Weather and Climate Risk Communication

Under the direction of
Bernard Motulsky, Jean Bernard Guindon
and Flore Tanguay-Hébert

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INTRODUCTION

This book, with sixteen contributing authors, is meant to be an educational and reference tool. The content is based on the current state of knowledge and does not promote any ideological or political platform. There may be differing points of view between the authors and even ambiguities, since tolerance for ambiguity is part of communications.

The authors were asked to take part in this initiative by contributing to an overall consistent framework. This is not simply a collection of texts but original work within a planned design. The authors of these chapters were approached because of their reputation in their respective areas of research, education or relevant experience.

We will be discussing an area of knowledge that is developing quickly. There are a multitude of books, courses, articles, symposia, conferences, other academic and fieldwork activities on this topic. Paradoxically, all risk managers communicate risks either directly or through their associates and this is done primarily with communicators. Often this process is done without considering the valuable contribution of these experiences to this new field of knowledge.

The idea for this book came out of the work by the Chair in Public Relations and Marketing Communication of the Université du Québec à Montréal (UQAM) on climate and meteorological risks. Funding was provided by Environment and Climate Change Canada (ECCC), whom we thank for their support. The authors had complete academic freedom inherent to a university setting. It is simply coincidence if their points of view align with or differ from those of the ECCC.

Although this book primarily focuses on meteorological and climate risk communication, it can also be useful in overall risk communication since it can be transposed to a general risk context. Natural, technological and man-made risks combined make up a substantial component of overall risks. Furthermore, meteorological and climate risks either cause disastrous effects that trigger other risk factors or they contribute to disastrous effects arising from other

types of risks (worsen or alleviate). By making the appropriate trans-
fers, this book can therefore be useful for any risk communication
education initiative.

The topic of this book is risk communication relevant to all
readers. Talking about the rain and good weather is part of everyday
conversation. Paradoxically, we might listen to weather forecast reports
but not really pay attention to what is being said. Sometimes even
these forecasts are imbued with cynicism. This book will show that
weather forecasts are derived from an exact science with highly sophis-
ticated models that yield extremely accurate projections. However,
this aspect is not reflected in weather-related communications. The
use of obscure terminology (jet stream, anticyclone, low-pressure area,
atmospheric pressure, etc.) does not do justice to its knowledgeable
authors. As well, the perception of the public involved is not always
taken into account. The consequences of forecasts for the public are
not sufficiently conveyed to get their attention. We are in a world of
unilateral communication. Bilateral and multilateral communications
are not part of traditional risk communication.

Some chapters provide a review of several facets of the opposition
between top-down risk communication and multilateral communica-
tions, by proposing avenues to explore, concrete examples, and tools
for individuals involved in communicating meteorological and climate
and other risks in order to achieve more effective communication.
Social media's contribution in risk communication allows for this
improved effectiveness. The public now conveys information in the
same way as authorities, experts, and scientists. Three chapters deal
with this topic.

To better understand the impact of social media, this book
touches on the basic concepts of communications in general with
a focus on risk communication. The ISO Standard 31000 is viewed
as the reference for risk management and risk communication. The
entire concept of perceiving risks infiltrates all chapters, with one
chapter dedicated to this topic. The book completes the picture with
a set of rules of the art of communicating, organizational aspects,
effects on health, change management through social connections,
and the public reflex. Chapter 14 focuses on the systemic aspect of
risk communication.

The authors would like to thank Stéphanie Yates, editor at
Presses de l'Université du Québec, for her rigour throughout this
venture. Thanks also go out to Flore Tanguay-Hébert, who collabo-
rated on this project from the very beginning. Our hope is that this

will be a tool for reflection, education and development for readers to advance in their respective areas and contribute to this new field of knowledge and communicate more effectively.

by Jean Bernard Guindon,
Bernard Motulsky
and Flore Tanguay-Hébert

1

BASIC CONCEPTS IN RISK COMMUNICATION IN METEOROLOGY AND CLIMATOLOGY

by Jean Bernard Guindon

This chapter deals with individual concepts to initiate and achieve risk communication. We will attempt to identify obstacles to adequately communicating risks and crises: assumptions, myths, and defense mechanisms. To link with the other chapters, the transition from the individual to the collective in risk communication will be outlined using an organizational charter for risk communication.

Risk communication is based on a risk management process led by scientists, authorities, or any duly appointed individual. According to ISO 31000 Standard (discussed in Chapter 3), there must be communication throughout the management process, and not simply at the end, as an afterthought. This approach is founded on the fact that risks, when handled and analyzed, are simply perceptions. These perceptions stem from interpreting the information received based on experience and the emotions felt about a subject. Perception will be further discussed in Chapter 4.

At the end of the process, the risk management topic will be the perception of the risks and not simply their so-called scientific or objective reality. If the individuals communicating the risk do not take the target public's feedback into account throughout the process, there is a strong possibility that people might not adjust their behaviour *(risk situation)*, or be compliant *(crisis situation).*

To develop the reflex to communicate throughout the risk management process, including potential crisis management, it is critical that those who convey information develop this reflex and that it is integrated in their risk management process. This requires the ability to develop qualities for adequate and effective communication, for communicators, managers, scientists, or other professionals.

This chapter will deal with the key elements of risk communication and communication obstacles to changing individual and social behaviours, ending with a risk communication charter model. Chapter 13 will provide a more in-depth review of the dynamics of change in risk communication.

1.1   CONDITIONS PRIOR TO THE RISK COMMUNICATION PROCESS

Generally speaking, communication is the transmission of information about facts and predictions, or the formulation of opinions, ideas, and sentiments. This understanding aligns with the right to freedom of expression. We are more interested in this than in the potential consequences of expression. This view of communication focused on expression is simplistic and does not take into account the critical act of listening. What is the value of expression if no one is listening and can provide feedback and ask questions?

This iterative cycle of expression, listening, feedback, and asking questions is essential for risk communication to be effective. Since risk communication must generate behavioural change in the target audience, and is a call to adapt to the conditions created by a risk, effectiveness is critical and intrinsic to the reality of the identified risk. Otherwise, a person's behaviour can undermine the gravity of the risk and especially any related serious consequences. For this reason, it can be said that there is no true risk management if communications is not part of the actual management process.

Risk managers not only have to deal with the hazards associated with the risk, but also their impact on the people potentially involved. However, the perception these people have of what the risks mean to them cannot be discounted. This perception either enhances or diminishes the severity of the risk based on whether people refuse to adjust their behaviour or they comply and make adjustments to lessen the potential impact.

Individuals involved in public communication (scientists, public authorities, stakeholders, or communicators) always need to consider the possible impacts.

If those responsible for risk communication do not have the right support to react properly in their communications, the usefulness of the principles, methods, and tools provided in this book may be limited.

In light of these considerations, it can be deduced that certain personal prerequisites necessary prior to risk communication must be embedded and put into practice:

- Self-presence
- Tolerance to Ambiguity
- Valuing Differences
- Availability

The above communication categories developed by Solange Cormier (Cormier, 2007, Chapter 3), and applied to management are used here in respect to risk communication and crisis situations.

1.1.1 SELF-PRESENCE

Self-presence means awareness of others, being de-centered from one's own performance when interacting with others, and not being focused on self-image (Cormier, 2007, p. 63). This is not about being self-aware, as it is commonly understood, but rather to be actively focused on what is occurring outside of oneself, the implication being that self-presence is needed in order to focus on others.

In risk communication, this means the ability to think, as a communicator of messages, about the intended audience, the impact of this information on people's lives and of the mass of information that will bombard people, requiring them to make choices. A meteorologist announcing a major weather depression should focus more on the winter storm and its repercussions on the lives of people, on families, travel, work, and agriculture, than about describing the storm scientifically with complicated vocabulary.

1.1.2 TOLERANCE TO AMBIGUITY

To be tolerant of ambiguity is letting go of true/false logic, linear thinking, direct causal relationships, and reduction (group thinking). This involves the ability to live with complexity, the unforeseeable, and the unexpected, with circular thinking, with what is incomplete, paradoxical, or even contradictory. The statement, "What you're saying isn't clear" – becomes the basis for a learning process, and not a source of frustration.

The receiver of messages related to a single event must be able to understand that the same people may change their projections, suggestions, and instructions. Receivers must also understand that they cannot impose logical order, since risky or chaotic, complicated situations are involved with complex origins with often unclear causes. Various sources of information (traditional and social media) may convey messages that might appear inconsistent or conflicting. This can generate confusion, but it can also be perceived as a way to gain an understanding of a complex, paradoxical, and changing situation.

1.1.3 VALUING DIFFERENCES

This is the opposite of *group thinking* that tends to level out concepts, facts, and judgments so that they are more acceptable and in line with a given context. Group thinking refers to organizational and professional culture, even to the prevailing culture, in which everyone is involved. This is where we say: "Here, such things cannot be said, cannot be done, do not align with our values." These are obstacles to clear, specific, and efficient communication.

We find this phenomenon in organizations where employees, regardless of their level, tend to be self-protective, so they don't compromise their chance for advancement and promotion. When an organization is not open to genuine communication, it is difficult for individuals to challenge the rules and traditional ways of doing things. The review of facts and ideas is filtered through windows where only a partial reality is perceived, which, although it may involve the same thing, is never perceived the same way. A number of individuals in the same room might look out a window and, because of their angle, they may see different things. Scientific, political, communicational viewpoints, within and between organizations, have as many windows through which people view different realities of the same object. This is why it is difficult for an individual to remain objective. The art of sharing when there are differences about the same topic enables us to value these differences, in order to better strive for a certain objectivity. In terms of meteorology, any risk communication to be shared will provide enrichment as well as meaningful clarifications for partners and the target public.

1.1.4 AVAILABILITY

Listening is critical to effective communication: both for the sender of a message and the receiver. Not listening often increases the misunderstanding that filters through all communications. Physical and psychological availability promotes a better comprehension of the message and of any reaction. It therefore completes a cycle of exchange to significantly improve cooperation, which offsets the risk through behavioural change. Take weather forecasts as an example, they often lack availability in terms of listening and are seen as lacking clarity.

Emotional distance between what is expressed and what we want to express characterizes availability. Effort is required to adopt a non-critical openness to a message while maintaining the necessary sensitivity to other points of view. This intricate amalgamation between the subjective nature of our perceptions and the openness

to understand the other's perceptions is achieved through availability. For instance, developing meteorological risk communication involves a certain ambiguity between the identified hazard and the potential threat on people's lives. The fear of causing panic might limit the clarity of the message and the receiver might panic regardless of the message's original intentions. Availability enables us to measure out communication, so that it is effective, yet still retain sufficient sensitivity to adjust interactions between the parties involved.

Based on these considerations, we can conclude that risk communication requires internal concepts that must be well integrated to ensure that the authenticity of the individual, credibility of the message, and the ability to listen are expressed within individuals in communication, and not solely by following external codes such as a code of ethics. Anyone familiar with meteorologist, Jocelyne Blouin, can attest to the fact that she demonstrates consistency and a high level of credibility in discussing meteorological risks.

1.2   OBSTACLES IN RISK COMMUNICATION

Even if we might have the best support and skills to adequately communicate, as human beings, we have defense mechanisms to help deal with complex or threatening situations. We need to remain in control and reduce any anxiety potentially created by these situations. These defense mechanisms can prevent or limit communication.

The issue is not so much the short-term use of defense mechanisms, but more if they are used on an ongoing basis. For example, if not believing the news that a relative has passed away is critical to maintaining psychological balance, then maintaining denial may have negative and unfortunate consequences, such as completely ending communication with the family.

1.2.1 Defense Mechanisms

There are many defense mechanism categories, yet none seem more relevant than those described by Pauchant and Mitroff (1995, p. 79-101), who used them in studying the obstacles people encounter in crisis management. Since crisis management involves managing risks – before, during, and after – (Bérubé, 2013, p. 532), and since this is always integrated in risk communication (Bérubé, 2013, p. 537), we are taking the liberty to apply them here to better understand the possible obstacles to clear, specific, and credible communication.

Table 1.1 outlines these defense mechanisms in meteorological risk communication (terms in parenthesis are the author's)

TABLE 1.1
Application of Crisis Management-Specific Defense Mechanisms in Risk Communication

1. Negation	Refusal to acknowledge certain realities as life-threatening: refusal to acknowledge the possibility of being severely injured or dying in an extreme meteorological event.
2. Denial (reductionism)	Acknowledging a threatening danger, but minimizing its importance: a set of meteorological conditions that, individually might be harmful, but when considered as a whole become catastrophic.
3. Fixation	Inflexible commitment to a set of actions or attitudes when faced with a life-threatening situation: believing that once public authorities are properly informed, measures will be automatically taken to prevent or manage any disaster.
4. Grandeur	Feeling of being all powerful, believing that humankind or science can deal with everything, including the hazards of extreme weather: believing that a hurricane will not follow the predicted trajectory, and thus not preparing for that possibility.
5. Idealization	Projecting infinite powers onto a person, an object, or an organization: if the hurricane hits, public authorities are equipped and prepared to deal with it.
6. Rationalization	Exaggerated intellectualization of an event, an action, or an idea: the application of excessive precautions in preparation for a winter storm (stating that a road is closed when this is not the case).
7. Projection	Projecting traumatic actions or thoughts onto other individuals, objects, or causes: the certainty that suffering, injury, and death resulting from a weather disaster can only occur in countries with inadequate systems and facilities.
8. Fragmentation (rift)	Binary separation of elements perceived as being opposite, driven to extreme dichotomy: there are only minor or major events, uncertain events that fall in between are disregarded.

1.2.2 ASSUMPTIONS AND MYTHS

When defense mechanisms come into play for a short period, when we have time to collect our thoughts and re-focus, they do not seem to be an issue. With self-presence, they can even help more quickly identify potential gaps in risk communication. If, however, these mechanisms persist, then they generate assumptions and even myths, which are obstacles to adequate and effective communication.

Assumptions and myths are established or preconceived notions that distort an accurate portrayal of reality and its expression in communication. Pauchant & Mitroff (1995) classify them under basic assumptions. This is what we believe to be true without questioning it.

This points to the gap between fact and fiction for individuals and organizations. They distort the true view of reality by introducing subjective veils created from emotion, feelings, and beliefs. It is, therefore, difficult to distinguish true events from the associated emotions. The assumptions and myths generated by persisting defense mechanisms are fixed in the internal reality of individuals in communications mode.

Here are some examples of assumptions:
- Members of the public need not do anything to prepare for an imminent weather event, since the authorities will take care of this. Therefore, we do not have to be concerned about weather alerts.
- Because of a warning system, any threat to public health or integrity will be under control. By exaggerating warnings about precautions to take, we have come to believe that no one can ever be a victim of a weather disaster.
- All well-founded and properly developed communications on meteorological science will be directed to the target audience, who automatically will know what measures to take.

Below are some examples of myths:
- The weather is a local phenomenon only and is unrelated to a global system: weather forecasts boil down to the sun, rain, wind, and clouds for a specific location.
- In case of a weather disaster, we can disregard all announcements (evacuation order, remaining at home, etc.), because we are certain that potential victims will be saved (helicopter evacuation).

- Major climate threats do not exist. They are pseudo-scientific creations made up to scare us.
- Any climate risk communication is founded on fear, therefore it unnecessarily creates drama.
- Only with complete transparency can we produce credible and trust-worthy risk communication.

These statements might seem outlandish. But this would be underestimating the power of public communication in keeping these beliefs alive, particularly with social media. It is no longer possible however to underestimate their impact on risk and crisis communications, particularly when the quality and effectiveness of the communication is poor or when there is an unwillingness to communicate.

1.2.3 An Antidote: Asking Questions

Human communication is paradoxical in the sense that its function is to convey understanding, yet it is a source of misunderstanding. The more we express ourselves, the more we think our messages are clear. However, we risk confusing the issue by providing too much information which loses the audience's attention, gives equal importance to both critical and secondary information, does not provide a big picture and fragments the perception of the reality.

With this in mind, it can be said that full transparency is not possible. The faith in total transparency voiced by some communication gurus is a utopic vision. It cannot withstand any serious test. We cannot claim to communicate all the facts, especially since we know that too much information causes a lack of understanding.

The main problem is the belief that only rationality and memory are the foundations of communication. The interaction in communication goes far beyond these two aspects and involves the complexities of mental states, emotions experienced, and the perceptions we have of external reality, even when the most experienced scientists and journalists claim to present an objective perspective. This is even more the case in highly stressful situations, when dealing with risks and crises. Certainties become a paradox, which often degrade into chaos.

In terms of human interactions in highly stressful situations, it is best to avoid communication that can add to the confusion (as in the case of anger). It is better to focus on understanding and reducing potential confusion. There will always be a level of unresolved ambiguity, since communication is a source of unintentional ambiguity stemming

from subjectivity. This brings us to our capacity for **tolerance to ambiguity**, which provides calmness in situations of adversity and exceptional conflict, as encountered in risk and crisis communications.

This is when asking questions is a solution or antidote to ambiguity. Asking questions helps to enhance the quality of communication. It allows for contextual understanding, which is critical to developing a systemic approach to situations involving misunderstanding and even chaos.

Its positive effects:
- Encourages reflection
- Promotes new perceptions
- Develops critical thinking
- Promotes rigour in attitudes during interactions
- Source of vitality and energy

Asking questions is the basis for a true partnership between individuals and organizations and helps in sharing a better understanding of the facts. It promotes the ability to translate facts into coherent communication.

Questioning:
- Anchors us in reality, helps us distinguish observed facts from subjective inferences
- Prevents **reductionism** and hasty generalizations (defense mechanisms)
- Prevents **polarization** (rift) between two extremes; contradictions create **anxiety**
- Enables us to confirm understanding between partners
- Prevents ready-made ideas, stereotypes, and **myths**

The purpose of asking questions is to:
- Focus on the facts and data purported to be "objective" (number of people in danger)
- Take a specific stance (behaviour the public needs to adopt)
- Focus on a reference framework for an organization or group of organizations (sharing of responsibilities in existing complex structures)

Questions should not:
- Attempt to identify immediate causes or blame individuals, which will encourage defensive and hostile behaviour

- Conceal intention or an affirmation
- Generate duplication, since this causes confusion, promotes defensiveness and leads to a communication dead-end

In conclusion, asking questions should be a springboard that allows for the best possible feedback between senders and the target audience.

1.3   MOVING FROM THE INDIVIDUAL TO THE ORGANIZATION

Personal aspects in risk and crisis communications previously mentioned are not an end in itself. They must be translated within a given organization, not only with communicators, but also with every person in authority for integration in the organizational culture. We say an organization is open or closed according to how its members are engaged in effective, credible, open, and honest communication with other organizations and the public they serve.

1.3.1   RISK COMMUNICATION CHARTER

In terms of risk communication, there are few examples of tools that facilitate this transfer. One of these models that most inspired the author's work comes from the former Agency of Health and Social Services in Mauricie: the Risk Communication Charter published in 2011.[1] Inspired by this document, we developed a similar charter for organizations wishing to advance risk communication in general and with a focus on natural risks. Risks in all cases are interrelated and interdependent and cannot be treated separately.

The municipal example is provided as a reference, however any private and public organization could develop its own charter aligned with its own organizational culture.

According to its authors, the Charter is a symbolic statement that publicly demonstrates its voluntary commitment to work within risk management logic, focused on risk communication and the input of all partners, including its citizens.[2]

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1. Jacques Isabelle, then head of emergency preparedness at this agency, and his associate Marc Nolin were the initiators and promoters of a municipal charter for risk communication related to hazardous materials and an application methodology. They did not retain copyright.
2. Quote taken from an unpublished text by Isabelle and Nolin, mentioned in note 1.

1.3.2 AN APPROACH TAILORED TO EACH MUNICIPALITY OR ORGANIZATION

The Charter does not impose a structure, model, or timeline. Each authority can provide its own implementation plan and schedule, according to its realities, resources, importance of partner input, and the expectations of its population, clients, or target public. Using the Charter as a reference, the municipality or organization can mobilize its community and employees for natural or other risks.

The success of this operation requires municipalities and other authorities to take certain actions within their organization, such as adopting an action plan aligned with their strategic orientations, designating a representative, and allocating necessary resources. It is also important to make sure the Charter applies throughout the constituents and the municipal branches or other authorities, as well as with their partners. The Charter is not a tool that we pull out of a box as needed, nor is it a project with a clearly defined beginning and end. It is more a strategy that's part of continuity and innovation.[3]

Proposed Approach for Charter Adoption and Implementation

1. Prior approval of the Charter by political and administrative senior leaders.

2. Development of a draft resolution.

3. Submission of the text to elected representatives, board members and other appropriate authorities.

4. Adoption of the Charter by formal resolution.

5. Publication in the media in order to create a public moral obligation.

6. Public posting of the Charter.

7. Designation of a representative.

8. Development and adoption of an implementation plan:

    a. Determining methods for partner and stakeholder input.

    b. Identifying goals, strategies, and methods to initiate the project.

    c. Developing a schedule for initial action items for year 1.

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3. Quote taken from an unpublished text by the same authors.

1.3.3 Proposed Amended Charter to Cover Overall Risks

The model developed in 2011 inspired the proposed Charter and is presented in the insert below. It has been completely reformulated by the author, with ISO 31000 Standard in mind (explained in Chapter 3). In order to adapt it to any other organization, the text and preamble information simply must be changed accordingly.

Insert 1.1
Municipal Charter for Risk Communication

Whereas the municipality is the political level closest to the public and has a critical role in terms of safety;

Whereas the municipality has an important and recognized role in terms of mobilization, related to leadership supported by the law, in regards to risk prevention in its territory, land-use planning related to these risks and emergency planning measures to prepare for potential disasters;

Whereas members of the public are responsible for taking care of their health and ensuring their safety and wellbeing, depending on their condition, their level of autonomy and needs, this responsibility extends to those close to them.

The municipality acknowledges
1. The integration of risk communication in the municipal risk management process.
2. The perception of risks by the public and partners as the basis for risk analysis.
3. The integration of risk communication in an inter-organizational and multidisciplinary process.
4. To provide the earliest possible alert system so the public and partners can best prepare and adopt the appropriate behaviours.
5. The mobilization outcome of risk communication as a source of developing collective resiliency.

The municipality therefore is committed
1. To identify risks in its area and ways to reduce its vulnerability; to determine what must be done to reduce or prevent disaster; and to communicate everything from the start in a risk management process.
2. To adopt two-way communications between the authorities and the public that will best align experience and science and ensure that communications has a key role in risk analysis.

3. To use the necessary strategies and tools for communication networking that will enable cross-risk analysis by the stakeholders in order to better understand the systemic aspect in the event of disaster or crisis.

4. To put necessary detection and early public warning systems in place so that the public and businesses can protect themselves in a timely manner.

The municipality agrees to promote

1. Public and partner involvement in the development and achievement of risk communication, recognizing the importance of their role and skills.

2. Communications calling upon every member of the public, organization, and business situated in the territory to be aware of the local preventive and emergency measures in place, and to be able to respond effectively with rescue services in the event of emergency.

3. Permanent integration of risk communication in its planning with required and available human, material, and financial resources.

CONCLUSION

There is clearly a subjective individual aspect to risk communication that can be transposed onto a formal organizational framework. The development of an organizational system of risk management and communication begins with individuals and their motivations. These aspects go hand in hand.

We could have developed some procedural concepts, such as the establishment of a community multi-risk, monitoring system, which includes all stakeholders working cooperatively. This theme will be revisited in Chapter 14 in the systemic approach.

The goal of this chapter was to provoke thought about the direction for risk communication in an organization to truly protect its customers, the public, and its partners. As long as efforts remain isolated with individuals or organizations, we will never move forward. Motivation of people instigates organizations to formalize the necessary procedures to protect individuals who depend on them, procedures where risk communication plays a critical role.

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EXERCISES

1. Questionnaire: Reflection on Tolerance to Ambiguity (Cormier, 2007, p.69)

   ### My level of tolerance to ambiguity

   Carefully review the following statements. Using a scale from 1-7, indicate your level of agreement or disagreement with each statement.

   Completely agree   1 2 3 4 5 6 7   Completely disagree

Statements	Score	Comments
A. Inability to provide a definitive response in your own area of expertise.		
B. There is always a right way of doing things.		
C. It would be much better if we shared similar values.		
D. Not leaving anything to chance demonstrates good management.		
E. People complicate life for no reason.		
F. For every question, there is a clear and specific response.		
G. It is a waste of time discussing problems when there are no solutions.		
H. Taking action is often better than discussing and reflecting.		
I. There is no problem that cannot be solved.		
J. I believe it is important to tell people the truth, even if may hurt them.		
K. People are effective when they know what needs to be done.		
L. I always say what is on my mind.		

M. I prefer meeting with people I know than those I do not know.		
N. I find it more rewarding to solve a simple problem than to work on a complex problem.		
O. I do not really like the unexpected.		
TOTAL TOLERANCE SCORE		

2. Referring to the pages that dealt with assumptions and myths about meteorological and climate risk communication, can you identify others and provide a clear description? Discuss their impact on adequate, clear, specific, and effective communication.

3. Reflect on **asking questions** as a part of the communications process to identify the positive effects.

4. Using the municipal Charter as a reference, try to develop a Charter matrix that could be applicable to your ministry, para-governmental organization, or private sector business.

COMMON CONCEPTS IN BUILDING A FOUNDATION FOR EFFECTIVE COMMUNICATION BETWEEN PARTNERS IN METEOROLOGICAL AND CLIMATE RISK COMMUNICATION

by Cédrick Morneau
and Jean Bernard Guindon

A number of emergency management terms (such as hazard, risk, disaster, vulnerability, and resilience) will be reviewed in this chapter. Official documentation published by Public Safety Canada (PSC) is also referenced. These documents outline terminology used in a number of provinces and countries. Crisis and disaster are reviewed in light of texts by Patrick Lagadec cited in the references. In the last part of this chapter, the authors review the challenges of using some of this terminology in meteorological and climate risk communication.

To varying degrees, human populations are all exposed to a multitude of risks that stem from complex interactions between society and the environment. In fact, various man-made and natural phenomena can potentially generate catastrophic situations when they occur and when there is human exposure involved.

In the past decades, there has been a considerable increase in natural disasters on a global scale, in particular meteorological and hydrological (ICLR, 2012, p. 15). Margareta Wahlström, United Nations Assistant Secretary-General for Disaster Risk Reduction stated that 76% of all disaster events between 1988 and 2007 were hydrological, meteorological, and climatological in nature; these accounted for 45% of the deaths and 79% of the economic losses caused by natural hazards (ICLR, 2012, p. 15).

These climate and temperature processes are associated with a broad range of associated phenomena that could cause major destruction (heat waves, frost, forest fires, drought, tropical storms, winter storms, violent weather phenomena, hail storms, tornadoes and regional storms, flash floods and flooding, landslides, storm surges, and landslides/land mass variations, etc.).

In recent years, Canada has experienced some of the worst natural disasters in its history with major direct financial consequences (1998 Quebec ice storm, 2013 Alberta flooding, 2013 Southern Ontario flooding, Slave Lake's 2011 fires, Ontario's rain storms in 2005, and Fort McMurray's fires in 2016).

The increase in number of events and costs related to natural disasters shows that there is a steady progression of exposure and vulnerability for both the population and property to meteorological and climate hazards. In a context where climate changes have a potentially major impact on the frequency and intensity of some natural processes, managing hydro-meteorological and climate risks is critical.

Since risk management involves a group of individuals (decision-makers, experts, stakeholders, citizens, etc.), the sharing of knowledge to gain a common understanding of fundamental emergency management concepts is critical in order for efforts to be effective. Therefore, this chapter will first outline recent developments in emergency management and define some basic concepts in this field, with a focus on those pertaining to risk management.

Secondly, special emphasis will be placed on the role communications plays in risk management, putting its application into perspective through examples from hydro-meteorological and climate phenomena.

2.1   EMERGENCY MANAGEMENT

The primary objective of emergency management is to save lives, preserve the environment, and protect property and the economy (PSC, 2011, p. 4). In light of multiple risks, as well as the recurrence and extent of disasters, the new realities of modern societies require authorities to rethink the intervention framework for emergency management. The traditional approach focusing on organizing and planning disaster response is difficult to apply to events that are increasingly complex and devastating, and where specific actions by emergency crews (firefighters, police force, ambulance attendants, etc.) are often insufficient in today's context. The limitations of this reactive approach has led to growing interest in the multiple causes of disasters, and in the various early response measures to reduce or possibly eliminate the potential disastrous consequences. Recent advances in emergency management involve how to approach and manage risks that societies encounter, using an integrated and comprehensive approach.

In Canada, emergency management is based on an all-hazards approach to address both natural and human-induced hazards and disasters (PSC, 2011, p. 4). Risk management is an

> approach adopted by a community or an organization, for the purpose of reducing risks. Any administrative decision will consider the repeated and systematic risks for managing its resources and how it carries out its responsibilities (SPQ, 2010, p. 24).

Emergency management is based on four main interdependent risk management categories (the four pillars of emergency management) to prevent or mitigate the possible consequences, prepare for the disaster, respond, and recover. Public Safety Canada illustrates this approach in the following manner:

Prevention and Mitigation – to eliminate or reduce the risks of disasters in order to protect lives, property, the environment, and reduce economic disruption. Prevention/mitigation includes structural mitigative measures (e.g. construction of floodways and dykes) and non-structural mitigative measures (e.g. building codes, land-use planning, and insurance incentives). Prevention and mitigation may be considered independently or one may include the other.

Preparedness – to be ready to respond to a disaster and manage its consequences through measures taken prior to an event, for example emergency response plans, mutual assistance agreements, resource of inventories and equipment and training or exercise programs.

Response – to act during or immediately before or after a disaster to manage its consequences through, for example, emergency public communication, search and rescue, emergency medical assistance and evacuation to minimize suffering and losses associated with disasters.

Recovery – to repair or restore conditions to an acceptable level through measures taken after a disaster, for example return of evacuees, trauma counseling, reconstruction, economic impact assessment and financial assistance. There is a strong relationship between long-term sustainable recovery and prevention and mitigation of future disasters. Recovery efforts should be conducted with a view towards disaster risk reduction (PSC, 2001, p. 4).

Ensuring a strong and seamless relationship across these components and with appropriate emergency management partners (managers, companies, citizens, etc.) is critical to effective emergency management (PSC, 2011, p. 4). The protection of people and property in times of disaster involves mobilization and the sharing of responsibilities and concerns among all stakeholders in society, in a proactive and preventive approach. In so doing, emergency management is viewed as a multidisciplinary field, where consultation and communication between the various individuals and organizations assumes a fundamental role (Maisonneuve *et al.*, 2005, p. 5).

Accordingly, we might define emergency management as being the field whereby we plan and organize measures that will prevent disaster from occurring, reduce its effects, protect people and property, and, after the disaster, help people recover and return to a normal life (Maltais, 2008, p. 36).

Finally, the global and integrated approach to emergency management relies on three basic principles: awareness of all hazards, adoption of measures that refer to the four functions of emergency management, and concerted efforts by every actor at all levels (SPQ, 2010).

2.2   RISK, HAZARD, AND VULNERABILITY CONCEPTS

In emergency management, **risk** is a composite concept resulting from the overlap of the **hazard** and **vulnerability** to exposed elements.

A **hazard** is a potentially damaging physical event, phenomenon or human activity that may cause loss of life or injury, property damage, social and economic disruption or environmental degradation (SPQ, 2008, p. 6). Generally speaking, a hazard is defined by its origin. A hazard can be natural (hydro-meteorological, geological, biological), or it can be caused by human action (technological or intentional accidents, related to environmental degradation).

Awareness and understanding of a hazard-related phenomenon comprise the primary source of critical data required to assess the potential effects on the exposed environment, and then appropriate prevention and protection measures to adopt must be determined. This information will be used in evaluating the degree of significance attached to a particular hazard, in regards to its specific characteristics, such as its expected intensity, predictability, probability of its occurrence and re-occurrence, geographical area and the potential scope of its effects, rate of progression (kinetic), and the possibility of controlling it (SPQ, 2008, 6).

Vulnerability in its broadest sense refers to conditions created by physical, social, economic and environmental factors or processes, which predispose the elements exposed to the hazard event to injury or damage (SPQ, 2008, p. 8).

Figure 2.1 presents a non-comprehensive list of possible vulnerability factors. Assessing the vulnerability of a community or of the elements exposed to the risk is complex and depends on many factors: social, physical/material, economic, and environmental.

FIGURE 2.1
Vulnerability Factors

Physical (material) vulnerability factors:
- Physical exposure to the hazard
- Proximity to source of disaster
- Density of population, property and infrastructures
- Geographical isolation
- Site-specific characteristic
- Design, material and state of buildings, equipment and infrastructure
- Etc.

Social vulnerability factors:
- Population age
- Mobility and specific needs of the population
- Access to healthcare, psychosocial services and proper sanitation
- Traditional values, customs and ideology or religious beliefs
- Ethnic or linguistic minority
- Degree of awareness
- Education level
- Degree of social equity
- Etc.

Elements exposed to hazards
Persons, property, infrastructures, activities, services, networks, heritage items, ecosystems and other tangible or intangible elements

Main characteristics of exposed elements that determine the level of vulnerability and possible impacts
- **Level of exposure** (number and concentration of elements exposed, proximity to hazard and duration of exposure)
- **Strategic importance or value** (for the community)
- **Awareness of hazard** (possible level of impact for an element)

Economic vulnerability factors
- Income or wealth level
- Financial reserves and debt
- Access to insurance coverage, credit or loans
- Disparity between market value and replacement or rebuilding cost
- Economic diversity
- Access to transportation, energy, telecommunications, health, drinking water and sewage networks
- Etc.

Environmental vulnerability factors
- Air quality
- Quantity and quality of water supply sources
- Ecosystem resistance to degradation
- Level of biological diversity
- Level of exposure to toxic pollutants and soil contamination
- Health conditions and effectiveness of waste management
- Etc.

Source: SPQ, 2008, p. 17.

For the past few years, vulnerability is increasingly defined by the capacity to respond to a potential crisis, as well as the capacity of the elements impacted to recover from a crisis. Vulnerability refers not only to the fragility of the components in a system, but also to the system's capacity to recover from a crisis caused by a hazard (Dauphiné, 2003, p. 20). Vulnerability declines with increased ability to recover after a disaster (Dauphiné, 2003, p. 20). From this point of

view, there is greater importance placed on the concept of **resilience** which is defined as the capacity of a system, community or society exposed to hazards to adapt to disturbances resulting from hazards by persevering, recuperating or changing to reach and maintain an acceptable level of functioning (PSC, 2011, p. 9). Resilient capacity is built through a process of reducing the vulnerabilities to hazards by creating or strengthening social and physical capacity in the human and built-environment to cope with, adapt to, respond to, and recover and learn from disasters (PSC, 2011, p. 9). In that perspective, the concept of resilience is opposite to vulnerability.

Based on these elements, *risk* can be defined as the combination of the likelihood of an event and the resulting consequences on vulnerable components in a given area (figure 2.2; PSC, 2008, p. 16). In that sense, a potentially dangerous event only becomes a risk when applied to an area where human, economic or environmental issues are likely to be impacted.

FIGURE 2.2
The Concept of Risk With Hazard-Vulnerability Overlap

Likelihood
Hazard   **Risk**   **Vulnerability**
                 Potential   of exposed
               consequences   components
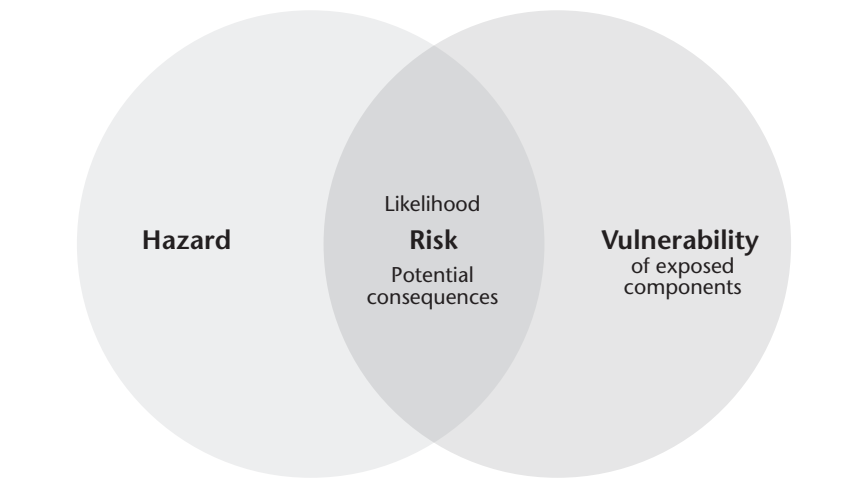
Source: SPQ, 2008, Appendix 3, p. 48.

