

Executive summary

State of the Art: Crisis Management Phase 2

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Introduction

The NCTV set out *'State of the art'* investigations in the field of cyber security, (counter)terrorism and crisis management. These *'states of the arts'* are part of a program that focuses on realizing an NCTV-wide research agenda. PLATO and ISGA have carried out the first phase of this *'state of the art'* research in crisis management. This report focuses on the second phase research building upon the knowledge and literature of the first phase.

Problem definition & research questions

Based on the conclusions of the first phase, the WODC formulated the following problem definition: What, according to the scientific literature, is the latest state of affairs with regard to the domain of crisis management, building on the results of phase 1 (Lakerveld & Matthys, 2019). Three research questions have been formulated based on this problem definition.

- 1) Which trends in types of risks and crises can be identified, and how to deal with them in the context of crisis management?
- 2) Which factors promote the effectiveness and timeliness of crisis management at meso (organizational) and micro (individual) level? How can these factors be influenced? What does this mean for decision-making during crisis management in the Dutch context?
- 3) In what way can factors that contribute to effectiveness be influenced in such a way that they contribute to the quality (efficiency and effectiveness) of crisis management/disaster mitigation?

Research design

Separate parts of the research design are devoted to each of the three research questions. The first part contains a brief literature review to determine which trends are emerging the occurrence of crises and how they have been managed. The aim of this exploration was to arrive at a selection of categories of crises and to provide concrete examples for the second part of the research. This second part of the research consisted of an analysis of available evaluations of crises in the Netherlands. The analysis is based on a framework of two scientific perspectives (Boin et al., 2013; McConnell, 2006) and the assessment framework of the Inspectorate of Justice and Security. These three perspectives together have resulted in the analytical framework:

- Crisis management starts with (1) recognition and (2) sensemaking of the nature and extent of a crisis;
- Focuses on organizing a response by (3) decision-making, (4) coordination and (5) coupling, or de-coupling of actions that minimize the impact of a threat;
- where (6) communication and (7) meaning-making are crucial to provide a symbolic need for direction and guidance to society;
- Ends with organizing the aftermath of the crisis by attributing (8) responsibility, (9) securing lessons learned and increasing (10) resilience to cope better with future crises.

Based on available evaluation data, 25 selected cases were described, analyzed, and their effectiveness characterized as either solid, questionable, or vulnerable. The results were presented to four focus groups of scientists, policy makers, professionals, and evaluators of the Security Regions Act. The outcomes of the focus group meetings have been described separately in the report and have been incorporated as comments or support in conclusions from the analyses of the cases. The research activities mentioned above have led to conclusions about crisis management and disaster control, or mitigation in general. Although the selected crises were deliberately not recent, in order to be able to consider the learning effects and policy implications, the question arose to relate the implications of the conclusions to the Covid-19 crisis. To this end, a separate chapter has been added to the report.

Results

Question 1. What trends in types of risks and crises can be identified, and how to deal with them in the context of crisis management?

Studying trends in the frequency of occurrence and impact of crises and disasters has shown that it is difficult to arrive at a valid prediction regarding the Netherlands based on global and European trends. This does not mean that none conclusions can be drawn. A number of trends can be deduced from the study of the literature/databases. The increasing effects of climate change and its consequences, dehydration, flooding, heat stress, storms, flooding and loss of biodiversity are examples. For example, an increased chance of large natural fires occurring as an indirect consequence of climate change is associated with this trend. Nevertheless, we do not necessarily see a greater chance of this happening, but rather the seriousness of individual incidents is increasing. A slight downward trend can be observed in the category of man-made disasters, with the exception of the transport sector. The risk of man-made disasters remains consistently present according to the EM-DAT database. In the focus groups, the predictive value of such analyses is strongly put into perspective. From the trend analysis, the following types of crises and associated cases have been selected for a more in-depth analysis:

