhere: making sense of an emerging crisis (Boin *et al.* 2005). China's new system clearly did not excel in what we refer to as organizational sense-making. This article starts with a brief description of the development of China's NEMS. We will then discuss sense-making challenges in the NEMS and consider how our observations might inform a research agenda.

CHINA'S NATIONAL EMERGENCY MANAGEMENT SYSTEM

In a national working conference on SARS prevention and control (28 July 2003), China's central leadership acknowledged deficiencies in the response (Zhang 2012). President Hu Jintao and Premier Wen Jiabao identified problems such as a failing emergency response mechanism, insufficient crisis management capacities, and a lack of local preparedness (*ChinaDaily Reporter* 2003).

Subsequent reforms went beyond the policy domain of public health. The entire emergency management system was restructured (Xue and Zeng 2014). The restructuring process started with a set of contingency plans that were delivered from the national level to communities and organizations in both private and non-private sectors. The plans were accompanied by the establishment of government offices dedicated to emergency management. In addition to new plans and organizations, the third step of the reform package consisted of streamlining the operating mechanisms that are dedicated to the coordination of emergency management actors. Finally, the reforms were embedded in a new Emergency Response Law (Gao 2008; Xue and Zhong 2009; Shan and Huang 2010). We will now briefly elaborate on these four components of the NEMS reform package (also called 'one plan and three sub-systems').

Many plans

In December 2003, the State Council, China's Cabinet, created *the* Overall National Plan for Responses to Public Emergencies (The Master Plan). It is the mother document for the prevention of, and response to, all major disasters in China. The Master Plan gave rise to 28 disaster-specific emergency response plans that cover threats such as natural disaster relief, floods, earthquakes, major forest fires, industrial accidents, aviation accidents, environmental emergencies, public health incidents, and social protests. The ministries of the State Council involved in emergency management affairs, such as the Ministry of Health, the Ministry of Agriculture, and the Ministry of Public Security, developed over 160 sector-specific plans. The Master Plan, the 28 specific plans, and the 160-plus sector plans together make up a detailed planning system that specifies response mechanisms and the responsibilities of the actors involved for many conceivable contingencies. This planning effort, focused on specific events, does not seem to fully take into account that crises are hard to predict and often impossible to imagine (Clarke 1999).

All governments, from provincial, municipal, and prefecture governments, to district and county, built on these plans to develop their own emergency plans. The Emergency Management Office of the State Council announced in 2013 that the total number of nationwide contingency plans had reached more than 5.5 million by November 2012. In addition, major state-owned enterprises and all corporations relating to mines and chemical production have been ordered to develop emergency plans.

An upgraded institutional structure

In addition to the massive planning effort, the Chinese government upgraded the institutional structure of China's emergency management system (figure 1). The updated structure carves out a central role for the State Council, the Emergency Management Office, and specialized inter-agency committees.

State Council

The State Council is the chief administrative authority in China both in normal times and during a disaster. According to the Emergency Response Law of the People's Republic of China (discussed below), the premier is responsible for managing an extremely serious emergency situation. Vice-premiers and state councillors serve as commanders of the response to specific, predefined types of major emergencies.