If the concept of risk involves a likely or potential phenomenon, then, on the flip side, **risk materialization** refers instead to a real and acknowledged situation, directly associated with consequences of a hazard where vulnerable components are involved.

The materialization of risk in some cases involves an *emergency situation* (accident, event, disaster, etc.), which requires prompt coordination of actions to protect property, health and people, or limit damage to the environment (PSC, 2011, p. 16).

In the case where a situation causes a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources – such a situation will be considered a **catastrophe** (UNISDR 2009, 11). This situation means that an affected area is unable to handle the conditions and consequences of such an event with its current resources (PQSC, 2014, p. 3). According to Public Safety Canada (PSC, 2016), the following conditions can be used to determine if an event should be classified as a catastrophe:

- 10 or more killed
- 100 or more people affected/injured/infected/evacuated or homeless
- Appeal for provincial/national/international assistance
- Historical significance
- Significant damage/interruption of normal processes such that the community affected cannot recover on its own

2.3   CRISIS, DISASTER OR CATASTROPHE CONCEPTS

In certain situations, crisis, disaster, and catastrophe concepts are often confused. There is no mention of the concept of crisis in the Public Safety Canada documents, or in those by the Sécurité civile du Québec (Civil Protection Quebec). It is as though the concept is non-existent.

However, in communications and particularly in the media, crisis is very widely used, whereas disaster or catastrophe are not. For example, in terms of emergency management, the January 1998 ice storm was called a major disaster, whereas it was referred to as an ice storm crisis in communications. Let's try to clarify these concepts.

Sécurité civile du Québec uses the terms *disaster* and *major disaster.* Public Safety Canada, uses the term *catastrophe* in French, and *disaster* in English. In English-speaking North America, the term *disaster* is used more often than *crisis. Emergency management* is often used to convey these realities. In the United States, the Federal Emergency Management Agency oversees disaster situations in that country.

In Canada, an emergency situation may refer to a traffic accident, a fire, or any emergency that specifically mobilizes emergency services as part of their standard mandate.

In everyday language, the terms, *disaster* and *catastrophe* might infer increasing levels of severity but dictionaries tend to list them as synonyms.

Generally speaking, crisis refers to an **exceptional situation** that extends beyond the usual functional capabilities of private and public sector managers and stakeholders. An exceptional situation might entail a disaster, but may not necessarily be one. The Maple Leaf Listeria outbreak crisis in August 2008,[1] was not considered a disaster; yet the situation had a profound impact on the company's senior management and the entire firm. They quickly admitted responsibility. Had this not been the case, the media would have transformed this event into a major crisis, which would have had a greater negative impact for the company with the public.

In order to define a crisis, there should be specific focus on the **epiphenomenon** surrounding the event, which jeopardizes the integrity, credibility, and survival of a company, organization or government body.

Most of the time, an epiphenomenon involves the combination of two aspects:

1. A **media crisis** that becomes public due to a snowball effect of attempting to identify what happened, the causes and, above all, what or who is responsible

2. **Paralyzing disarray** among top executives involved in dealing with the chaos created by an exceptional situation (Lagadec, 1993), which disrupts the business, due to lack of uncertainty and reliable information about what actions should be taken.

According to Lagadec, there are three elements that determine a crisis (Lagadec, 1993):

- **Burst**: referring to the convergence of persons involved: victims, stakeholders, population affected, and members of the media. **Convergence** creates a volume effect that adds to the challenges inherent to the event.

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1. Internet: http://www.cbc.ca/news/business/how-maple-leaf-foods-is-handling-the-listeria-outbreak-1.763404.

- **Disaggregation**: the crisis threatens the operation of systems involved and their interfaces, in normal times already complex and heavy. **The chaos** created by the event adds to the disturbance of systems intended for management.
- **Divergence** on basic choices:
  - Most critical **reference** points of a system are shaken
  - Profound **failures and ruptures** are at the centre of the crisis dynamics
  - **Fragmentation** of the decision-making and media process sets in

According to Lagadec, the crisis dynamics components create a loop:

- The destructive **synergy** of efforts to overcome the crisis creates a **domino** effect that continuously repeats.
- Incapacity and **confusion** intensify and heighten the crisis, especially because of the addition of **complexity** and randomness.
- The difficulty to distinguish **truth from rumour**, facts from impressions and emotions, reality from fiction. All of this combined creates overwhelming **uncertainty** for decision-makers and communicators.
- **Disintegration** threatens organizational or inter-organizational systems.
- Unresolved **conflicts** develop and break out, highlighting the need to resolve them before a crisis.
- **Alliances**, agreements, and conventions splinter and dissolve because of the need to make quick decisions and improvise.
- Contradictions and **ambiguities** develop and create **blockages** in attitudes and behaviours.

Other authors, such as Thierry Pauchant and Danielle Maltais, outline similar characteristics in qualifying crises (See bibliography for this chapter).

2.4   APPLICATION TO METEOROLOGY AND CLIMATOLOGY

Meteorological risk can be a risk on its own or added to other risks. For example, a hurricane is a disaster on its own, but it also overlaps with other risks in a domino effect: infrastructure damage and a

threat to industries dealing with hazardous materials (toxic fluid leaks), destruction of buildings and the natural environment, flooding, etc. Furthermore, meteorological risks can be considered as an adjuvant to other risks, either in terms of making them worse or altering their nature. A strong wind, for instance, can divert a toxic cloud from a spill toward a community that will need to be evacuated.

Nothing is as simple as we would like it to be. In the 1998 ice storm, the major damage involved the electricity networks. The devastating effects exceeded those of the ice storm itself. There was an **evolution** in the actualization of risks and in the inherent difficulty of determining if this was a disaster or a crisis. What was a disaster (ice storm) transformed into a crisis due to the inability of the electricity network to handle the ice storm's destructive effects, the confusion and disturbance in decision-making structures (Ministère de la sécurité publique, Hydro-Québec, the Premier, Police Force, Canadian Armed Forces, etc.); and the serious consequences on all critical vital infrastructures.

What makes risk communication even more challenging in respect to meteorological risk is how risks are trivialized due to daily communications where there is reduced credibility with the public. Skepticism shifts to cynicism and incredibility ("They are always wrong"), and then to simplification and devaluation by insignificant weather reports (clouds, rain, sun, temperature). Alerts warning of an imminent catastrophic event can often become buried in a changing environment and have little impact in inciting behavioural change with the intended public.

For the 1998 ice storm,[2] the January 5th weather report announced major freezing rain, but nothing catastrophic. It took the news of the collapse of eight Hydro-Québec pylons in Drummond-ville, at 1. p.m. that same day (figure 2.3), before people realized how serious the situation had become. But it was already too late. Everyone was taken by surprise. Yet some people continued to think that the collapse of the pylons was an isolated incident and that there was no need to mobilize. Instead, this should have been seen as a sign of a serious event.

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2.   The data of the next two paragraphs were taken from *Rapport sur les mesures de sécurité civile de la Communauté urbaine de Montréal face à la tempête de verglas de janvier 1998,* May 1st, 1998.

**The Well-Known Photograph of the Collapsed Pylons
in Drummondville (Quebec), Taken on January 5, 1998**

Source: Agence QMI.

At the time, few people at Hydro-Québec, the Ministère de
la sécurité civile and the Montreal authorities believed that such a
disaster could be possible. The effect of surprise resulted in the mobili-
zation of stakeholders staggered over a five-day period following the
start of freezing rain on January 5, 1998. We were in a crisis situation.

CONCLUSION

The purpose of this chapter was not to place everything in a hermetically sealed vocabulary, since establishing a common terminology clearly is virtually impossible. Many attempts to do this have rarely been achieved within organizations.

In 2012 a glossary was produced in Canada, a shared lexicon that included French terms and English terms and their translations. The Translation Bureau of Canada's 580-page document published in collaboration with 17 organizations, is mentioned in our bibliography. Its unusual title does not do justice to the content of this work.

We have tried in this chapter to respond to more limited expectations in an area where the main players navigate without always having a mutual understanding. We referred to the Public Safety Canada official documents, which provide a synthesis of national and international documentation. For any missing reference terms, we referred to authors who are known or recognized as being subject matter experts.

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EXERCISE

Group or individual exercise

Describe the concrete elements that differentiate standard management from crisis management in organizations.

Perspectives	Standard management	Crisis management
Organization		
Communications		
Authority		
Information		
Time		
Space		
Persons		
Planning		
Negotiations		

THE STANDARD REFERENCE FRAMEWORK FOR SETTING BENCHMARKS IN METEOROLOGICAL AND CLIMATE RISK COMMUNICATION

by Flore Tanguay-Hébert

This chapter discusses the ISO 31000 Standard, the foundation for articulating risk management and risk communication. The principles behind this Standard are outlined in light of the work conducted by the Chair in Public Relations and Marketing Communications at the UQAM (University of Quebec in Montreal). Namely, this Standard is applied as a reference point that helps in establishing collaboration between partners and the early warning systems. The chapter ends with two case studies reviewed by the Chair: flooding in Calgary and in the Richelieu river basin.

Several ISO standards have been developed over the years in order to frame and define the management processes associated with a large number of activities, such as quality management (ISO 9000), the environment (ISO 14000) or sustainable development (ISO 26000). Risk and crisis management are also included in the standardization process, with the development of ISO 31000 and 31010 standards to govern the management and communication of risks.

After defining an ISO standard, we will first focus on describing these two standards, with a particular focus on their systemic nature. We will then look at two case studies, analyzed using the principles of these standards. This will allow us to draw some general conclusions and findings about the risk communication processes.

3.1   WHAT IS AN ISO STANDARD?

As the official site of the International Organization for Standardization explains, the scope of this organization is to support "the development, manufacturing and the supply of more efficient, safer and cleaner products and services",[1] through the development of finished international standards. These standards contain helpful decision-making tools, as well as guidelines to direct the use of certain products, define safety criteria, put management and control measures in place, etc.

With the intent of creating and maintaining these reference documents, more than 30,000 professionals around the world work every year to develop ISO standards in technical committees. National standardization organizations are then asked to form teams of recognized experts in their respective fields, both in the private and public

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1.   Official Site of the International Standards Organisation: http://www.iso.org/iso/fr/home.htm Page accessed February 12, 2017.

sectors, who are then sent as delegates to advocate for national interests in discussions on approval of a standard. ISO members meet to review and discuss various aspects of an ISO standard and must reach a consensus for it to be approved.

3.2   STANDARDS 3100 AND 31010

There are various ISO standards for all sorts of activities and areas of expertise. In terms of risk management, the complementary 31000 and 31010 Standards set guidelines for the development, implementation, evaluation, and review of risk management and communications processes.

ISO Standard 31000 sets out general principles and steps of the risk management process. Along with a textual explanation of the various parameters involved, it also has checklists for important items involved. This Standard deals with all the steps in the risk management process and can be used as a guideline for any individual or organization wishing to have an approach based on an international consensus in this area and for its actions to align with a more global and integrated context.

As outlined in ISO Standard 31000, different analysis methods can be used to qualify, measure, and study the risks involved. Some might be qualitative whereas others may be semi-qualitative or quantitative. In some cases however, the specification levels to achieve are clearly stipulated by national legislation or standards already in place.

Standard 31010, for its part, provides a set of tools that can be used at different stages of the risk management process depending on the needs they serve and the results they achieve.

3.2.1   Communication Principles of ISO Standard 31000

According to the International Organization for Standardization and the risk management principles presented in ISO 31000, risk communication should be developed based on the following four principles:

1. Risk communication embedded in the risk management process
2. Perception of risk used to analyze risk
3. Communication of organizational, multidisciplinary and integrated risks
4. Earliest possible warnings for optimal stakeholder preparedness and response

Communication, consultation, and collaboration are critical at every step in the risk management process, both in providing data about the context, but also as a catalyst in certain situations. Managing information flow is therefore a highly sensitive issue. In addition, communications and consultation plans should be developed as soon as possible when creating a risk management process and must provide for a strategy that will be used throughout all stages of an event, whether this involves the monitoring, warning, crisis or recovery period.

From a communication viewpoint, these plans should ensure that stakeholders and individuals in charge understand the risk management process and the rationale behind specific decisions and actions. As well, risk management communications plans must anticipate the type of messages to be disseminated, the target audiences, the communication channels to be used, and the individuals responsible for coordinating communications. All aspects should be based on an approach focused on analysis and awareness of the perception of the risks involved.

Because the entire risk management process is based on the perception of risks of various stakeholders, communication is fundamental when it comes to targeting their concepts, values, concerns, and assumptions. Communication should therefore be direct, ongoing, pertinent, truthful, accurate, and understandable. To achieve this, it may be necessary to identify common ground through discussions, surveys, etc.

Working with multidisciplinary teams is almost always necessary in terms of the composition of risk management teams and potential victims of meteorological hazards. It is therefore crucial to factor this in by adopting a consultative approach. In fact, in terms of consultation, this approach can help in identifying the needs, interests, and goals of everyone involved, in better defining the context and identifying risks. It also helps in gathering opinions in various areas of expertise, in providing stakeholders with a forum of expression for their viewpoints and in securing endorsement for the adopted treatment plan. This consultation not only ensures the suitability of the context-specific strategies, it also gives credibility to the selected plan and justifies the actions taken.

Lastly, in order to ensure the earliest possible effective response, alerts should be given and communicated as soon as possible. This not only allows disaster victims to adopt the necessary behaviours

throughout the event, but it also influences their perception of the risks and their management by projecting an image of transparency and proactivity.

3.2.2 RISK MANAGEMENT PROCESS

Any risk management process requires a carefully chosen methodology and approach. These will influence the validity and relevance of the entire process undertaken. When the tools used or application of a specific process are not appropriate, the results will in turn be inadequate.

Given the fact that many decisions are made based on these results, which will potentially impact the prioritization of needs, mitigation or prevention measures to be applied, failure indicator thresholds, monitoring levels, actions, etc., the choice of appropriate tools is therefore critical to the success of the exercise and to proper risk management.

Since this kind of process may be more or less comprehensive (depending on the quantity and accuracy of the information available, or the needs of the organization that implements this process), it is imperative to establish the scope of the review beforehand, which will be a framework for this process, so as to avoid unnecessary costs in collecting superfluous data.

Since risk is a dynamic phenomenon that may change over time, the process itself should be constantly reviewed, so that techniques, methods, and tools are up-to-date and consistent with a changing situation.

One of the key components in implementing a risk management process is communication and collaboration between the various multi-disciplinary stakeholders who need to work together to enhance the overall review of the situation by leveraging their specialized expertise.

The materialization of risk can often be incongruous or exceptional. No possibility, assumption or opinion should be discounted in order to analyze the potential causes of the risk. Likewise, we should not discount any solution or any other item considered, brought forth that initially may seem destined to fail.

Establishing risk management measures and policies through the application of a process that is embedded in every step of an organization's decision-making approach can enhance its value since it enables the organization to be better prepared to deal with any kind

of hazard. The organization has a greater awareness of its own vulner-
abilities and is better equipped to follow the course of a potentially
problematic situation before it can no longer be managed.

3.2.3 Risk Management Process Based on Standard 31000

Risk management is based on assumptions and integrates qualitative
and quantitative factors:

- Multitude of data to integrate
- Bias that can be introduced by research and analysis
  conditions and methods
- The often unforeseeable domino effect that ensues because
  of the vulnerabilities of interrelated systems
- Catalyst effect of certain hazards for other failures to occur
- Dynamic transformation of various parameters assessed
- Lack of risk-measurement tools
- Difficulty in evaluating the effectiveness of the process
  in place

All these factors make risk management complex and
consequently the related communication is very sensitive and critical.
Thus, rather than attempting to imagine all the possible scenarios and
establish the consequences and methods for each case, the approach
to risk management and risk and crisis communication is based on
systemic modelling. This establishes a decision-making support process
based on an internal analysis of the functioning of the potentially
affected system and its failures. This may be applied to several types
of hazards.

Regardless of the type of risk, the approach adopted, or the
choice of methods in place, risk and crisis management and communi-
cation can be broken down into five general stages, corresponding
to the levels of situational progression: risk identification, evaluation
of the risks and impact, risk prevention/mitigation if possible, crisis
management and intervention if the event occurs and recovery to
attempt to restore the situation back to its initial state. Obviously, the
entire process must undergo a review after the experience to assess its
effectiveness and relevance. This is illustrated in the following diagram:

FIGURE 3.1
The Risk Management Process
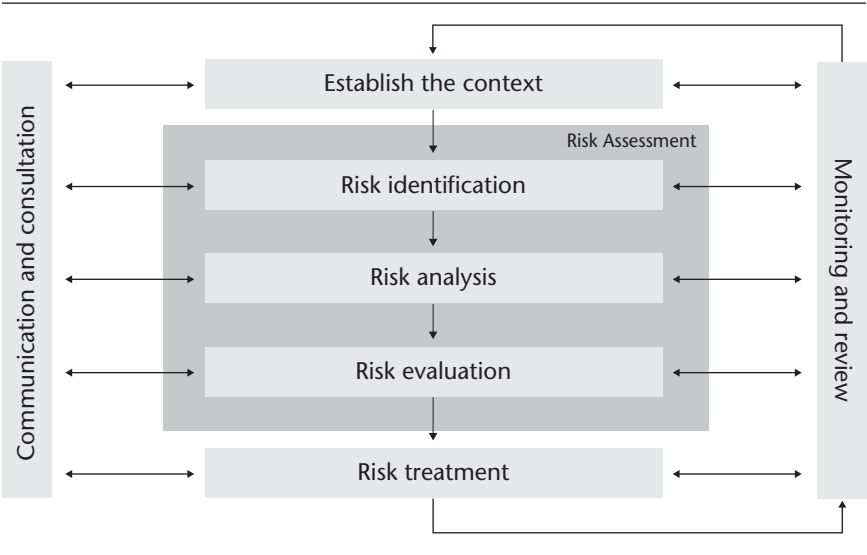
Source: ISO 2009.

3.2.4 THE SYSTEMIC APPROACH

ISO Standard 31000 promotes a systemic approach to illustrate and analyze the various operational methods and potential risk factors, in order to develop a risk management and communication process tailored to a specific situation or organization.

The systems-based or systemic approach entails considering an organization, group, or society as a graphically representable system (figure 3.2).

To schematize an organization as a system, it should be dissected into subsystems, sub-processes, subsets, services, functions, etc. and the interactions between those various items must be analyzed.

Furthermore, inputs (resources), as well as the outputs (objectives), should be clearly identified and inventoried to establish the flow of action or information between them.

FIGURE 3.2.
Schematic Representation of the Systemic Approach

Figure showing INPUTS, SYSTEM, OUTPUTS columns with subsystem, subprocess, subset, service boxes, and subcontractors, know-how, tools, software.
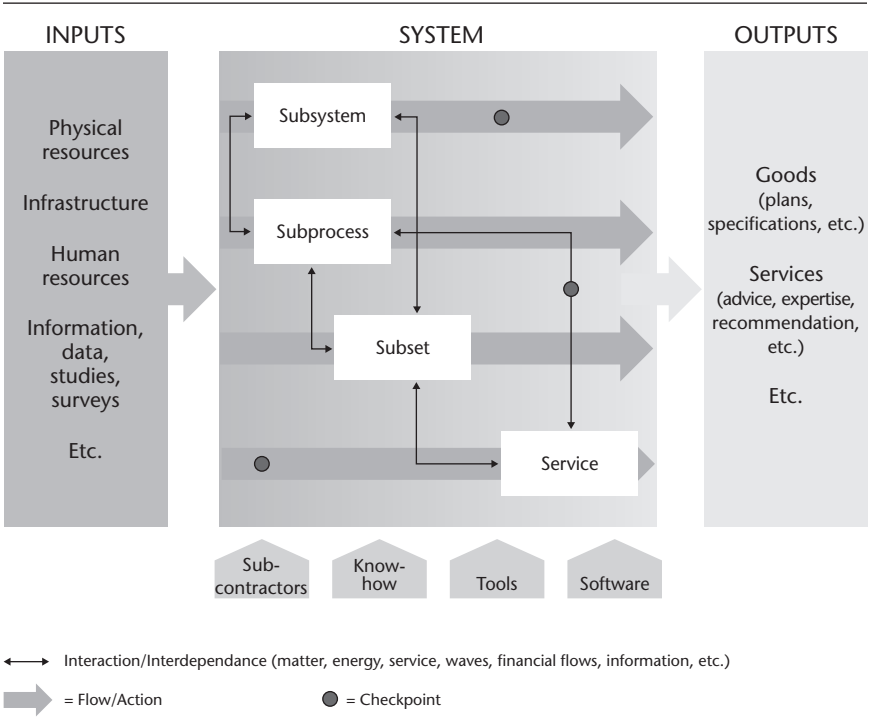
It is also necessary to take into account external interactions, tools, control, prevention, and monitoring methods in place. Potential checkpoints for this system should also be mapped out to help optimize early warning systems in preventing meteorological and climate risks.

This approach allows for an understanding of the responsibilities of these sets and to evaluate the interactions between the different functional sets and the various inputs and outputs. A proper understanding of how the system operates will help evaluate the effects of the degradation of various parameters on the overall system, identify failures and vulnerabilities, and assess performance or failure thresholds for each item.

The benefit of this systems-based approach is its multidisciplinary nature. However, this approach tends to focus only on the organization itself, and there might be less ability to tailor it to evaluate the acceptability of a project involving risks.

3.2.5 The Systemic Approach and Risk Management

A proper analysis of a situation must start with a solid understanding of the system in question, its internal components, the interdependences between these items and components external to the system, identification of resources and objectives. Following this analysis, it will then be possible to define system performance and failure thresholds and put in place the appropriate management method and communicationspractices.

When the system works normally or optimally, the management to apply is the current one with integration of risk management. When the system exceeds the failure threshold, is in a disturbed or degraded state, current management measures are not appropriate and instead, special management is required. The purpose of this type of management is continuity of operations and gradual return to normal operations. If the system is in an inacceptable state of failure or completely non-functional, a series of drastic emergency management measures will be required to try to restore the system to an acceptable operating and working state (or at the very least to achieve its objectives, even in a disrupted manner) (figure 3.3).

Depending on the approach adopted, the information required to identify, analyze, and assess risks can be gathered through statistical analysis, experimentation, simulations, modelling, research, as well as consultation with experts and impacted groups.

In addition to establishing risk acceptability thresholds, risk assessment provides important decision-making components by not only determining whether or not an activity should be done or a risk should be handled, but this also prioritizes and determines a number of options, such as increased opportunities, optimizing the use and allocation of resources, with the ultimate goal of reducing risks to manageable levels.

Since meteorological hazards are unpredictable and dynamic events that change over time and can impact a system at multiple times and in different ways, it is important to map out the system according to potential failures that the system can undergo throughout the course of events.

Since the multiple system components are inter-related through their interaction and shared resource dependencies, partial failure of a system could have longer-term consequences on other sectors of activity.

FIGURE 3.3
System Disruption and Special Management
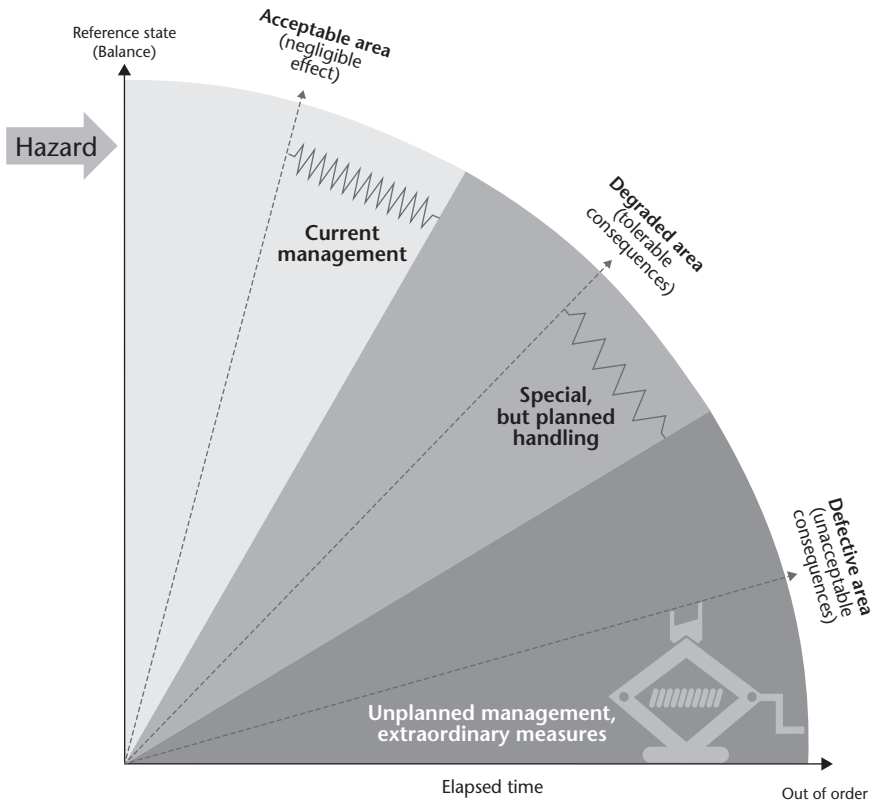
Source: Robert, Hémond and Yan, 2010, L'Observatoire de l'administration publique, ENAP.

The following example illustrates a hypothetical situation of a power outage and how it creates a domino effect over time, involving other failures (figure 3.4).

FIGURE 3.4
Course of a Hazard, Systems Failure and Special Management
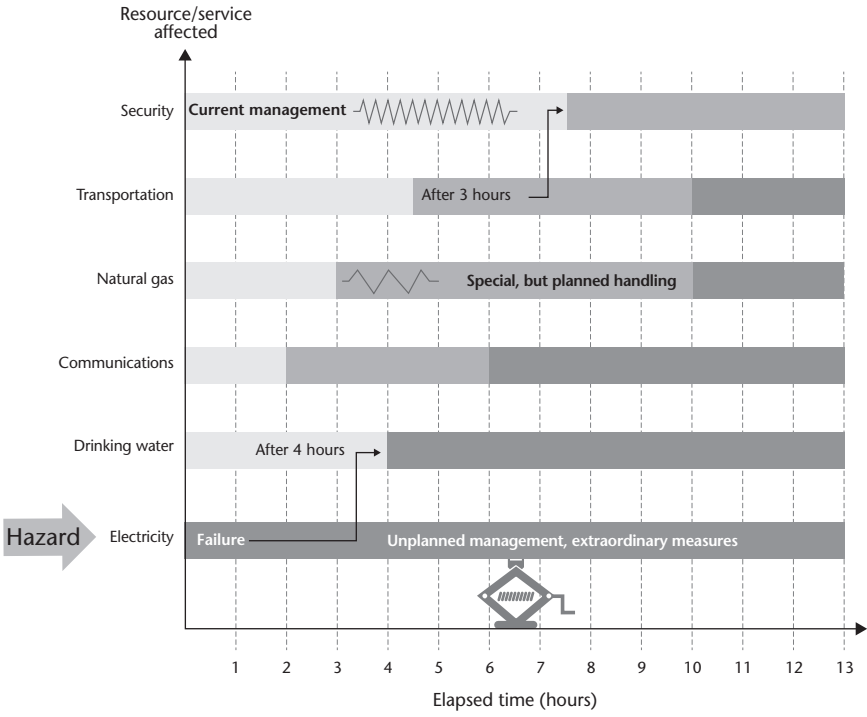
Source : Based on Robert, 2010, L'Observatoire de l'administration publique, ENAP.

3.2.6 MONITORING, VIGILANCE, ALERT, REVIEW

Once the risk management and communication process is in place, it is important not only to monitor and measure its effectiveness, but also to ensure constant monitoring in the event of other risks. These checks should be done on an ad hoc or periodic basis to ensure continuous improvement of risk management within the system.

It is essential that accountability for this review and monitoring is clearly assigned to an individual in charge, as this step is the only way to concretely verify the effectiveness of measures in place to make the necessary adjustments. In addition, this role includes preventing the occurrence or worsening of other potential risks.

More specifically, every aspect of the risk and crisis management and communication process should undergo regular re-assessment to ensure that all the methods used are effective and performing and at full capacity. Additionally, we need to watch for the emergence of new risks and the progression of existing risks so that data may be collected for further analysis in terms of noted incidents, trends and changes.

Review and monitoring in fact lead to a performance analysis of risk and crisis management and especially communication within the system, which can be integrated to the overall system management. This explains the need to record and report on results in order to improve the risk and crisis management and communication process by reviewing its framework or content.

3.2.7 RECORDING THE RISK MANAGEMENT AND COMMUNICATION PROCESS

In order to be able to communicate and justify the decisions arising from applying the risk management and communications process in an effective and understandable manner, everything must be comprehensively documented.

Depending on the scope of the decisions, extent and objectives of the assessment, process documentation may include items from the previous steps. This may involve establishing context (objectives, scope, risk criteria and justification, review of both internal and external context, limitations, assumptions and their justification, assessment methods, etc.), identifying risks (data, assumptions, sources and their validation, etc.), and analyzing risks (results of the risk assessment and analysis, sensitivity analysis, and uncertainty, etc.). This also involves considering critical assumptions and other factors requiring monitoring (summaries of discussions on outcomes, conclusions, recommendations, and references).

Given the need to record the outcomes of the risk management process, its review, and monitoring done to improve the tools and methodologies used, it is critical to set up a strict operating method for retaining this information.

The risk management and communication data retention process must take into account the needs of the various stakeholders, relevance of the data recorded, resources associated with retaining, processing and updating information, standards and professional or legal regulations, appropriate retention duration and level of sensitivity for the various data handled.

3.2.8 COMMUNICATION AND CONSULTATION AS RISK MANAGEMENT METHODS

If the accepted definition of accountability as well as participation in the risk management consultation process contribute to better stakeholder involvement, regardless of their importance in the overall process, then communication and consultation can also influence how the risk is perceived and thereby help in preventing or managing certain crisis situations.

More cautious communication might be appropriate if an incorrect perception of the risk could trigger a domino effect and produce negative outcomes. To effectively manage a potential crisis, the parties involved should be brought together in the early stages of the risk management process to identify their needs and goals.

After evaluating the various treatment options, the least advantageous options should be discarded so that the most desirable solutions are communicated to the parties involved, who should be allowed to make the choice. This generally facilitates adoption of the decision. However, it is important to regularly communicate progress about implementation of the chosen solution and how the situation is progressing. This will promote a culture of risk management embedded in the philosophy of the organization and the population, and adopted by all citizens.

3.2.9 SCOPE

Because of their comprehensive nature, the ISO 31000 and 31010 Standards' general principles and processes are intended for universal use in all areas and levels. However, this versatility also means adapting the process for each context and organization. The concepts outlined should be used as guidelines in developing the risk management and communication process and not as a replacement. In addition, if risk management or communication processes are already in place within the organization, it may be appropriate to review them in light of the principles and concepts in these Standards.

3.2.10 CONTINUOUS IMPROVEMENT AND TOTAL QUALITY MANAGEMENT

Since risks change over time, the risk management process should be re-evaluated on an ongoing basis to make sure it is effective and applicable, but also that it is clearly embedded in the organization's ongoing management.

To ensure that a risk management process is effective, the individuals involved (or potentially involved) have to be aware of it and be regularly updated so that information does not become out of date. It must align with the changing realities of the environment and be tested through simulations.

It is also with a view to control risks that plans are developed for prevention, day-to-day management, crisis management and systems continuity. As with processes, they must be reviewed regularly.

In addition to a review of current processes, it is vital to have indicators to monitor changes in acceptability levels and potential risk, with emphasis on monitoring the situation (table 3.1 and figure 3.5).

FIGURE 3.5
Deming's Wheel and Continuous Improvement Applied to a System

P = *Plan*   **D** = *Do*   **C** = *Check*   **A** = *Action*
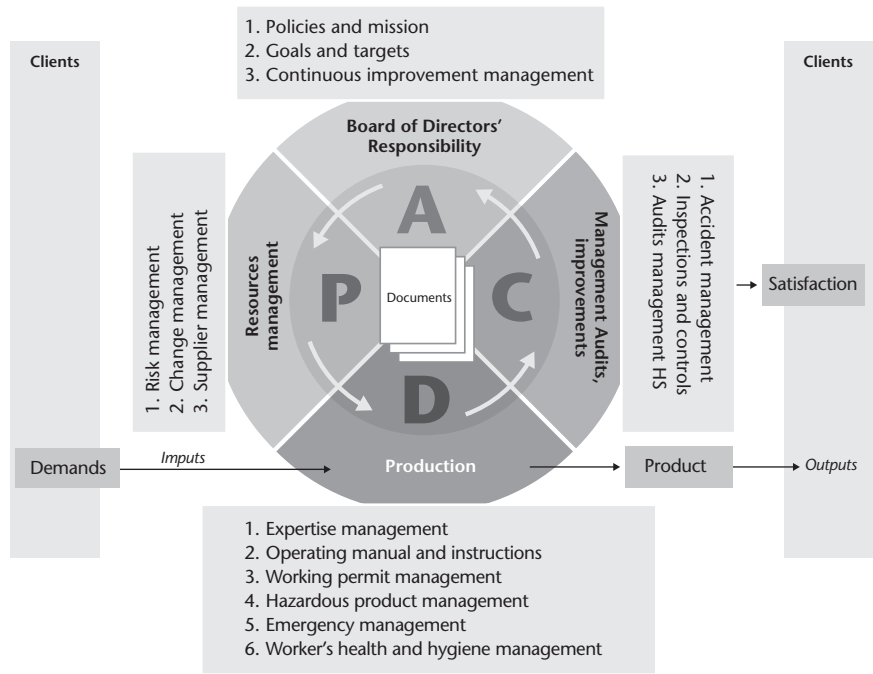
Source: Based on Annoni *et al.*, 2006.

TABLE 3.1
Deming's Wheel and Continuous Improvement

Deming's Wheel is a model for continuous improvement that consists of four aspects: Plan, Do, Check and Act. It is based on fourteen basic principles (Annoni *et al.*, 2006) that can be adapted to risk and crisis management and communication as follows:

- Create consistency of purpose for the organization or the fundamental function of the system by constantly improving risk and crisis management and communication processes.

- Adopt the new risk and crisis management and communication philosophy, and, if necessary, steadily drive this change.

- Make sure that risk and crisis prevention requires a minimum of control. Embed risk and crisis management principles into governance right from the planning stage.

- End the practices of minimizing costs to promote savings, but rather focus on quality and sustainability. Instead, attempt to reduce the total cost in the long term. Minimize risks by reducing the number of stakeholders and by building partnership relationships based on loyalty and trust.

- Constantly improve all planning, governance and service processes, which will generate cost reductions without introducing new vulnerabilities.

- Institute a culture of resilience with adequate stakeholder training and also accountability and autonomy of the population.

- Institute a modern form of leadership to facilitate the introduction of risk and crisis management and communication principles at all levels.

- Build a climate of trust to foster optimal collaboration in risk management and communications processes related to meteorological or climate hazards.

- Break down or minimize the barriers between the various disciplines and stakeholders involved in the risk or crisis management and communication process. This will promote team work and minimize potential issues during the event or as the event unfolds.

- Accept the fact that it is impossible to predict everything. Instead, try to improve the system's resilience against any kind of hazard.

- Try to eliminate capitalist and short-term financial considerations and opt for a vision of an improved and adaptable system that is profitable in the long term.

- Provide as much autonomy as possible to the different parts of the system in order to reduce the system's overall vulnerability, and improve its overall resilience.

- Institute education, awareness, and prevention programs to foster a vibrant culture of resilience.

- Put all necessary resources to work to achieve optimal risk and crisis management and communication.

Continuous improvement and systemic approach

When the Deming's Wheel is superimposed on the systemic design, we are better able to see how each aspect applies to certain sectors of the system according to their respective responsibilities, in enhancing the transition from demand to satisfaction.