Table 1.
Categorisation of selected cases

Type	Casus
Terrorism	Tram attack in Utrecht Assault in Apeldoorn Shooting in Alphen aan den Rijn
Wildfires	Strabrechtse heide Hoge Veluwe
Infectious diseases	Q-fever Mexican flu
Social turmoil	Project X in Haren Bonfires in Scheveningen Soccer riots (Ajax – Feyenoord)
Industrial accidents	Fire in chemical plant in Moerdijk Incidents on Chemelot Industrial Park(2x)
Transport accidents	Turkish Airlines Crash Dam collision in Grave Traffic accidents on A58 Train collision in Amsterdam
Critical infrastructure failure	Power outage in Bommelerwaard Power outage in Tielierwaard Power outage in Diemen
Flooding	High tide in Groningen Friesland Dike collapse in Wilnis Excessive rainfall in Utrecht
Food crises	Fipronyl contamination in eggs Salmonella contamination in salmon
Hurricane	Hurricane Irma on Sint-Maarten

Question 2. Which factors promote the effectiveness and timeliness of crisis management at meso (organizational) and micro (individual) level? How can these factors be influenced? What does this mean for decision-making during crisis management in the Dutch context?

The comparative analysis shows on which processes the effectiveness of the operation has been assessed as vulnerable (v), questionable (q) and solid (s), according to the crisis evaluations. To determine effectiveness, it is important to look at what the goal is within a subprocess and whether this goal is achieved. Especially the processes of *recognition*, *sensemaking*, *(de)coupling*, *meaning-making* and *communication* show many vulnerabilities.

However, it should be noted that there is a bias in the choice of the cases studied, because the reason that evaluations are carried out often indicates that cases were problematic. An important omission in the field is that much less is learned from successful action, which means that factors that contribute to effectiveness remain underexposed. This is clearly visible in the table, and also provides a crucial call for future research.

Table 2.
Effectiveness of crisis management across cases

	Wildfires	Terrorism	Food crises	Social Turmoil	Industrial accidents	Transport accidents	Infectious diseases	Failure of infrastructure	Hurricane	Flooding
Assessing the crisis										
1. Recognition	V/Q	V	V/S	V	V	V/Q	V	Q	S	Q
2. Sensemaking	V/Q	V	V	V	Q	V/Q	Q	Q	S	V/Q
Organising the response										
3. Decision-making	Q/S	Q	S	V/Q	Q	Q	Q	V/Q	V	Q
4. Coordination	V	Q	Q	V	Q	Q	Q	V/Q	V	V
5. (De)Coupling	Q	Q	Q	V/Q	V/Q	Q	V/Q	V/Q	V	V/Q
Communicating with society										
6. Meaning-making	V/Q	Q	V/S	V	V	V/Q	V	V	V	V
7. Communication	V/Q	Q	V	V	V	Q	Q	V	V	V/Q
Beleid										
8. Accounting	Q	Q/S	Q	Q	Q	Q	Q	Q/S	S	Q
9. Learning potential	S	Q/S	Q	Q	Q/S	Q	V/Q	Q	V	Q
10. Resilience in view of future crises	Q	Q	V	Q	Q	Q	V/Q	Q/S	V	Q/S

V	Vulnerable	Q	Questionable	S	Solid
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Assessing the nature of a crisis

The analysis of the cases shows that in crisis evaluations recognition and sensemaking are often assessed as vulnerable or questionable. This is problematic, because the processes of recognition and sensemaking are of decisive importance to develop awareness of the crisis progression and to activate crisis structures. Factors that determine the outcome in attaining overview at the micro level have to do with assessing (deviating) signals, and at the meso level with estimating the social impact and/or the role of partners. At the micro level, we see that if problems with overview are identified in the evaluations, this concerns collaboration awareness, i.e. the operation and deployment of units. At the meso level, we see that evaluations focus on information management. Important conditions at meso level for information management are access to systems, a common operational picture, and the visibility and sharing of information with partners. This also highlights that the focus in evaluation reports is predominantly on information management which conceals factors at the micro level.