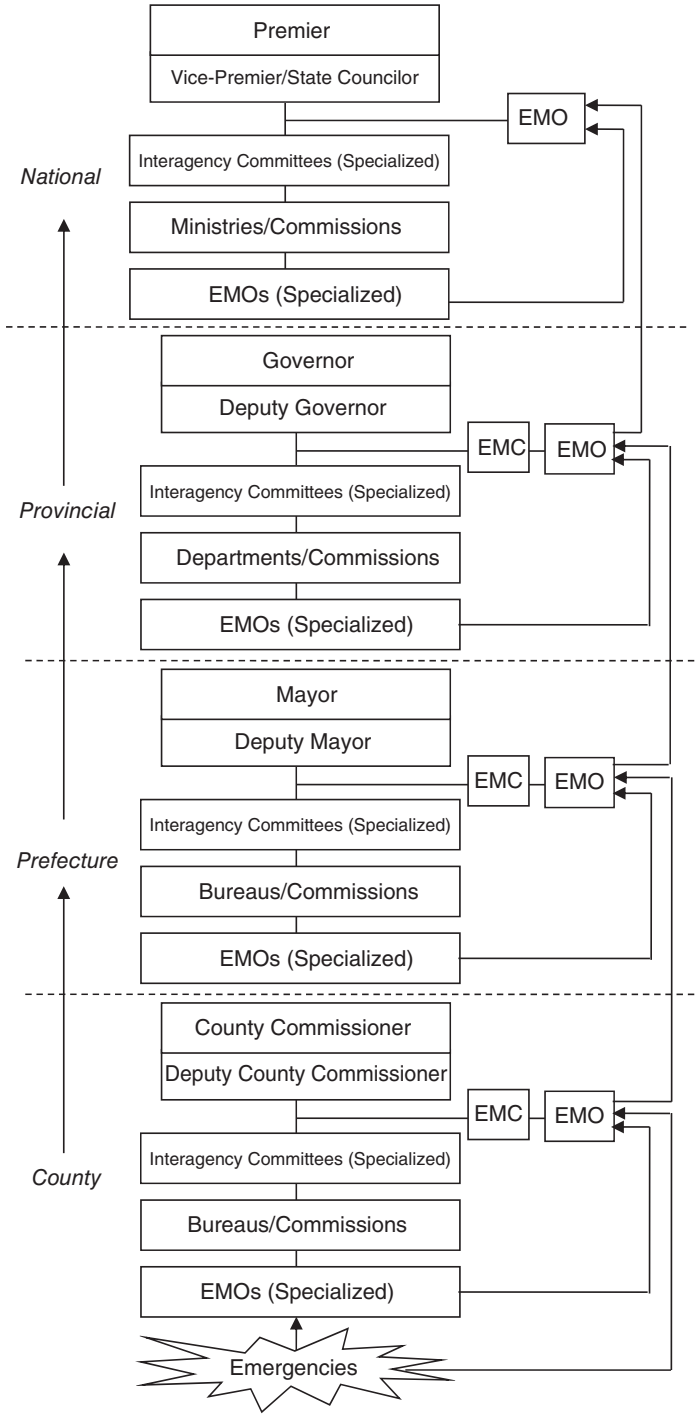
The national-level command headquarters are only activated in cases of a truly catastrophic disaster; most disasters are handled by ministries or bureaus (based on the type of disaster). For instance, the Earthquake Administration is responsible for dealing with earthquakes, the Ministry of Civil Affairs is responsible for natural disaster relief, the Ministry of Water Resources is responsible for coping with floods, typhoons, and droughts, the State Administration of Work Safety is responsible for handling industrial accidents, the Ministry of Health is responsible for dealing with epidemic diseases or public health-related accidents, and the Ministry of Public Security is responsible for managing terrorist threats and social unrest.

Ministries and agencies will facilitate, at the national level, coordination among supporting ministries or bureaus. They also supervise provincial governments in their response to disasters. In provincial, prefectural and county governments, there are similar coordinating organizations responsible for emergency management (as shown in figure 1).

Emergency management offices

The failed response to the SARS crisis prompted the Chinese government to reconsider its traditional ad hoc and reactive approach to emergency management. It established a permanent set of comprehensive emergency management offices (EMOs). The comprehensive EMOs are responsible for supporting the chief executive at each level of government (such as the premier, provincial governor, prefectural mayor and county head) in managing emergencies in their jurisdiction. In December 2005, the national EMO was officially established. Comprehensive EMOs have since been established at the provincial, prefectural and county levels of government. By the end of 2012, all provincial governments, 96.1 per cent of the prefecture-level governments and 80.8 per cent of the county-level governments had set up their comprehensive EMOs (Hong 2012, pp. 5–11).

In addition, the Chinese government streamlined the specific disaster-based EMOs. The specific disaster-based EMOs support ministers or department heads at the national level and departments or bureaus in local governments to cope with specific emergencies. The ministries either restructured their existing EMOs or established new ones to coordinate their response to specific emergencies. Most local governments set up or restructured their own specialized EMOs with close connections to ones in their higher-level department or ministries and the comprehensive EMO in their local governments. For example, by the end of 2005, 27 provinces, autonomous regions and municipalities in China had established their EMOs specializing in managing public health crises (Xue and Zeng 2014).



Adapted from Zhong and Lu (2013).