Source: Based on Annoni *et al.*, 2006.

3.3   COMMUNICATION PRINCIPLES ACCORDING TO ISO STANDARD 31000 AND CASE STUDIES

3.3.1   WHY DO CASE STUDIES ON RISK COMMUNICATION?

Since communication takes place throughout the risk management process, good practices should be taken into account at every stage. They should be embedded in the organization's operations, especially in terms of interactions with the public, scientists, decision-makers, and stakeholders.

To identify factors that influence the perception of meteorological risks, such as stakeholder demographic characteristics, the nature and features of the hazard, understanding the channels governing communications and identifying the most adapted tools, techniques and approaches, these items should be considered as multidimensional, dynamic processes made up of contextual, interactive and interpretive components.

By analyzing communications in case studies and using indicators tailored to the situation, we can arrive at conclusions about these experiences and foster greater resilience in the population and society when dealing with meteorological risks.

3.3.2   METHODOLOGICAL CHALLENGES IN ANALYZING RISK COMMUNICATION

There are a number of ways to evaluate and study communications, such as analyzing the content of the message, identifying and interpreting information channels, or reviewing the factors that may influence the public's perception of the risks.

Risk communication involves a wide range of communication factors that may be analyzed for diverse purposes. No single aspect can provide the information required to properly evaluate its effectiveness.

Therefore, it is necessary to combine various indicators relating to the many facets of the risk management and communication process, to be able to arrive at an ultimate diagnosis, learn from the process, or enhance practices to anticipate the hazard.

There are many challenges in identifying valid indicators that can be used to assess the risk communication process and its effectiveness, including the scarcity of guidance documents on the communications planning process, the difficulty in assembling the necessary documents (archiving issues, access to data due to reasonable information, lack of necessary equipment) and identifying criteria that can be quantified and used for assessment.

There is also an intrinsic challenge in evaluating communications after the fact. This is because it is difficult to assess the actual impact of these tools and governance strategies after an event has taken place. Instead, testing, assessment and development should take place prior to the event.

3.3.3 THE STANDARD'S PRINCIPLES AS GUIDELINES IN REVIEWING CASE STUDIES

Although the ISO Standards are guidelines for implementing management tools within organizations (usually before the occurrence of disruptive events), the four main communications principles referred to in ISO Standard 31000 can be used as benchmarks when assessing and comparing different case studies.

In fact, since the risk management and communication measures in place should be directly derived from these principles when setting up the ISO system, they can serve as a basis for identifying relevant indicators in assessing case studies and communications effectiveness.

For each one of these principles, criteria and key indicators can be identified and adapted in order to compare different events or organizations to others. The purpose of this comparison is to be able to identify best practices in risk communication, independently of time, location, stakeholders involved, and the magnitude of the danger. This can also help build and improve resilience in society overall.

The four principles mentioned at the beginning of this chapter can be used to analyze the following cases.

3.3.4 THE RICHELIEU AND CALGARY FLOODS

Due to the extent of the flood's impact and the nature of the danger itself, certain items make this flooding case complex in terms of management, particularly for communications. Since the cultural, political and organizational contexts are somewhat similar, floods in the Richelieu River and the Lake Champlain basin (2011) and in Calgary and southern Alberta (2013), provide a good comparison between certain communications strategies that were used. This will allow for some general conclusions to be made about improving risk communication and resilience in general.

By reviewing communications during these event through the lenses of ISO Standard 31000 principles and the resulting analysis parameters, some key factors can be identified that had a major influence on risk prevention, management, and mitigation. Based on these findings, it is then possible to identify a few of the best governance practices to implement in terms of communications to optimize stakeholder response.

The next section outlines some observations by applying the ISO 31000 principles for the Richelieu and Calgary floods.

3.3.5 THE RICHELIEU CASE: STRONG NETWORK AND UNILATERAL COMMUNICATION

In the spring of 2011, the Lake Champlain and Richelieu River basin flooding was described by Environment Canada as the worst natural disaster of its kind in Quebec since the 1996 Saguenay River flooding. Lasting for more than two months (from mid-April to mid-June), the rising water caused flooding in over 2,500 homes and forced the evacuation of more than 1,500 people on the Canadian side of the border. This caused over $40 million CDN in infrastructure damages alone.

For Richelieu, risk communication involved a multitude of parties (stakeholders, risk managers and the authorities, the media, and the public) and a solid network of decision-makers was put in place, which resulted in an effective transversal risk analysis. This iterative and ongoing process allowed for osmosis of stakeholder perception as the situation developed.

Although a certain coordination and constant contact were maintained between the authorities and stakeholders for operational purposes, this was not the case for communications strategies and messaging, which were developed instinctively as the situation unfolded. This caused confusion that led to disparity in the public's

perception and uneven satisfaction in terms of overall response. There was no clear leader in the eyes of the public, which generated uncertainty, mistrust, and fear.

There were missed opportunities with social networks as well. The lack of real interaction with the public resulting in rumours, frustration toward a seemingly weak government response and missed opportunities to obtain local feedback and information that could have helped the operations. Instead, the strategy was simply to convey the message stressing the people should avoid the area, with no further comment.

3.3.6 THE CASE OF THE CALGARY FLOODS: AN EXAMPLE OF SOCIAL MEDIA INTEGRATION

In June 2013, flooding in Calgary and southern Alberta was described as the worst in the province's history. It had experienced similar events in 2005 but less severe. A state of emergency was declared in twenty-nine communities, tens of thousands had to be evacuated and there was major infrastructure damage, with large-scale blackouts and a public notice to boil water. The extent of the event was unprecedented in recent history due to a particular mix of contributing factors and circumstances.

Downtown Calgary was underwater barely two weeks before the Stampede, an event that generates over $300 million CDN annually in tourism for the city. Recovery efforts were a success and the Stampede took place. Nevertheless, damage was estimated to be between $3 and $5 billion CDN and five people lost their lives. However, even months after the event, studies showed that the public was generally satisfied with the risk management led by the authorities.

One of the most innovative features of the risk communication strategy used,[2] which promoted a positive perception of government response during the events, was the various uses of multiple social media platforms as the crisis needs progressed. In fact, social media's informative role changes based on the progression of a crisis, such as a flood. It is a critical first line of information before the torch is passed to the media who have privileged access to more traditional critical

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2. It should be acknowledged however that the strategic use of social media by public authorities was certainly much more extensive in 2013 than in 2011.

information. Social networks regain a vital role once the media starts generalizing the information in order to reach a larger audience that does not have the same needs for locally adapted information.

During the events in Calgary and southern Alberta, platforms with user-generated content, such as geographic information systems, were also widely used to monitor and issue alerts about changing water levels. People provided information directly from their observations, and this data was used by the authorities in their decision-making process. Similarly, because requests for assistance could be received in real time, decision-makers were better informed, allowing them to allocate resources where they were most needed.

Lastly, social media was a key component in organizing and coordinating general response. Because of social networks, people who needed help or wanted to provide assistance were able to organize outside of official structures. These platforms gave victims access to a virtual rather than physical community, and provided mutual assistance and achieved an unparalleled sense of solidarity, as evidenced by the many keywords that came out during the crisis and long after.

CONCLUSION

Although certain key factors have been highlighted in this chapter, they do not represent the overall case study analysis process, and they do not provide a full comparison to arrive at a final diagnosis. However, using the ISO Standard 31000 principles, it is possible to identify certain issues and possibilities in respect to the risk communication process.

The communications strategy put forward by stakeholders and emergency managers should not only take into account the various potential channels of information and be planned and timely, but it should also be embedded in all stages of the risk management process.

Particularly in the reconstruction phases, it is important to not only share the results of the event analysis with the public, but also include the public as much as possible in the analysis and assessment process[3]. Transparency and openness help to increase awareness and preparedness for future events and in building a climate of trust.

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3. See Chapter 14 on this topic.

As outlined in ISO Standard 31000, there is a need for a paradigm shift to integrate resilience and "best practices" in risk communication in all levels of the risk management process. This approach would have many potential and tangible benefits, such as improved endorsement of the plans established, adoption of appropriate behaviour, and better trust in the risk managers. The general vulnerability of society would be reduced by public empowerment and awareness in terms of their own risk management, improved accountability and coordination for managers with the common goal of building and developing a "culture of resilience" with both the organization and society.

Ultimately, there are many potential benefits of the systemic organizational application of ISO Standard 31000, especially since the related tools and underlying principles can be adopted by any type of organization, regardless of its industry or size. This provides a big-picture view of the processes involved in risk communication. However, as with other International Standards, the real challenge lies not only in implementing the appropriate ISO system, but also in applying it rigorously and systematically by all involved immediately or remotely in the organizational activities. This can be challenging due to lack of time, resources or even motivation. Indeed, since the benefits or mitigating effects of effective risk communication are sometimes difficult to evaluate *a posteriori* and, that to be effective in the midst of a hazard, these must have been applied upstream of the events. The process must be supported by committed decision-makers who are aware of the issues at stake and supported by a constant leadership.

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EXERCISES

1. Identify all the waterways with a permanent and early warning system for flooding in your area, either by watershed, by region, by province, or Canada-wide.

2. Try to describe this warning system and the various issues considered using a systemic diagram.

3. Compare the models used, particularly in terms of collaboration between the stakeholders.

4. Describe these systems in terms of their technical effectiveness and reliability.

5. In light of the four communication principles outlined in Standard 31000, explain how these systems are compliant or not compliant with what is proposed in your organization for promoting effective communication.

6. For future implementation of this type of system, identify the costs of the systems selected and the work force required to operate them on an ongoing basis.

4

PSYCHOSOCIAL ASPECTS OF RISK PERCEPTION AND COMMUNICATION

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and An Gie Yong, doctoral students

This chapter aims to demystify risk perception. The notion of perception based solely on subjective biases and emotions shifts to an in-depth understanding of the phenomenon of perception. This is done by looking at the experiential development of risk – from uncertainty to control. In particular, the technical assessment of risk is to be differentiated from the psychosocial evaluation of risk. True risk communication cannot exist without understanding the perception of risks. Examples related to meteorology supports this with many particularly informative illustrations. This chapter reviews and critically analyzes various concepts discussed in other chapters (hazard, risk, vulnerability, resilience, etc.) – acting as a reference to help understand the content.

In meteorological risks, as with natural or accidental disasters, risk management has become a professional field replete with experts and specialists of the hazard domains. While the value of their knowledge and technological tools are recognized and required, it should be noted that those on the real front line are individuals and communities. Those who are mainly affected and the "zero-responders" are members of the public. The objective of professional risk management is to protect these individuals and to help them help themselves and each other, either by prevention or mitigation, through actions intended to directly or indirectly improve their adaptive capacity. Risk communication is the means to mobilize prevention and response efforts, among both professionals and affected populations.

The goal of risk communication is to prepare members of the public as well as public service organizations. Fostering preparedness requires mobilization (wanting to act) and empowerment (knowing what to do). To be effective, communication must include information on the hazard (risk source), its likely consequences, and possible protective actions that are realistic and useful. Moreover, communication should preferably occur well before the incident. However, the further away in time, the more uncertainties there are. Risk communication should therefore convey these uncertainties in a way that will not create fault and blame, but will encourage preparedness.

For risk communication to be effective, it is important to recognize how certain aspects of risk and their consequences are understood – and appraised – by the stakeholder. This will be presented in three parts: 1) unpacking the key components of risk; 2) examining how these components affect the representation and perception of risks, and act as vectors of influence on individual behaviours or collective actions; 3) laying the foundation for a "responsible" risk communication paradigm, i.e. effective and empowering.

4.1   UNPACKING THE CONCEPT OF RISK: UNPACKING THE COMPONENTS

A risk is the possibility of a negative outcome from a hazard (source). Traditionally, risk is expressed as the probability of an event. For physicians and epidemiologists, the main consequence of risk is death. And it stems from pathogenic exposure. For engineers and financial experts, risk is measured by financial losses and damages. For the average citizen, risk mean the loss of a loved one, of one's job, or one's home…

From a pedagogical standpoint, risk is discussed using the key technical terms of experts, engineers, meteorologists, and physicians: cause and effect, hazards and consequences. However, to truly describe risk, the phenomenological experience of risk needs to be broken down into its stages; that is, the process and timeline of the "experience" of risk. It starts with a lack of knowledge, moves on to the unknowns and uncertainty, then shock of occurrence, and finally recovery. It is important to note that for the communicator, managing risk should mean managing a sequence of uncertainties, unknowns and probabilities.

4.1.1   HAZARDS AND CONSEQUENCES

The formal definition of risk is the probability that a hazard may occur multiplied by the probability of its damage.

$$R = prob\ (hazard) \times prob\ (consequence)$$

However, in both everyday language and specialized usage, one of the two components is often not considered: either the probability of the hazard or the probability of loss/damage. By failing to recognize either the hazard or the consequence, we confuse the risk of a thunderstorm with the risk of flooding; the risk of extreme cold versus frostbite; risk of strong winds versus risk of a car accident. There is a certain discrepancy in the discourse related to the concept of risk both for the expert and the layperson. Risk does not mean the same thing to the meteorologist, insurer, emergency physician and to the public, i.e. respectively a category 3 hurricane, claims amount, death toll, or lost family photos.

In fact, for each hazard, there are various consequences. Beyond physical damages and costs, one must consider loss of life, injuries, destroyed homes and neighbourhoods, and also loss of jobs, loss of routine, loss of tranquility, loss of trust, etc.

In fact, risks are calculated as follows, as the sum of all consequences:

Risk = prob (hazard) x Σ prob (consequences).

On the other hand, for a particular individual, a large range of hazards may involve similar negative consequences. The risk of losing one's house is the (integral) sum of weather, seismic, and financial causes:

Risk = $\int$prob (hazard) x prob (consequences).

INSERT 4.1
The Consequences Mobilize More than the Hazards

In risk communication, it is important to distinguish between hazards and consequences. People are more inclined to mobilize if the hear of the consequences rather than the hazards (source). For example, we are more motivated if we are told about the potential consequences (electro-cution) of the hazard (lightening) rather than simply about the hazard. In risk communication, it is worth explicitly shifting focus from the hazards to the consequences, and to the protection measures so that the public is better prepared.

In fact, each hazard that materializes will involve multiple consequences. In addition to damages and costs, there will be fatalities, injuries and loss of homes, neighbourhoods, jobs, loss of routine, of peace of mind, of confidence… In short, there are cumulative consequences:

Risk = prob (hazard) $\times \Sigma$ prob (consequences).

On the other hand, for a specific individual, a series of hazards may involve negative consequences. The risk of losing one's home is the (integral) sum of weather, seismic and financial risks:

Risk = $\int$ prob (hazard) $\times$ prob (consequences).

4.1.2 VULNERABILITY: SUSCEPTIBILITY, SENSITIVITY, ACCESSIBILITY

Risks are not distributed evenly, nor equitably, among people. Some people are more at risk of negative consequences either because they a) are more exposed to hazards – i.e. increased susceptibility (living close to a river bank); b) experience greater effects – increased sensitivity (sloped terrain); or c) have less access to mitigation or response measures – less accessibility (distance). These vulnerability factors that increase

either the probability of occurrence or the severity of the consequences relate to context (environmental characteristics). In fact, risk is relative to both the hazard and the severity of the consequences, as well as to vulnerability factors such as susceptibility, sensitivity and mitigation.

$$\text{Risk} = f\ (\text{hazard}) \times f\ (\text{vulnerability})\ \text{x}\ f\ (\text{consequences}).$$

$$\text{Risk} = f\ (\text{hazard}) \times f\ (\text{susceptibility}) \times f\ (\text{sensitivity}) \times f\ (\text{mitigation}) \times f\ (\text{consequences}).$$

By extension of language, these vulnerability concepts are attributed to individuals since hazards do not have the same impact for everyone. Some individuals are more likely to be exposed to a hazard or have less access to mitigation or preparedness measures, and can be accurately described as being "at higher risk". However, to characterize them as "vulnerable populations" is ill-advised and understates their resilience capacity. It gives them an intrinsic fragility, deficit or fault which tends to victimize and demobilize them, and undermine their adaptive capacity. The importance of creating a communication that positively empowers people will be discussed further on.

INSERT 4.2
Vulnerability and Groups at Higher Risk

In risk communication, it is more appropriate to characterize vulnerabilities in terms of context (increased susceptibility or sensitivity), and to avoid attributing intrinsic fragilities to geographical groups or socio-demographic sub-groups who are at higher risk of exposure or have less access to resources. To describe one as "vulnerable" is not empowering and does not promote action: "groups at higher risk" is a more appropriate expression.

The most obvious situations of disempowerment include Aboriginal peoples or vulnerable immigrant groups. They certainly are more likely to be exposed to hazards and have less access to palliative resources; however in light of their past resilience, it is inappropriate to label them as vulnerable. Similarly, women are often assimilated into a vulnerable group, which attributes a negative connotation of weakness. Further on, we will explore how the objective of risk communication, namely to mobilize people to take a protective response, is not well served by the "vulnerable" label despite the good intention of including marginalized groups.

Vulnerability is associated with either the context of the hazard (such as frost or clay in a landslide), or with the context of the response (time frame, inadequate access to services, etc.) Vulnerability is a factor that heightens the consequences.

4.1.3 TIMELINE OF ACTION: COMMUNICATION AS PREVENTION

For first responders and emergency workers, risk is often closely associated with the onset of a disaster and it is referred to as T0 (Time Zero), the moment of occurrence. Likewise, for meteorologists, the focal moment is the occurrence of a weather event. They aim to describe risk at T0. Communication is, however, more effective in advance – that is, at T-x.

A timeline going from T_{-3} to T_{+3} can be used to represent the temporal field of an event (figure 4.1). In general, T_0 represents the occurrence of the event (or time of impact); T_{+1} corresponds to the emergency response (or rescue); T_{+2} is the recovery period; and T_{+3} refers to the time it takes to get back to normalcy. Upstream in terms of time, an alert occurs at T_{-1}. T_{-2} is the threat or pre-warning phase. T_{-3} refers to the baseline level with its possible theoretical risks, but without any sense of imminent danger. The period preceding the event is the most sensitive for risk management and risk communication: this time should be used to prepare interventions and mitigation. However, similar to the fact that medicine focuses more on curing illnesses than on promoting good health and prevention, risk management is currently more focused on emergency response and response coordination on the ground than in preparedness and planning. The field is evolving however and the role of risk communication upstream of the incident is becoming more important. Its function is evolving to better prepare and mobilize people ahead of the developing risks.

The concept of risk, in terms of uncertainty or probability, exists throughout the timeline. The content of the risk communication message should be adapted according to the targeted time point. On one hand, communication at -t can express the probability and severity expected at T_0, with the aim to prepare for T_0. On the other hand, communication at T-t can also express the probability, severity and uncertainty at T-t in view of better conveying the uncertainty about the pending occurrence. As in public health, it is worth identifying various objectives of risk communication according to the timeline, since earlier communication may be more useful, albeit less precise.

FIGURE 4.1
Timeline
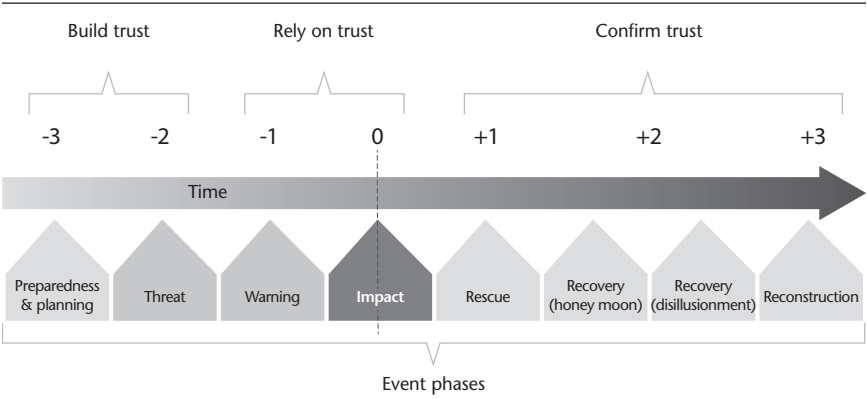
Source: Lemyre *et al.*, 2016.

Fundamentally, the concept of risk should serve prevention. Being aware of risks, their likelihood, severity, characterization, consequences and vulnerability factors such as increased susceptibility and sensitivity should help identify the best-suited prevention behaviours. The objective for both professionals and members of the public is to control either consequences or the hazard, or to prevent the consequences of a hazard. In terms of mitigating complications from a hazard for which direct consequences have already occurred, *tertiary* prevention seeks to reduce those consequences: For example, not getting electrocuted after flooding, not drinking contaminated water, or staying cool during a heat wave.

Secondary prevention aims to minimize the impact of a risk (consequence): such as by not storing valuable documents or valued photographs in the basement, or getting snow tires in December, and so on. *Primary* prevention consists of avoiding exposure to risk: building one's house outside the flood plain, increasing tree foliage canopy around one's home to create shade and avoiding excessive indoor heat in the summer. It is useful to list various types of prevention across the timeline and to identify early mitigation measures. Of course, depending on whether risks are described by the hazard or by the consequences, it is sometimes possible to identify what constitutes primary, secondary or tertiary prevention. However, the core principle remains: to identify appropriate interventions and behaviours that can facilitate adaptation and minimize problems.

The integral components of risk analysis, risk management, and risk communication are: 1) identifying the characterization of both the hazard and its consequences across the timeline and across the various types of stakeholder groups; 2) listing prevention, mitigation and recovery behaviours across the timeline and across the affected groups. Often this risk-analysis mapping will require consultation and collaboration between – experts of various sectors.

Specialists and experts tend to focus on timeline points close to the occurrence or shortly after – at the rescue or in the "post" period. For the public, however, it is before, in the "pre" period (T_{-2}), when the threat of a hazard is already seen as a risk and leads to fear-related consequences. This temporal experience of risk depending on the type of stakeholder must be considered for relevant and effective risk communication and successful collaboration in risk management.

4.1.4 SOCIAL ECOLOGY OF RISK: INDIVIDUAL AND COLLECTIVE CONTEXTS

The risk timeline (from hazard to consequences) – equally relevant for understanding risk perception and risk communication – must be understood in its social ecology (figure 4.2). Bronfenbrenner (1978) defined a social ecology model that places human activities and dynamics in a system of social interactions and reciprocal influence.

A social environment is made up of various systems. The individual's thoughts (cognition), affective reactions (emotions) and behaviours develop and evolve in a **microsystem** of core proximity composed of family and loved ones, which influences ideas, reactions and behaviours. This core interfaces with the **mesosystem**. This **mesosystem** comprises, on the one hand, the community context: neighbourhood, associations; and the professional network: work, school, public services, and businesses. These are all nested in the **macrosystem** which corresponds to the values, policies, laws, norms, and institutions of a society.

Risk and risk management operate on both the individual and collective level, through the family microsystem and the community and organizational mesosystems. Hazards involve consequences for individuals directly, physically or financially, which has a ripple effect on their families, employment or housing. Hazards also have collective consequences on the community and public services. Risk perception plays at each level through system interdependencies. Risk communication is more efficient if it targets those levels specifically: individual, community, organizational and inter-organizational. Aspects and

parameters of risk perception and mobilization toward action will vary according to the targeted levels. The next chapters will illustrate some examples.

FIGURE 4.2
The Social Ecology Model
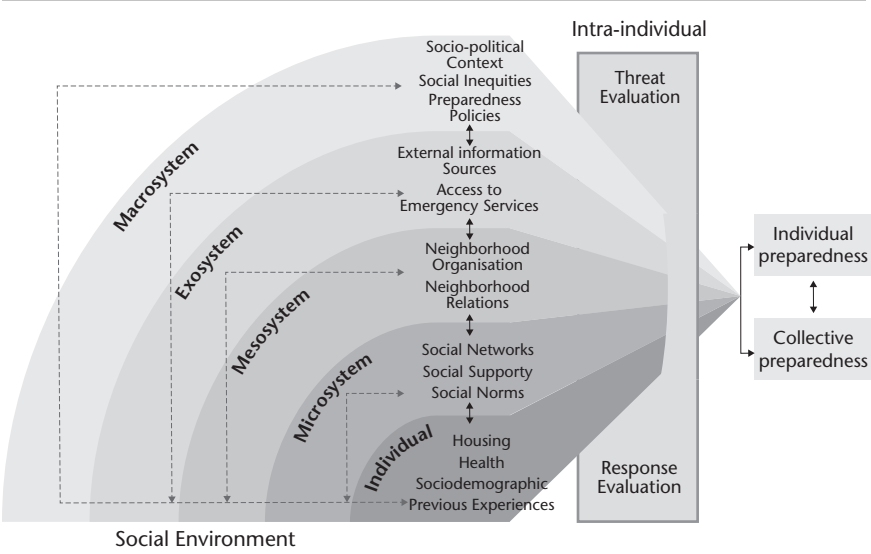
Source: Lemyre *et al.*, 2016 (based on Bronfenbrenner, 1977).

Risk communication should therefore target 1) the individual and 2) the collective – differently, but always within the context of mobilization and empowerment. Organizational communication is aimed at first responders and emergency experts; it should also promote inter-organizational collaboration through roundtables and coordination alliances. Community risk communication, on the other hand, should attempt to create a network of information and support to mobilize the "zero-responders", the lay volunteers who are on the ground, as neighbours, observers and informants ready to act.

4.1.5　COMPLEXITY, UNCERTAINTY AND ANTICIPATION

In our understanding of risk – and of its psychology – there are challenges that are difficult to grasp and are not adequately considered: the role of complexity, uncertainty and of anticipation. Risk inherently comprises a complexity that should be made explicit and intelligible

to public audiences by segmenting its main factors and vectors: i) the mechanisms by which a hazard creates damage; ii) the types and severities of consequences; iii) the various forms of protection; iv) the timeline; v) a system approach to actions.

Each of these components include elements of probability and of uncertainty. Uncertainty may be linked to a few things: the probability of occurrence; the precise predicted time of occurrence; the misunderstanding about the mechanism of action (such as for the zika virus at present), or the effectiveness of mitigation and prevention measures. This inherent uncertainty should not be presented, nor understood as incompetence, but explained as the natural progression of time and the evolution of knowledge. Thus, communicating uncertainty as a vector of progressive adaptation and preparedness becomes a factor of resilience.

Furthermore, these considerations overlap: for experts, risk is complex; for the public, risk is uncertain.

Risk communicators must acknowledge and explain that uncertainty and complexity are key elements of forecasting and anticipating, which are central to appraising risk and adapting. Communicating uncertainty is not a sign of incompetence, rather, it allows for planning and preparation processes under conditional scenarios.

4.1.6 RISK EVALUATION: ASSESSMENT AND PERCEPTION

In Canada, as a bilingual country, it is important to note that the English language has an advantage over French to reconcile risk science and risk psychology by using two distinct terms: risk assessment and risk evaluation (whereas in French the word *evaluation* is used for both meanings). The distinction can be reflected through a) the concept of risk assessment as the technical quantification of probabilities, impact and uncertainty margins, and b) the concept of risk perception to identify a more qualitative appraisal of the meaning of the risk.

For a technical expert, risk assessment mostly involves how the hazard is characterized. For the public, who bears the consequences, the assessment focuses on the extent of losses and damages. Each weighs the probabilities of different scenarios: probability of occurrence and severity of the hazard for the former, versus probability of the threat and losses for the latter. The expert carries out a limited technical analysis while the public sees the broad, fluid and intricate ripple of risk (figure 4.3).

Figure 4.3
Parallel Streams of Risk Assessment and Risk Perception

	Experts (Hazard driven)	Public (Consequence driven)
Risk Evaluation	Risk Assessment	Risk Perception
Risk Tolerance	Risk Threshold	Risk Acceptability
Risk Management & Preparedness	Risk Mitigation	Risk Behaviour
	(Probability based)	(Meaning based)
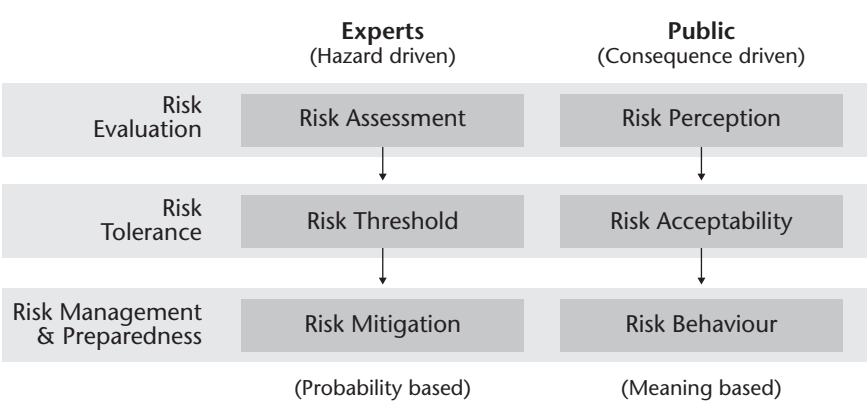
Source: Lemyre *et al.*, 2016.

4.2   RISK PERCEPTION: LEVERS OF COMMUNICATION

Risk perception is often the poorly managed offshoot of risk science. Viewed as a misunderstanding, distortion, incompetence, or even an unpredictable change in mood, risk perception is considered a naïve approximation of laypeople that rational experts should disregard and good communicators should rectify. However, risk perception points to the difference between the technical assessment of the risk and the appraisal of other issues at stake. It reflects the mental representation of probabilities, of the mechanisms by which a hazard creates impact, and the appreciative evaluation of the potential losses, damages and threats. Risk perception provides a window into how communication can be leveraged.

It is somewhat pointless to debate whether public perceptions are inaccurate or not. Instead, a communicator should focus on deconstructing the differences as additional dimensions of concerns. To the public, which aspects of risk are most salient, meaningful, consequential or worrisome?

The field of **risk perception**, as it is normally referred to, focuses on *valuing* the risk. The field is often criticized by experts, yet it is so fundamental to risk communication. It combines the cognitive function of estimating probability, the emotional function of qualifying, and the anticipatory function of controlling the hazard or its

consequences. For example, an individual's perception of the risk of a snow storm prompts him or her to weigh a) the willingness to travel to a given activity or event, b) the likelihood of dangerous roads, and c) the individuals driving skills. This analysis goes beyond characterizing the strength of the storm. It provides the possibility for two additional risk communication targets outside of the storm: i.e. re-evaluate the uniqueness or value of the activity, and recalibrate one's skills to avoid car accidents.

Since risk perception involves the understanding of the dynamics of the risk, it is the gateway to effective communication to promote protection and prevention behaviours. It reflects a highly adaptive function, weighing pros and cons, involving explicit information, overall assessment, and decision-making. Risk perception is also a temporal projection of the hazard, its consequences, and one's capacity to respond and cope throughout the timeline. The debate against risk assessment and risk perception dismisses these fundamental processes and issues. It is less a matter of discrepancy in assessing the risk than a difference in the evaluation parameters and considerations. Risk perception is particularly relevant to risk communication because it is tied to people's behaviours and decisions. To better understand risk perception, it is necessary to examine the following underlying principles.

4.2.1 COGNITIVE AND EMOTIONAL RISK APPRAISAL

Risk assessment allows for a better understanding of how individuals can absorb information and gain a feeling of control to adapt and protect themselves. Among factors in this appraisal we note the following heuristics at play: cognitive information processing, mental models, emotional load and trust.

4.2.2 HEURISTICS

Among the many forms of cognitive appraisal, the Nobel prize-winner Kahneman (2011) describes information-processing heuristics, which allow humans to manage a vast and rapid flow of information, albeit with some errors, called cognitive biases. There seems to be an adaptive value, even evolutionary-based value, in using quick information association mechanisms. In processing large amounts of data, people have certain biases that Kahneman and Tversky have extensively described in their careers.

These biases are integral to the way humans process information. For instance, it has been established that the mental representation of quantities and numbers does not follow the linear arithmetic curve; rather, it is an asymptomatic function of assessment which shows that humans differentiate between small quantities but are unable to do so with larger quantities. Thus, one might criticize the higher cost of living, but lose sight of the fact that the national deficit increased from $200 million to $20 billion. It is the risk communicator's task to relate numbers and probabilities using comparative benchmarks to provide an accurate relative value for events.

Overestimating small probabilities (e.g. terrorism attacks) and underestimating high risks (car accidents) gets combined with the effects of recency, salience, mental availability bias, trauma, or rarity bias, which distort the mental representation of such events. Often these feed rumours and generate spirals. Heuristics are mental short-cuts that allow information to be processed quickly. A good communicator should know how to provide background data and examples to counter these effects. There are a number of popular books available that describe these effects, which can be likened to that of distorting mirrors at the circus.

Another well-known bias is loss aversion, which is to perceive losses as being more significant and more alarming than gains of a similar amount. A penalty or cost of five dollars is perceived as more substantive than a profit or incentive of five dollars. This imbalance in values based on context demonstrates an adaptive value and the paradox of risk assessment: is the gain or the loss of five dollars equivalent in value? For an accountant they are, but for the layperson they are not. The same applies to five degrees above or below the seasonal norm: it does not have the same impact on one's view of climate change.

Understanding the difference between these two viewpoints is not simply a tool that can be used to manipulate people: it reflects how the human mind works.

To avoid these automatic biases in situations, Kahneman proposes inducing a slow, conscious and explicit information processing mode. This can be created by either showing contradictory evidence or by evoking conscious deliberation. The idea is to trigger a thought process by a task or a context: having to collaborate for problem-solving in an interdisciplinary manner or in an inter-organizational setting drives such awareness.

Messages can be designed in such a way to leverage these effects. For example, risk perception for tornados in Canada can be increased by disseminating images and testimonies of victims, which will facilitate availability bias and, thus, increase likelihood estimates.

4.2.3 MENTAL MODELS

To better understand mental representation phenomena that are key in changing behaviours or practices, Fischhoff and Bruine de Bruin developed methods to study mental models to better understand people's reasoning behind their reactions to risks (Bruine de Bruin and Bostrom, 2013; Fischhoff and Sheufele, 2013). Their methods map out the values, barriers and explanations that prevent people from adopting appropriate behaviours. Mental models form causal pathways in people's understanding of an event. They are the logical basis for people's behaviours. These models are useful for understanding decisions, and therefore allow for behavioural change.

4.2.4 EMOTIONAL COMPONENT

Slovic studied the affective processing of information parallel to cognitive processing (Slovic, 2000). Many characteristics of message content, such as familiarity of images, risks to children, traumatic imagery and connection to identity influence our emotional appraisal of risks and, thus, our evaluation of them. The way messages are emotionally processed should be considered by communicators so they can properly calibrate the message.

The consequences of a hazard can be intangible, emotional, and symbolic. Apart from death and cost, there is a ripple of interdependent consequences that affect people's values, employment and social networks. These are important elements in the public's perception of risks.

4.2.5 TRUST, ETHICS, BENEVOLENCE

Risk perception consists of a highly comprehensive evaluation that involves much more than a probability assessment of occurrences or of damages. Studies have shown that risk perception includes ethical evaluation, trust evaluation regarding the source of information, and a judgment on the benevolent or manipulative intent of the communicator.

The public integrates the perception of the messenger's intentions in its evaluation of risk management. Public trust is crucial for any communicator. Trust should be earned early on, in the prevention stages, and especially in times of uncertainty, through transparency and authenticity. Studies demonstrate that perceived benevolence generates more trust than the communicator's personal credibility and competence.

To sum up, there are three main aspects of risk perception:1) perceived impact stemming from perceived probability and severity (two concepts well differentiated by the public); 2) sense of control over knowledge, skills and information with respect to resolution methods; 3) uncertainty, either in margin of error, confidence intervals, variability, reliability of the sources, or yet unknown consequences.

The difference between risk perception and risk assessment is not based on mistakes or distortions, but on the complementary or contrasting nature of the evaluative aspects prioritized by the experts versus the public.

4.3   RISK COMMUNICATION: AIMING FOR MOBILIZATION AND EMPOWERMENT

As mentioned in the introduction, the goal of risk communication is to promote action through motivation and mobilization and to provide the knowledge and tools to respond effectively. The previous section showed the critical role of risk perception dynamics to achieve this goal. By integrating the known perception of risks, risk communication can lead to the adoption of appropriate behaviours through effective and empowering messages.