For example, assessing deviating signals turns out to be consistently problematic, as a routine reliance on scenarios and procedures hampers the development of situational awareness. Individual biases and human factors may play a crucial role here, but in evaluations hardly any attention is paid to them. In addition, as we can learn from sensemaking theory, the problem of a dominant frame consistently recurs. Once a frame has been formed adjusting this frame proves to be a difficult task. This is due to the fact that while at the operational level several signals are picked up, they are only exchanged at the tactical and strategic level to a limited extent. Relatively little attention is paid to the need to continuously update the common operational picture as the crisis evolves. This has major consequences for effectiveness, because it means that the relevant network partners are not always recognized, nor does the operation adequately respond to the actual situation.

Organizing the response

The effective organization of the crisis response is frequently reflected upon in evaluation reports, especially when structures are activated asynchronously, and/or not according to protocols. Relevant conditions at the micro level are knowledge about authority, standards for scaling up, and mandates as to who can decide to scale up. At the meso level, the existence of plans and protocols for upscaling and accessible information provision are important. Evaluations often show that the procedures were not, or only partially, followed. The most important factors identified in evaluation reports are unstructured upscaling, limited communication and alignment, and limited enforceability of tactical or strategic decisions. In evaluations the emphasis is mainly on the procedures themselves, but far less attention is paid to motivated deviations from plans and procedures. This is important because increasing adaptivity and responsiveness has proven to be crucial in several cases. Factors such as improvisation, workarounds, and customization are shown to a limited extent, while the current academic literature shows that these factors can be of decisive importance. The risk here is that too much emphasis is placed on developing structures and procedures, but that the professional customization of crisis management remains out of sight. At the meso level, this problem is closely related to network governance. Problems with network governance lead to reduced effectiveness, especially between the operational and tactical/strategic levels. The related process of (de-)coupling receives very limited attention in evaluations. However, especially for network governance, the active design of the network, and the timely linking of actors, are crucial factors.

Communication with society

Managing the social impact through crisis communication is predominantly considered as vulnerable. Usually the lack of, or limited response to feelings in society, is a clear signal that in the preceding sensemaking, and/or organization of the response, matters have diverged. Evaluations focus on the internal delays within the crisis structure, but there is a limited awareness that crisis communication starts much earlier with sensemaking and identifying relevant parties. This is often accompanied by delays in upscaling, which means that the choices made in the crisis organization are only shared to a limited extent with society. As a result, the evaluation reports hardly reflect on the process of meaning-making; using a frame to proactively give meaning to the crisis. We see that evaluations often assess crisis communication as reactive. One of the crucial factors for effectiveness at the meso level is the loss of control over communication, causing unrest, dissatisfaction, or even resistance in society. The more crisis managers succeed in developing a good information position, the more they are able to communicate clearly with the population. A clear story with clear perspectives for action is important here, with an eye for empathy and frankness in the message. A related dilemma concerns the extent to which information must be validated before it can be shared with citizens. It is striking that in analyses hardly any attention is paid to setting up (counter)frames to take back control.

Policy

In the cases studied, the degree of social and political accountability is often extensive and at times also has actual political consequences. However, we do see that evaluations focus on particular aspects and often do not make an integral assessment of a crisis. The lessons learned are mainly aimed at structuring (upscale, responsibilities, network, information management) and often not at the actor (micro)/group level. The reports do not pay immediate attention to resilience over a longer period of time, but in policy documents several years after a crisis changes can sometimes be recognized. Evaluation reports focus mainly on the meso level. The analysis of case evaluations shows that those involved in crisis management indicate on paper that learning is important. However, the emphasis is too much on a form of learning that is mainly retrospective. In some cases, we see that when a similar crisis occurs again at a later stage, the lessons that had been formulated earlier do not appear to have been acted upon. In other cases, we see that the lessons have been linked so much to the specific incident that the transfer to new disasters/crisis falls short.