FIGURE 1 *The organizational structure of the emergency management system in China*

TABLE 1 *National interagency committees for emergency management*

Name	Abbreviation	Year (establishment)	Ministries (resident in)	Functions
Food Safety Committee of the State Council	FSCSC	2010	China Food and Drug Administration	Food safety
National Forest Fire Prevention Headquarters	NFFPH	2006	State Forestry Administration	Forest fires
National Flood Control and Drought Relief Headquarters	NFCDRH	1950	Ministry of Water Resources	Floods, typhoons and droughts
Earthquake Relief Headquarters of the State Council	ERHSC	2000	China Earthquake Administration	Earthquakes
National Committee for Disaster Reduction	NCDR	1989	Ministry of Civil Affairs	Natural disaster relief
Work Safety Committee of the State Council	WSCSC	2003	State Administration of Work Safety	Industrial accidents

Source: Zhong and Lu (2013, p. 64).

Specialized interagency coordinating committees

Under the State Council, six specialized interagency committees or headquarters[2] (as shown in table 1) are responsible for coordinating the various bureaucratic 'stovepipes' that may have to collaborate in times of crisis. These interagency committees or headquarters are led by the premier, a vice-premier or state councillor when a crisis occurs (see table 1).

Specialized interagency committees have also been established at local government levels in order to achieve 'unified leadership combining vertical and horizontal agencies' (Xue and Zhong 2009; Suttmeier 2011). In addition to those specialized interagency committees responsible for only one type of emergency, some provincial, prefectural, or county governments have set up comprehensive Emergency Management Committees (EMCs) responsible for coordinating all-hazard responses. At these EMCs, the chief executive officer at each level of government – governors, mayors and county heads – acts as the chairperson of the committee.

Streamlining response mechanisms

The new NEMS specifies two important response mechanisms: the up-scaling and information-sharing mechanisms.

The up-scaling principle

Similar to most large countries, China's emergency response system has introduced a mechanism that matches the scale of the emergency with the appropriate level of jurisdiction (Roberts 2013). Emergencies are classified on one of four levels: especially serious, serious, large and ordinary (*Xinhua Reporter* 2006).[3] Each level of seriousness requires a different response level in the government hierarchy. The more severe the situation, the higher the level of government that should be supervising the response. This up-scaling mechanism is a sharp departure from the traditional Tiao/Kuai authority system,[4] as local

administrators (instead of sector leaders) have leading roles in responding to emergencies in their jurisdictions (Zhou 2009).[5]

Sharing information

One of the biggest problems during the SARS crisis was the slow disclosure of critical information (Xue and Zeng 2014). In the subsequent reforms, introducing a mechanism for information reporting and sharing has therefore become a central focus. To enhance information reporting within the government, the General Office of the State Council introduced very detailed requirements for reporting information on the occurrence of a disaster and its impacts in its Notice on Tentative Measures for the Administration of Information Reporting and Sharing on Public Emergency (30 December 2007). To release timely information to the public, the central government required that all local governments should establish an office of government information disclosure[6] and a news-briefing system, and assign a spokesperson who could provide updates on crisis development and governmental response.

The emergence of a legal institution

The fourth element of the NEMS reform is the adoption of a legal framework for managing emergencies. In March 2004, the Amendment to China's Constitution replaced the term 'martial law' with 'state of emergency', allowing for a more inclusive legislative context that ensures action for a wider variety of emergency situations including natural disasters, public health crises and economic crises (*Xinhua Reporter* 2004). Under this amendment, the president of the People's Republic of China can declare a state of emergency. The constitutional amendment also stipulates that the State Council has the power to proclaim a state of emergency in sectors or provinces (*ChinaDaily Reporter* 2004).

This amendment provides the legal basis for a law on emergency management. In June 2003, the Chinese government initiated an effort to draft a new 'all-hazards' emergency response law. The Emergency Response Law of the People's Republic of China was adopted at the 29th session of the Standing Committee of the Tenth National People's Congress in August 2007. The law legalized the response mechanisms and institutional restructuring described above.

MOBILIZATION AND SENSE-MAKING IN NEMS

In recent years, China has demonstrated a capacity to mount a massive and immediate response to devastating natural disasters (Su 2008; Zhang 2013; Zhong and Lu 2015). Zhou (2012) has described this response capacity in terms of 'campaign-style governance' (CSG), as the response somehow managed to replace normal routines of bureaucratic operations by a structured yet better-suited alternative mode of organizing.[7]

CSG refers to a governing style in which political resources are mobilized to cope with a situation that is perceived to be beyond the capacities of bureaucratic routines. CSG denotes a response that breaks through the boundaries of organizations, focusing attention on a temporary yet central task.[8] The concept of CSG can be traced back to the traditional bureaucratic operations of the Qing dynasty (1636–1912). Emperor Qianlong relied on CSG to cope with natural disasters and widespread social panic caused by sorcery, which were threatening its regime (Kuhn 1990).