The main components of risk and risk perception should be reflected in the risk communication strategy. This should take into account the technical knowledge and the effective risk mitigation and prevention measures. It should also consider the dynamics of risk perception and the main aspects of risk assessment (perceived impact, sense of control, and uncertainty). Risk communication strategies should answer the questions the public asks itself: What does this mean for me? What are the associated uncertainties? How do I best prepare and protect myself?

Notably, one of the main drivers of human behaviour is the search for control. Risk communication should be a means to *empower*: risk communication must elicit action and mobilization.

In meteorology, risk communication contains: 1) the description of the weather event in terms of probability and severity (likelihood of a storm, and its strength and magnitude); 2) the foreseeable consequences (flash flooding); and 3) proper preparedness (avoiding transport), following a timeline from T_{-2}, at the anticipation phase, with suggestions for secondary and tertiary preventive measures. Three target groups should be considered: individual, community, and organization. The key message being empowerment.

4.3.1 Strategic Approach

Fischhoff developed a method for strategic risk communication by separating the components of the hazard and its consequences; the mapping of contextual vulnerabilities according to increased susceptibility and sensitivity; the typology of at-risk groups; the type of mitigation measures and protective behaviours; and timeline. He also takes into account the social ecology of risk. What are the various analysis and dynamics units: individual, family, community, work, public service, and government. What are the mental models of all these stakeholders? From there, Fischhoff pairs target audiences with target messages, at the individual and collective levels. Messages should 1) state the extent and scope of the risk, its probability and severity, 2) the direct consequences and the indirect ripple effects; and 3) propose effective preventive measures and concrete protective behaviours.

From these considerations, a set of simple, clear, complementary messages should be created, tested, and evaluated. Three major target groups should be involved in such pretests: 1) emergency responders and public service organizations; 2) the public; and 3) community support groups, non-profit organizations, schools, support centres, etc. The goal is to develop the capacity to mobilize.

4.3.2 Contemporary Paradigm

After establishing the role of risk perception as an insight into the mobilization and empowerment factors for risk communication, a communicator needs to create the context to facilitate discussions on uncertainty, sharing of knowledge and responsibility, control, trust, resilience, anticipation and prevention.

The contemporary paradigm of risk communication recognizes the value and validity of risk perception as indicating the meaning and scope of the many direct and indirect consequences of risk, of the mechanisms at play and of the emotional appraisal.

For example, meteorological risk communication should address both the complexity and uncertainty inherent to the phenomena in a manner that promotes empowerment. This can be done by identifying personal risk, vulnerability and protective factors, and by conveying mitigation and prevention measures that are feasible and realistic. Even if it is not part of the explicit mandate, it is critical that meteorological organizations participate in the governance of risk management within its social ecology. Indeed, many stakeholders and interventions depend on this expertise at the municipal or national level, and for individual behaviour.

The Council of Canadian Academies (CCA) recently gathered these considerations and published an evidence-based summary of this data in a scientific report on risk communication (figure 4.4). Although it focuses on drug-related risks, the elements and model apply to meteorological risk communication: *Does the message get through?* (CCA, 2015).

Figure 4.4
The Risk Communication Paradigm
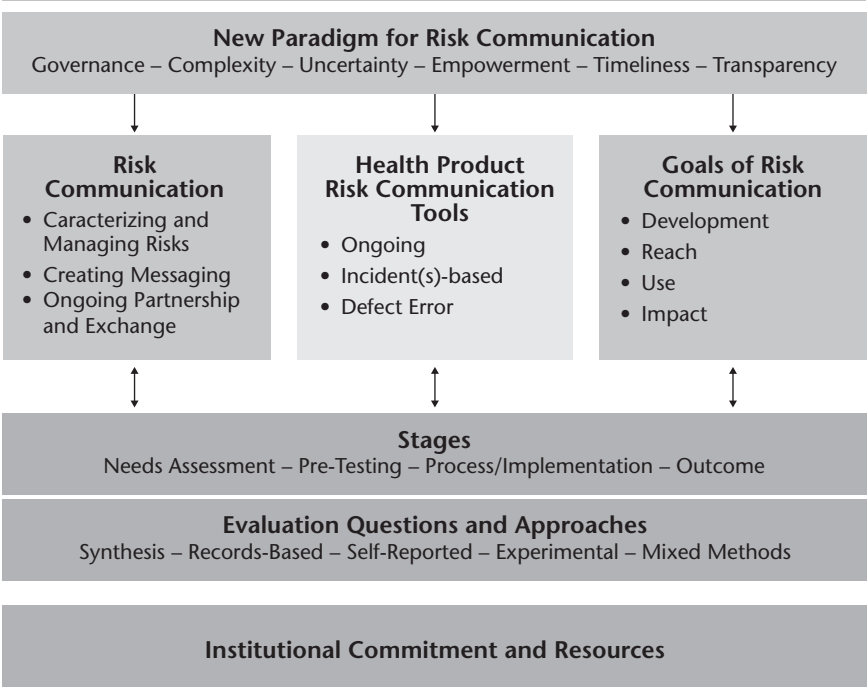
Source: CAC, 2015, p. XII.

4.3.3 Responsibilities and Evaluation

Once we have understood the different stages and dynamics of risk perception in risk communication, there is a professional duty to not only develop messaging that will foster mobilization and empowerment, but also to evaluate effectiveness.

Is risk communication effective in ensuring an understanding of the hazard? Does it elicit an evaluation of consequences, provide the skills and knowledge to protect oneself in a given context and timeline for different populations and target groups?

Responsible risk communication requires testing messages, validating those messages with groups and measuring their impact through appropriate research.

4.3.4 Examples

Beaudry and Lemyre (2016) recently carried out a series of experiments that illustrated the varying impacts of a message depending on whether consequences of the hazard were explicitly mentioned, as well as the impact of including preparedness suggestions. Controlling for message length, messages with prevention suggestions had more impact on behavioural intent, preparedness and perceived risk than messages solely on risk probability (figure 4.5).

In a similar manner, a systematic experimental testing of risk messages revealed that words such as **Advisory**, **Watch** and **Warning** did not have the desired effect. For example, the term "watch" did not result in increased vigilance, but rather reassured the audience. A more in-depth review showed that "watches" generated confusion about when the event would occur. The work of risk communication therefore requires pretesting messages with various audiences to assess their risk representation and understanding of messages.

Other recent studies with immigrants to Canada (Yong and Lemyre, 2016) demonstrated the need for caution and nuance when using the concept of "vulnerable" populations. Although immigrants are often identified as a vulnerable subgroup and indeed live in environments and neighborhoods at higher risk of natural disasters, and are less aware of the available services, they had more experience with severe meteorological events and showed better adaptability and resilience. However, they indicated greater dependency on governmental preparedness: their mental models suggested that in Canada, the government takes care of everything and everyone. They therefore did not need to prepare. They relied on the government for their

safety. Thus, it is crucial to emphasize to these subgroups the importance of being able to be self-reliant for at least 72 hours. Their initial openness to individual preparedness was replaced by the perception of governmental responsibility.

FIGURE 4.5
Preparedness Index Based on Message Content

Preparedness for flooding
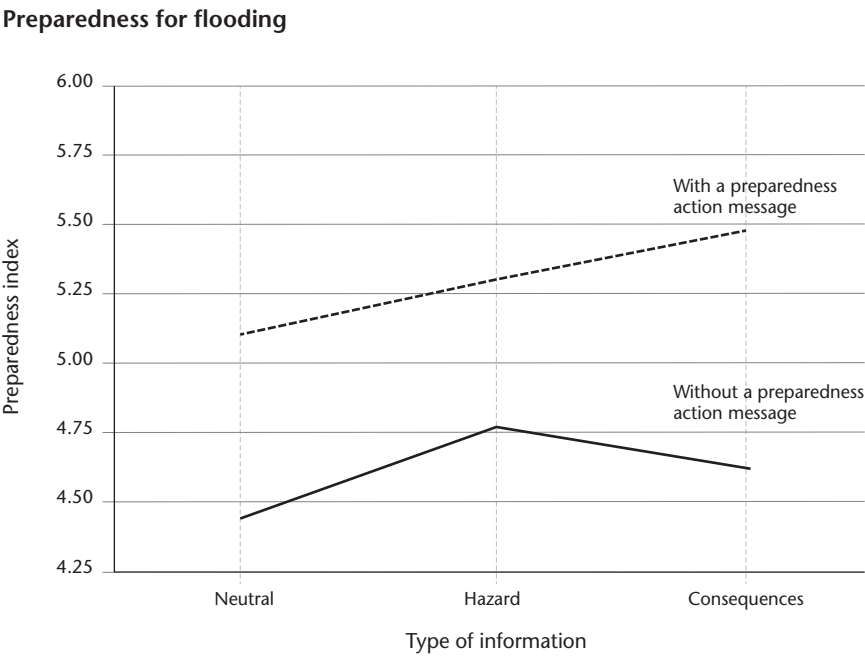
Source: Lemyre *et al.*, 2016.

CONCLUSION

Risk perception reveals the significant issues of a hazard's consequences. It also reveals the tacit understanding of the cause-and-effect relationship that links a hazard to the consequences, and to the mitigation measures. This helps to identify leverage factors for protection and prevention behaviours. Mapping risk components and the clusters of factors should not detract from the essential phenomenology of risk

– the management of uncertainty – especially before the event occurs. The goal of risk communication is to provide information to support mobilization and empowerment in the preparing and planning.

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EXERCISES

Simple exercises in anticipating, problem-solving and empathy are useful for developing effective communication skills.

Ask participants to make a list or outline available and realistic mitigation measures for various hazards, different consequences, and various groups of people.

Target empowerment and mobilization by asking:
• What should people know at T_0 to act appropriately?

Then go backwards in the timeline:
• What should people know at T_{-1}? At T_{-2} to be ready at T_0?
• What should people have known?
• What tools should people have and know how to use?
• What training should they have received?

Exercises in empathy and role-playing can also be used to help equip the communicator to better understand the stakeholders whether this involves a) other decision-makers b) experts from other organizations (what do they need to be aware of?) c) members of the public (what sort of information will reassure them?).

These exercises can be used to educate participants and promote collaboration.

RISK COMMUNICATION STRATEGY AND STAKEHOLDERS

by Michel C. Doré

This chapter, like the previous one, allows for a better understanding of the complexities involved in the risk communication process by taking into account all of its related components. First, we will explore the components of a risk communication strategy, specifically preparedness, delivery and feedback. Then the stakeholders and their respective contributions will be outlined. The chapter ends with some thoughts on the challenges of optimizing and orchestrating into a coherent overall picture the contributions of each stakeholder and organization to effectively reduce risks and vulnerability.

Risk communication is a major challenge in all organizations. To achieve its goals, this communication must be part of a strategy with a multitude of factors. For professionals and managers involved in the process, this is a highly complex exercise involving research, analysis, reflection, planning, implementation, and monitoring. The volatility of the information and perceptions also contribute to this complexity. This chapter will simply outline some items to consider in developing a risk communication strategy.

This text is divided into two parts. First, we will describe the components to consider when developing and implementing a strategy. We will then identify the stakeholders involved in the various components of the strategy. The chapter will conclude with a discussion about coordinating individual contributions.

Risk communication is not an end in itself, but is embedded in the risk management process. It relies on the capacity to influence the perception of the risk and the adoption of safe behaviours, which is the ultimate goal of risk communication. Contrary to persistent views, the outcome of the risk communication process is not to convey results of analyses. Communication should start at the very beginning of the risk management process, creating initial dialogue that promotes social acceptability of the risk. Risk communication allows for an expected transparency and contributes greatly to the credibility of the risk management process.

5.1 COMPONENTS

Risk communication influences the overall effectiveness of any risk management process. Depending on the nature of the hazard, the organization's mandate, its goals, and the stakeholders involved, the scope of the communications strategy will vary substantially. Regardless of its breadth, a strategy is composed of three main components.

5.1.1 PREPAREDNESS

These components are neither linear nor mutually exclusive. They are inter-related to translate objectives into concrete action. Preparedness is the foundation for the overall communication process. It is the common thread that connects identifying the parties involved, monitoring areas and indicators, establishing and maintaining communication channels, planning communications activities, and changing anticipated behaviours.

In risk communication, the term "stakeholders" refers to all groups and organizations impacted by the risks. This grouping does not take into account the important nuance between the parties involved in the issue and individuals that should be shielded from exposure to the risks and vulnerability. The term implies that the parties have competing values and priorities.

Too often, not enough importance is placed on identifying the interested parties involved. Whether this involves internal or external parties, they have different characteristics and expectations. Internal interested parties include employees and their unions, managers, administrators and shareholders. External interested parties include government and regulatory organizations, partners (and competitors), various associations, neighbours, the media, customers (users, beneficiaries), and the public.

In this chapter, the term "interested party" refers to the public, the audience, the intended clientele, or the market receiving the communication. Although these interested parties might at times comprise a committee or an action group and be included with stakeholders, they deserve particular attention in risk communication. The concept of interested party stresses the importance of dialogue where they interact through their reactions and behaviours. This emphasizes the importance of not only issuing or communicating a message, but also paying attention to the different forms of the messaging for the interested party.

Every group has a particular role in the organization's environment, and has a different relationship with regard to the risk and its management. Furthermore, an individual might belong to more than one stakeholder group, for instance an employee, living in the immediate area of a facility, sitting on a standards committee, and using the organization's products. Likely to receive a number of messages from the same organization, this individual needs these messages to be consistent and complementary in nature.

Now there is an understanding of the importance of properly identifying these stakeholders and interested parties, their points of view, their expectations, as well as their potential and anticipated contributions in the risk management process. Therefore, an optimal communications strategy will consider the various groups where for each one, tailored messaging and approaches align in a consistent and convergent manner. It is crucial to define objectives, develop messages, and select ways to communicate to take these characteristics into account.

Monitoring stakeholders and their characteristics is an ongoing activity. There may be new parties and new groups in the organization's environment. A group traditionally positive to a project or the organization might suddenly react negatively to new information. Thus, it is critical to constantly monitor the organizational and media environment. Monitoring the scientific, technological, and media aspects are some examples.

Once the organization's environment is properly defined, it is important to establish and maintain effective communication channels with the various parties involved. The frequency and nature of these communications will vary depending on many factors. The important element is our ability to use these channels in a timely and effective manner. Ongoing corporate communication efforts keep these communication channels open. This does not simply mean the ability to convey messages to these interested parties, but also the ability to receive information and to quickly extract and analyze the strategic impact.

The benefits of a strategy translate into planning communication activities. Planning will integrate recurring awareness, prevention, and education activities. Planning will include the development of alert and mobilization activities, as well as instructions to promote appropriate behaviour. The strategy will also include activities to position the organization in its environment and reinforce its credibility as a major player in managing the risk.

Preparedness allows for the reinvestment of lessons learned. These lessons may be derived from feedback from past experiences within the organization, but also from a large number of lessons learned that are shared within professional groups, publications, or during conferences. Since the aim of risk communication is to influence the perception of the risk and ultimately to encourage the adoption of safe behaviour when dealing with a hazard, significant effort should focus on these behaviours and on the obstacles to their adoption. Public information campaigns remain the primary way to achieve this. However, it should be noted that such campaigns have many limitations and constraints. Thus, sustained monitoring and adaptation efforts are needed to improve their effectiveness.

Considering the scale of items to consider and the actions to take, preparedness requires ongoing attention and effort throughout the entire risk management process.

5.1.2 MESSAGE DELIVERY

There are two distinct contexts in delivering a message: programmed communication and emergency communication. The first component initiates the strategy to adjust the perception of the risk and conditioning of expected behaviours. The second component is set in motion when a hazard is imminent or taking place.

Due to their very nature, climate and meteorological phenomena cause major hazards. Some of these hazards can be predicted (fronts, storms, spring tides, hurricanes), while others occur without warning (microbursts, tornadoes). A critical component of risk communication takes shape when faced with an imminent event or dangerous phenomenon.

When dealing with an imminent or recognized actual dangerous event, risk communication is supported by the measures put in place during the preparedness phase. Weather services, emergency services and emergency management organizations work together to convey tailored communications to targeted groups using well-established communications channels to promote the immediate adoption of appropriate behaviours. The scope of the climate or meteorological phenomenon indicates the need for continued effort.

Although this process might look simple, the reality is quite the opposite. Uncertainty and questions proliferate during this intense, but relatively short-lasting phase. First, uncertainties and probabilities inherent to weather forecasting affect our ability to accurately detect

and anticipate how the phenomenon will unfold. Meteorologists can observe the development of a hurricane in real time, but they have difficulty in providing accurate predictions of where it will hit land. For tornadoes, meteorologists announce "severe storm cells that may produce tornados" but they cannot predict or detect their formation or their trajectory. In such a case, issuing an alert would depend entirely on someone in the area witnessing and reporting the tornado.

Considering all this uncertainty, the decision to alert the public becomes complex. It is understood that people want to be alerted early so that those who are potentially affected have time to take appropriate safety measures. However, such early warnings over large areas where there may not be a threat in the medium-term may desensitize the public.

Once the decision to alert the public is made, we also need to consider the message and how it is conveyed. If for many people the terms *alert, statement*, *watch,* and *warning,* have clear distinct meanings, the public usually is confused about the differences. Statements like "severe storm cells that may produce tornados", may be scientifically accurate but they do not seem to convey the same level of seriousness for the public. This can be better understood when, after hearing many statements and nothing happens, there is a passive response from many people when warnings are issued. It is necessary therefore to develop messages that are absolutely accurate, while considering how receptive the target audience will be and how they will interpret the message.

In a time when there is instant individual communication, it becomes increasingly complex to issue alert communications. First, traditional siren systems have limitations and those that rely on electronic media (radio and television) do not reach the audience to the same extent as before. Intermodal alert systems (media, web, and cell phones) optimize delivery, but require authorizations, interfaces, and modalities that involve time delays. In the race for information, official alerts are being overtaken by unofficial information circulating on social networks.

There remains a need to find a balance between the importance of quality information (valid and credible) conveyed to the right audience and the need to have information conveyed quickly. The time required to develop and validate a message delays the transmission, thereby allowing other messages to take up public space. The delay in

official messages and the number of messages from various sources, contribute to the confusion and doubts about the authenticity and relevance of messages.

5.1.3 FEEDBACK

Feedback measures the effectiveness of the strategy and evaluating response from interested parties. Risk communication calls for a program assessment process, whereby activities, means, planning, and the strategy itself will be assessed. More importantly, we need to be able to determine how successful a communications activity is in providing a positive contribution to the risk communication and risk management strategies.

It is important to know if the people exposed to the hazard were aware of the risk and of their exposure, if they were familiar with the appropriate measures and behaviours to reduce the risk, if they received the alert, and if they adopted the pre-determined safety behaviours. The answers to these questions would shed light on appropriate improvements and adjustments to make to the communications strategy.

This entails monitoring the media, collecting information, and possibly conducting studies (measurements, interviews, focus groups, surveys), to gain input from the primary interested parties. Observations from internal and external interested parties will add to the consistency and effectiveness of the communications strategy.

The outcome of the feedback will enhance reviews of strategy, objectives, activities, and methods used. This reinvestment in knowledge is critical to any risk management process and its related communications strategy.

Now that a description has been provided for the primary components of a communications strategy, we will provide a more in-depth look at the nature of the parties involved who can provide a structuring contribution to the process.

5.2 THE PLAYERS IN RISK COMMUNICATION

There are several parties involved who represent a part of the winning combination for successful risk communication. Some of these will be discussed to illustrate the potential contributions they can bring to optimal risk management.

5.2.1 SCIENTISTS

Scientists constantly seek to understand dangerous phenomena, vulnerabilities of our societies, current and future risks, and how to manage or completely eliminate these risks. They provide knowledge that can be fundamental or sometimes applied, and are from universities, research centres, government institutions, and private companies.

When it comes to meteorological and climate risks, meteorology and climatology sciences immediately come to mind. However, other sciences, such as geography, geology, oceanography, physics, and chemistry, have their role to play in understanding hazards. Computer science, geomatics, and remote sensing provide new avenues for observing and analyzing hazards and their occurrences. Modelling translates the integration of this knowledge into a representation that is closest to reality. The challenge for these disciplines is to translate this knowledge into information useful for individuals who assume an active role in managing these risks.

Yet these sciences cannot resolve everything on their own. Sciences that study human behaviour complete the link between understanding the hazard and experiencing it. This category of sciences includes psychology, sociology, health sciences, political sciences, communication, and management. These sciences explore vulnerabilities in respect to the hazard, the possible risk management measures, and help in understanding the elements that affect implementation of these measures. Philosophy and ethics add another dimension to the meaning and value of behaviours.

5.2.2 TECHNOLOGISTS

Leveraging scientific and technological advances, these specialists work at the frontiers of science and its applications. Technologists make sure that systems are reliable and monitor their operations. They can detect changes in the risk properties and the development of dangerous phenomena. Technologists are an important group in generating alerts.

5.2.3 COMMUNICATORS

Communicators ensure integration of information about the phenomenon, its risks, and safety measures in order to mobilize all parties involved in the risk management process. They convey the information to the various parties involved through the appropriate means

and channels. Communicators are the architects of messages and take into consideration the message content, target audience and expected outcomes.

5.2.4 AUTHORITIES

Authorities primarily involve political and corporate organizations, as well as individuals in positions of power. These individuals endorse the selected risk management strategies and systems. They support all the decisions within their organizations. In this sense, it is vital that these individuals in a position of authority are made aware of the knowledge acquired by the various players to ensure an optimal view of the content and scope of their direction. This is where the organization's commitment is asserted in all areas including the management and communication of risks.

5.2.5 MANAGERS

Managers are the gatekeepers in respect to consistency of their organization's actions. They take the directives from the decision-makers and translate them into instructions. Managers are responsible for planning and allocating resources. Their daily tasks involve ensuring implementation and smooth running of the organization's operations. This monitoring is done by testing and assessing the performance of units and systems.

5.2.6 MEDIA

In risk communication, the media is incorrectly perceived as conveyors of information. Journalist responsibilities are not limited to informing, but they also include verifying, providing a voice to different opinions and commenting on situations. These responsibilities, which are characteristic of freedom of the press, may sometimes cause a certain amount of confusion in a public interest message and that involves a widely recognized scientific consensus.

Quebec media coverage of Influenza A(H1N1) virus vaccination in 2009 is a good example of this situation. The news media provided almost equal coverage to scientific, medical, and government authorities, communicating a generally agreed upon consensus about the relevance, effectiveness, and safety of the vaccine, as they did to marginal groups expressing divergent opinions on the subject.

Although news media analyses and commentaries contribute to the perception of the risk and to mobilizing civil society players, it seems fundamental to establish a dialogue with the media in order to adjust each groups' expectations, and pave the way for an alert system, where the need to communicate a message takes precedence over any other consideration that might be valid in another circumstances.

5.2.7 EMERGENCY RESPONDERS

Police officers, fire fighters, paramedics, emergency responders and emergency management officials are an integral part of alert systems. They bring concrete perspectives in terms of alert system implementation. Their involvement in the risk communication process, in a complementary manner with other players, brings specific expertise to the critical moment of emergency intervention. As well, these professionals not only assist in validating these plans, but also give the system added credibility.

5.2.8 THE PUBLIC

As ultimate user and beneficiary of the information, the public can be a strong ally throughout the risk communication process. In the immediate phase of an emergency, the public communicates primarily through its behaviour, by following or not following the instructions issued by the authorities. In normal times, the public representatives might participate in the planning, validation, and feedback processes to ensure that the planned and applied measures are relevant.

This short list shows how important it is to have broad involvement in the risk communication process. It may seem convenient and quicker to limit the number of players but the benefits are very short term if the work has to be re-analyzed or redone to integrate critical stakeholder contributions. Added to this is the potential demobilization of individuals required to redo all the work, and the lack of trust on the part of the new individuals towards those who started without them.

The diversity of the players and the wealth of their respective contributions allow for innovative and mobilizing communications strategies to be developed. The challenge then lies in optimally coordinating everyone's contributions.

5.3   ORCHESTRATING RISK COMMUNICATION CONTRIBUTIONS

Risk management and its communications strategy are like a system within systems. First, the political system and the rule of law are fundamental guiding principles in our society. Administrative and financial systems define how we operate. Technological and industrial systems make our daily lives easier. These systems involve risk items that are superimposed over the risks present in our natural environment. Public safety systems respond to emergency situations.

Risk management operates within these systems, and risk communication involves every system. It is critical to take a step back to better analyze the organizational and social context of the risk management process and develop a communications strategy that maximizes the use of existing resources with a development effort focus on the specific aspects of the strategy. In addition to saving effort and energy, this type of approach presents opportunities for synergy among existing systems and processes, and reduces the potential confusion associated with parallel initiatives.

Risk communication must remain focused on the results while operating in organizational contexts that are often dominated by process. In a situation of shared responsibilities, complex accountabilities, major financial limitations, and a myriad of other priorities, risk communication can flourish through interaction and coordination from contributions from all areas. This interactive exercise will foster mobilization and, in the long run, collective commitment to eliminate risks or at least to reduce them to a socially acceptable level.

CONCLUSION

Risk communication is an integral component of any respected risk management process. Risk communication efforts should be articulated using a strategy that develops and is simultaneously deployed within risk management efforts. Beyond the process, techniques, and methods used, risk communication requires significant preparedness. Neglecting to properly develop and prepare a communications strategy invariably means significant gaps in achieving the objectives. One of the main mistakes in preparedness is not considering all of the players involved right from the start of the risk management process.

Above all, the communication of messages should focus on decisions and behaviours that will have a real impact on reducing risks before, during, and after the hazard.

Effort put into developing and implementing a strategy is justification for focusing on an assessment of its effectiveness. This evaluation should take place throughout the entire implementation process, both to document the lessons learned as well as making dynamic adjustments.

Success lies in the arrangement and coordination of all stakeholder contributions in a consistent risk management and communications strategy.

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EXERCISES

1. Identify potential risks that could impact your organization or community.

2. List the hazards or risks that might require a risk management/ risk communication process.

3. Identify the positions and issues for each party involved and stakeholder and what they represent. Is anything missing?

(see Chapter 8 for continuation)

6

REQUIRED SKILLS
AND RULES OF THE ART
OF RISK COMMUNICATION

by Bernard Motulsky

This chapter deals with the skills required for risk, crisis and emergency communicating. In outlining the success factors in risk and crisis communications, failure is the opposite of these factors or the outcome if they are not followed. Stakeholder perception of messages conveyed is discussed in this chapter. Also clarified is the importance of proximity between communications leads and those at the top of the decision-making structure. Lastly, the chapter will delve deeper into seemingly commonplace aspects such as budget, required and available workforce, and organization.

Proper communication at a minimum requires preparedness to avoid conveying empty words or even worse, not being able to say anything. A number of questions have to be asked before conveying a message, which, it is hoped, will adequately describe a potentially harmful situation. What exactly should be said, who should say it, who is the audience, what channels should be used, what effect will the message have, when should it be delivered?

First of all, we need to agree on what risk communication involves. It is the controlled management of messages conveyed by an organization within the framework of managing a risk, an emergency, or a crisis. Obviously, this type of communication is a management activity just like other functions carried out by the organization, which is responsible for managing a risk or hazard (management of financial, technological, human, environmental, legal, and decision-making resources).

The role of communications varies based on the nature of the situation at hand: the greater the real or potential impact, the greater the number of people affected, the greater role communications will have, since it is the primary means available to inform everyone affected by a given situation.

Regardless of the importance of communication, it is only a tool used to deliver a message, virtual information with no tangible existence and no binding character. A message on its own will not have the power to change behaviour, like a police barrier or an enforceable regulation. This means that it is a challenging tool to manage despite the fact that it seems accessible to all and easy to use. Expressing ourselves is easy and is something everybody can do. Yet it is much more challenging to convey messages that produce an expected result such as changing perception, attitude, or behaviours with a target audience.

6.1   HOW TO INTEGRATE COMMUNICATIONS IN RISK MANAGEMENT

Regardless of the management system in place, communications must assume a role that is neither domineering, nor minor but one that is tailored to its intended reach based on the simple rule of number of individuals to reach and scope of the intended impact. The management team must include an individual responsible for communications. In fact, if communications is simply a current concern that is not sustained by a specific individual accountable for making and implementing decisions, there is a strong risk that an accurate diagnosis of the situation will not be made, resulting in ineffective, inaccurate, improperly-targeted communication that will ultimately create noise but not significantly contribute to common goals. Given the overall skills that fall under communications, as will be shown further on in this chapter, communications should be embedded in every stage of risk management: when identifying risks, in the risk analysis and assessment stages, and most certainly in the risk treatment stage.

There are four reasons substantiating this position: **timeliness**, **relevance**, **control**, and **advice**.

6.1.1   TIMELINESS

Timeliness is most certainly a determining factor in effective communications. When there is an emergency or crisis situation, there is enormous pressure on organizations to provide useful information as quickly as possible. Mass media and social media are the largest consumers of immediate information. The more dangerous the situation, the more they attempt to have information that is often very difficult to obtain. The organization will be judged to a large extent by its ability to respond rapidly to this need for information and silence is never an option. Embedding communication throughout the entire process ensures a smooth flow of information between those managing the situation and the immediate availability of information to the communications lead, who then will be able to quickly convey the information without going back to other links in the chain of command and having to repeat explanations that were already provided.

6.1.2 RELEVANCE

Relevance goes hand-in-hand with timeliness. There is no value in providing information quickly that is not valid or that risks having the opposite effect than what is desired – loss of credibility and effectiveness in the issuing organization's communications. When the communications lead is actively involved in discussions about managing the situation, this person is aware of the facts at the same time as the other participants and does not need to consult other sources to validate the information or wait for approval before conveying the information to ensure it is accurate.

6.1.3 CONTROL

Control of the information is also important in risk management communication: designating an individual responsible for communications as the automatic contact for all circulation of information. All information queries, interviews, statements require approval by this individual, who may even act as spokesperson if needed or will designate, coach or support another spokesperson. In general, when all members of the management team are largely focused on their respective responsibilities, the communications lead will act as primary spokesperson, which frees up valuable time for other colleagues. Centralizing communications is the surest way to avoid spreading contradictory, ambiguous, or even harmful information for the organization's continued operations or to maintain its reputation.

6.1.4 ADVICE

Lastly, communications also involves providing **advice** with management. To ensure success of communications activities and even in managing a risk, emergency or crisis, an in-depth understanding of the audience is critical. Firstly, there are the obvious considerations such as language, location, best ways to communicate to ensure the messaging is received by the intended audience. Other factors to be considered are what the target audience thinks, wants, wishes, believes, understands, and is willing to do. Anticipating the expected effects of a decision, choice, or even a simple message are variables that must be part of risk management. Predicting the reactions of individuals and groups affected or involved in a hazard can never be entirely accurate since this involves an unreliable and unpredictable environment, opposite to the predictability of a mathematical equation. Yet a number of

indicators can and must be used to support decision-making, taking into account possible reactions, past situations, and the use of more sophisticated analytical tools that will be discussed later in this chapter.

6.1.5 RESPONSIBILITY OR ACCOUNTABILITY

Responsibility or accountability for communications in this type of situation (an individual fully integrated in the management team) is above all based on a relationship of trust. This person is accountable to the group and does not take any initiative without agreement from the other members. This person is not simply a parrot repeating what he or she is instructed to say. This is a communications strategist capable of analyzing a complex situation, understanding the issues for other management functions, and delivering communications that will support this overall vision. This person does not attempt to subject decisions to the dictates of the communication. This conveyor of risk management communication issues is ideally a communications professional (recognized by peers and through experience[1]), with previous experience in this area. However, if no resource is available, temporary external resources can be used on an ad hoc basis (for instance, a self-employed or agency consultant, selected based on experience and references). However, this should be a consideration in the risk management planning phase, and not during an emergency or crisis situation, when it is too late to select and prepare a resource. As a last resort, this responsibility could be assigned to a person who is not only a communications professional but has already dealt with emergency situations and has a number of skills that will be discussed later in this text.

6.2 PLANNING COMMUNICATIONS

Communications are planned so that they can achieve reasonably tangible results. Otherwise, there is a high risk of empty rhetoric or ending up with outcomes that are vastly different from what was expected. Strategic communication is, thus, intelligent communication. It is founded on a basic understanding of the objective and of the environment in which the communication will occur. Planning and implementing effective communication can be broken down into

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1. There is no universally recognized accreditation except for ARP through the Canadian Public Relations Society for public relations accreditation, which involves several years of experience plus an examination.

four stages: 1) What are the expected results of the communication? 2) Who is the audience? 3) What needs to be said to achieve the desired result? 4) How is this accomplished?

We will go over these stages individually below.

6.2.1 WHAT ARE THE EXPECTED RESULTS?

- This is the central question and it will dictate the entire process. We need to identify what is expected from the communication, what it can accomplish, or how it can and must contribute to managing the risk, emergency, or crisis. Risk management communication generally involves three types of outcomes: *creating awareness* of a risk or hazard and *providing the necessary information* to make decisions for matters such as safety, shelter, travel or mobilization. In this case, timeliness, accuracy and proper targeting are the most critical components to ensure success.

- Secondly, communication *informs* and *educates,* which is a bit more complex since this involves changing perceptions, attitudes, and behaviours. The complexity is because the outcomes will depend on an in-depth understanding of the targets. And this is part of a longer-term process, where there is the challenge of focusing attention on an issue that does not hold people's interest, while hoping to achieve a behavioural change in people. Perseverance, substantial resources, and solid allies are prerequisites to obtain tangible results. Therefore, a full assessment of available resources and assets is required before tackling a communications operation intended to bring about this kind of outcome.

- Thirdly, communication requires *sharing* and *discussion,* so that decisions can be made that will receive broad support. This means being in a real communications situation with exchange between the organization and stakeholders (anyone affected by the risk or with a particular interest in the matter). Attempts are made to defuse conflicts by identifying acceptable solutions (often called social acceptability). To have a reasonable chance for success, modifications and adjustments must be made to the project to produce communications that truly reflect a two-way discourse and not simply an attempt to convince the audience of the merit of a position. This would surely end up as failure and rejected by those who want their concerns heard. The TransCanada

pipeline is a particularly interesting example, since the discussion process failed after several mishaps. Credibility of the organization and its openness are success factors.

6.2.2 WHO IS THE AUDIENCE?

This is the target audience/public, composed of individuals with a number of similar characteristics and who are the direct target of the communication. Some groups are easy to define: employees, executives, current customers, vendors, constituents, neighbours, shareholders, investors, people identified through their connection to the organization, and in the case of risk management, to their level of exposure to the risk. Criteria such as geographical location (within a defined perimeter) or connection to the organization (employment, service contract, recipient of goods or services) can generally be used as a selection mechanism, and to define individuals who belong to or do not belong to the target group. In other situations – particularly individuals targeted for education or awareness – the target audience lines are much more blurred and less specific. People who text while driving, or people or groups targeted for awareness campaigns about the importance of cancer research are lost in the mass of the general population. In these cases, we often arbitrarily decide on specific groups to target for the sake of efficiency.

We need to determine a target to measure our effectiveness, which is our ability to achieve the targeted outcomes using prescribed resources. If we do not know who the target audience is, it is difficult to know whether or not we have reached the right persons or if we will obtain the expected results. A target is identified to better understand this group so that we can know the potential effect of the communication. Essentially, the task is to comprehend their perception of the risks they are exposed to: their assessment of the likelihood of an occurrence and their understanding of it (earthquake awareness campaigns are much more challenging in Canada than in Japan, where such occurrences are practically a daily phenomenon). Understanding perception of risks with the target group is critical in implementing effective communications, meaning communications that will produce tangible results.

In addition to risk perception components, understanding the target group provides valuable insights into what available means of communications to use (**media**) to reach the group. As communications planning is carried out, this step allows us to identify which channels of communication could be used to reach the target audience.

Is there a newspaper that can be distributed with this group? Are there distribution lists, email addresses, telephone numbers? Is it possible to pinpoint them in a specific area? Can posters be used? Are there specific social media accounts? All these questions should be considered prior to developing a targeted communication.