Decision-making & interventions

In operational crisis management, there are roughly two forms of decision-making to be distinguished: rapid intuitive assessments based on recognition (system 1) and rational thinking processes & step-by-step considerations (system 2). In operations, system 1 decisions in particular (recognition-primed) contribute to effective and timely interventions. However, the condition for effective system 1 decision-making is that the sensemaking of a situation is rich and correct. If the situation is interpreted too quickly or too rigidly, there is a high risk of tunnel vision, 'confirmation bias' and/or a 'collapse of sensemaking'. Both forms of operational decision making can be seen in the cases studied, although they are not mentioned in this way in the evaluation reports.

At a strategic level, a distinction can be made in the academic literature between two forms: principled and incremental decision-making. In the researched cases it is often possible to distinguish between forms of incremental decision-making. During the decision-making process, it is important that administrators, and other parties involved always ask themselves how the crisis is developing and which actors, organizations, sectors, or structures in society are involved. This concerns the question how the functioning of society can be maintained in such a way that the safety of people and organizations can be optimally maintained. In many cases, particularly where unusual or private partners were involved, or in cases where borders of regions were crossed, we see that such reorientation or restructuring lags behind. Much of the effectiveness and timeliness of crisis decision-making depends on translating it into a clear, unambiguous message to society.

Organizational structures

Crisis management is often dominated by hierarchical 'command & control' structures. These structures can be found all over the world as blueprints for operations. In the underlying doctrine, 'command' is about making decisions and ordering action; 'control' is about monitoring and influencing this action. The basic idea of the traditional 'command & control' structure is that ultimately there is a top executive who brings all the lines together, has an overview and can make the best decision based on this. In the Dutch system, the GRIP structure, with the same underlying doctrine, is leading in shaping multidisciplinary crisis management. However, often crises are more complex and involve multiple actors from various organizations and governments. As a result, the limitations of 'command & control' soon become apparent.

The analysis of the cases shows that in operations there are often major delays in the GRIP structure because information and decisions run through multiple layers before they can be implemented. The crisis has already developed further by the time decisions are made, and communicated. As a result, crisis managers on a tactical and strategic level often lag behind the facts, and yet they have to direct the operation at their level. The result is that in an operation all kinds of teams are active at different command levels, which as the pressure increases, turn their perspective inwards and gradually lose sight of the dependencies with other teams.

The researched cases show that crisis management benefits from a form of network control. The results of the case analysis and discussions in the focus groups show that particular attention should be paid to (de)coupling networks in modular collaborations. The challenge of network governance lies in working together towards a shared goal without sharing the primary responsibility. Each participant in the network has their own task area and responsibility, but effective crisis management requires that these responsibilities are put in relation to each other. Our finding is that in the current system the emphasis is (too) much on the structures themselves. The organizational form itself is not leading, but the added value lies in the development of network heuristics to switch between different types of networks. This involves public, as well as private partners, and partners in the general and functional chains. Disasters do not respect the boundaries of safety regions, nor national borders. That is why clarity is required about how the collaboration should proceed across borders. Shared overview about the situation, task orientation, and a common operational picture are crucial.

Question 3. How can factors that contribute to effectiveness be influenced in such a way that they contribute to the quality (efficiency and effectiveness) of crisis management?

Sensemaking

The cases analyses offer a varied picture in terms of effectiveness. In some cases, a high degree of preparation is visible. There are monitoring systems, models, indicators, structures and scenarios that speed up the recognition of a crisis and an adequate response. It has also been emphasized in the focus groups that sensemaking is a key factor to determine the quality of crisis management. The ability to get a timely and accurate picture of a crisis can be strengthened by having:

Up-to-date system analyses, maps, environmental knowledge; analyses of past crises and scenarios; monitoring systems; relevant data; interpretation models; key figures, threshold values and decision rules; availability of essential expertise.