CSG is initiated by the highest level of authority, such as the emperor or the central government. The threshold for triggering such a CSG is still left unresolved in the new

NEMS. It is not always clear when the crisis is big enough for the central government to get involved. Much depends on the sense-making capacity of the central government (Weick 1969; Weick and Roberts 1993; Boin *et al.* 2005). While the NEMS has a demonstrated capacity to mobilize resources, one of the problems that became evident during several crises is related to the detection and understanding of emerging crises.

JOINT SENSE-MAKING: MISSION IMPOSSIBLE?

The organized response to a large-scale crisis typically requires performing a difficult set of executive tasks (Boin *et al.* 2005): the system has to recognize the emergence of a crisis, collect and analyse critical information, make critical decisions, coordinate the actions of all actors in the response network, and communicate with internal and external stakeholders. These are no easy tasks to accomplish under any type of circumstances, but crises make them even harder to fulfil.

Decision-making and coordination are often considered the most important tasks in relation to a quick and effective mobilization of resources. This may be true, but these tasks critically depend on the ability to collect, check, share, analyse and disseminate information that is usually not readily available (Turner 1978).

Crises present organizations with disturbance, disorder, and interruption of normal routine operations (Weick 1988; Maitlis and Sonenshein 2010). These ecological changes cannot be addressed through normal routines. But before anything can happen, the change (or threat) must be understood. This is the task of organizational sense-making (Weick 1988). Karl Weick has extensively researched how small groups make sense of rapidly emerging crises. Weick describes sense-making as 'the experience of being thrown into an ongoing unknowable, unpredictable streaming of experience in search of answers to the question "what's the story?" … "Now what should I do?"' (Weick *et al.* 2005, p. 410).

Weick's research demonstrates just how important accurate sense-making is to the survival of small groups (see also Flin 1996; Kahneman and Klein 2009). Weick's (1993) classical case study of the Mann Gulch disaster described how a small group of firefighters failed to create a shared understanding in response to a wildfire in the Mann Gulch area of the Helena National Forest in Montana, United States. An ad hoc team consisting of 16 members was dispatched to fight the fire. The team leader, Wag Dodge, did not know most of his crew. When Dodge realized that their firefighting method was ineffective, he ordered the crew to 'drop their tools' (such as shovels and saws). He improvised, lighting a fire in front of them and ordering them to lie down in the area it had burned (a so-called escape fire).[9] For most crew members, keeping 'their tools' in hands was standard procedure and was required according to their training. Dropping their tools and starting the escape fire was novel to them and was at odds with the method they had been trained in. As they did not share the analysis that the situation outmatched their traditional tools and approach, the crew members did not adopt the escape fire method. Thirteen members of the crew died that day.

The sense-making challenges are multiplied in a complex system such as a federal disaster system (as the response to Hurricane Katrina demonstrated in 2005). In a multilevel response, it is not always easy for different actors to bring all the information together and create and maintain a joint picture of the situation (Turner 1978; Boin and Renaud 2013; Catino 2013). Let us consider how the structure of China's NEMS might enable or hinder joint sense-making.

Sense-making on the vertical dimension

Drawing lessons from the SARS response, the post-crisis reform initiated two mechanisms to enhance sense-making capacity. First, it created a crisis information reporting mechanism, clarifying obligations for local EMOs. As soon as a local government learns about an unfolding crisis that may have consequences for a higher level of government, as described in the Grading Standard of Public Emergencies, it is required to inform the next level of government within one or two hours.

Effective sense-making depends to a large extent on the sense-making skills of local first responders. Local responders pick up signals of crises, interpret the signals, and initiate the first actions (Weick (1969) considers these initial actions as part of the sense-making process). Whether local responders can correctly understand the situation and effectively communicate their insights depends on their expertise and experience. Without these assets, first responders are unlikely to be successful sense-makers.

While China has invested in a nationwide system (NEMS), local crisis management capacity is still under construction. Many first responders lack the necessary expertise or experience to detect or communicate crisis signals. The 2013 Qingdao pipeline explosion is a case in point (SAWS 2014). On 22 November 2013, an oil pipe of the state-owned enterprise Sinopec was found leaking in the Qingdao Economic and Technological Development Zone, Shandong Province. When the first responder tried to excavate the underground utility pipes in the oil clean-up process, the oil–gas mixture in the culvert caught fire, causing an explosion that led to 62 deaths and 136 injuries (SAWS 2014).