6.2.3 What Needs to be Said to Achieve the Desired Effect?

Communicating means conveying a message. The next step involves deciding what information to convey to these target audiences in the messages to obtain the anticipated effects. These **key messages** contain basic information that in the individuals receiving this should trigger a change in perception, attitude, and behaviour (at least this is the hope). Therefore, the message content must get the attention of the persons targeted. If these messages do not attract attention, are poorly visible, they will not have any impact with the target audience, who will simply be exposed to our messages without really seeing them. Often it is at this stage that the most difficult choices must be made since the amount of information is so limited that something could be overlooked. If too much information is provided, we either risk losing the attention of the target group or we leave them to select the information they consider to be personally relevant, which is not necessarily the information considered important. For instance, by giving long-winded explanations and by making comparisons between the kinds of risks the group is exposed to, people might easily come to the conclusion that the maximum risks are the ones most present. It is therefore always best in effective communication to limit the messages conveyed as much as possible. According to Aristotle, choice involves rejecting something. We need to focus only on specific information to be emphasized, and then complete this with further information once the first step in communication is done.

6.2.4 How Is This Accomplished?

What is next after taking the time to question what we hope to achieve through communication, who is the audience, what we want to say, after all this information is available and has been shared with our colleagues? Now is the time to get down to work and communicate effectively. There are at least five variables in initiating an efficient communications program: agreement on **governance** (who decides what?), proper choice of a **strategy** that will produce a **budgetary**

framework and provide adequate **resources**, choice of the **timing** and intensity of interventions, and lastly identification of the best **methods**.

- **Governance** in communications simply means the responsibilities shared by those with a role in planning and executing communications. Who is ultimately responsible for making decisions (presses the GO button to send messages and once this is done, there is no going back), therefore will approve content and approve release. In terms of effectiveness, the less people involved in making decisions and the higher up the chain of command for the organization's decision-maker means less time lost on discussion, indecision and, often, communicating can happen too late. For instance, when sending responses on social media, a great amount of leeway should be given to the person in charge of conveying information. Quick response is among the top qualities since otherwise, the response will be issued too late and will no longer be useful. The same can be said for verifying content. If content of a communication must be verified at a number of levels, the opportunity will be missed and these messages will be sent too late to have any real impact.

- **Strategy** allows us to decide how to intervene: either quickly with significant intensity but at the risk of exhausting resources, or saving resources and acting in measured steps. Strategy assumes there is a solid analysis of the situation, risks involved and possible consequences, financial resources, available human and material resources, as well as an appropriate action plan for the situation. If our issue is truly critical, we should spare no expense and engage all available resources to limit the damage, whether this involves available budget, spokesperson status, quality of the external resources selected, and the investment in monitoring and analyzing the situation as it evolves. If, on the other hand, a temporarily critical situation is involved and it simply means getting through the situation, a more measured approach could be used, limiting the extent of expenditures and interventions. The intensity of our communications will undoubtedly be combined with specific timing to communicate: certainly quickly but how frequently and for how long?

- In terms of the chosen **means** of communication, if the strategy is solidly executed, if we have a good understanding of the target groups and the existing communication channels to reach them and if the message content is clear, often we will be faced with a very limited number of choices. Limited types of media to reach our audience and decisions will be based on a simple cost-effectiveness analysis of each available format (immediate availability or not, reasonable cost for each person reached, adaptable to the type of content, decision to show images, plans or simply instructions, do we want to obtain reactions or simply convey a message). The choice of method will also be determined by the communications team's experience and their proficiency with the tools. (Video advertisement is more complex than posting and generating messages on social media platforms. However, social media requires more monitoring and reaction capacity than video). We may also want to use tools that have an impact we understand and when we can rely on previous experience or simply on common sense (in a power outage, radio is often the most accessible form of media and easier to use than other forms).

CONCLUSION

In conclusion, the critical skills for any individual in charge of risk management communication can be divided into four main skills.

First, knowledge of the **regulatory** framework for the communications environment. For instance, possible requirements for disclosure of information (such as a publicly traded company), the limitations and restrictions of various access to information legislation (what must and what cannot be disclosed), handling of personal information (personal image protection). This is often difficult to manage when dealing with individual or specific cases, since civil responsibility comes into play for any information about other parties and that can have financial or reputational consequences.

Secondly, and clearly obvious, the ability to **communicate** properly, to express oneself clearly in writing and orally in the languages of the target groups and partners. The ability to communicate is not limited to the ability to express oneself, it is also the ability to listen. An understanding and proficiency of the tools involved provide a better understanding of the expectations, perceptions and

the reactions of the target audience. The primary tools include surveys, focus groups, directed interviews, vox pop (random interviews with the public), gathering, compilation, and analysis of feedback on social media, analysis of press coverage, measure of the advertising impact, and compilation of data from participation in activities.

Thirdly, the ability to properly **diagnose or appraise** when dealing with a problem situation, and determine what stems from communication and what does not. In other words, the communications lead must be able to quickly identify how communication can support the risk management team and how it can truly contribute to resolving the issue at hand. Extreme positions should be avoided: the belief that communications can magically clear up any issue (the moment we say the word, everything is fine), or the opposite view that communications will involve optimistic messages that are, in fact, unconvincing and harmful.

Lastly, preparing communications and knowing what to do is not enough. We also must be able to **implement** strategies. Communication relies on a number of individuals contributing with a variety of different skills. These include research and analysis, writing, translation, organization, design, as well as a number of complementary fields (graphic artists, community leaders, press secretaries, ideas managers, video artists, caterers, musicians, composers). It would be unreasonable to think that a single person can do all of these tasks. One person cannot have all these skills, but the communications lead should be acquainted with the situations in which these different tasks will be implemented, able to assess costs, select the right vendors, and conduct diligent follow-up for content, orientation, budget, administration, and coaching for all involved (spokespersons, content vendors, and operation managers). The intricacies of this position should not be cause for alarm, since the key to successful communication is authenticity. Be yourself. Be a good listener. Surround yourself with the right people. Follow your instincts when you are unsure. Everything will work out, and at the very least, you will be pleased with your efforts.

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EXERCISES

1. Message Analysis

    a. Select a news item (disaster, debate, election, merger, acquisition or closure, etc.). Choose three messages about the platform (media, Internet, social media) that deal with the event.

    b. Identify the most commonly used hashtag on Twitter and review the comments (for, against, neutral, disappointed, angry, ironic).

2. Writing Exercise

    a. Think of a critical situation. Come up with a headline for the newspaper of your choice.

    b. Draft your first tweet (140 characters maximum) describing the situation.

    c. Draft the first paragraph of the press release **(all information must be in one paragraph of less 200 words)**.

        You should be able to answer the 5 Ws: Who? What? Where? When? Why? And sometimes followed by two others: How? How much? These are the main questions everyone asks when something happens.

        – *Who* are they talking about? A person, a company, an organization?
        – *What?* What is happening?
        – *Where?* Where did this event happen? Nearby, far away, on the street, in a house, in a factory?
        – *When?* When did this happen? Has this just happened? Is it still going on?
        – *Why?* Why did this happen? Personal motivations, natural causes, consequences of previous decisions?
        – *How?* What methods are being used?
        – *How much*? How many victims? How much money is at stake?

3. Key Messages

    a. Go to www.newswire.ca (where CNW posts press releases). Select a press release and identify the three key messages conveyed by the issuer. Summarize them in a single sentence.

4. Identification of the Target Audience

    a. Watch, listen to or read five advertising messages and define the intended target audience (using general criteria such as age, gender, education level, primary values).

5. Q&A

    a. Select a current news item involving a situation with a politician, business or union leader.

    b. Think of ten questions that would truly make this person uncomfortable.

    c. Write down the response to the first question as though you were this individual.

ADVICE, REFLECTIONS, AND TESTIMONIALS OF A COMMUNICATOR "AT THE END OF THE TUNNEL" IN RISK COMMUNICATION

by Jacques Lavigne

This chapter is a break in the tone mid-way through this book. The reader can take part in a virtual dialogue with the author, who at times calls upon the reader with advice, testimonial and imprecation. The author shakes up conventional ideas while encouraging a communications practice with concrete examples. The author calls upon decision-makers and professionals, and especially scientists, to position themselves in relation to communicators. Testimonials are indented and in italics so they stand out. Tips or advice are placed in text boxes to make them easier to put into practice.

You have spent weeks getting ready. You have studied every detail of every aspect of the issue. You have done all the research and carefully gone over the available data. You have done all the necessary consultations and there is agreement with all the partners.

Armed with all this information, you have developed a communications strategy that subsequently was formalized into a communications plan.

Basically, you are ready to go!

There's only one thing left to do: Present the result of your work to your target audience.

What to do:
- Make sure you are understood.
- That your communications exercise achieves its objectives.
- Potentially induce behavioural change.

This chapter is in many ways the tip of the funnel, the end of the tunnel.

This chapter first will discuss the different ways to deliver your message, how to do this properly and avoid the common pitfalls that can sabotage your work.

7.1   COMMUNICATIONS: INTEGRAL PART OF OUR LIVES

Nowadays, communication has become an integral part of our lives. Every company, every organization, either public or private, has a communications team.

Even Non-Governmental Organizations (NGOs) and Not-for-Profit Organizations (NPOs) have their own communicators. There are even organizations specific to communications.

Not all communicators will have the opportunity in carrying out their duties to be in front of a microphone or a TV camera or even to present before an audience. Communications is a science that requires years of study and practice.

The purpose of this chapter is to give you the opportunity to ask yourself questions before jumping into the arena, using a few techniques along with practical examples.

"If the message conveyed has not been understood, it is because there has not been any communication."

Knowing how to communicate: is this the same as communicating properly? Not so sure.

Communications is a science, communicating properly is an art (almost a show). Except in rare circumstances, no one is born a communicator, this is something you become.

> I love this example: There is a car salesperson at the dealership and a mechanic who works in the garage. They both work in the automobile industry, yet they have very different skills. The salesperson has no need to know about all the inner workings of a car. But he or she has to be able to convince a customer that this same car motor is the best on the market.

How many times have you seen politicians who are highly competent in terms of their portfolio but literally collapse in front of reporters?

> I know many people who failed miserably in a job interview, in spite of the fact that they had excellent results in the written exam.

What could have happened? Nerves alone can't explain everything. In the next pages, we will try to figure out if proper preparation could have changed the outcome.

Communication means managing perceptions and this needs to be taken into account. NIMBY (Not in my backyard) is a great example.

One of the mistakes decision-makers and scientists often make is assuming that everyone (to varying degrees) sees science as they do and, by that very fact, believe their explanations will be understood in the same way.

Imagine having creationists and climate skeptics in the same room. The first group belongs to the anti-Darwinism movement that does not believe in evolution, while the second group believes that climate change is not a man-made phenomenon but caused by natural climate variations.

A critical step is the communications plan, which is discussed in this book. Readers interested in obtaining further information can obtain this easily by searching on the Internet.

However, one point that is often overlooked is strategic analysis. This is one of the most important components of a communications plan. This is where:

- We define our strengths and our weaknesses (our positioning)
- We analyze market changes
- We analyze the change in customer perceptions and needs
- We determine potential issues and opportunities

Here are two testimonials:

1. I hosted a press conference to announce a new Environment Canada WeatherRadio antenna. This service would be dedicated solely to the weather with continuous 24/7 broadcasting. The announcement took place at the summit of a mountain above the Petite-Rivière-Saint-François ski resort.

   It was wintertime. Visibility was poor. It was frigidly cold. I did not expect to see anyone in the hall – at most, a journalist or two from the local newspapers. To my surprise, there were about fifteen journalists and some had come from the South Shore of the Saint Lawrence River.

   Journalists said it was the first time that they had a reliable meteorology source in that part of the country for agriculture and maritime purposes, or simply for travel, which often can be hazardous in this area. I had underestimated this information in my analysis.

2. For a Federal economics forum at the Îles-de-la-Madeleine (Magdalen Islands), I was asked to give a talk to the local population. I chose climate change adapted to the context of the Islands for my topic. It was March, and the weather was gloomy. Nobody would want to leave the comfort of their homes to attend a conference.

   That evening, to my surprise, the auditorium was packed. Reporters, many of whom worked for national networks, took up the first rows. What no one told me was that, a few weeks before, an internationally renowned scientist had practically predicted that the Islands would disappear due to rising sea levels and the Gulf waters. And here I was, a government representative, about to give a talk on that very topic.

In both cases, a more in-depth analysis would have identified these issues and, in the case of the conference on the Islands, identify whether or not to address this topic or decide to call off the event all together.

Regardless of the communications tool used, there are rules that are good to know.

According to Leonardo Da Vinci, simplicity is the ultimate form of sophistication.

In the United States, plain language is now entrenched in law.

As of October 13, 2010, the "Plain Writing Act" requires that Federal departments and officers communicate in plain and understandable language. On January 18, 2011, the "Executive Order" stated that this principle had to also apply when writing legislation.

Clarity is the opposite of complexity and this should always be reflected in our way of communicating. This applies to both written and spoken communications.

A simple idea is easier to understand:
- It saves time.
- It saves resources.
- It saves energy.

Clarity (simplicity) pays off. If you tell a joke and have to explain it, you waste time and the point is missed.

7.2   IMPORTANCE OF CUSTOMER SEGMENTATION

A good knowledge of your audience guarantees success. Customer segmentation allows you to compartmentalize your audience into a number of categories (ethnic background, sex, age, social class, education level). You can then adjust your talk accordingly.

A few years back, a church congregation invited me to give a talk on meteorology. After discussing with the person in charge, I decided to speak about severe weather and the alert process. I was told there would be about twenty people with the average age of about sixty-five years.

I prepared by developing slides with large type so they could be clearly visible and understood. Before my talk, as an ice breaker, I went around the table to get an idea of my audience. So you can imagine my surprise to find out that there were mathematicians, two doctors in physics and a few modelling specialists.

At that moment I realized that my talk was not going to work. I switched to Plan B and changed my presentation into an interactive forum on meteorology issues. The talk (more than three hours long) was a success and at the end of all this, it was me who got the most out of it.

Had I taken some time to discuss the matter beforehand with the person in charge, the situation would have been different.

Know how to control your emotions. There are several schools of thought on this topic. Personally, I prefer to be on the side of rationality rather than emotions. You don't want to be dull as dishwater but you also don't want to have to set your hair on fire to get your audience's attention. Moderation is always best.

Keep in mind that non-verbal language can convey our attitudes and what we think about certain subjects that we don't want to emphasize. Some individuals might have strong reactions based on how we present.

INSERT 7.1
Pay Attention to Language

This can have involve many things.

- Avoid overly familiar language (and approach). There should be an ethical separation between you and the audience. This is especially true in an interview. Avoid familiar language by addressing people properly. Some politicians have the bad habit of adopting a familiar approach with their audience, thinking that this makes them more approachable.

- Avoid language that is highly technical. If people need a university degree to understand you, you won't achieve your objective. You want to inform, not hammer your listeners with obscure language and by being erudite.

- Steer clear of acronyms. Unless this is with your peers, but otherwise, there is a good chance that your audience will not know them. Once, during a radio interview, a former MSC unit manager (do you know what I am referring to? the Meteorological Service of Canada), began his interview with CBC saying: "At the AES (Atmospheric Environment Service), there are various departments. The WO-4, the scientific services…" He should have clarified: "At the Meteorological Service of Canada, there are various departments: the Meteorological Offices, the Scientific Agencies, etc…"

- Be careful when using terms and expressions. Many phrases have different meanings to different persons and might even be offensive to some people or groups.

7.3   THE TRUTH IS ALWAYS THE BEST!

> *If you tell the truth, you don't have*
> *to remember anything*
> Mark Twain

Some may recall a certain commission of enquiry where people went out of their way to say, in more ways than one: "I don't recall".

Transparency[1] is a very important component of communications, particularly in interviews. By being candid, you have everything to gain. Do you need to say everything to everyone? Certainly not in the same way, which brings us to customer segmentation.

7.4   CREDIBILITY: A CRITICAL COMPONENT

Credibility is based on two aspects:

- You, as a scientist, professional, or decision-maker, through your qualifications.
- Your organization as it is perceived by the public, its background, its quality standards, its transparency, etc. This can work in your favor, or it can create additional challenges for you.

Insert 7.2
If You Are a Scientist, a Decision-Maker, a Professional, Act Like One!

- Stay with your area of expertise. You might feel you have a valid opinion on a range of topics, but you need to stay within your respective areas. You might be knowledgeable about digital modelling because you worked with this type of product, but you are not an expert in it. There's nothing worse for credibility (and reputation) than to be corrected by another expert.

- Never speak on behalf of someone else or for another organization.

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1.   See Chapter 1 where the author states that total transparency is not possible because too much information creates misunderstanding. These comments are similar here.

> • Answer the questions being asked. Do not answer before the question is asked. Expert witnesses are often a nightmare for lawyers since they can be cross-examined by the other side and force strategy changes.

This brings us to another important element of communication: **the message**.

There are several possible definitions, but it can be summarized as: a message is simply the information conveyed by words, images, numbers, music, or symbols.

Communication is a process that allows for messages to be shared through various means and techniques. It can be written, spoken, or non-verbal, each with its own specific defining features.

Communication will only be effective if the message conveyed is understood and generates (in some cases) an action, a behavioural change in the target audience.

An effective message depends on a number of items. It should be clear, precise, and concise. If you want to be understood, your message should not have multiple interpretations, which only add complexity. The shortest path between two points is a straight line. A message defines the issues in your communication according to your discourse and ideas. Some might say: These are not my ideas, but those of my organization. True enough, but it is you who will have to defend them, so it is important that you are comfortable in how they are delivered.

This is the common thread. It will prevent you from digressing and will help you remain in control. We will come back to this later when discussing media relations.

There are many communication methods: oral (presentations, speeches), written (texts, specialized or general articles), media, which combines the two. It would be unrealistic to try to describe them in a few pages, since they are all covered in this book and in a number of easily accessible texts.

We will provide a quick overview and attempt to identify some good practices that will be useful in your work.

When people ask if there is a secret recipe for working well with the media, success depends on a few criteria:

- Understand and learn to work with the media
  - What they are
  - Their limitations
- Have a message (or messages)
- Know how to communicate these messages
- Practice

7.5 MEDIA RELATIONS: THE THORN IN THE SIDE OF MANY SCIENTISTS AND OTHER EXPERTS

Some believe (often incorrectly) that journalists exist to find the fault, the crack in the door that will allow them to confront you and gain fame and place their news item in the headlines. This is not true, members of the media are your allies and are the best tool to reach the public. There is however the risk of a slip-up, which explains the importance of being well prepared when working with the media.

One item that distinguishes a journalist from a scientist is that the journalist (except when doing an in-depth story) works with very short deadlines in terms of time and space. So your words will be cleaned up, often reduced to a few seconds (or a few lines), hence the need to make sure your message is simple and concise.

As well, the profile of the media has changed. Gone are the days when a reporter would focus exclusively on scientific and environmental issues. Today, journalists for the most part are generalists and often cover several topics on the same day.

A journalist tries to be objective and will provide (if applicable) both points of view. Journalists will develop the text (or interview) the way they find to be most appropriate so that it is understood by the readership. This is most often mentioned when scientists, experts, and decision-makers are asked about their frustrations when dealing with the media.

With the advent of the Internet and its seemingly limitless resources, journalists have access to a vast amount of information. Often, when you are contacted by a journalist, he or she has already investigated the issue, asked other experts and wants to hear your point of view. This is why it is crucial that you stick to your message.

You may even be challenged or called upon to comment on a current news item. For example, in the summer of 2015, there was media activity involving the tourism industry asking meteorologists to provide more positive weather announcements as they felt they were losing business.

All these items demonstrate the importance of:
• Having the right messages
• Corporate messages (you are part of an organization with guidelines that must be followed)
• Staying with your area of expertise

The five **5Ws**[2] are commonly used in journalism since they help to order and prioritize information. Answering these questions will help to quickly determine the various issues you need to cover in an interview. As with any method, there are limitations; some of the responses will require more in-depth explanations.

Reporters often take shortcuts and tend to reduce news items to the basics. With the five Ws you can convey a message in a few lines. (These are discussed more in Chapter 6.)

It is important however to keep in mind items not covered by the standard 5 Ws:
• **Who cares?** This is a very important question. Is your approach relevant? Will it get the attention of the media? The answer to this question may determine the success of your communication.

_____

2.   The 5 Ws – who, – what, – where, – when, – why – that are sometimes 7 with the addition of how and how much, are the main initial questions that everyone asks when something happens (see Exercise 2 of the previous chapter): Who (who are we talking about, a company, an individual, an organization), what (what happened), where did it happen (nearby, very far away, in the street, in a home, in a factory), when did it happen (it just happened or is still underway), why (the motivations of individuals, natural causes, consequences of previous decisions), how (what means are being used) and, finally, how much (how many victims, how much money is involved).

INSERT 7.3
Strengthen Your Message

> · Subject, verb, object… Period! Don't feel like you have to catch your breath in the middle of your sentence, so make it short.
>
> · Use action verbs that create the image.
>
> · Avoid using the passive format.
>
> · Stick to facts.
>
> · Don't forget statistics but use them in moderation.
>
> · Use examples that are easy to understand and support your position.
>
> · Refer to experts.

7.6   INTERVIEWS

The purpose of an interview is to communicate your message and not simply to answer questions. The initial statement allows you to remain in control whereas the second statement is entirely led by the journalist. This is when it can become difficult to convey your message.

Here are a few tips that will make things easier. Some might appear simplistic, but often we tend to overlook the simplest things.

A request for an interview, is a negotiation between you and the journalist. You need to make sure that you have as much information as possible on the journalist such as affiliations, topic covered, what the journalist wants to know, how this will be handled, and what are the deadlines. You will want to know if there are other people involved. You have been approached for an interview and you have rights.

A number of organizations have their own communications or media relations teams and they can provide support.

Remember that your goal is to communicate your organization's message(s) rather than being reactive when answering the journalist's questions. For questions asked, you can:

- Agree (elaborate) or disagree
- Use a bridging statement if necessary
- Go back to the organization's or your message

There is no "**off the record**". Unless there has been an agreement beforehand not to use specific information, from the moment something is said, this is in public domain. If you do not want to have information released, do not mention it.

There is nothing wrong with not answering a question. You can say that you do not have the answer, the question is outside of the scope of the interview or your area of expertise, that it involves a third party or is not aligned with what you agreed upon with the journalist prior to the interview.

What is a bridging statement? This is a way to control the interview by bringing it back to your message by using transitional wording such as:

- What's most important is...
- I think the real question you should be asking is...
- This brings us to a more pressing issue, which is...
- Let me put this into context...

In response to: "Why didn't you do something?" answer: "That is not the case, we were very responsible."

A number of politicians have perfected the bridging statement. It enables them to refocus attention back on their message and avoid putting themselves in a difficult situation.

Keep in mind that you might one day be quoted out of context. Unless you are an independent researcher or self-employed professional, you have no personal opinion. You are always perceived as a full member of an organization or a government department, and therefore you are the spokesperson for that organization.

INSERT 7.4
Tips for Phone Interviews:

- Use notes
- Have your key message points in front of you
- Speak clearly and pay attention to your tone
- Use short sentences
- Avoid being ambiguous (there is no visual aspect in a phone interview), so be clear and use imagery in your explanations

The interview is all about attitude. "Radio is blind. TV has eyes." A phone or radio interview done in a studio, gives you freedom (notes, dress code) that is impossible on TV. Though not a requirement, a professional dress code at work will spare you the embarrassment of being depicted in overly casual clothes.

INSERT 7.5
Tips for TV Interviews:

- Being nervous is normal, so be aware of that. Be yourself. People will overlook hesitations if you are consistent.
- Pay attention to your body language.
- Be aware of the setting.
- Look at the journalist and not at the camera.
- Smile at the right time.
- Pay attention to your gestures, body language sometimes says more than words.
- Be positive.
- Pay attention to the journalist (attitude).
- Relax but not too much, don't be too familiar.
- Speak with confidence.
- Never raise your voice, follow the tone of the conversation.
- Don't interrupt.

A key factor in any interview, but which is seldom used, is the self-assessment commonly known as the "Dry Run". You might not predict or control the questions, yet you have all the latitude on your answers.

We have a tendency to include in our discussions certain words and expressions that do not do well on air. Tape yourself or practice with a colleague to check:
- Your vocabulary:
  - The use of the Uh
  - Frequency of using OK
  - Use of idiomatic expressions that you constantly repeat: "In fact", "You know", "I think", etc.

- Style and clarity
  - Acronyms
  - Long sentences: the winning combination is Subject, Verb, and Object
  - Clarity of your explanation (non-technical language)
  - Understanding (simple responses)

Therefore be yourself, be confident, be prepared and most of all, enjoy doing what you are doing.

If you have the opportunity, I strongly encourage taking media relations and writing skills training. This type of training will give you confidence by providing you with a good theory base, but especially by doing simulations that will get you to put your skills into practice.

CONCLUSION

In advertisement, marketing and risk communication, the ultimate goal is to reach your target audience in order to change or modify certain behaviours.

A wide range of tools and techniques are available for organizations to help achieve this. Although you need to know how to use them properly.

Communications is a demanding discipline that requires many years of study and special personal skills. Not everyone can be a communicator. Often, the failure or success of a program or a campaign depends on communications and its execution, which resides with the communicator.

The focus of this chapter was on the communicator, and provided a number of examples, anecdotes, and tricks of the trade that should be helpful for speaking to the public or with the media.

The idea was not to provide communicator training, this would go well beyond the scope of this chapter. Instead, this chapter is meant to facilitate the task by showing that the media should not be viewed as the enemy but as a valued support tool to reach the public.

Lastly, emphasizing practice in this chapter shows that it can be enjoyable to communicate directly with the public, whether this involves a conference, a presentation, or through the media.

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EXERCISES

Practice makes perfect!

Try to simulate as closely as possible the conditions that you might encounter in a real situation.

Repeating the guidelines to yourself over and over is certainly helpful but this does not give you the necessary distance to be aware of your flaws and there is even less of an idea of the perception of the message.

Simply practicing in front of mirror will help you be more aware of and correct certain issues in attitude and in non-verbal expression.

Why film or tape yourself giving a talk in media relations training? For two reasons: this helps you get used to the camera and the microphone. You can see and listen to yourself. You also benefit from feedback from colleagues and trainers.

Here are a few exercises to help prepare for an interview.

1. As we have mentioned many times, the message is the key component in any type of communication.

    Practice by writing down some good communications messages and guidelines. A good idea is to watch the daily news and put yourself in both positions: for and against an issue.

    Two examples taken from recent events (but you can find your own):
    - UBER and the taxi industry
    - The Police putting journalists under electronic surveillance
    - Hillary Clinton's emails

    If you were to represent first one side and then the other, what would you say? How would you say it? How would you react in front of reporters?

    There are no right or wrong answers. What matters is your process and your reasoning.

2. The Dry Run

    Regardless of whether this is a speech, a presentation, or pre-interview preparation, practice is a critical tool, just as rehearsal is in the theatre world.

If you're not able to practice in front of a colleague, tape or film yourself. This will help you check a number of things:

a. Your Posture.
    – The use of your hands
    – Your facial expression
    – Your body language

b. Your speech.
    – Pace (too fast? too slow?)
    – Do you repeat certain words and phrases?
    – Your level of language

c. Relevancy of your talk

Practice with a colleague who will give you immediate feedback and this can be used to test out the points above. More importantly, your colleague will be able to tell you if your comments/explanations make sense, and are easy to understand.

3. You can write down all your messages and answers to potential questions, but doing this verbally is another matter.

Listen to yourself.

Concision, simplicity, and clarity all apply to both written and spoken language.

If you need to pause in the middle of a sentence, this means the sentence is too long. Shorten or rewrite it. If a sentence sounds awkward, it is most probably because there is a problem with it. Try it on your colleague.

You'll be surprised by the results you'll get from this exercise.

THE MULTIDIMENSIONAL LIMITATIONS OF RISK COMMUNICATION

by Michel C. Doré

Meteorological and climate risk communication is part of a specific management context that is multidimensional. The author tackles this by portraying a realistic and concise picture of the complexity of the three overlapping scientific, technological, and organizational components all risk communicators need to consider, particularly in terms of meteorological and climate risks. The author provides insight on the limitations and constraints of these three components. This allows for an understanding of all the affiliations an individual must deal with to implement the best communications while not losing sight of the target audience's interests.

There have been many risk communication initiatives over the past decades. A number have been a success while others have been a far cry from the expected results. Despite their many similarities, there are multidimensional limitations involved in every risk communication process, in varying degrees. Risk communication has scientific, organizational, and social contexts. Each context has limitations that impact the development and implementation of a risk communication strategy. Managing and communicating risks is very much a balancing act for those involved.

This chapter will explore certain limitations that influence risk communication from scientific, technological, organizational, and institutional perspectives. Understanding these limitations enables us to better consider the specific environment within which risk communication operates while enabling the players to adjust their strategies to reduce the impact of these limitations and better achieve their objectives.

As discussed in Chapter 5, risk communication is a system within systems. To achieve optimal communication, it is important to involve a group of players. Each will provide individual contributions without, however setting limitations. Limitations will emerge in the early or late stages and impact risk communication outcomes. For this reason, the individuals responsible for risk communication must demonstrate vigilance in identifying and acknowledging these limitations as they come up.

The primary concern is to identify scientific limitations in regards to the hazard, the risk, its prediction, and detection. Many questions also arise about how to inform and alert the exposed populations. Technology advances do not make it easier to respond to these

questions. Reducing risks requires adopting behaviours. If these behaviours might appear logical, their adoption is greatly influenced by psychological and social aspects.

In addition to these limitations inherent to risk communication, limitations associated with stakeholder organizational and institutional contexts also must be considered. They affect communications in the same way as any other component of an organization or a society and influence both capacities and outcome. We will further explore the limitations of each dimension.

8.1   SCIENTIFIC LIMITATIONS

Meteorological and climate risk communication takes place in a complex, multidimensional environment. Meteorologists and climatologists from around the world strive to better understand and predict atmospheric phenomena. Supported by the most advanced technology, scientists share basic and applied knowledge which allows us to best handle atmospheric fluctuations in our surroundings.

Although meteorology and climatology specialized areas are often considered to be similar, they involve different atmospheric perspectives. Meteorologists focus on short-term atmospheric variations. Their forecasts influence people's clothing and transportation choices. Certain applications assist farmers in planning their operations while others that are more specialized, contribute to air and marine navigation and safety.

Climatologists focus on climate variations, namely long-term atmospheric fluctuations. Their predictions influence planning with land developers, urban planners, and engineers. Many political decision-makers are impacted as well as standards and regulatory organizations. Climatologists also influence financial institutions, insurance companies, transportation and construction companies. The study of atmospheric variations clearly affects many aspects of our lives and our societies.

Both climatology and meteorology leverage other disciplines such as mathematics, physics, astronomy, biology, hydrology, and computer science, to enhance analysis and forecasts. The study of meteorological and climate phenomena, their related hazards and risks is based on multidisciplinary approaches. Although the convergence and synergy are positive, a more in-depth review of the incidence is called for. More precisely defining, the concepts is an example.

Environment, risk, storm, and *disaster* are concepts with different definitions based on the discipline, institution, and even the researcher. The definition of the concepts has great importance in overall communications and particularly in risk communication. Effort is still needed to reach a consensus on the concepts and ensure consistent messaging. Scientific uncertainties add to the challenge of defining the concepts, which vary in nature and importance depending on the phenomena observed.

First, uncertainties related to meteorological phenomena will be reviewed. These uncertainties develop with precipitation (snow, sleet, freezing rain, rain), as well as with their probability, quantity, and distribution. Gaps related to these uncertainties often reside with the public's ability to adapt. This is not the case for storm predictions. Uncertainties associated with storms negatively impact the adoption of cautious behaviours. Although we can accurately predict cold waves and strong winds, it is still currently not possible to predict a tornado, one of the most violent meteorological events.

Climate uncertainties also create major risk management issues. First of all, this is because climate phenomena develop over long periods of time, which makes it difficult for a layperson to see the cause-and-effect relationship. As well, some people do not believe in global warming while others do not believe climate change is caused by humans. We need to overcome these uncertainties to ensure that structured adaptation measures are adopted in respect to our dependence on fossil fuel, our society's choices in land-use development and construction standards.

Psychosociological uncertainties are also added to the climate and meteorological uncertainties and explain the gaps in perception of risks and adoption of behaviours to reduce vulnerability. Psychosociological aspects also significantly influence tolerance to risk and its indicator of acceptable risk. The importance of psychosociological aspects alone justifies including risk communication activities right from the planning stage of the process.

Weather forecasting has become increasingly more reliable. Atmospheric measurement and modelling allow for highly focused analyses. Certainly, these predictions perceived by the individual can be subject to different interpretations. Probability of precipitation is a good example of the differences in interpretation between the individual issuing the prediction and what is interpreted or experienced

a by mountain hiker. Therefore it is important to consider all uncertainties and their implications in developing robust communications strategies that can adjust to their different audiences.

8.2　TECHNOLOGICAL LIMITATIONS

Environment Canada's weather services issue alert messages to the public about hazardous weather situations. It can relay these alerts through a public Weatheradio[1] system. To receive these broadcasts, a weatheradio receiver-compatible system is required. Some programmable models can be set to only receive messages for local events. Although this technology has existed for several decades, its ability to reach the public with area-specific messages is somewhat limited.

This is why for many years, alerts have been relayed by broadcast media. The current National Public Alerting System[2] uses a private firm to relay emergency alerts to radio and television broadcasters. In Quebec, this system is known as Québec En Alerte[3]. Since March 31, 2015, broadcasters are required to transmit alerts over their airways. However, since traditional media are reaching less and less households and people, this contributes to reduced system performance.

With the arrival of smart phones and social networks, users are no longer just receiving information but are also generating it. For instance, they can send images of tornadoes before government authorities can be officially informed of the event. Cell phone and Internet platform managers can compensate for the decline in traditional media by relaying alerts on computers and smart phones. Currently computer or smart phone users need to subscribe to these alerts. We are witnessing a growing collaboration between the public and the private sectors on this issue.

Monitoring, detection and alert capacities for hazardous weather phenomena reside in the reliability of the systems and their interfaces. Expanding the number of parties involved implies a greater risk of failure. Although there have been improvements in collaborations and

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1.　http://ec.gc.ca/meteo-weather/default.asp?lang=En&n=792F2D20-1 (accessed October 10, 2016).
2.　https://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/mrgnc-prprdnss/ntnl-pblc-lrtng-sstm-en.aspx (accessed October 10, 2016).
3.　https://alerte.securitepublique.gouv.qc.ca/ (accessed October 10, 2016).

infrastructures, systems still have limitations and can sometimes fail. Power, communication satellite, and information system failures can still diminish the integrity of an alert system.

8.3   ORGANIZATIONAL LIMITATIONS

There is a general agreement about the importance of proactive risk communication. The parties involved in this type of communication work in organizations with constraints that could affect their activities. An example of these limitations includes priorities, structures, human and financial resources.

8.3.1 PRIORITIES

Political and corporate authorities set directions based on political programs, business strategies, and strategic plans. These directions generate priorities and institutional objectives that in turn influence resource allocation and decisions. Circumstantial priorities (disasters, crises, opportunities) can also influence institutional priorities.

The actions of risk managers and communicators must be guided within the framework of these priorities. Therefore, risk management and communication must be included in decision-maker discussions. Otherwise, there would be negotiation for each individual initiative competing with the organization's institutional priorities, and even some efforts identified as a non-priority would potentially not be pursued.

8.3.2 STRUCTURES

In organizations, structures are a compromise between culture and priorities. There is no ideal structure or model from all viewpoints. Employees work in an environment with complex hierarchical, functional, and interpersonal relationships. Understanding these structures and how they work helps in navigating and advancing projects.

There is some confusion between the meaning of communications and risk communication. Although they have similar vocabulary, their resemblance often ends there. Communications teams often respond to immediate events, and they may have limited time and resources to plan and coordinate actions. This reality often labels communication teams as being reactive and focused on protecting the corporate image, which is quite different from the proactive, strategic,

and programmed approach of risk communication. Risk communication actions must in all situations be aligned with the institutional communications activities.

In most organizations, risk management and communication are conducted within a matrix where a number of stakeholders from different administrative units work collaboratively to advance projects and matters. This approach facilitates access to a large range of expertise within the organization. Risk communication managers must however constantly negotiate with their superiors and colleagues since contributions from other areas are needed, which often causes delays in advancing projects.