Organizing the response

A large number of cases feature problems with adhering to procedures and protocols. Problems emerge when existing upscaling procedures are not strictly followed or adaptations of command structures are not communicated clearly. Evaluations point out solutions that result in the strengthening of networks and collaboration awareness. When working in such networks, attention is often focused on the traditional blue light partners. Yet, the collaboration with other (private) actors more often results in misunderstandings. Therefore, in order to be effective in network governance, it is important to increase the overview and working relations with relevant partners in crisis preparation. This requires:

An overview of relevant partners; updated network maps; clear mandates and division of responsibilities; contacts between the general and functional chain; insight into cross-border cooperation; adequate information management; monitoring and registration.

Communication with society

On the one hand, effective crisis communication must provide accurate information on the impact of a crisis, and provide actionable advice. On the other hand, responsive crisis communication requires opening up for information from different stakeholders, sectors and organizations. Responsive communication also requires an adequate infrastructure and equipment, and if needed, back-up facilities. The effectiveness of crisis communication is influenced by:

Versatility, listening, discussion; timeliness of communication; stakeholder awareness; a balanced mix of communication about the crisis, societal impact mitigation and actionable information.

Policy

Evaluation policies and inquiries often emerge when the crisis is over and offer a retrospective view on the crisis. A richer approach to crisis evaluation is visible in cases where attention is paid to monitoring, reflection, and feedback before the crisis hits. Working systematically on accountability demands:

Awareness and registration of relevant processes; registration systems; overview of the bodies to which one is held accountable; safe storage of data.

Crisis management as a profession

The quality of crisis management is not given; it is a process that requires constant attention. In the cases such attention features in scenario simulation, preparation, training, evaluations, publications and (scientific) articles. As such, crisis management requires increasing professionalism. This implies that crisis management must be approached and developed as a profession. This concerns both the professional development of the people involved, and the further development of crisis management as a field of knowledge. In addition to the emphasis on professionalization, participants in our focus stressed the key role of personal qualities.

In the focus groups the idea was strongly put forward to assign an important role to crisis evaluation as a method to systematically work on knowledge development. A direct link was advocated between preparation, training and practice, crisis evaluation and knowledge development. Working on professionalization can be strengthened:

Individual professionalization of crisis managers; knowledge development through accumulating analysis of cases; linking scenario development, evaluations, training and exercise/simulations.

Societal resilience

Societal resilience is a key factor for effective crisis management. Resilience is in part determined by crisis preparation, but above all by the extent to which one is able to organize the infrastructure, facilities, landscape, sectors, organizations, industries and companies in such a way that safety is promoted and the ability to cope with extraordinary circumstances is increased. In order to strengthen resilience one can think of:

Reflecting upon recovery, or the 'new' normal; analyzing revealed vulnerabilities, risks and opportunities; discussing future scenarios with all relevant stakeholders.

Improving crisis management

Crisis are becoming increasingly transboundary. The result is that networks with partners from other regions, disciplines, and organizations are increasingly prevalent. As crises are becoming more complex, the number of required communication links is also increasing. This limits the relevance of centralized 'command and control' doctrines. Currently crisis management doctrines have focused on the locus of safety regions, but now the time has come to widen up towards other public organizations. This also entails strengthening functional chains, public-private partnerships, national, and international relations. In addition, the professionalization of information management was increasingly mentioned in our discussions in focus groups. Overseeing available information, analyzing it, and using digital analytics, requires a high degree of competence in information management. This also entails strengthening the abilities to interpret information; separating facts from rumors, and news from fake news. Increasing competences is required to display, compress, and visualize information.