After acknowledging the oil spill, neither first responders from Sinopec nor officials from the Qingdao Development Zone followed their emergency plan to identify the amount of spilled oil or the density of oil–gas mixture in the culvert before starting the excavation.

Local sense-making is further undermined by a lack of risk assessments in the drafting of local emergency plans. Most local governments do not allocate sufficient resources to conduct a thorough risk assessment, which would allow first responders to make better sense of vulnerabilities in their jurisdictions. Information on critical infrastructures such as urban pipeline systems, or port areas, is scattered across different municipal departments and major state-owned companies, and sometimes that information is not completely documented or is simply lost. For instance, most cities only maintain detailed information on underground pipelines built after 2012 (Yan 2014).

As a result, first responders often lack the necessary information to understand the potential impacts of an accident. When firefighters arrived at the scene of the 2015 Tianjin port blast, they knew nothing about what was stored in the burning containers.[10] Using water to cool the containers became the only viable action for firefighters; however, the fire triggered an explosion of the chemicals stored in the warehouse, resulting in the death of 99 firefighters, and 8 missing.[11]

During an emergency, local governments generally prefer not to report negative information that might show their lack of capacity to deal with the crisis as this may erode promotion opportunities for local officials. This appears to be especially true for man-made disasters, such as industrial accidents, food crises, or social riots (Zhong 2007; Peng 2008). When local governments cover up crisis situations, they effectively slow down or paralyse the sense-making process (keeping central government in the dark). Sometimes, central government does not learn of a catastrophic situation until the crisis has escalated in full public view.

The 2008 Sanlu milk powder crisis provides a good example. The crisis was triggered by a rapidly increasing number of infants diagnosed with kidney stones after feeding on milk powder produced by the Sanlu Group, a state-owned company (and partly owned by New Zealand firm Fonterra). More than 39,000 infants were affected by the contaminated formula and six babies died (Gong 2008). The cause of the kidney stones was a chemical that staff in milking stations added to the milk to make the protein content appear higher in quality tests. The chemical was later found in other well-known brands in China, which destroyed public trust in the milk industry (it has yet to recover).[12] The Sanlu milk scandal ended with the bankruptcy of the Sanlu Group, the resignations of the Mayor of Shijiazhuang and the Director of the General Administration of Quality Supervision, Inspection and Quarantine.

Early in the crisis, the Sanlu Group informed Shijiangzhuang municipal government about the milk contamination, and requested the municipal government to assist in investigating how and where these chemicals were added. Acknowledging the ongoing crisis, however, the Shijiangzhuang municipal government did not inform the Hebei Provincial government nor the State Council, as required by the emergency management plans, until five weeks later (Wang *et al.* 2009). At the central level, the Ministry of Health received scattered reports of increasing numbers of infants diagnosed with kidney stones, but it did not send its expert team to investigate the case until weeks later (Gong 2008).[13] The Ministry of Foreign Affairs was informed by the New Zealand embassy in Beijing about the contamination of the Sanlu infant formula; the embassy had in turn learned the news from Fonterra, a shareholder in the Sanlu Group (Gong 2008).

The new information reporting mechanism is complemented by a new accountability system. Meng Xuenong, the Mayor of Beijing, and Zhang Wenkang, the Minister of Health, were removed from office after the SARS fiasco. The same happened to other mayors and officials after various coal mining disasters between 2005 and 2010; for example, the governor of Shanxi province was forced to quit after the collapse of a dam caused the deaths of 281 people. As the Sanlu case demonstrates, the accountability system does not necessarily promote timely information reporting; it may, instead, have even driven local governments to cover up critical information.

The spectacular rise of social media in China has brought additional challenges for the NEMS' vertical information reporting mechanism in recent years. Higher-level government often learns of an unfolding crisis via social media or contractors responsible for monitoring pubic opinion before the lower-level government has reported it via formal channels. At the same time, governmental microblogs play an active role in terms of disseminating warnings of a coming crisis and updates on crisis development and addressing rumours (*People's Daily and Sina Weibo* 2015).