Many would consider the ideal situation to be an administrative unit dedicated to risk management and/or risk communication, and centralizing the required resources for project implementation under a single manager. Tasks could then progress more easily in the short term. However this could result in other managers in the organization pushing back on collaboration, arguing that this falls under the unit's responsibility.

Apart from these two examples, various approaches can emerge. First of all, it is critical to clearly define the expected outcomes and to obtain clear instructions from the organization's senior leaders about the chosen management model. This model will ultimately be a compromise between the organization's culture and priorities.

8.3.3 HUMAN RESOURCES

Human resources allocation and assignment should generally align with the organization's priorities. In private and public bureaucratic organizations, a person or team is usually designated project owner. If business continuity requires diversity in terms of people on the team, task optimization involves specialization and is an obstacle to this interdependence of resources.

Risk communication brings together hazard and risk experts, communications specialists, the organization's leaders and external stakeholders. Risk communication professionals therefore need to develop the capacity to interact with each of these groups from the perspective of their own language and concerns. Therefore, when filling positions or functions in risk communication, managers should target people with a good understanding of the organizational culture, solid people skills, and cross-disciplinary expertise promoting collaboration.

Risk communication involves major ethical considerations. Professionals must ensure convergence between their loyalty and integrity in terms of their organization, their superior, professional field, and the people who will be receiving the information. The interests, motivations, and methods of each one are compared with those of the others. This adds another human dimension of uncertainty that is complex to manage.

8.3.4 FINANCIAL RESOURCES

As with human resources, financial resources are distributed according to the organization's directions and priorities. In the current economic and budgetary environment, it is increasingly difficult to pursue projects that are not priorities. For this reason, risk management and the resulting risk communication should be part of an organization's priorities.

In many cases, integrating risk management involves no or marginal costs. Over time, risk management may generate savings that can be reinvested in the organization. If it does not immediately generate savings, risk management reduces the risk that the organization may have to assume additional costs related to unmanaged risks. Costs for unmanaged risks are those inherent to management of crises associated with changes in the perception of the risk or its social acceptability. Train, truck, boat, or pipeline transportation of gas and oil is an example of the consequences of this kind of change in the perception of the risk, and the unexpected costs that many organizations now are required to assume.

8.4 INSTITUTIONAL AND POLITICAL LIMITATIONS

Communicating climate and meteorological risks depends on authority and jurisdictions. In Canada, the provinces and territories are responsible for health (except for indigenous peoples). Public safety and public alerts are also the responsibility of the provinces and territories. However, weather and climate monitoring and forecasting fall under the jurisdiction of the Federal government. The Federal government is also responsible for telecommunications and radio broadcasting regulations. Therefore the effectiveness of communicating and managing climate and meteorological risks is dependent upon collaboration between many players.

Contrary to popular belief, risk communication is not the final step in the risk management process with the objective of sharing outcomes. This kind of approach has its share of issues. These include not considering perceptions throughout the process, establishing dialogue late in the process, which raises concerns about the transparency of the process itself and the people involved, as well as a sometimes shortened risk communication process due to constant delays in analyzing and managing the risks.

CONCLUSION

The ultimate recipient of risk communication is the public asserting its right to information so members of the public can decide and act in the interest of their health, safety and integrity. The best risk management analysis and measures will never meet public expectations if the public is not part of the process. Risk communication currently is still the most decisive component in determining acceptable risk and the mobilization required. Every party involved therefore needs to promote a risk communication strategy that takes into account the potential and existing limitations in the environment.

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EXERCISES

(Continuation from Chapter 5)

1. After identifying the potential stakeholders and parties involved in your risk management process, analyze the communications strategies and/or actions put in place as well as their effectiveness.

2. Explore ways to maximize the advantages of risk communication actions to get the target public audience to make changes in response to climate change.

3. Develop the next version of the risk communication strategy, taking each stakeholder's institutional limitations into account.

9

MANAGING
COMMUNICATIONS
IN A CRISIS SITUATION
IN THE AGE OF SOCIAL
NETWORKS

by Nadia Seraiocco

In this chapter the author takes the reader into the often difficult and ambiguous world of social media, and its discerning, consistent and coordinated use in a crisis situation. Her focus is on crisis more than risks, but shows that managing crises also means managing risks, especially when social media is used in an immediate setting. The author demystifies certain beliefs and assigns significance to a social media presence in our organizations, in embedding social media with traditional media when managing communications. The author provides valuable examples and references that will provide the reader with an understanding of this topic, particularly in respect to the Web.

In 2003, when Montreal's Public Safety department was managing the impact of Rivière-des-Prairies spring flooding, an event where the author was involved in communications, the main source of measuring media impact for this event was through live news channels. The French-language branch of CBC, RDI, had been in existence for about ten years and the younger communicators, including the author, who only knew this age of live reporting and broadcasting often reminded their more experienced colleagues that the live component of communication needed to be part of their strategies. Fast-forward a few years and a new kind of live information vector was in place, with both the general public and journalists contributing: social-digital networks, with Twitter and Facebook being the most popular. Now if we were to manage a public safety crisis, the war-room would have a screen dedicated to social network posts (with hashtags such as #RDP, #flooding, #Montreal, etc.). These are now critical tools in conveying information. When the general public needs to be addressed, it is natural to go to the places people go to first, which is mass media and the preferred social networks. In Canada in 2015, nearly 60% of people had a Facebook account, 25% had a Twitter account, and 15% had an Instagram account. Instagram is primary comprised of younger users.[1]

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1. Data compiled by Forum Research, reproduced on Canadians Internet Business site: http://canadiansinternet.com/2015-canadian-social-media-usage-statistics/, accessed November 21, 2016.

9.1   A KNOWN ACCELERATED DIFFUSION CURVE IN PUBLIC RELATIONS

> *Managing crisis is in many ways a contradiction.*
> *We cannot manage torment and trouble; we try to prevent them*
> *from happening, minimize the effects or restore order.*
>
> GIRARD *et al.*, 2006, p. 5

To prevent a crisis or minimize the effects, public relations professionals, during the second half of the 20th century, devised ways to maintain consistent communications, even in difficult-to-manage situations, such as a crisis. A number of crisis management steps were defined: analysis, organization, action, prevention, and/or assessment. These remain the foundation for planning interventions, extracting key learnings from a difficult situation and improving crisis prevention. In a crisis management operation, it is critical to provide information to the public involved and concerned members of the public. In a context of fast-paced communications and a growing number of multiple senders, organizations need to understand the information ecosystem of the audience they wish to reach.

Over the past twenty years, as outlined at the start of this chapter, new continuous information channels have appeared, there has been a democratization of the media, and more specifically, each member of the public has the ability to post and convey information on the Web. This can be done through personal sites, blogs, and (since 2006-2007) through social networks.[2] The Web has turned information broadcasting, as we knew it, completely upside down. Social networks, such as Twitter and Facebook, have added to the voices that the public pays attention to in any given situation. This diversification of communications sites or forums, both corporate and public, needs to be considered and potential dispersion of information must be avoided, as well as distortion of critical information in a crisis situation. This will be the topic of this chapter: managing mediatization in a context of multiple media platforms, developing strategies and tactics to ensure consistent messaging and balancing safety issues with freedom of expression. If the cycle of crisis communications has not changed, this allows us to identify ways to support risk management and an adoption curve for new forms of communication for populations affected by emergency situations.

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2.   Facebook was created in 2004 for a university environment and has been available to the public since 2006, whereas Twitter's microblogging platform became available in March 2006.

9.2 MANAGING MEDIATIZATION IN A CONTEXT OF MULTIPLE MEDIA PLATFORMS

Controlling the message, managing communication, maintaining a quality brand image or trying to restore it as needed has always been the purpose of communicators. When there is a crisis, regardless of its nature, managers and communicators of an organization work to define what information should be conveyed and develop key media statements for the official spokesperson to deliver to journalists. A press conference might be called (briefing or teleconference), and then information would be kept up to date through press releases or by holding a press conference, depending on the situation or strategy. In this model, the organization addresses the press to communicate with the public. If necessary, communications scripts are developed for customer service so that the front-line employees are able to field questions from the public.

9.3 ADDITION OF WEB PLATFORMS, THEN SOCIAL NETWORKS

This traditional model has already undergone adjustments, first by adding new sites for conveying official messages (press releases, statements, etc.) on organizations' Web sites. Very often these messages are delivered simultaneously on multiple communications platforms for the press. In this initial communication site, organizations would however be in control of the message by communicating internally, or even through a newswire service, such as CNW (newswire.ca) or CNN Matthews (marketwired.com). Up to this point, the Web is only an additional tool in the range of an organization's communications options. However, with the arrival of public media (blogs and personal sites) and the ability of members of the public to use these tools to respond to and comment on an organization's communications, we have arrived at Web 2.0. At the very least, the familiar process has been turned upside down. Regardless of the situation, an individual can now intervene in any communications process, alter the messaging, respond to it or even become a first-line conveyer of information.

We now know that in a crisis situation – and we have recent examples of this – the first messages to come out at "ground zero" are sent using social networks by people who witnessed the event. So when an organization holds a press conference, even before the spokesperson has delivered the message to the mass (or traditional)

media, members of the public, employees, and any person present, in just a few clicks (messages, photos, videos), will already have relayed their point of view about the event.

In the heat of the action, these multiple voices can create a cacophony. For members of the public looking for information, it becomes difficult to differentiate between relevant information and hearsay or approximations from on-site observers in a crisis situation that is unfolding. In light of this, a company will unquestionably come out as a loser if it refuses to take these social networks into account and the activity generated by its messaging. Outside of its official communications channels – media relations, Web site, customer service – other messages will circulate on a number of public channels, where the "official" message is often misrepresented or contradicted. For instance, in the days following the November 2015 Paris terrorist attacks, when arrests were made in Belgium, the authorities asked for a public social media blackout so that police strategies and tactics would not be revealed,[3] or worse to avoid the spread of false information that might unduly cause public panic.

Marketing and communications observers recently have expressed the importance of a "social network presence" for an organization. This does not mean neglecting to take the time to reflect on the strategic role of these information paths. In other words, we can no longer simply remain "senders of information" on these networks. We need to analyze the nature of messages circulating about an organization when there is a crisis situation. Our communications need to consider feedback that is often seen in social network activity. For example, in a crisis situation, we can quickly judge if a message can be relayed without further comment, or if important aspects of our operation are being relayed. There are tools[4] that can quickly sort messages by "hashtags" or expressions, and assess whether action is required.

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3. *Le Devoir* commented on November 23, 2015 the social media silence in Belgium: On November 13, social media helped the public in France regroup and provide support using hashtag #porteouverte, but in the midst of things, a number of details about police operations underway were also conveyed to the public: http://www.ledevoir.com/societe/medias/456013/belgique-quand-les-medias-et-les-reseaux-sociaux-se-taisent-pendant-les-operations-de-police.
4. Business solutions such as Sysomos (CNW) or Radian 6 do these operations practically automated, for smaller organizations, less costly solutions are possible by combining free monitoring tools.

9.4 HARMONIZING COMMUNICATIONS BY CONVEYING THEM VIA "OMNICHANNELS"

A number of organizations, especially in politics, use social networks as their preferred way to communicate with the public. They are fully aware that journalists are also present on these networks, ready to relay an official statement as an exclusive. Similarly, it is clear that these social media tools have become an integral part of strategy and tactics in an organization's communications plan. Distinct "traditional" and "social media" communications no longer exist. Instead there is a single organizational communication that may be sent through various channels based on the identified needs.

FIGURE 9.1
Company External Representatives

Public Relations Person or Spokesperson	Head of Social Media
• External relations – Media, interest groups & public	• Adapts corporate messaging and promos to various networks where they will be posted
• Communicates corporate messages according to corporate or targeted promotional objectives	• Manage or facilitate relations with followers for the various company social networks
• Acts as consultant for tools to use to convey corporate messaging	• May act as consultant for tools or media platforms to be used to convey corporate messaging

In more rigid structures, these roles are still perceived as two separate silos, one for "real media" and the other for social media.

Source: Based on *Econtentmag.com.*

For a number of organizations, the structure in place is always developed in silos (figure 9.1). However, media requests are often handled by a public relations expert, for external relations. Social media is viewed as an animated delivery promotional channel led by a "community relations manager", an entry-level job in the organization.

FIGURE 9.2
Omnichannel Delivery
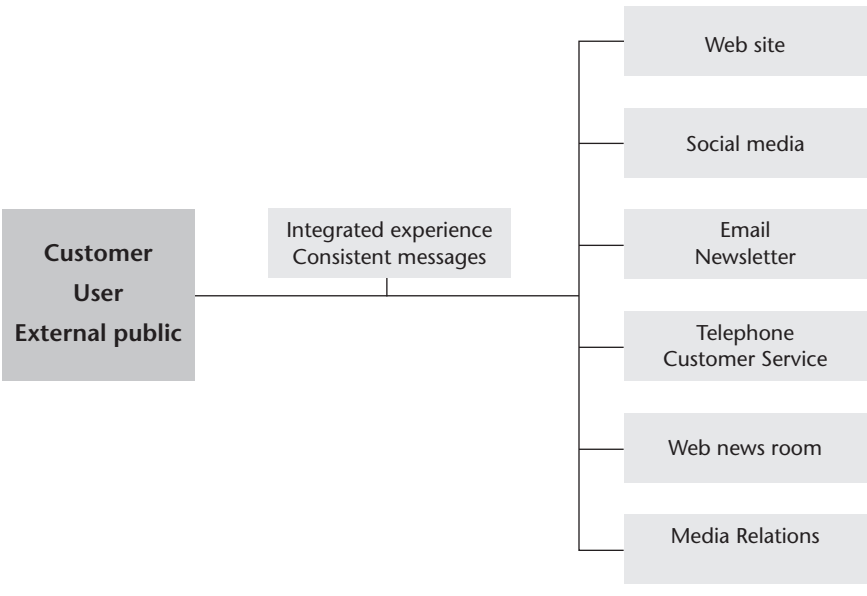
Source: Based on *Econtentmag.com*, "Multichannel vs Omnichannel", http://www. econtentmag.com/Articles/Editorial/Feature/Multichannel-vs-Omnichannel-Marketing-Is-There-a-Difference-and-What-Does-It-Mean-to-You-102361.htm. Page accessed on February 12, 2017.

There is a trend of replacing this communications development strategy with an integrated vision, whereby an organization's various communications vehicles are part of the same communications strategy (figure 9.2). This is because the different audiences that an organization wants to reach are found on different channels. Journalists use social networks both to post articles they are writing and to locate information, find sources, and ideas for articles. The general public using these same social networks has the same status as anyone else. The importance of Twitter in media relations, as confirmed by an article published in 2014 by the *Columbia Journalists Review*, indicated

that while only 20% of Web users had a Twitter account (and this ratio has barely increased since that time), for journalists, the penetration level is 60%. No doubt that three years later, this would have increased.

Figure 9.1 was developed using job postings published on specialized communications sites and shows how the role of public relations is perceived as a position requiring years of experience and knowledgeable about delivering "official" organizational messaging. The community relations manager position is however limited to sending messages and interacting with network users. This view of these different roles is called into question when there is a crisis involving public safety. VIA Rail is an example and will be discussed later on in this book. At various times, the social networks lead will be required to provide a quick response to questions that often come from customer service. When a crisis is imminent, this person will likely be the first line in dealing with a crisis event and therefore should be trained on how to deal with the public. This social networks lead will also have to know how to quickly direct media asking for information through social networks. This job is therefore more complex than it may initially seem. During the work week and business hours, there is no issue. The lead simply has to ask his or her Customer Service and Media Relations colleagues. However, in a crisis situation, the social networks lead must be aware of the organization's crisis management protocol.

INSERT 9.1
Case #1: VIA Rail Train 92[5] Derailment in Burlington, Ontario

> On Sunday, February 26, 2012 just before 3:30 p.m., VIA Rail train No. 92 travelling between Niagara Falls and Toronto abruptly derails, killing three employees in the car and wounding a number of passengers. Minutes after the accident, the weekend consultant handling social media responses advises Richard Marginson, social media lead (during the week) of the situation, who takes over. At the same time, a crisis team meeting is called at VIA's headquarters, involving travel for some people and adding time to the response.

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5.   In the article published on the Radio-Canada website on the day of the derailment, Sunday, February 26 and updated on February 27, note that Twitter is mentioned as a credit for a photo. This photo was taken by a member of the public who arrived with the first responders on the site of the accident and whose account name was available: http://ici.radio-canada.ca/regions/ontario/2012/02/26/002-deraillement-train-burlington.shtml.

Messages on Storify (created by *Toronto Star*) show that by 5:20 p.m. the company had not yet released an official statement. Around 6:00 p.m., a VIA spokesperson began to respond to the media and a brief communication was published nearly three hours after the derailment. In a time when information is instant and amplified through Twitter, this delay that in the past would otherwise have been acceptable, seemed like an eternity for those who were following the event on social networks. VIA issued six official messages on February 26 and 27, relayed by social media. During this time, the social networks manager was dealing with more than 2000 messages and company mentions.

Fortunately for VIA Rail, Marginson was very familiar with the rail environment, and in 90 responses, he provided relevant information to the public, and channelled their information requests appropriately. This accident made a number of communications leads realize the importance of an online presence during a crisis situation, and especially to know how to act and what information to convey. In this case, one point stands out from all communications management considerations: it would have been important for the media communications leads to understand the impact of social media on the crisis as it unfolded.

Official messages from the organization:
6 statements
90 replies

Social media messages and mentions:
2 179 messages
1 051 article shares/re-posts
498 mentions
+ **344** *retweets* (RT)
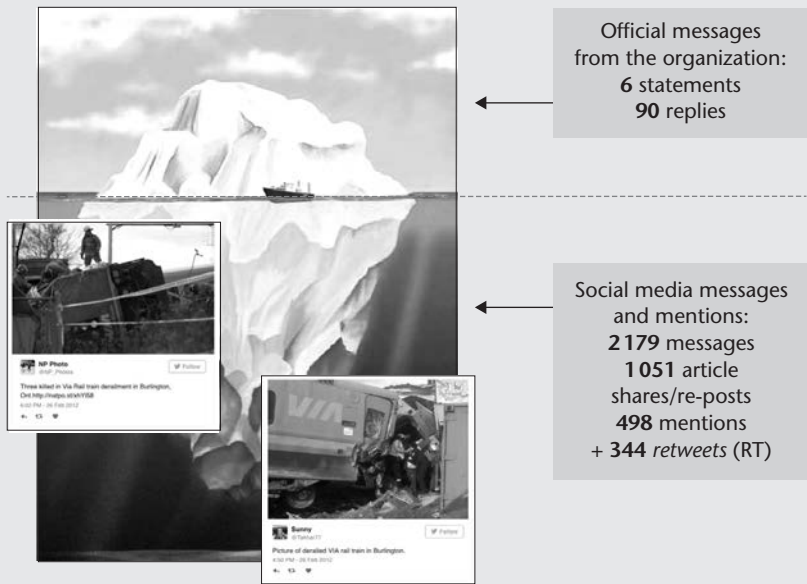
Source: Figures produced by Richard Marginson, CM Consultant – Twitter @RickyinMotion.
Photos: http://storify.com/toronto-star/via-rail-trail-derailment-in-burlington.

9.5   ORGANIZING COMMUNICATIONS TO RESPOND TO SAFETY ISSUES

The VIA Rail case clearly shows the huge difference for a community relations manager interacting with an organization's followers, between managing a communications crisis (caused by an inappropriate statement or negative perception: see Case 3: #McDoStories) and managing a crisis caused by a real threat, accident, weather risk or compromising the public's physical safety. With easy access to available Wifi, these unfortunate events appear on networks almost instantly with no time to prepare. The social networks manager needs to reassure and inform the public involved both locally and remotely. This can involve curious observers on the watch for hashtags to follow a crisis. Certainly not an easy task.[6]

However, as with traditional crisis management, messages should be organized to properly communicate all safety issues (in figure 9.3, this is called organizational actions, which encompasses public messages and instructions) and to preserve the organization's image (using messages that demonstrate the values evidenced by the company's actions to resolve the crisis).

FIGURE 9.3
Messages, Actions, Values

Operational ACTIONS	Organizational VALUES
• Provide practical information • Support victims or present subsequent accidents	• Reinforce corporate values in the current context • Reminder of the corporate mission

Why differentiate between these various messages? Because an integrated omnichannel delivery over various platforms, once these messages are identified, can identify them on social networks and above all, present them properly. Messages about operations can have

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6.   The OECD published a study dealing specifically with the use of social media in risk and crisis management related to natural disasters, accidents or other events that involve a threat to a given population (Wendling *et al.*, 2013).

special hashtags so they are easily accessible to the public and journalists (these hashtags are accepted on Facebook and Instagram, and can be used to categorize videos).

9.6   RAISING AWARENESS IN SENIOR LEADERS ABOUT THE ROLE OF SOCIAL MEDIA IN A CRISIS

Successful integration of social networks in the crisis management process requires an organization's management to understand why this is necessary. The main issue until recently, and which is still a problem for some organizations, is the lack of interest in social networks other than as marketing tools. In a brief report published in 2013 and updated in 2015, the Weber Shandwick group (Weber Shandwick, 2015) stressed the importance of social networks in crisis management. This article was about how to make sure that senior leaders in organizations understand the impact of social networks, when so few are familiar with this media platform.[7] For the purposes of consistent communications, it is often the communications leads who explain the importance of social networks at all times to senior leaders, and also their role in crisis situations. This is a perception that needs to be changed before a crisis occurs. This is why it is important to develop monitoring tools tailored to senior leaders, such as an "executive" report on social network events and subsequent social media results for the organization. This sort of report might contain the number of messages sent to the organization, messages about specific events (accidents or positive events). By showing a flow of relevant information or even shared perceptions about the organization, it is possible to get senior leaders interested in this form of media. This will facilitate the integration of social media in crisis communications plans for the organization. It also enhances the role of communication channels, both for the operational and organizational messages that senior leaders will need to convey in its daily operations or in a crisis situation. For example, as in Case 2, which involves rumours about RECYC-Québec. The organization was advised to produce a report, so that social network activity could regularly be reported to senior management, who then could consider this information in the organization's decision-making and direction.

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7.   The percentage of CEOs on social networks went from 16% in 2010 to 18% en 2012, representing flat growth as indicated in the report.

Case # 2: RECYCY-Québec and Social Media Reactions

In 2010, there were provincial parliamentary debates about moving RECYC-Québec budget and projects to the portfolio for the Ministry of Sustainable Development, Environment and the Fight against Climate Change. The rumour about dissolving this organization generated little media reaction. It was discussed by a columnist interested in environmental issues, and then the City of Montreal mentioned it on its Web site. However, on social networks, the news was being commented on by members of the public, who were concerned about the environment and recycled waste management. A few days after an initial mention in the media, the communications team had social media messages supporting the organization but did not see how this could be used positively for the organization. When the organization's CEO at the time, Ginette Bureau, received the executive report on social media reactions (one week later), she immediately saw the potential this could have for the publically owned organization.[8]

9.7   LIVING WITH FREEDOM OF EXPRESSION AND EXPECTING THE OPPOSITE

Communication crises can be managed by issuing a few communications pieces, three interviews, and a few private interventions on social networks. There may be a potentially negative impact on the company's reputation but the physical integrity of the public is not compromised. Often the source of the issue is difficult to trace to a single person. Attempting to identify the source and track down those responsible is futile, even harmful for the organization.[9] It is better to learn from the situation and makes sure it doesn't happen again. Take the case of #McDoStories (Case #3). Although the story made the headlines, generated a few laughs, and perhaps embarrassed company management, the fact remains that only the chain's reputation was compromised. Instead of trying to shut down the comments on Facebook, it would have been wiser to defuse the situation and learn to respond with grace (especially if the comments do not break social media rules on slander and threats). To achieve this, a social media

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8. This information was provided by Ginette Bureau to the author of the article, one week after the start of the crisis.
9. There is a right to freedom of expression on social networks and in legislation applicable to public spaces.

policy would have been useful plus a social media Q&A diagram. The most commonly used example as a basis for this reflection remains the Air Force on Jeremy Owang's blog.[10]

Insert 9.3
Case # 3: Awful Comments About McDonald's

On January 2012, McDonald's launched a sponsored Twitter campaign (it paid for the hashtags highlighted on the network): #McDoStories. This strategy generated interest: the hashtag became popular, but not for the reasons that McDonald's expected.

Here are some of the messages posted under hashtag #McDoStories:

Dude, I used to work at McDonald's. The #McDStories I could tell would raise your hair (via Twitter).

One time I walked into McDonalds and I could smell Type 2 diabetes floating in the air and I threw up #McDStories (via Twitter).

These #McDStories never get old, kinda like a box of McDonald's 10 piece Chicken McNuggets left in the sun for a week (via the LA Times).

The promoted TT of #McDStories isn't going the direction I think @ mcdonalds wanted it to go. Lots of weed stories and heart attack jokes (via Paid Content).

Ate a McFish and vomited 1 hour later… The last time I got McDonalds was seriously 18 years ago in college… #McDstories (via Twitter).

#McDStories I lost 50lbs in 6 months after I quit working and eating at McDonald's (via The Daily Mail).

With all the urban legends circulating about the popular fast-food chain, for an outsider, Twitter reactions were not a surprise to anyone. Subsequently, McDonald's developed a Web platform using a communications agency: *Our food, Your questions* (http://yourquestions.mcdonalds.ca/) where the company debunked myths about its products.

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10. Air Force diagram: http://www.web-strategist.com/blog/2008/12/31/diagram-how-the-air-force-response-to-blogs/.

INSERT 9.4
**What Can Cause a Crisis that Requires
Communications Action?**

Real threat to public health and safety

- Accidents, contaminated or defective products, meteorological/
  environment risks, etc.

- Transportation, sale of food or electronics

Values clash

- Employees and community leaders should be aware of the
  company's values and be able to distinguish their personal values
  from those expressed on the networks; otherwise there is a risk
  of conflict.

Lack of transparency and clarity

- If you refer to a news item or a quote, provide a link. Allow the
  public to understand and above all, respect the sources and the
  intellectual property of the content.

- Missing information: better to admit a mistake than to create
  a crisis.

Lack of clear instructions for employees

- If there is no written policy for managing social media, mistakes
  can happen.

9.8   EQUIPPING THE ORGANIZATION'S SPOKESPERSON FOR SOCIAL NETWORKS

Although this is not always the case, when a crisis has generated a
lot of attention on social networks, the level of direction provided to
social networks staff should be the same as the teams who intervene
at an accident site. Managing communications in a crisis, or even in
a high-risk situation and providing reassurance to customers on the
networks requires a high level of tact and is highly stressful. Reactions
on social networks are very often immediate and can be blunt. The
fact that this interaction takes place in a virtual environment does
not make it any less real. If an organization is dealing with a high
level of risk, it must ensure that communicators on social platforms
are properly trained and equipped to act in a manner that is aligned
with their employer's mission.

Social Tools Used to Communicate About a Situation and Finding out More About the Existing Risks

Before an initial article is communicated using an "official" TV, radio or WEB media, there will already be social network posts about the crisis, documenting the situation, offering help to people impacted. As well, people will use social media to let friends and family know that they are safe. Since this function is available in a crisis situation, people use social networks to post text messages (SMS), even when the Internet does not work. Major network players provide options to follow a situation live. And Facebook's Safety Check provides alerts for people in an area affected by a natural disaster, a serious accident, or a terrorist attack. Therefore, government organizations need to adapt to these methods of communication.

On Twitter, the main groups involved in with American climate surveillance, such as the National Weather Service (@NWS) and NASA (@NSA-Hurricane), monitor meteorological risks on an hourly basis. In Canada, Space Weather Canada (@SpaceWeatherCA) provides on-going updates on meteorological conditions.

As all areas of activity extend into social networks, it is important that crisis prevention and follow-up measures are integrated with the employees who manage these crisis situations.

9.9   TREND TOWARDS OMNICHANNEL CRISIS COMMUNICATIONS

In terms of a communications plan, an organization's annual plan should include all the tools available to communicators to convey their messages, including social networks. The action plan in a crisis situation (having one is essential since prevention is important) should include social networks. We now know that social media monitoring and providing reports to management for standard operations is important. This can become a critical internal tool for crisis management.

It is generally acknowledged that when a crisis impacts public safety, such as meteorological risks, war room managers are trained to act in sensitive situations with the population impacted. As well, they need to be able to identify employees who need a break or speak with a counsellor. When social networks are not integrated in the company's crisis management plan, a critical component in resolving the crisis is missing. Since there is also a risk related to organizational

communications, the community leader should have a good under-standing of the corporate values and be able to convey them in everyday responses and particularly in a crisis situation. This leader should be able to differentiate between operational and organizational messaging and know how to communicate information in a balanced manner.

CONCLUSION

As discussed in this chapter, crisis situation intervention through social networks follows known crisis communications principles. These same principles related to transparency, conciseness, and respect of rights and freedoms in social network interventions, should be respected during all exchanges between organizations and social network users. Since social networks have an increasingly important role with journalists and in how the public is informed, it seems clear that including them in risk planning and crisis communications management is critical.

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EXERCISES

In a crisis situation, do you know where to communicate your messaging to the public?

Step 1: Your social network presence

1. List the social media used by your organization and the number of followers.
2. Do you have
   - Twitter account? If so, how many followers?
   - Facebook? If so, how many followers?
   - YouTube? How many views per video and how many followers?
3. If there was a crisis situation involving your organization, do you know how to effectively reach your customers or members?
4. How would they ask you questions if there is a problem?

Step 2: Analyze Twitter coverage for a crisis situation, messages from the public and messages from organizations involved in this crisis situation.

1. Do a search by expression in the Twitter search module to identify the hashtags used to discuss this event.[11]
2. Identify the most commonly used hashtags.
3. Collect tweets, either by copying/pasting them into a document or by using Storify.
4. Develop an analysis grid, categorizing tweets as positive, negative or neutral.
5. For further thought, identify negative posts and analyze the organization's and public's response by using the conversation.

Items to consider

- Quantitative: What can we conclude about the number of messages posted for hashtags?
- Qualitative: Was important information about the crisis conveyed by the public?

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11. For example, the hashtag for a hurricane has the name of the hurricane, plus the word "hurricane"

10

DATA SCIENCE AND PERCEPTION OF NATURAL AND CLIMATE RISKS

An Analysis of Twitter Conversations

by Nathalie de Marcellis-Warin
and Thierry Warin

The authors of this chapter provide an overview of the ability to evaluate messages using Twitter to better understand the perception of risks in a sample that is not necessarily representative of the general public, but sufficient for understanding certain trends and in particular, the emotional component of messages. The reader will become familiar with social media that some find complex, by providing a better understanding of the abilities and scope of Twitter, particularly in respect to meteorological events. Scientists and decision-makers are called upon to use this social media to quickly understand, in real time, the scope of messages conveyed by authorities and scientists so they can adjust content based on the target public's perception.

When we want to inform and make the public aware of natural, meteorological and climate change risks, it is important to properly understand the public's perception of the risk and their experience with natural risks in the country and area where they live. It is also important to know how and where the population obtains information, and how it will be shared.

The public's perception of risk is traditionally measured by surveys done for a region, province or country wide. Population surveys have been done about risks related to natural, meteorological, and climate change. With the increase in extreme climate events that have human and economic consequences, we can assume that there is an increase in the perception of these risks. However, results show that some people are "climate-skeptics", and their ideas continue to be relayed in the media and on social networks. In this context, a number of surveys have been conducted in Quebec to find out public opinion in Quebec about natural risks (de Marcellis-Warin and Peignier, 2011) and, more specifically about climate change (de Marcellis-Warin *et al.*, 2015).

In CIRANO's yearly barometer on Quebecers perception of risks, which has been conducted since 2011, a representative sample of the Quebec population is surveyed using ten risk categories (de Marcellis-Warin, 2011). The survey is administered by Léger, a company that specializes in public surveys. Respondents are asked to identify the two risk categories that are top concerns for them personally and for Quebec. Compared to other types of risks (risks related to healthcare systems, transportation, economy, technology, etc.), Quebecers seem to not be terribly concerned by the category of "natural risks", which includes landslides, floods, earthquakes, forest fires, heat waves, etc.

The level of perceived risk has even declined over time, compared to other categories. On average, women perceive a slightly higher risk than men for heat waves and flooding.

Another study developed jointly with CIRANO and the Institut de l'énergie Trottier, entitled "Energy and climate change: A portrait of Quebecers perceptions", was conducted in April 2015, with a sample of 1,010 respondents representative of the Quebec population (de Marcellis-Warin *et al*, 2015). Eighty-four percent of Quebecers believe that the number of natural disasters around the globe has increased in the last decade. However, fewer people perceive this increase for Canada (57%) and for Quebec (53%). Perhaps this difference is because in our region, we do not have the more spectacular disasters such as hurricanes and typhoons or perhaps this is due to the perception level of natural risks noted in the CIRANO Barometer. More than 75% of respondents agree that global warming is the cause of natural disasters. In our studies, "climate-skeptics" are defined as respondents who feel that there is no scientific evidence for global warming (6% of respondents) or that it is not caused by human activities (19%). They represent 25% of the respondents. These findings can be analyzed by variables such as respondent age, profession, and place of residence. The source of the information seems to have an impact on level of perceived risk. The most popular sources are still the television and newspapers, and in third place, the Internet and social networks. A greater number of individuals who receive their information through social networks do not believe scientific reality about climate change than those who do not use social networks. According to CIRANO's Barometer surveys, it was also identified that for certain categories of risks, people who use the Internet and social networks as a source of information have a perception of greater risks.

These surveys are an initial database on the public's perception of risks, which can help scientists, government organizations, elected representatives, etc. to better inform the public and increase the public's awareness of risk and prevention measures. In an environment where the Internet, social networks, and more specifically Twitter are taking on an increasingly larger role as sources of information and discussion, it seems relevant to do a more in-depth analysis of the messages and information in circulation to have a better understanding of the risks perceived by the public. The popularity of these social networks provides a new opportunity to study "public discourse" related to natural events that have occurred, or about societal issues such as natural risks and climate change.

Given this context, data science can provide an interesting venue. It stands at the crossroads of three disciplines: firstly, quantitative methods to filter and identify trends in structured and unstructured data; secondly, computer science, since these analyses are based on the creation of algorithms for quantitative analysis; and, lastly, information technology, since the first two items rely on the ability to implement a computer infrastructure to collect and organize massive amounts of data. For the illustrations for this chapter, we developed, for example, a Nuance-R (www.nuance-r.com) dedicated platform.

The chapter is organized as follows: (1) guiding principles for analyzing Twitter conversations, (2) analytical methods based on data science, (3) findings of the analyzing conversations using #debatsdeschefs during the 2015 Canadian federal elections and #globaldebate, (4) use of Twitter to communicate and alert about major events.

10.1   GUIDING PRINCIPLES FOR ANALYZING TWITTER CONVERSATIONS

People use social networks to obtain and share information, voice their opinion in public debate and in crisis and disaster situations, the public can receive alerts from public authorities. There are currently over a billion Facebook users and close to 316 million active Twitter users around the world. These figures have been constantly growing in the past years. Every 2.5 days, there are a billion tweets posted on Twitter. We will focus on the messages posted on Twitter, an open network where online messages can be read without requiring an account.

10.1.1 Characteristics of Twitter Users and Posted Messages

Twitter allows for messages of 140 characters or less to be sent. Every word counts, and in risk and crisis communications, message content is critical. Tweets can contain emoticons (e.g.,: 0) and different data items (video, photos, gifs). Since September 2016, such items posted with the message are no longer counted in the 140-character limit. Each tweet is represented by the user name (@individual or @organization). For each user account, additional information is provided: profile photograph/logo, a short user description, number of tweets posted since the account was created, number of accounts this particular user is following, number of users following them (followers), messages with the "like" tag, lists created, and recently a "Moments" section to tell a story using Twitter messages (figure 10.1).

F<small>IGURE</small> 10.1

The Weather Network Twitter Profile (October 8, 2016: 13:31) With an Example of a Message that Has Been Retweeted With an Image

The message posted may be intended for one or more people by using "@", a symbol used to call out usernames. Another Twitter feature is the ability to create specific discussion subjects using "#", also known as "hashtag", which enables the sender to discuss a specific discussion topic (Digoin, 2015). For example, #Matthew is used for hurricane Matthew. This hashtag allows other users to quickly join the conversation by searching messages by # and also to find out about top topics. Twitter posts the top "#" in real time when logging in, under "Trends" (e.g. #Matthew, 193 K Tweets). According to Hamed *et al.* (2015), when hashtags are new and more complex (e.g. #ClimateChange), this increases public awareness on Twitter about the topic (climate change in this example). Some hashtags have a global impact, such as #EarthDay, used everywhere around the world on Earth Day.