The inclusion of the citizens and stakeholders in the response was also mentioned as a key aspect to improve crisis management. While citizens are often not involved and might expect that the government takes care of them, citizens can be of great help when they are empowered. When their information position is strengthened, they can actively participate in crisis management. Finally, our focus group participants mentioned the idea of initiating, or strengthening a process of knowledge development. This requires the integration of prevention, preparation, response, and recovery in an integral context of education, training, scenario development, practice, simulation, evaluation, and research. The idea has also been put forward to invest in an independent center of expertise that offers a meeting place for scientists, policy makers, and professionals.

Research agenda

1. Recognition & sensemaking

Increased understanding of the process of sensemaking in crisis management is required. In the cases discrepancies between operational and tactical/strategic sensemaking often emerged. In order to explain how this can happen and how to prevent it, more systematic knowledge is needed about processes of recognition and sensemaking. These processes take place both on an individual level (for which there is currently little attention) and on a group level (socio-psychological processes). Research into sensemaking will have to look at these levels in relation to each other. More insight is needed into questions such as: How does a (divergent) perception of a crisis arise? How do we interpret 'weak signals' in order to recognize a crisis in an early stage? How can deviating signals be recognized during a crisis? How is it possible to avoid to get stuck in a static (outdated) frame of the crisis?

2. Incident command structures: experimenting with alternative forms of network control

One of the major recurring issues that emerged from our study was setting up an effective crisis management structure. Timely communication between the operational & strategic level, and cooperation with stakeholders, often turned out to be problematic. Unfortunately, there is not a clear explanation for these problems. In a number of cases crisis managers successfully deviated from the command structure; in other cases, adjustments resulted in separate silos, resulting in coordination problems. Crisis management has predominantly become an issue of network governance. This finding is supported by the recent evaluation of the Security Regions Act (2020). An effective network governance structure will have to find a balance between predictability and flexibility. The research agenda may focus more on experimenting with different forms of network governance, focused on switching between different forms of governance. The central concern is not developing new variants of existing structures, but increasing our understanding of the effects of connections between different partners. This required the development of new network governance heuristics. How can actors connect with each other, where does the primacy of control lie, and at what precise moments are bypasses (liaisons) needed to break through inertia?

3. Developing a view on microprocesses of crisis management

One of the core conclusions of this research is that knowledge is lacking (in evaluations) about the functioning of teams and individuals in a crisis situation. The scientific literature shows that microprocesses often play a decisive role in a crisis. These dynamics are not clearly visible in evaluations and professional knowledge development. However, this knowledge is probably secured within specific internal training and learning processes. Of course, the relationship between accountability and learning is delicate at the individual level. Nevertheless, getting a good picture of these dynamics at the micro level is crucial to further professionalize crisis management.

4. Meaning-making strategies and societal dynamics

Crisis communication is consistently classified as vulnerable in the evaluations. In our analysis of different crisis situations, a clear meaning-making strategy is often lacking. Partly this is caused because the strategic level is lagging behind due to a poor information position. In this respect, information management is an important process that has received much attention. However, further development must not stop here. The effectiveness and legitimacy of crisis management is largely related to perceptions and impact. Research questions such as: how do we gain insight into the societal impact of a crisis? What are the effects of meaning-making strategies on reducing or channeling societal impact? When do resistance, disbelief, or denial arise, what are tipping points? Which strategies promote the legitimacy of crisis management?

5. Development of an unambiguous evaluation systematic and knowledge development

A key observation in our study is that each crisis has been evaluated in its unique way by different investigators. In the series of internal, external, and legal frameworks of evaluators, different criteria and different focal points are used. The result is a diversity of frameworks and perspectives on effectiveness. More synchronization is required. There are research possibilities to develop knowledge ex-ante (preparation), but especially in situ (during a crisis). Examples of in-situ research are working with camera images or sound recordings. For this knowledge development process to be successful, it is important to bring preparation, training & practice and crisis evaluation together, and link scientific research to practice and training. There are many new possibilities in virtual simulations, or VR experiments. Finally, it is recommended to focus evaluations not only on the current crisis, but instead on series of crises. What are the 'lessons learned' for crisis management across cases?