Sense-making on the horizontal dimension

Horizontal sense-making can take place on at least two administrative dimensions: functional (between different departments) and geographical (between different regions). The challenge is quite similar in both types of situation: when a major crisis unfolds, emergency managers in different agencies might detect signals but they cannot make proper sense of them without synthesizing the information from different agencies. As Barry Turner (1978) explained in his classic *Man-made Disasters*, organizations find it very difficult for a wide variety of reasons to share information in a timely and constructive manner (Rosenthal *et al.* 1991).

The 2008 blizzards impacted 19 provinces and paralysed 20,000 kilometres of railways and 220,000 kilometres of highway, closed 14 airports, disrupted water supplies, and trapped millions of passengers in stations and airports before the Chinese Lunar New Year, when China was on the move (Qin *et al.* 2008). The blizzards crisis was what may be called a 'compound disaster', bringing together a natural disaster, railway accidents, a plane accident, and an electricity blackout in 170 counties. The blizzards caused 129 deaths and 151 billion Chinese yuan of damage (Zhang 2008).

The 2008 blizzards started with unexpected cold rain in the southern provinces. The cold rain iced the cables of power grids. The Chenzhou Power Grid Corporation in Hunan province initiated its routine measures (a heavy-current, ice-melting method) on 11 January. This method failed to address the ice formation due to the unexpected duration of the cold wave until 19 January (Fu 2008). Highways were closed on 23 January, and Chenzhou city in Hunan province began to lose power on the same day. Power grids in Chenzhou broke down on 25 January. On 26 January, more than 8,000 vehicles were found trapped in the Chenzhou section of the Jingzhu express, a major highway connecting Beijing and Zhuhai in Guangdong province.

Most senior officials in Hunan province were not at their post as they were attending the annual meeting of the Provincial People's Congress from 17 until 25 January. Moreover, the existing emergency plans did not explain how to cope with this type of complex crisis (Su 2008). With their leaders absent and hard to reach, local emergency managers suffered from a leadership vacuum. The absence of unified leadership hampered horizontal sense-making. The Ministry of Transportation, the State Grid, and the Ministry of Railways each responded in its own line of jurisdiction without sufficient information exchange between agencies to allow each agency to make sense of the potential impacts of their actions and those of others.

The 2008 Sanlu milk scandal provides another illustration of the sense-making challenge. NEMS did not manage to establish a common picture of the crisis early on in the process, before the State Council declared the situation to be a crisis. Ministries and departments in central and provincial governments did not share their information with other ministries and departments. The national Ministry of Health and Department of Health in Gansu province exchanged information within their vertical chain of command, initiating an investigation on the causes of infants' illness. Neither informed other ministries or agencies, such as the General Administration of Quality Supervision, Inspection and Quarantine (GAQIQ), or the State Administration for Industry and Commerce, which could have led to a faster and more comprehensive intervention. GAQIQ had actually received complaints from customers regarding Sanlu's milk products (Gong 2008), but the lack of horizontal information-sharing made it hard to connect the contaminated milk with the rising number of infants diagnosed with kidney stones.

Joint sense-making between local governments and state-owned enterprises

The 2013 Qingdao oil pipeline explosion, the Wenzhou bullet train crash and the 2015 Tianjin blast exposed an important disconnect in the NEMS: local administrators find it difficult to cope with state-owned enterprises or vertically administrated agencies in their jurisdiction. The boundary between public and private domains is a difficult one everywhere, especially during crises (Boin and Smith 2006; National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling 2011). The problem may be even more complicated in China given the size and influence of state-owned corporations.

During the response to the aforementioned 2013 Qingdao pipeline explosion, Sinopec, the major state-owned petroleum energy and chemicals companies in China that actually owned that pipeline, did not provide timely information to local governments regarding the type and volume of the oil spill. The information was shared within the company, which was governed directly by the central ministry of State-owned Assets Supervision and the Administration Commission of the State Council (SAWS 2014). The Qingdao municipal government and Huangdao district government could only acquire information based on ad hoc requests to Sinopec.

During the response to the Tianjin blast, a lack of joint sense-making between the Tianjin municipal government and agencies in the port regions became apparent. The port used to be managed by the Ministry of Transportation. It was placed under the jurisdiction of the Tianjin municipal government in 2004. Even though the port is under the jurisdiction of the Tianjin municipal government, it has retained its autonomy with its own police station and fire department. During one press conference, the spokesman for the Tianjin municipal government could only present the casualties among the Tianjin municipal firefighters; it could not provide any casualty information about the fire department in the port which was heavily impacted by the explosions.