The social network is different from comparable microblogs since it allows users to retweet messages from other users, retransmitting one or more information items to a user's followers. Many tweets involve re-sending information found on web sites from other media sources. Newspapers also have Twitter accounts where they post the latest news items. Every message shows the number of retweets and how many times it has been "liked". Some tweets are geotagged if the

sender has activated this account option, which could be important in analyzing conversations about a specific event. All this information can be qualified as metadata for each message posted.

In this specific communications process, the sender is a Twitter user who writes a tweet, the content is limited to 140 characters. The recipient can be directly specified in the message (if responding to another message), or it can be sent to the community following that account (followers). However all users can read a post, even they don't have an account. Users can also activate the "mobile notifications" setting for a user to receive notifications any time this user posts a tweet. For example, Environment and Climate Change Canada posts alerts. By following them on Twitter and activating this function, you will have up-to-date information in real time about information that is posted.

10.1.2 Why Is Analyzing Twitter Conversations Relevant?

The reasons are at least twofold. (1) Firstly, we should be careful when using statistical terminology. In most situations, Twitter is not likely a representative sampling of the population (unlike population surveys). However, Twitter is a population of its own. The benefit of this is that all tweets on a topic can be extracted, which means that with sufficient calculation power, the entire population can be used without conducting a sampling. The issue then is to know however if this can be generalized to the entire population, including non-Twitter conversations. Views are highly divided on this. The dynamics on social networks are generally polarized. There is no single global village on the Internet; we have "villages" of people grouped according to cultural, thematic, demographic affinities. Therefore, there is a sampling bias if we attempt to make any generalizations. It is interesting however to analyze a specific conversation and identify cultural, thematic, demographic and other control variables. At this stage it is possible to draw general conclusions about the population in the broadest sense. (2) Other than statistical considerations, there is a second interesting use of Twitter: it is a platform for users to connect and share information. We can easily imagine all the situations where user-level information will enhance social relations or provide feedback that is useful in communicating and managing risks. Additionally, the temporal aspect of this information is of interest. For example, public authorities can find out about a crisis in real time through these social networks. They can find out about the emergence of a

crisis situation and its development and therefore can respond more effectively through appropriate means. Developing tools and analysis frameworks to extract this information is increasingly relevant.

10.1.3 COLLECTING TWITTER POSTS

Twitter provides access to tweet texts and user metadata (username, location, etc.). There are a number of ways to extract this data (Digoin, De Marcellis-Warin and Warin, 2015). The main method is through API (Application Programming Interface). REST API and Streaming API are the main two APIs available to the public. Users have direct access to all data through an API query for a specific period of time. API Streaming seems best for real-time analysis. Using R software, for instance, recovery loops can be created to retrieve data directly from the API. All tweets can therefore be retrieved for real-time analysis for a predetermined period. Based on the period in question and the hashtags selected, this can result in a very large number of posted messages, which may involve several thousands or even hundreds of thousands of messages. In some cases, the database must be cleaned up to remove messages that do not apply to our search. For example, if we are looking for message with #storm or #tornado hashtags, we could end up with messages such as #bill_storm, which is a user name, or even "Fun the #tornado! better that lazy river" which was posted after a trip to a water theme park.

10.1.4 ANALYSIS OF TWITTER POSTS

Before doing an in-depth analysis of all posts, we first need to have an initial idea of the conversations about certain topics by using the Twitter search engine. For instance, if we are looking for information on earthquake or seismic wave risks, we would quite rapidly notice that most of the messages do not use the "#" for #earthquake. Is this because the word is too long? Some use #quake, but is this the same thing the general public would look for when searching for information on an earthquake? There are a number of messages about the Grande Secousse du Québec (Great ShakeOut), which promotes drills to prepare for an earthquake, with a simulation held each year. Messages may come from individual users as well as specialized sites, insurance companies, government departments, journalists, etc. Some people may ask questions or provide information on an event that has already taken place.

INSERT 10.1
Examples of Questions Asked on Twitter After an Event

> Is it possible that some people felt a micro earthquake lasting just 2 or 3 seconds in Quebec?

> Did the earthquake wake you up last night? Is Quebec a risk zone?

> Earthquake… in Mirabel now? Strange feeling… 9:45

> Quebec earthquake, level 6, scary

> #earthquake was really scared: why so hard in Montreal, what about the rest of Quebec?

> According to Richter studies, Quebec sits on the Canadian shield, so risks of an earthquake are rare… my eye!

Etc.

Some will receive responses from users they may or may not know, but who want to be part of the conversation. And, as with a search engine, search results can be displayed by user (@sismiquezone, @seismoCH_F, @Tremble_Terre), or in photos and videos (and this will display all messages with a video link). If we search for, say, the word "seisme" [quake] in French, different accounts will appear (@Seismes, @CANADAseisme/@CANADAquakes, @FranceSeisme, @PlanSeisme, @seismesrecents, @HaitiSeisme, etc.). @CANADAquakes is a certified account that posts messages about the earthquakes that are important for Canadians. For some other user accounts, it is difficult to confirm if the information is true, scientifically validated, or a rumour, etc. Few users cite scientific sources and the major international scientific associations do not have a strong presence on social networks. Some messages might cite or comment on articles published in the media, web sites, or blogs.

Between 2012 and 2013, Lirilenko and Stepchenkova (2014) collected 1.8 million tweets that mentioned "climate change" and "global warming" in five languages (English, German, Russian, Portuguese, and Spanish). The most cited sources were The Guardian (5% of all references on climate change), followed by news aggregators The Huffington Post and the ThinkProgress blog. The most often

cited popular scientific sources in their samples included the main print media publications such as Scientific American, Science Daily, and National Geographic. Some websites that question the truth about climate change (e.g., wattsupwiththat.com and climatedepot. com) are regularly cited as an information source in these messages. Users will comment on the articles cited and often provide their personal opinions.

Conversations on these topics often move beyond the article and focus on user comments, and not on the points covered in the article. Reading these comments first can create a bias in the perception of the arguments presented in the article. Furthermore, how can we measure user influence on Twitter? Is it the number of posts? Number of followers? Number following? Number of retweets?

Kwak, Lee, Park, and Moon (2010) showed that on average, a retweet reaches about a thousand users, regardless of the number of the followers of the user who first published the message. Messages from one user will be displayed on the news feed of the followers. However, this does not mean the followers will retweet the initial post to their own network. De Marcellis-Warin, Sanger and Warin (2015), showed that retweeting (RT) a message is the best way to measure the impact of a posted message. A RT shows the name of the person who originally posted the message. Therefore, it is possible to link this person who posted the original content with the first circle of persons who retweeted the information. These coupled users help us trace a map of the retweet network.

In the example of network users shown below (figure 10.2), we note that the most followed user is minimally associated with the other groups and is not part of most of the interactions (circle A). The dynamic suggests that the user posts the content that is retweeted by other users; but these users remain quite separate compared to the rest of the overall network. The second group to emerge (circle B) is formed by news channels (Twitter media accounts). This network highlights the central points across the network that could be structurally qualified. Lastly, the third group (circle C) is made up of most of the users, and is characterized by the mass around the dozen most connected users. This structure suggests a high level of interconnectivity between users, but it does not help us identify central points as in the previous group. In other words, if one of the points of the last network was removed, this would not prevent the spread of information. However, if one of the elements from the other two groups were

to be removed, this would have a profound impact on the structure of the sub-networks. This is an initial step in measuring the influence of certain users on Twitter (De Marcellis-Warin, Sanger and Warin, 2015).

FIGURE 10.2
An Example of a Network of Users (Individuals and Organizations) Who Posted About a Specific Topic and Were Retweeted (RT)
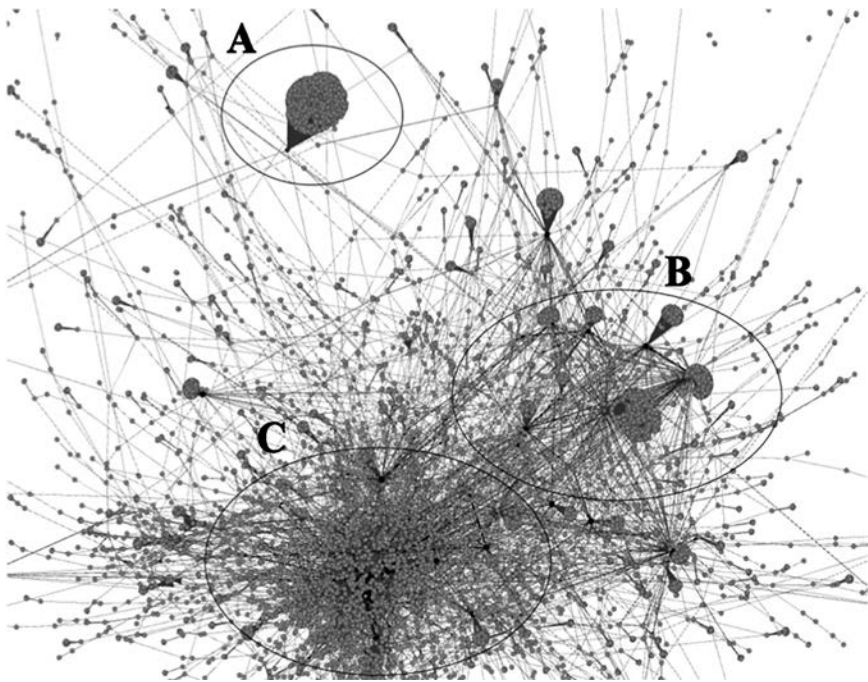
Source: De Marcellis-Warin, Sanger and Warin, 2015.

10.1.5 SENTIMENT ANALYSIS IN TWITTER POSTS: POSITIVE OR NEGATIVE?

An analysis of the content of posts is another way to better understand the scope of the information conveyed. Word clouds provide a bit more detail in the analyzed messages, by grouping the most mentioned terms in a word cloud. This provides insight into the scope of posts. In other words, sentiment analysis is a good way to assess the content of a message. The term "sentiment analysis" was first used in a study by Nasukawa and Yi (2003). In this article, the authors use a new approach

by analyzing specific parts of a text and assigning positive or negative attributes instead of categorizing the entire document as being positive or negative. Based on this initial work, the essential items could be extracted for a semantic analysis: How are sentiments expressed in the text? Do expressions indicate a positive (favorable) opinion or a negative (unfavorable) opinion on the subject? (Digoin, 2015).

Bollen, Pepe, and Mao (2009) were the first to use sentiment analysis for Twitter posts. Throughout their study, they extracted six dimensions of mood from posts: *tension, depression, anger, vigor, fatigue,* and *confusion.* Then they compared their findings with fluctuations recorded by stock market and crude oil prices and major events in the media and popular culture, such as the U.S. Presidential Election of November 4, 2008. They found that events in the social, political, cultural and economic sphere have a significant effect on the six dimensions of public mood. This finding is a turning point in the history of Twitter sentiment analysis (Digoin, 2015).

This kind of study is of great interest in risk communication because message content can have a major impact on public reaction. Messages in this case are transmitted by all Twitter users using certain words in their messages. Based on how the information is presented or if it is a video (which we do not know whether it is real or rigged), a perception bias may occur. So we need to ask ourselves whether it would be important for government agencies or scientists to post on the network and be part of these conversations, providing evidence-based data, scientific study results, and if there is uncertainty, information about the current level of knowledge.

Another study by Bizhanova and Uchida (2014) attempted to create an automated method for sentiment analysis based on the messages posted on Twitter and their emoticons. Some messages include emoticons, which are pictorial representations using a combination of symbols inserted in a line of text to convey expression. These studies focus on two main emoticon groups: :) :-) :], which are considered to be positive; and :'-(:'(, which are considered to be negative. For every post, a sentiment score can be assessed using a lexicon. A positive word in the lexicon means adding a point ("+1") and a negative word means subtracting a point (value of "-1"). There are also neutral words. If we use the example of the message "earthquake in Quebec, level 6, scary", the term "scary" gives the message a negative score. This provides a way to approximate how a specific topic is perceived on Twitter.

10.2   EXAMPLE OF THE ANALYSIS OF REAL-TIME TWITTER CONVERSATIONS DURING THE 2015 CANADIAN FEDERAL ELECTIONS (#GLOBALDEBATE AND #POLCAN2015)

During the 2015 Canadian Federal Election televised debates, a number of tweets were posted on Twitter. Both the environment and climate change were topics of discussion. Conversations were analyzed during both debates (Sanger and Warin, 2015): http://mondointl. cirano.qc.ca/2015/10/06/canada-2015-debatdeschefs/). The first English debate took place on September 17, 2015 and was organized by The Globe and Mail. On September 24, 2015, La Presse, Télé-Québec, and Radio-Canada organized the third debate of the campaign in French, which was also broadcast on the English-speaking television channels, CBC, CTV, and CPAC. Tweets started coming in an hour before the start of the debate (7:00 p.m., EST), and ended an hour after the debate ended (11:00 pm, EST). The number of messages with hashtags "#débatdeschefs" and #globaldebate were counted each minute. These messages also contained the hashtags, #polcan, #Polcan2015, #Elxn42, and #elxn2015, indicating that users wanted to be part of the conversation.

For the English-language debate, more than 130,000 posts were gathered during this time, peaking at 1,000 tweets per minute for certain parts of the debate. During each debate, the various topics were discussed by Twitter users. Posts both in French and English referring to the various topics were counted each minute. In so doing, it could be determined whether specific election topics generated more reactions than others, and, particularly, if these reactions were limited in time, or if they persisted beyond the period allocated to these topics. For the environment and climate change, the following hashtags attracted our attention: *COP21, Paris conference, environment, climate, greenhouse effect, pipeline, energy,* Énergie *Est, pollution, Keystone, Kyoto, carbon, bituminous sands, Megantic, oil, and water* (for each tweet, the hashtag was preceded by "#", e.g. #climate).

Figure 10.3 shows that the first two posting peaks correspond to the hashtags for the environment. They were tracked right from the beginning of the debate. During the October 6, 2015 French-language debate, there were messages related to the environment and climate change present throughout the debate, with a significant peak when the candidates spoke directly about these issues. However, Twitter users communicated throughout the debate on a number of topics about this theme, highlighting the importance of these issues for the people of Quebec (Sanger and Warin, 2015).

If this is represented in a word cloud, then the words most mentioned during the period reviewed are shown in a larger font size. The words "change/changement", "climate/climat", and "climatique" stand out for being mentioned the most. The surrounding words provide information about the content of the conversation: the English equivalent of these words are impact, warming, clear, false, debate, let's talk about the climate, etc.

FIGURE 10.3
Word Cloud of Words Mentioned the Most on Twitter During the September 17, 2015 Debate (size of the word corresponds to frequency)

Source: Mondo international.

Through a slightly more in-depth analysis of the context of the debate, and by attempting to identify the reasons for the two peaks, Sanger and Warin (2015) discovered that there was a campaign organized by 350.org Canada (which is defined on its site as building "a global grassroots climate movement that can hold our leaders account-

able to the realities of science and the principles of justice") prior
to the debate encouraging Twitter users to send a specific message
during the debate. This organization provided an example of a
Tweet: "Climate science isn't a debate. Climate actions means a clean
economy & freezing tar sands. #ClimatELXN #globedebate." 1,138
people responded that they planned to do this post, and more than
860,000 people in networks for these user networks were aware of this
campaign. This campaign explains some of the peaks in the analyses.

10.3 TWITTER ALERTS IN DISASTER OR SEVERE WEATHER EVENT PREVENTION

In order to have effective communication about severe weather
phenomena, the issuers of meteorological information must provide
accurate and timely messages so that the recipients (population at
risk) receive and react to these messages. Twitter is therefore a good
medium for sending this type of information (Ripberger *et al.*, 2014).
For example, to inform people about weather alerts on Twitter, a
weather alert messaging service has been available since 2015, based
on information contained in weather alerts transmitted every day by
Environment Canada meteorologists. Each time an alert ends or a
new alert is issued, a tweet is automatically sent out. Every tweet also
has a hashtag to report severe weather. Each page dedicated to a city
on the Canada.ca/weather also has its own Twitter page. For example,
Montreal's account is @ECAlertezQC147. Each tweet posted has specific
content (figure 10.4). Hashtags are added in the alert description as part
of the conversation on the subject.

FIGURE 10.4
Detailed Content of a Twitter Alert

A. Account name	B. Time	C. EnvCanada	D. Status	E. Alert Description	F. #City Name	G. Feed back	H. link to City page
@ECAlertAB14	14:20	EnvCanada	issued	#Tornado #Weather Warning	#Edmonton	#ABStorm	------------

Source: Environment and Climate Change Canada, https://www.ec.gc.ca/meteo-
weather/default.asp?lang=En&n=BF9C15EC-1.

In Quebec, the hashtags for reporting severe weather are #météoqc (French) or #meteoqc (English). This corresponds to a weather-related message. In French, the hashtags are Météo #ABMétéo, whereas, the hashtag used for other provinces in English in Canada is STORM (e.g. #ABStorm). When doing a search with #meteoqc messages on Twitter, many are about the weather, even including good weather. Other hashtags, such as #storm #tornado are used for information on messages on severe weather. Most messages with the #storm hashtag will involve exclusively storms and severe weather events.

In order to have effective communication about severe weather phenomena, the issuers of meteorological information must provide accurate and timely messages so that the recipients (population at risk) receive and react to these messages.

Ripberger *et al.* (2014) measured the public's attention in "real time" to communications about climate alerts by studying data flow of Twitter posts. They noted that the number of tweets with "tornado" increases with the number of tornado alerts issued the day before and on the same day. They collected tweets on risks of tornadoes, tornado warnings, and the conversations that followed these climate events between April and November 2012 to establish a relationship between risk communication, attention, and the reactions of the public to severe weather phenomena. This provided information about what the public was thinking on the day of the warning, or even five to ten minutes after a warning was issued, as well as impact on public behaviour and messaging content. They found that the more people talk about a risk or hazard on social media, the more likely they are to be concerned. Fluctuations in public Twitter posts provide a valuable and useful indication of public attention about earthquakes (Sakaki *et al.*, 2010). Therefore, social media can be used to analyze public attention to severe weather communications. However, the number of messages after a tornado (often at peaks) is higher than the number that follow tornado warnings.

Other sites can provide additional information, such as @urgencequebec, which is the hub for government information in emergency situations. Messages conveyed are re-sent on social media, which shows the relevance of analyzing messages and information in circulation, to refine the public's perception of risks.

CONCLUSION

Social networks are an integral part of public life. A great deal of information – valid or not – is shared and it is possible for us today to be alerted practically in real time and react right away. It is therefore important that government and scientific agencies communicate using these networks and join the network and the conversation, by posting evidence-based data, scientific study results, and in times of uncertainty, by providing information on what is known at that time. Twitter messages can be up to 140 characters. The content of a message is very important since it can go viral after just a few re-tweets. Following and analyzing what Twitter posts gives us a better idea of the level of risk perception of some of the network users. Although they might not be representative of the general public, they help to identify general trends and, especially, the emotional component of the messages. This also enables us to reframe the conversation by responding to messages or by shedding a more scientific light on the information conveyed. Above all, we need to remember that "#" is the key to join in on the conversation!

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EXERCISES

What is being said about climate change on Twitter?

1. Go to the web site www.twitter.com, and in the Search function, type in "climate change" (you can search on Twitter, even without having an account)

2. Analyze the overall results of your search.

   Tip: Comment on accounts identified with these terms; the most recent messages that mention climate change; the use or not of the hashtag #climatechange; the use of other hashtags; the mention of other accounts "@"; if these are re-tweets (RT), or the reaction to a tweet; if there are images – photographs or texts – attached to these messages, emoticons; if there are videos attached to messages, what is the content; what references are made to scientific sources, etc.

3. By navigating the parameters of the resulting posts (Top, recent, accounts, Photos, Videos), what do you think about the Twitter conversation on climate change?

4. Wait fifteen minutes. Then redo the search. What do you notice?

5. Under "Other options", do an advanced search identifying places and dates.

6. Get involved in a conversation and compose a Tweet to be part of the conversation on climate change.

   Tip: Think about the message. Ask yourself if you want to respond to a particular message specifically by mentioning the sender of message @; or by using the RT function; or if referring back to a message by quoting it, use the hashtags #; do you want to attach a photograph, a link to a web site, an emoticon; and be quick about it since a conversation continues while you are writing your message.

   If you are part of a group, let each member prepare a message and share it among yourselves. Then comment on the messages!

SOCIAL MEDIA IN EMERGENCY MANAGEMENT (SMEM)
Adopting the Public Response

by Guylaine Maltais and Thierry Libaert

This chapter delves into one of the topics discussed in previous chapters: the public's role in risk communication and meteorological and climate crises. Herein, the topic is analyzed through the lens of social media in emergency management (SMEM). We will explore how it is possible to develop a strategy to deal with the flood of information on social media during a crisis. Information related to the crisis is already complex and paradoxical, especially when compounded by information disseminated by members of the public on social media. The public should be treated as allies, and not as obstacles, in the resolution of a crisis. We will look at how the public can become conveyors of information, and how experts and authorities become receivers of crucial information they would not have otherwise known about. These bi-directional communications roles during a crisis should be built on trust.

There is relatively little analysis on the role of the public during a crisis. This can be explained largely by the history of crisis management and the technical approaches that governed its development. At present, because of the growing power of social sciences and, notably, psychosociology or information sciences, the human factor, combined with public response, plays a central role. Still largely absent in reports published by survey commissions (analysis in insert), this role is more apparent in digital communications and, more specifically, in the use of social media in emergency management (SMEM). In fact, members of the public can immediately take a photograph or video with their cell phones, and then share this information on their social network. Gerald Baron, an American expert in the field, discussed this back in 2011.[1] When a member of the public wishes to collaborate in an emergency, sharing information becomes an automatic response that helps the community. This type of control is also vital in implementing post-crisis management measures. However, it is pertinent for authorities to equip the public beforehand by informing them of what is expected in case of an emergency, such as actions to take on social networks. The French government fully understood this concept when it integrated social media in emergency management (SMEM) in its digital strategies (adopted in October 2015).[2]

1. https://www.youtube.com/watch?v=MFt7NXDhcmE. Page accessed February 12, 2017.
2. http://www.siglab.fr/fr/les-msgu-en-cas-de-crise-sur-les-reseaux-sociaux-adoptez-le-reflexecitoyen. Page accessed February 12, 2017.

11.1   SOCIAL MEDIA DURING A METEOROLOGICAL CRISIS

During meteorological crises, social networks have proven their worth when other media seem to have failed. This was observed during major floods, hurricanes, earthquakes, and forest fires (these were more natural disasters than meteorological or climate events.

Firstly, it should be emphasized that on social networks, openness and transparency are vital.[3] In fact, this is the basis for using these tools by various authorities during meteorological or climate events, or other kinds of crises/emergencies. It should be noted that for meteorological crisis management to be effective, social networks should also be used by the relevant stakeholders before a crisis or an emergency.[4] This will help in building credibility.

In the United States, the Federal Emergency Management Agency (FEMA) has fully embraced this reality and uses videos to train people on what to do during hurricane season. Viewers can virtually step into the agency's Coordination Center through short videos that are effective in disseminating instructions to follow ahead of hurricane season. Filmed in FEMA's Coordination Center, these video capsules, demonstrating openness and management transparency, inspire public trust, and require very little administrative work.

The National Oceanic Atmospheric Administration (NOAA)[5] is one of the official organizations that effectively uses social networks before and during a crisis situation. Furthermore, its Storm Prediction Center[6] offers interactive maps and safety instructions in case of tornadoes.

A number of disasters have left their mark on the still short history of social media in emergency management (SMEM). Some of these were severe meteorological disasters, which provided many emergency management learning opportunities for agencies and organizations. The following cases will be explored:
- Major flooding in the state of Queensland, Australia (2011)
- Major flooding in Alberta (2013)
- Forest fires in Fort McMurray, Alberta (early May 2016)

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3.   See Chapter 1 where it is stated that total transparency is not possible because "too much information causes a lack of understanding." This statement does not contradict, but complements, what is written here.
4.   In risk communication as defined in this work.
5.   http://www.noaa.gov/.
6.   http://www.spc.noaa.gov/.

While the disaster struck over 90% of Queensland, Australia in 2011, disrupting the lives of more than 250,000 persons in a dozen cities, the state police, responsible for emergency measures, used Facebook and Twitter to communicate with the public as the situation unfolded. Information updates were posted regularly on their Facebook page. Traffic on the state police page went from 6,000 hits in early December 2010, to 165,000 on January 11, 2011. This demonstrates the importance for an organization responsible for emergency measures to have a presence on social networks during an emergency or crisis. This page became the official source of information for the public and traditional media. The media could then redirect their audiences to the Police's social platform.

The importance of social media is clear during the Australian disaster. By 2016, bringing together traditional and social media became critical for any organization involved in emergency management. This will be revisited further on in the section on SMEM.

In 2013, Alberta in Western Canada experienced the worst flooding in its history. The flooding affected a quarter of the area, forcing more than 100,000 people to leave their homes. At the time, many official organizations turned to social networks to communicate with the public.

In a major emergency, the flow of information on social networks can quickly become uncontrollable for a government department or any emergency management organization. It is therefore possible (in many parts of the world) to use a team of volunteers for virtual support in emergency operations. This is known as VOST (Virtual Operation Support Team).[7] The primary role of the team is as follows:

- Ensure messages from the authorities are understood by the affected populations
- Identify rumours and misinformation that could endanger lives
- Evaluate the reputational risk for the organizations involved
- Determine, analyze, and visually display information circulating on social media that could help managers, as much as possible, gain a better understanding of the disaster and its consequences

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7.   http://vosg.us/history/.

During the 2013 Alberta floods, the Canadian Red Cross mobilized CanVost, of which Guylaine Maltais is a member. The team coordinator ensured that the Red Cross and team members were connected, and that monitoring requests were carried out. This team then becomes a major asset for emergency management officials. Furthermore, the VOST team is made up of members of the public willing to assist fellow citizens, which is highly representative of the movement.

Lastly, Fort McMurray (also in Alberta) was hit by a severe disaster in May 2016. This was a devastating forest fire that forced the evacuation of close to 90,000 people. While it was not a typical meteorological event (in fact, the latest assumptions about the Fort McMurray fire suggest it was caused by human activity), forest fires, nevertheless, can be considered climate risks. This crisis, as never seen before to this extent, required the province to declare a state of emergency just three days after the fire started. The agency now in charge of emergency management in Alberta solicited the help of CanVost,[8] which was mobilized for four days. Communications on social media were practically instant because of the many emergency management officials. A few examples are provided below. Early on and throughout the crisis, maps were published and information updates were disseminated by various authorities. Simply mentioning the word "update", including date and time, is highly effective in that it enables people to contextualize information on a timeline.

Here are two screenshots of the Regional Municipality of Wood Buffalo's Twitter account, with updates on the forest fire situation in May 2016 (figures 11.1 and 11.2).

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8.   CanVost: @CanVOSTactual on Twitter.

FIGURE 11.1
Twitter Post of an Update on May 2, 2016

> **RMWB** @RMWoodBuffalo · 3 mai
> Updated map for the Fort McMurray west wildfire. Accurate for May 2,
> 11 p.m. #ymm #rmwb #ymmfires
>
> ↩   ⇄ 37   ♥ 8   •••
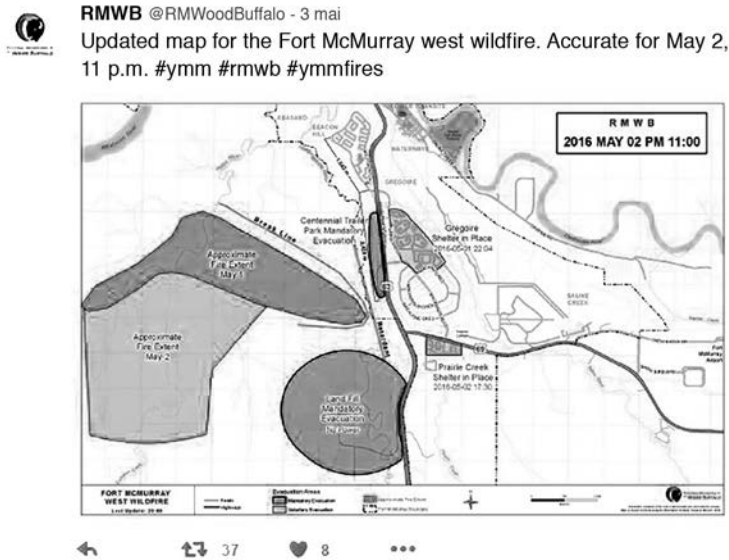
Source: RMWB@RMWoodBuffalo, May 2.

FIGURE 11.2
Twitter Post of an Update on May 6, 2016

Wildlife Update – May 6, 11:55 a.m.

Anzac – 12 structures gone, spot fires remain however the fire is
under control

The fire has not reached Gregoire Lake Estates/Fort McMurray First
Nation; crews are working to prevent it from spreading

> **RMWB** @RMWoodBuffalo · 22 min
> Wildlife Update - May 6, 11:55 a.m. #ymmfire #FortMacFire
>
> ↩   ⇄ 136   ♥ 55   •••
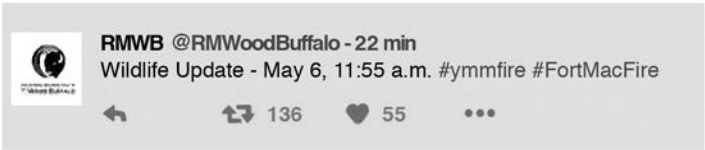
Source: RMWB@RMWoodBuffalo, May 6.

The fact that traditional media recognized the relevance of social media was telling. In an article published in the Globe and Mail on May 4, 2016, a reporter compiled, among other things, the first overview of official and essential accounts to follow on Twitter and Facebook. Conveying this information through traditional media demonstrated how critical these new tools have become.

In conclusion, there is a growth in the use of social networks as a means of alerting the public and in the use of mobile applications for weather alerts. Given that issuing alerts to the public is critical in an emergency situation and can save lives, these advances can only be viewed in a positive light.

11.2   SMEM: USE OF SOCIAL MEDIA IN EMERGENCY MANAGEMENT (HURRICANE SANDY, A CASE STUDY)

11.2.1 BIRTH OF THE CONCEPT

First of all, it should be pointed out that the original #SMEM hashtag was co-created in Quebec. Although an English term was already well established, Judith Goudreau and Guylaine Maltais in February 2012 reflected on which term to use for consistency in social discourse. Among other things, they wondered if they should consider the concept of public safety. They chose to do so by focusing on emergency management. It was crucial to keep in mind the unique aspects of emergency management in Quebec and in French-speaking communities. To address this essential need for information (knowledge, sharing, interaction) that rises from an emergency, the French hashtag **#MSGU (médias sociaux en gestion des urgences)** seemed an obvious choice. It integrates the four stages of emergency management in Quebec: preparedness, prevention, intervention, and recovery. Therefore, before, during, and after an emergency.

Four years later, that concept has greatly evolved thanks to our colleagues in France, members of VISOV[9], and to the ever-expanding MSGU (SMEM) community in France and Belgium. It evolved to such a degree that France's Service d'Information du Gouvernement has developed and implemented a #MSGU strategy to raise public

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9.   http://www.visov.org/.

awareness about using social media in crisis situations. Clear and effective communication tools have also been developed. This is an inspiring approach for governments around the world.

11.2.2 SMEM: Assuming a Role Before, During, and After an Emergency

Currently, organizations that regularly use and apply SMEM have confirmed that contributing to their platforms during an emergency (meteorological or others) is directly proportional to fewer interviews requests with the traditional press. In effect, by contributing regularly to social media and by having a presence, an organization can quickly and indisputably become the official and reliable source for events in which it is involved. By using SMEM during each stage of emergency management, government departments, agencies, municipalities, and other organizations, with a role to play, along with the private sector, can build relationships of trust with their target audiences. During the recovery (post-crisis) stage, they can also provide safety instructions and information on available assistance programs, such as psychosocial assistance, etc.

11.2.3 A Place For the Public-Actor

Members of the public want to help out in an emergency and contribute. They have, therefore, a role as willing and able actors in any emergency planning. Those responsible for emergency management should keep the public in mind when planning. The public-actor can certainly become the eyes on the ground for the authorities, provide updates, and convey information of their behalf.

For instance, during the Fort McMurray, Alberta, disaster in May 2016, the following open-data Facebook page was immediately posted online to help the public evacuate the city (figure 11.3).

This forum for exchange became critical for both those in need and for people willing to provide shelter or other forms of aid. In the days after the evacuation caused by the forest fire, many such pages appeared online.

FIGURE 11.3
Facebook Fort McMurray Open Source Help Page
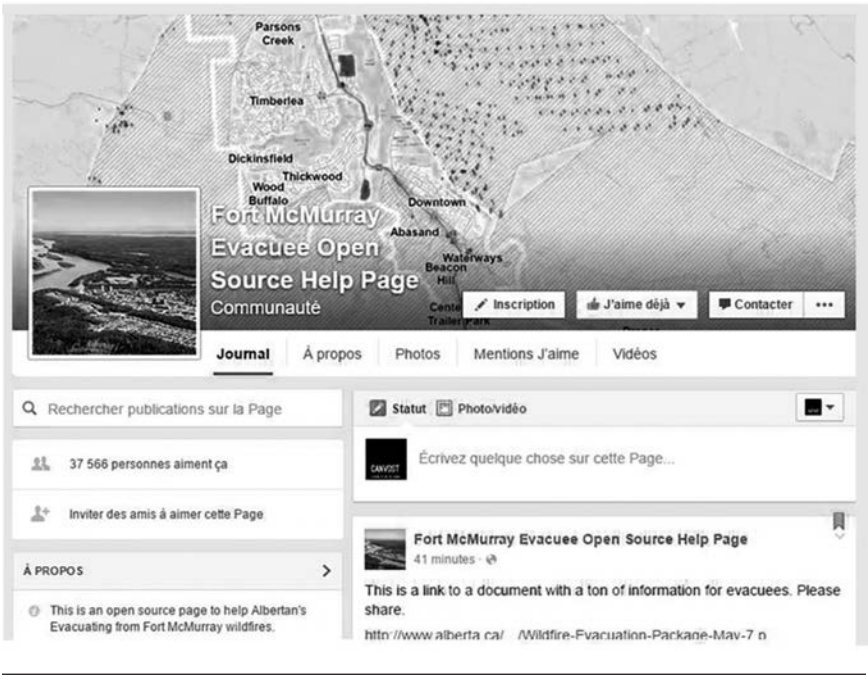
11.2.4 HURRICANE SANDY[10]

Shortly after Hurricane Sandy, which hit the Caribbean and the United States in October 2012, the small French-speaking MSGU (SMEM) community at the time had set up a chat room (#MSGUCHAT) to highlight learnings. Although exchanges lasted no more than one hour, it was enough to learn a few things. The exchanges focused on four questions:

- How did Hurricane Sandy's characteristics and impact zone promote heavy use of SMEM?

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10. Paradoxically, the best disaster response was with Hurricane Irene, which hit a part of the same area the previous year. As social media had already proven to be useful, preparedness for Hurricane Sandy was much better. For example, an open-data platform made possible by a digital road map, was published that year (2011). It helped, New York City, in 2012, to lay out evacuation instructions on social media, among other things. Both the authorities and the public had learning take-aways with Hurricane Irene.

- How did SMEM help the population to become more resilient?
- How did the authorities organize their response through SMEM?
- What could have been done to improve the effectiveness of SMEM?

11.2.5 CHARACTERISTICS AND IMPACT ZONE PROMOTING HEAVY USE OF SMEM/MSGU

It is worth repeating that Sandy was the most powerful Atlantic hurricane to strike the most populated areas of the planet – the Caribbean and Eastern North America – where at least seven American states (from Virginia to Maine) were severely affected. Modern and connected people lived in the impact zone, which includes New York, and areas where the Internet network is highly developed. Thus, this area's population was already extremely active on social networks at the time.