DISCUSSION

China has begun to rebuild its crisis management system. But the NEMS, combining complex relations on the horizontal and vertical axes, does not have a water-tight method of addressing sense-making challenges. This is, of course, to be expected. It is very hard to move incomplete information efficiently across a new system that brings together a huge number of people, processes and plans in one overarching organizational structure. This is difficult under any type of circumstance, but especially during a crisis (Turner 1978). Yet a quick survey of recent crises has helped to uncover a set of factors that undermine joint sense-making capacities to a larger degree than might be expected based on the theorized challenges of organizational sense-making.

Low degree of professionalization

First responders do not receive sufficient training and lack the necessary expertise to perform the difficult task of sense-making. Moreover, the emergency plan system that is supposed to assist first responders in their sense-making has failed to play that role due to its low acceptance among first responders. This emergency plan system is an inherent component of NEMS. It has been established and imposed in a coercive manner through China's top-down administrative system (DiMaggio and Powell 1983; May and Burby 1996). Lacking buy-in, the emergency plan system does not appear to be deeply institutionalized; it can therefore not offer to first responders what Weick *et al.* (2005, p. 414) call a 'script for cue bracketing', which would facilitate a joint sense-making process.

Plans do not match crisis events

As an initial step in developing NEMS, millions of plans have been drafted by various levels of government in just a few years. However, most local plans were drafted by local emergency managers for routine response only. They were not designed to deal with catastrophic situations. This is a common deficiency of disaster planning: defined situations based on historical experience in emergency plans do not capture the actual variety of crises and disasters (Clarke 1999). Many local emergency managers rely on the

idea that their chief administrators will get involved and lead the response once a major crisis unfolds and develops into a catastrophe.

Cover-ups

One of the major problems in responding to the SARS crisis was the cover-up of its very occurrence. The NEMS includes new mechanisms, like the accountability system and information reporting mechanism, to prevent such cover-ups from happening again. The information reporting mechanism lists various situations that need to be reported within a given time frame to upper levels of the hierarchy. Meanwhile, the accountability system puts strict sanctions on both causing and covering up emergencies due to deficient governance. As a result, cover-ups appear to be relatively rare now (but they still happen around man-made disasters).

No unified leadership

In response to a transboundary crisis, which typically crosses the boundaries between state-owned enterprises/vertical administration agencies and local governments, some form of transboundary crisis leadership is necessary to move information across boundaries (Ansell *et al.* 2010). The Emergency Response Law and the National Comprehensive Emergency Response Plan suggest that the NEMS should play that role. However, state-owned enterprises and vertical administration agencies maintain their autonomy in managing emergencies in their jurisdictions. Once a crisis escalates across boundaries, there is often a leadership vacuum that ultimately undermines the prospect of joint sense-making or even sharing critical information.

CONCLUSION

This article describes how the newly built NEMS in China deals with the challenges of crisis and disaster management, and in particular the challenge of joint sense-making. It gives rise to a few lessons, both for China's system and the emergency management systems of other large countries or federations.

One lesson points to the importance of training first responders in the art of sense-making. First responders are first and foremost trained to deal with emergencies by initiating action that limits human suffering and economic damage. But as crises increasingly cross functional and geographical borders, the management of a crisis can very soon become complex. It is then critically important that key information flows in both vertical and horizontal directions. First responders must thus be trained to recognize what important information is, how it should be transmitted and to whom. This is not part and parcel of the first responder training, in China or elsewhere.

China's system has introduced harsh sanctions for officials in charge of man-made crises who do not share information in a timely and effective manner. This is an understandable reaction in the light of crisis cases – mentioned in this article – where information was intentionally withheld from higher levels of government. But sanctions can never fully replace training and, even better, the institutionalization of a culture of inquiry, where it is understood that professionals share even a vague sense of unease about a developing threat.[14]

In a system that relies heavily on hierarchy, a leadership vacuum may create a bottle-neck for information flows and block joint sense-making. It is therefore important that a hierarchy in formal responsibilities is not confused with a preferred order in which actions should be initiated. In other words, first responders cannot sit back and wait for

orders from above because a crisis situation does not fall neatly under the category of 'local' contingency.

What is needed, then, is an institutional culture of sense-making that stretches across the system (Lu 2014). Institutions set boundaries for organizational perception, sometimes creating blind corners. But they can also help first responders to figure out cues in their efforts to make sense of a process. Institutions produce scripts that anchor perceptions of ecological changes.[15]

Inspired by the failure to mount an effective response to a new type of crisis (SARS), China has built a comprehensive system that is geared towards organizing a response for *traditional* crises and disasters. When new and inconceivable crises emerge, sense-making is critical: without an accurate and joint picture of the situation, no system can effectively organize a massive response. This suggests that NEMS should be further developed to enable enhanced sense-making in response to transboundary crises.

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NOTES

[1] The NEMS consists of a set of organizations and institutional arrangements aimed at minimizing losses from various emergencies (Xue 2010, p. 22). European colleagues, such as Boin *et al.* (2014, p. 5), talk about civil protection systems, which refer to 'policies, bodies and mechanisms that a country or region has in place to protect it against new and urgent threats to the security of people and/or the functioning of critical infrastructures'.

[2] According to the Regulations on Administration of the Establishment and Staffing of the Administrative Agencies of the State Council, which was promulgated by the State Council on 3 August 1997, 'The organization and coordination of the important work across agencies of the State Council shall be undertaken by the advisory and coordination agencies of the State Council' (Article 6).

[3] The urgency level of an emergency is based on such factors as the nature of the emergency, its potential impacts, and the coping capacity of the corresponding government in the jurisdiction.

[4] For the audience not familiar with the administrative system of China, Tiao means connections between the vertical sector system such as the water resource department at different levels of government, while Kuai means the regional administration, such as the county government. For example, the prefectural-level water resource department is directed by both the mayor and the provincial-level water resource department. This joint direction persists in most governmental agencies in China. Currently, directions from the vertical sector are weakened but still widely exist. For more on the historical development of horizontal and vertical authority division, see Zhou (2009).

[5] Unlike the American federal model, high-level interventions do not require formal requests from local administrators. In more predictable routine emergencies, such as typhoons, once the Headquarters for Flood Control and Drought Relief (HFCDR) activates their response, the HFCDR set up a tele-conference with potential impact provinces and cities to learn their preparedness and response. Sometimes, the HFCDR activates their response even earlier than local governments (Personal observation in 2008 in Wenzhou; Lu 2009).

[6] This has been specified in the Regulation on the Disclosure of Government Information (2008).

[7] Zhou (2012) only mentioned crisis response in his definition of CSG. He mostly concentrated on social movements, such as the Cultural Revolution.

[8] CSG has not always been successful in crisis response in China. For instance, the central government initiated CSG to restore the food market and reduce social unrest, but it failed to manage the food crisis and social unrest.

[9] Escape fire is a method to set some fires nearby before a wildfire comes close to firefighters. The burnt areas can provide a life-saving space when the wildfire approaches. The firefighters responding to the Mann Gulch fire had not been taught this method.

[10] On 12 August 2015, a series of explosions occurred at the container station owned by Ruihai International Logistics in Tianjin Port. The disaster caused 165 deaths (including 24 firefighters from the police security department, 75 firefighters from Tianjin Port, and 11 police officers), 8 missing (including 5 firefighters), and 798 injured. The blast also damaged 304 buildings (including 231 residential buildings), 12,428 cars and 7,533 containers stored in the port. Besides the direct economic cost

of 6.866 billion Chinese yuan, more than 129 hazardous chemicals were burned or leaked because of the explosions, which polluted the air, water and land in the region (State Council Investigation Team 2016, pp. 7–8).

[11] http://3g.163.com/ntes/special/0034073A/wechat_article.html?docid=B10HKJLP000465CI&s=newsapp&w=1&f=wx&from=groupmessage&isappinstalled=0 (last accessed 1 March 2016).

[12] Due to a lack of confidence in local suppliers of baby milk powder, Chinese customers purchased large amounts of milk powder from the Netherlands and Hong Kong via personal friends or the online shops of Taobao (which is an e-business platform like Amazon). The purchase caused a shortage of milk powder supply in the Netherlands and Hong Kong, causing protests by local customers.

[13] The Department of Health in Gansu Province officially reported the increasing cases situation to the MoH.

[14] See Vaughan's (1996) analysis of NASA for a helpful explanation of how this could be done.

[15] Here we adopt the definition from Barley and Tolbert (1997, p. 98): 'Scripts are observable, recurrent activities and patterns of interaction characteristic of a particular setting.'

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