The 911 lines on the East Coast of the USA were overwhelmed and unable to respond, yet the Internet continued to work across most of the area. More powerful than the power grid and traditional phone lines, mobile networks and 3G connection seemed to have worked quite well.

11.2.6 RESILIENCE THROUGH SMEM

The simple fact of being located in an area that is highly connected to social networks represents, for affected populations, an enabling factor for resilience. The population searched for localized information, hence, the importance for local authorities to have their own social network accounts. Alert information that was widely disseminated on social media did not do as well through other kinds of media. Many people with no 911 access reached out for help directly on social media. Notably, the New York Fire Department's Twitter account proved to be an unequivocal success thanks to the community manager's outreach to citizens in need. By answering numerous calls for help, some requiring psychological assistance, and thus, helped save lives, the community manager became a true hero.

Volunteers and authorities offered their input as well. Here are a few examples:

- Calls from individuals requiring insulin were handled, and members of the community provided help.

- Online maps published by volunteer teams provided practical information (open pharmacies, shelters, mobile charging stations, etc.).
- More than 100,000 photographs were verified and posted online by the community.
- Open Street Map, a collaborative map, depicted the extent of damages.
- Spontaneous communities were set up to dispel rumours.

During Hurricane Sandy, obvious differences between Facebook and Twitter came to light, each with their own strengths and goals. Facebook's main strength is the way it connects families and friends, thus, reducing stress, and helping develop resilience. Once again, with Hurricane Sandy, generosity between neighbours and others from the surrounding area surfaced during this emergency – and possible through social networking.

Twitter's strength comes from the way it can spread news in real time and very quickly. It's ideal for communications between authorities, emergency services and the population. It's also ideal for communications with traditional media. There were at least twenty million tweets posted about Hurricane Sandy. This social medium has become the perfect tool for emergency communications.

11.2.7 ORGANIZING THE AUTHORITIES' SMEM RESPONSES

Hurricane Sandy was a turning point for SMEM: authorities were wisely using social networks as a best practice and were subsequently commended by the press. From the initial alert, the Federal Emergency Management Agency (FEMA) had established the use of social networks and text messages (SMS) as means of communicating, having anticipated the breakdown of phone lines. The public turned to social media within the first hours of the event.

New York City made location-based data available to help with finding shelter and the evacuation process. Other organizations (such as Google and VOST volunteers) published maps. Authorities provided an incredible amount of information by providing links to pertinent accounts to follow on Twitter and Facebook and curbing the use of links to pages that were too large to load.

The authorities' level of commitment also made SMEM history. Here are two examples that demonstrate true collective intelligence and personal determination:

- Press conferences given by the mayor of New York were rebroadcasted live on social media[11].
- Decision-makers (governors, mayor, etc.) who sent tweets from their personal accounts reinforced those published by their administrations.

Authorities who did not have a social media presence during the emergency were criticized for not having responded to the population's SOS. With the level of social commitment by various authorities, a single person per organization was simply not sufficient. Various organizations, such as the Red Cross, and private companies, such as General Electric, provided a 24/7 presence, posting a tweet every five minutes at the height of the emergency.

Before, during, and after Hurricane Sandy, the use of interactive and collaborative maps indicated respectively, for example, the trajectory of the hurricane, essential service points (gas stations, shelter, roads, etc.) lost or restored and where electricity had come back on.

11.2.8 Avenues of Improvement for a More Effective SMEM

Although the public took it upon itself to curb rumours, FEMA had organized its response by launching a tool dedicated to rumours on their Internet site: "Rumor Control".

Here are some points raised in chat rooms to consider for improvement:

- Authorities should plan ways to digitally share information on alerts and include them in their emergency, crisis management, or recovery planning (depending on where they are in the world), which will improve resiliency
- Eliminate confusion when qualifying a hazard (Is it a storm or a hurricane? This creates doubt about the severity of the event)

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11. "FRANKENSTORM: – "Take Huricane SANDY Seriously – OBAMA & FEMA WARNING to Americans", Youtube, October 29, 2012, https//www.youtube.com/watch?v=z.Xhc.11.8FBsk. Page accessed February 12, 2017.

- Organize hashtags for different platforms: #Sandy, #HurricaneSandy, #Frankenstorm[12]; checking rumours, which could have been done sooner
- Find ways to summarize information
- Plan ways of using volunteer teams as support to deal with the large amount of data on this type of emergency when authorities are overwhelmed

Whether this involves New York City or for any other city/district, some ideas are worth further discussion:

- With Wi-Fi connections considered as critical as water and electricity, we should find ways to make connections more stable during meteorological and climate crises.
- Since access to information is vital during a disaster, thus, emergency planning of various organizations and companies involved in emergency management should provide designated stations to the public to recharge their mobile phones.

Regardless of the technological tools and methods, it is important for those in charge of emergency management to include these tools in their preventive communication programs, and to test them with a sample group.

There is sometimes a fine line between the various phases of an emergency. Hurricane Sandy showed that, for integrated emergency management, it was possible and essential to use SMEM before, during, and after the emergency. SMEM allows for greater effectiveness during an emergency. However, it is best to integrate SMEM into communication planning related to the organization's emergency management plan, coordinate it with traditional communications, and use it before and after an emergency.

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12. In 2016, it is possible to make further progress in the planning of public emergency communications by ensuring coordination between SMEM and the press. This is done, first, by determining the hashtags to use for meteorological and climate (risk) phenomena. And then simply by identifying meteorological and climate risks in the planning of emergency management for the city, district, department and all the actors with a role to play. Finally, by preparing press releases 2.0 in advance, and integrating hashtags to these which will be used following an event (press release that will thus be ready in part should a crisis or emergency arise).

INSERT 11.1

What Should the Various Authorities Involved in Meteorological and Climate Crises Keep in Mind for Effective Communications and Intervention With SMEM?

1. Integrate SMEM in any emergency planning
2. Have an online presence and use social media **before**, during, and after a crisis situation
3. **Advise of imminent** meteorological and climate risks by issuing safety instructions
4. **Acknowledge the emergency** or meteorological crisis from the outset and define it as such
5. **Take up space** on various social platforms
6. **Combine** traditional media and social media
7. **Consider the public** as stakeholders in emergency planning, as being involved in their own safety
8. **Demonstrate** organizational **transparency and openness**
9. **Choose visual tools** to optimally convey information in a non-technical way
10. Consider social networks as a way to **provide alerts**
11. **Use the proper hashtags** on Twitter
12. **Call upon volunteer virtual teams** for support in emergency operations

11.3   POST-CRISIS PERIOD FOR A METEOROLOGICAL EVENT

Once an extreme weather event has passed, a new phase begins: recovery and the processing of consequences. The event tends to fade as a current news media item, yet this does not lessen the need for a communications presence for the event.

There are two period types: the immediate post-crisis period, and the subsequent period, which includes the healing process, reconstruction and prevention against another similar risk.

During the immediate post-crisis period, the primary focus of all communications is on the victims of the event, not only because they have had to directly deal with the consequences, but also because the media will continue to be focused on them. It is therefore imperative to clearly define the expectations of a population affected by a meteorological disaster. Two main elements should be emphasized.

Firstly, victims are typically severely traumatized: their house has been flooded, a loved one may have died in a heat wave – emotions are running high. During this phase, victims do not want to hear explanations about the causes or responsibilities. They are not interested in technical information.

Secondly, the information they are expecting should be concise and operational. Hydro Québec understood this well in the 1998 ice storm crisis. The company provided practical advice, such as: "Do not touch a fallen electrical cable" and "Be careful when handling a safety generator" among others. Essential and sometimes material needs should be addressed: "Where do we go during reconstruction?"; "Will my house be safe if I leave?"; "Can we start repairs on our house now? Or should we wait for the insurance inspector?". Communications must both convey empathy and provide concise, individual and practical information. At this stage, it is crucial not to make any promises, such as "The area will be entirely cleaned up, and residents will receive payment in fifteen days." If the authorities are unsure about delivering on their commitment, the disappointment about a broken promise will outweigh any expected hope.

The key principles of crisis communications immediately after the occurrence of the event are:

- Have psychological support available for victims.
- Monitor the smooth coordination of messages between various interested parties: national, provincial or regional authorities, as well as authorities from local communities and safety services. Any conflicting information could create suspicion in respect to how effective the situation or emergency is being controlled, and generate rumours.
- Expect secondary effects. A fundamental principle of any crisis management is the ability to plan for the most critical scenarios. Thus, handling an emergency situation should take potential outcomes into consideration, such as the crisis taking on a new dimension. For example, a flood-related meteorological crisis may become a health crisis if there is an increase in the mosquito population because the area is now suitable to reproduction.
- Convey concrete, concise, and operational messages.
- Ensure there is a symbolic political authority presence. Many studies on crisis management indicate that the perception of strong leadership is critical in fostering a feeling of being safe. Public authorities should therefore demonstrate a high

level of concern. In 2005, the Bush administration was heavily criticized for its actual and symbolic absence during Hurricane Katrina. Historically speaking, the first time a head of state travelled to the disaster area (France's Loire and Rhone valley) simply to show a public presence was in 1856.

- The means of communication should be tailored to the event. Traditional supports may in fact prove to be inadequate. When electricity lines collapse, televisions will not work. Destroyed telecommunication antennae mean there will be no access to the Web. Blocked roads prevent the circulation of newspapers. Radio is the best crisis communication tool because it simply needs batteries. At the local level, a city truck with a speaker can announce the most immediate information. For example, asking residents to gather at the local gymnasium for an information meeting.

- Subsequent communications. Once the disaster is over, the cameras quickly go away. As Sandrine Revet and Julien Langumier observe: "Away from the cameras, life – unspectacular and ordinary – very quickly is re-established among the ruins and remains of the disaster."[13] Yet victims and their families still need support as the population remains in a state of shock. The local population will have two expectations:

  – Never again. Steps must be taken immediately to prevent a similar situation from occurring, and to demonstrate to the local population that their concerns about the crisis have been heard and that it will not happen again.

  – Positive change. A positive image must be projected, praising the way people pulled together during the disaster, in a way that is perceived as "remarkable" by all those involved. This is, at the same time, territorial marketing built around images of a transformed landscape, new construction and the residents themselves. It is often said that there is an opportunity in every crisis that stems from the common challenges faced and overcome by the local population. There may be "storytelling" through messaging conveying repair, reconstruction, preparation for the future and new solidarity.

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13. Sandrine Revet and Julien Langumier, *Le gouvernement des catastrophes,* Karthala, 2013, p. 15.

Communications following a meteorological disaster must seek to look to the future and turn the page, but not without creating a place for the disaster within the community's history. It would be useful to hold an event, erect a memorial structure, or have an exhibit with "before and after" photographs of the landscape following reconstruction. Other ideas include putting up a monument or plaque or planting a symbolic tree.

Communications should be addressed to all those involved, including emergency management services and volunteers from outside the most severely affected areas. If monetary gifts have been received, then it is advisable to show how these have been used, both to avoid claims of financial mismanagement and to reinforce the perception of a new landscape built for the future through solidarity.

Post-crisis communications are a fundamental step too often forgotten in the urgent need to look to the future and move on from the suffering of those affected by a meteorological crisis. Post-crisis communications must clearly distinguish between the phase immediately after the event and the phase that comes into play some weeks later, away from the glare of media coverage. Technical issues fade away and the psycho-sociological aspect becomes the issue. Once again, the local people are at the centre, and through them, a memory of the area is forged. It is one more important reason why we should not turn the page too quickly on a crisis.

INSERT 11.2
What Do Commission of Enquiry Reports Tell Us About Meteorological Crises?

Meteorological crises* differ from other forms of crises in that they fall within a specific timeframe. Whether it be a tornado, flood, storm, or heat wave, meteorological phenomena take place within a clearly defined span of time, even though the effects may last longer. A review of the commission of enquiry reports thus provides an interesting perspective, which allows to better situate accountabilities which, in a media blitz, are primarily focused on the climate conditions.

We looked at four types of meteorological crises that took place in France to demonstrate potential commonalities between these events and consequently propose preventative action plans.

The crisis events were:

- Two snow storms: one suspended operations at Charles de Gaulle Airport (Paris), December 26-27, 2010; the other closed down travel in the Ile-de-France region, December 8, 2010
- Storm hitting the Atlantic coast of France, April 27, 2010, causing 35 deaths in the Vendée region
- Two floods: June 2010 and November 2011, both in the Var region, causing 27 fatalities
- Heat wave in August 2003, affecting all of France, the number of associated deaths is estimated at 15,000

All these crisis situations were reported on by commissions of enquiry. The parliamentary commission of enquiry for Cyclone Xynthia (which hit the Atlantic coast in April 2010) includes five months of interviews with around a hundred people to produce a 100-page report. There was a related criminal investigation, trial and appeal. The Ile-de-France snow storms were the focus of an enquiry carried out by the General Council for the Environment and Sustainable Development (Conseil Général de l'environnement et du développement durable). The council's investigations lasted 15 days for the airport closure and one month for the road network problems, producing a 40-60 page public report. The 375-page report on flooding in the Var region, published on September 24, 2012 contains interviews of close to 200 people. The 232-page report on the 2003 heat wave, published on February 25, 2004, has an additional 576-page report.

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*   The concept of crisis is defined in Chapter 2, however, its meaning varies with the concept used in this chapter, which refers to the concept of crisis used in France.

Reports are, for the most part, scholarly works based on a number of interviews and they are often highly technical. Sometimes several reports may focus on the same subject, as with Hurricane Katrina (not covered here), which caused around 1800 deaths in Louisiana on August 29, 2005. That event was the subject of various enquiry reports by the House of Representatives, the Senate, and the White House.

The main message of these enquiry reports on meteorological crises is that very often weather conditions are merely the trigger for a multitude of disruptions across many areas that may not seem to be connected. Thus, for Cyclone Xynthia, the report draws attention to "the combination of exceptional weather conditions with serious system failures." In fact, the commission of enquiry points to failures in unrelated sectors, for example inadequate serious weather alert announcements, inadequate defenses against coastal flooding, erratic maintenance of seawalls, and a patchwork of land-use plans based on complex and uncoordinated legal regulations.

The report on the Paris airport congestion points to a combination of different factors: a massive number of scheduled flight departures (1,402) for Christmas Eve, and communication difficulties between those in charge at the airport and the airlines. For example, airline companies were informed very late of a shortage of de-icing fluid for aircraft (glycol). In addition to these major issues, there was supplier failure, very limited responsiveness of personnel over the holiday period, and little information was provided to passengers. Additionally, climate conditions involved wet snow associated with exceptional weather conditions.

The December 2010 traffic congestion shows a similar pattern of multiple but distinct causal factors. The report outlined the inability of rescue services to reach locations, fallen branches on overhead power lines, lack of public information, rain washing away road salt and, above all, a lack of coordination between national, regional and local services.

The commission of enquiry report on the Var floods, for which Thierry Libaert was interviewed, similarly shows an alarmingly wide division of accountabilities. The report indicates that regional authorities were focused on the threat of forest fires which minimized the threat of flooding. Other factors also involved serious consequences: the Senate Commission pointed to the transformation of agricultural lands and pressure on land in general, reducing the capacity for floodwaters to be absorbed. Added to this was a lack of political and financial support for local associations and unsupervised embankment practices.

The February 25, 2004 commission of enquiry report on the heat wave states that the devastating consequences could be attributed to the failure of the public health monitoring systems. Health information from localities was not linked to any national overview. At the central level, there was no awareness of how grave matters had become. There was, thus, little coordination between different services. Additionally, the crisis took place in August when most government and hospital services were on annual holiday. For a long time, media coverage emphasized only the environmental consequences in terms of drought and impact on agricultural land before suddenly switching headlines to focus on mortality among the elderly. For almost the first half of August, media coverage largely ignored the human factor, which did nothing to motivate political leaders to consider the human consequences of the heat wave.

These commissions of enquiry reports are rich sources from which to draw conclusions: they take a very different approach to the media reports of the time, which present meteorological crises as being solely about weather and nothing else. The work of the various commissions emphasizes that a meteorological event is a simple catalyst for exposing numerous system failures. For every major meteorological crisis, reports show that consequences result from a set of distinct causes that developed in unrelated sectors: technical problems, dilution and compartmentalization of responsibilities, lack of direction and monitoring, complex and poorly enforced legal regulations, poor public communications. Seen in this light, placing blame on the exceptional nature of meteorological events appears as a means of dodging responsibility.

CONCLUSION

If the true goal is to have the public actually take on responsibility for their own safety and the safety of those around them, then they must be included in all phases of emergency planning: before, during and after an emergency. This fosters a true sense of trust between the individual and the authorities. This two-way trust is vital during a crisis, not least to ensure that people follow safety instructions. Treated with respect, people will not feel they are being led along like children, but will appreciate that they have been given a real role.

Similarly, to have the public respond appropriately during meteorological and climate emergencies, it is important they be involved in emergency planning programs both before and after crises occur. That is the key to real behaviour change. SMEM can and should be part of this, applying it to all risk management planning as a means of communication. Given that meteorological and climate crises (and

indeed all other sorts of crises) evolve in uncertain ways, using SMEM in the before, during and after phases allows for continual adjustment to communication strategies and, consequently, maximum flexibility. Above all, if authorities are willing to assume a "listening mode", they can of course be assisted as needed by a team of volunteers specialized in online emergency support.

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EXERCISES

1. Develop a strategy to implement SMEM in your organization, company, ministry department. Refer to the criteria listed in Insert 11.1 to confirm capacity, methods and senior management support.

2. Is public involvement possible in terms of your organization in order to consider the perception of risks by your target public? If so, how do you achieve this to make your communications more effective?

3. Does your organizational culture need a shock treatment to move away from one-way traditional communication? If not, identify the actions taken in terms of multilateral communication involving social media.

THE EFFECTS
OF METEOROLOGICAL
AND CLIMATE RISKS
ON HEALTH

by François Reeves

This chapter does not directly deal with risk communication but provides an overview of the effects of the environment and climate on health, justifying the relevance and importance of risk communication. Physician expectations for risk communication focusses on public and patient safety. This chapter deals with the health impact of environment and climate changes and demonstrates why weather-related forecasts need to be effective. Communications in the event of alerts must provide connectivity and clinical relevance.

12.1 CARDIO-PROTECTION: WEATHER TO CARDIO

This chapter will explore the points of view and concerns of cardiologists in terms of climate change (CC) and how meteorology is just as important as radiology and epidemiology in anticipating and preventing illness, particularly cardiovascular conditions. Previously underestimated in relation to genetics and lifestyle, it is now acknowledged that the environment plays a crucial role in overall health and cardiovascular risks. An ongoing assessment of the climate and meteorology allows to assess and measure impacts so they can be prevented or mitigated.

The issuers of alerts should be provided with an overview of the clinical situation in terms of environment so that they can properly identify the population at risk to prevent sickness and death. There are two types:

12.1.1 DIRECT HUMAN MORBIDITY

1. Air pollutant level: ozone, fine particles <2.5µ (FP), NO2, SO2
2. Ultraviolet ray level (UV)
3. Allergen level
4. Temperature and humidity
5. Wind and precipitation
6. Smog, heat wave, UV alerts

12.1.2 INDIRECT HUMAN MORTALITY

Climate extremes (heat waves, droughts, fires, storms, floods) are on the rise and are responsible for billions of dollars in destruction. They involve health and social risks due to shortages and cause major disruptions: water, electricity, environmental destruction, etc.

According to CIRANO, estimated health costs associated with climate disasters amount to \$600 million annually in Quebec, and could reach \$50 billion by 2050 if rising CO_2 emissions are not reduced.

The increase in zoonoses[1] in Quebec caused by global warming has introduced morbidity factors that did not previously exist: Lyme's disease, Zika virus, malaria, and the West Nile virus.

12.2   PUBLIC HEALTH INDICES AND THE WEATHER

According to data from major health organizations, climate change has become important in terms of public health. In addition to predicting heat waves and major cold fronts that invariably lead to increased deaths, weather reports also provide information on UV levels (skin cancer), pollen levels (allergies and asthma), and pollution levels (death, stroke, infarction, cardiac decompensation, and respiratory failure).

12.3   CLIMATE AND HEALTH: MAJOR HEALTH ORGANIZATIONS SPEAK OUT

Highlighting the impact of meteorological observations on health, The Lancet Commission, an organization under the umbrella of the prestigious medical journal The Lancet (impact factor of 39[2]), stated in June 2015 that climate change (CC) was the most pressing issue of the twenty-first century. The consequences of climate change on health may compromise advances in public health made over the last fifty years. An historical turning point in medicine, the World Health Organization (WHO) held the first two Climate and Health summits in Geneva (2014) and Paris (2015). The WHO provided recommendations to the United Nations and the international community (which we will review at the end of this chapter). Both these Health and Climate summits were contemporary and complimentary to the Paris COP 21 conference with common priorities.

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1. Zoonosis is a disease or infection caused by a virus, bacteria, parasite, fungus or prion that is naturally transmissible from animals to humans Definition adopted by the Observatoire multipartite québécois sur les zoonoses et l'adaptation aux changements climatiques (November 2, 2015), adapted from the World Health Organization definition, cited (in French) from: https://www.inspq.qc.ca/zoonoses (December 21, 2016).
2. Impact factor, or IF, is an indirect estimate measuring the frequency that a scientific journal is read. A journal's IF is the average number of times an article has been cited in this journal. For example, the publication Nature has an IF of 38 and Science has an IF of 34, source Agence Science-Presse, August 3, 2016

12.4   THE COST OF CLIMATE CHANGE

Money is the driving force in Western societies. The increase in extreme climate events is disastrous for the economy. Some examples are listed below:

- 1999 storm that destroyed the trees of Versailles planted in the reign of Louis XIV
- 2003 heat wave in Europe that directly caused 70,000 deaths, particularly in urban areas
- Katrina in 2005 involved $15 billion in damages
- Destructive fires caused by drought over the last five years in California, Alberta, and Australia
- The depletion of large lakes in the East, of snow in Sierra Nevada, and of water reserves in California

According to a United Nations study, over the past twenty years, 90% of major disasters have been caused by 6457 recorded floods, storms, heat waves, droughts, and other weather-related events.

In a report published on Monday, November 23, 2015, the United Nations Office for Disaster Risk Reduction (UNISDR) reported that, since 1995, *"606,000 lives have been lost and 4.1 billion people have been injured, left homeless or in need of emergency assistance as a result of weather-related disasters."*

In a speech to Lloyd's, Governor of the Bank of England, Mark Carney, stated that insurance claims from climate-related disasters have tripled since 1980. Losses for these mega financial companies have quintupled to exceed $50 billion dollars, which puts our economic fundamentals at risk. These figures are alarming, to the point that three major international insurance companies (Aviva, Aegon, and Amlin) urged G20 leaders to commit to phasing out fossil fuel subsidies. These fuels release greenhouse gases responsible for climate change.

CEO of Aviva, Mark Wilson stated: *"Climate change in particular represents the mother of all risks – to business and to society as a whole. And that risk is magnified by the way in which fossil fuel subsidies distort the energy market. These subsidies are simply unsustainable."*

According to estimates from the Organization for Economic Co-operation and Development (OECD), its members invest between $160 and $200 billion in carbon, petroleum, and gas production. Furthermore, according to the International Monetary Fund (IMF), these funds do not take into account the environmental and health damage caused by the use of fossil fuels. The cost for this damage

is assumed by governments. The IMF estimates that healthcare and environment costs related to fossil fuel pollutants amount to $5.3 billion.

The WHO estimates that an additional 250,000 deaths are directly caused annually by climate change, and this trend is increasing. The Center for Interuniversity Research and Analysis of Organizations (CIRANO) estimates for Quebec alone, health costs secondary to climate change will be $50 billion by 2050, which represents $600 million per year.

12.5   FOSSIL FUELS AND HEALTH

Well before there were signs of climate change, fossil fuels have been directly responsible for a significant mortality rate for many years. The event that led to the first ever Clean Air Act (GB, 1956) was London's famous Great Smog, which was responsible for over 12,000 deaths in London in December 1952. Sixty years and hundreds of international studies later, the WHO released a publication stating that over 7 million deaths were attributed to pollution, both indoors (cooking fires and poorly ventilated toxic heating systems) and outdoors (smog). These 7 million deaths represent 1 in 8 deaths, making air pollution the leading cause of death in the world.

This WHO publication states that 80% are cardiovascular-related deaths (heart attack and stroke), which explains the interest of cardiologists. Inhaling fossil fuel exhaust causes oxidative stress and generalized inflammation that is responsible for a host of conditions such as atherosclerosis, cardiac and cerebral, arrhythmia and sudden death, chronic pulmonary disease, cancer, hypertension, etc. This is particularly an issue in emerging countries: there are 2 million deaths in China where 70% of the energy is carbon based. And in the West, areas with a high level of pollution also have high mortality rates. The "Six-City Study" published in 1993 by Harvard claims that using average-size American cities, the mortality rate was 25% higher in the city with the highest pollution level versus cities with lower pollution levels. This study involved a 15-year follow-up period.

12.6   ATMOSPHERIC BROWN CLOUDS (ABC)

Canada's well-known weather satellites were able to detect an even more significant threat: ABC (Atmospheric Brown Clouds). These large clouds of aerial soot/dust have been observed from space over South-West Asia (where there are coal power stations, forest burns), and are moving toward the shores of North America. When these ABCs arrive, the pollution levels for Los Angeles, which has the strictest environmental legislation in the world, could increase by 25%.

Similarly, in 2010, Environment Canada showed that 30% of Montreal's pollution came from Ontario and 30% from the U.S.A., from carbon power station exhaust clouds following the prevailing winds. New York City has successfully sued a Pennsylvania carbon power station for excessive pollution, in particular for their sulphur dioxide emissions. Power station closures or conversions would significantly contribute to improved air quality and less smog formation. Satellite surveillance and ground measures help in monitoring and communicating about smog.

12.7   A CLEAR AND STANDARDIZED DEFINITION: AIR QUALITY INDEX

Popular understanding of this issue is complicated by differing pollution parameters between administrations, and sometimes even within the same country. Just as there was a progressive standardization in medicine to provide a universal definition of diabetes and hypertension, work is still ongoing to harmonize data on pollution.

The Air Quality Index (AQI), according to Montreal's Réseau de surveillance de la qualité de l'air (RSQA) (Air quality monitoring network) is a composite of the five main air pollutants (SO2, CO, 03, NO2, PM 2.5).

- AQI less than 25: a good day
- AQI 25-50: moderate day
- AQI greater than 50: smog[3]

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3. The City of Montreal measures air quality using a numerical Air Quality Index (AQI) value. 50 corresponds to the maximum acceptable limit for each pollutant measured. The reported hourly index is the highest of the sub-indices for each of the five pollutants (SO2, CO, O3, NO2, PM 2.5) measured on a continuing basis by the stations of the Réseau de surveillance de la qualité de l'air de Montréal. The index is calculated using the following equation: Index = (measure/AQI norm or value) × 50.

This is similar to the WHO classification which is the most recognized. The WHO acknowledges that safe pollution levels definitions change over time. Lead is an example of this where recent scientific findings have shown it to be increasingly serious.

12.7.1 What to Do When the AQI Is Above 50?

This AQI is published daily in weather reports. Whenever the AQI is above 50, public health organizations issue alerts, and the same is done for heat waves. The combination of smog and heat wave can be particularly fatal. Recommendations, although somewhat limited, have been issued by the major cardiology associations, particularly for vulnerable individuals (children, seniors, people with a chronic disease) and these are often communicated by the media.

These recommendations are:

1. Avoid going outdoors
2. Avoid outdoor physical exercise
3. Use air filters to ensure clean air in the home
4. People with chronic lung conditions should regularly use their puffers

12.7.2 What Happens in Large Cities?

Some large cities are now using more forceful measures to control pollution, such as limiting the use of gas-fuelled vehicles to every second day when there is excessive smog. Another example is the 2016 G20 in China, when all factories were forced to shut down. Pollution levels have become a weather phenomenon. A toxic cloud can directly affect health so we need to understand, monitor, anticipate, and even correct the impact supported by evidence-based data.

According to Montreal's RSQA, the City of Montreal (lower city) only has "good" air quality one out of four days. Two-thirds of days are considered "moderate" and as many as forty days are considered to be "poor", with the AIQ above 50 (scientifically defined as smog).

According to recent studies, pregnant women and young children exposed to moderate pollution levels will experience a number of harmful effects during their lifetime, involving all health aspects (psychomotor development and IQ, hypertension, diabetes, attention deficit, cancer, etc.).

Across Canada, over 20,000 deaths are considered to be caused by the environment, and these are concentrated in large urban areas with pollution and mineralized areas. The good news is that the overall pollution trend in Canada has greatly improved since its peak in the 1950s, which coincided with a peak in cardiovascular mortality rates in North America.

12.8   HEALTH OUTCOMES OF ANTI-POLLUTION MEASURES

In the fall of 2015, the University of Toronto made an historic announcement: since the start of the industrial revolution, 2015 was the first smog-free summer, with Montreal reporting the same situation. According to researchers, this historic smog-free summer was due to the following factors: a) conversion of Ontario's coal power stations to natural gas centres and b) Ontario's Drive Clean program, requiring older cars to pass gas emissions tests (legislation not yet introduced in Quebec).

In 2010, Environment Canada researcher André Rousseau published a document showing that 40% of Montreal's pollution was local, and that 60% came from Ontario and the U.S.A., primarily from coal power plants that release emissions which are naturally directed by prevailing winds toward the St. Lawrence Valley. The active conversion of power stations to cleaner energy has significantly improved air quality in Quebec.

The University of Toronto has a system to monitor pollution-related health complications. Their studies have shown that since 2004, there has been a significant decrease in deaths and hospitalizations caused by smog in Toronto. In 2004, there were 1,700 deaths and this figure dropped to 1,300 in 2015. Hospitalizations dropped from 6,000 to 3,550 patients for that same period.

12.9   POLLUTION PEAK OR CHRONIC POLLUTION?

There may be reservations about how pollution-related deaths are calculated, which measures additional deaths during peak pollution times. Extensive studies on smoking provide a more general perspective. Calculating the number of deaths in peak smog periods seems as restrictive as calculating the number of deaths when smoking a cigarette (pollutant peak), between two cigarettes (baseline). The risk associated with smoking is calculated by 1) primary versus secondary

smoke, and 2) level of exposure to smoke calculated by pack-years (number of packs/day × years of smoking). This would provide an estimate of total inhaled pollutants over a lifetime.

For example, in a six-month-old baby with 40/breaths a minute (57,000 breaths/day), with an average fine particulate of 12 µg/m$_3$, it would be more physiologically relevant to quantify the pollutant exposure level over a year, as well as the risk of hospitalization for smog.

A recent Barcelona study involving over 2,500 primary school students showed that psychomotor development (IQ, operational memory) is two times slower in schools located in areas with higher pollution levels than in schools with lower levels, and this regardless of other factors considered in the analysis (education, social-economic status, lifestyle, obesity, smoking, etc.).

12.10 URBAN DESIGN AND WEATHER

Another geomatics application is satellite monitoring in respect to large urban settings. More specifically, quantifying urban heat islands; canopies, fine particulate levels, building structure characteristics reacting to weather events: such as, urban canyons and smog valleys. These measures help with urban planning and in correcting urban healthcare gaps.

12.11 ZOONOSES AND ACTS OF GOD

The new zoonoses threat cannot be overlooked, which is soon to arrive in Quebec: Lyme disease and the highly present West Nile virus. In the mid-term, we are concerned about malaria, the Zika virus, dengue fever, and chikungunya fever. Is this pessimistic? Lyme disease was recently considered to be as exotic as leprosy but is now part of the everyday medical fabric of Quebec. And malaria will soon impact Toronto.

Lastly, in a direct way, Acts of God (floods, drought, destructive fires) clearly cause their share of health morbidities. These events each put significant strain on health services, and often risk disrupting these services. In terms of national public health and safety, solid risk communication allows for proper mitigation and reaction to climate crises, such as ice storms and heavy rains.

CONCLUSION

To conclude, the 2015 Lancet Commission's main recommendations to prevent current and future health and environmental complications should be kept in mind:

- Investment in environment and health research;
- Carbon-neutral cities and increased green space;
- Eliminating fossil fuels, and investing as quickly as possible in renewable energy;
- Increased collaboration between the Health departments and other administrations to integrate health and environmental consideration in all government strategies and the protection of our ecosystems.

Public accessibility to major atmospheric indices, both for temperature and precipitation immediate concerns, should better inform us about how we influence climate and how climate influences our lives.

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EXERCISES

1. Understand the main atmospheric threats for cardiovascular health and physician recommendations in the event of severe weather (heat wave, smog, UV, etc.).

2. What adjustment strategy can be considered to limit the catastrophic effects of zoonosis in natural disasters?

3. Urban development may promote the development of diseases and even disasters. Can you identify land development measures that could reduce public health risks?

CHANGING BEHAVIOURS WHEN DEALING WITH CLIMATE RISKS

From Information to Collective Action or From Nudge to Living Lab

by Valérie Lehmann

This chapter explains that climate risk prevention can be based on stake-holder involvement and that "participatory" communication is relevant in certain contexts. The author revisits certain concepts already discussed in other chapters, but presents them from a different perspective. Then the author identifies a number of proven inclusive approaches, which effectively change behaviours when dealing with climate risks. For risk issues, stakeholder col-laboration to identify realistic and viable solutions produces approaches that are highly effective. In some situations, the actual experiences and knowledge of residents, along with expert scientific knowledge, allow for better adapta-tion when dealing with climate risks. Thus, behavioural changes are shaped rather than imposed. This means that top-down communication, relying essentially on rationality, authority and expertise, is not necessarily the best option. However, it is also up to decision-makers to be accountable for the various possible choices and stay up to date on new collaborative approaches.

"Il faut être pris pour être appris" ("you need to get caught to be taught"). This popular French expression suggests that one must experience a particular situation so as not to repeat errors and to move forward. For example, if after walking in the rain you have not caught a cold, you will happily continue to walk under big, grey clouds looming above.

In short, people are rather incorrigible.

In general, this is not necessarily a bad attitude or behaviour, however, it has been recognized from a scientific standpoint. Amer-ican economist Herbert Simon, recipient of the Nobel Prize in 1972, depicted humans as having "limited rationality" and do not try to maximize their happiness or well-being.

Other researchers in social sciences, such as Lewin (1971), have noted for some time that it is hard to change our attitudes on our own. According to Argyris (2001), change does not mean gaining knowl-edge, but rather integrating knowledge in our everyday lives (realized change). The most difficult part happens in our minds; we need to re-examine our mental framework to make changes ourselves. And yet we continue to resist change (which is normal and not pathological), and it all depends on our past, our culture, our personal traits and our present situation (Dai, 1999).

13.1 CHANGE THROUGH ANTICIPATION: A MAJOR CHALLENGE!

When we find ourselves in a new situation, and it is difficult for us to modify our habits, *how then can we change through anticipation?* How can we form new habits *when dealing with the intangible and projections?*

As Roger-Pol Droit explains in *Vivre ensemble le changement climatique* (2015), if "everyone knows that the climate is changing […] the reality of this is blurry; the foreseeable metamorphosis seems very distant." That is because a meteorological or climate risk, as any other *risk*, does not directly correspond to our direct reality. It is expected to occur only in the future, and not in the here and now.

Using questions containing two almost contradictory key terms: "risk" and "change", this chapter explores the various approaches that may contribute to proper meteorological and climate risk management for different populations. Communication is, of course, discussed here as a key option to support the adoption of desired change in the face of growing climate risks. A number of methods are presented where communication is viewed as an instrument for change or as a driver of change. Some strictly communications approaches are outlined in this chapter, but more comprehensive approaches will also be reviewed, where communication is used as a tool for action.

Risk issues represent a central theme, thus, the first part of this chapter examines the concept of risk and underlines its implication for management. The second part highlights what changing behaviour means for individuals, beyond gaining knowledge, and the consequences that this "simple" observation entails. The subsequent sections explore each of the different approaches relevant to managing climate risks, mainly for the public, but also for specific stakeholders, such as public authorities and managers.

Throughout the chapter, examples and case studies are used to illustrate concepts.

13.2 A HISTORY OF RISK MANAGEMENT?

What is a risk? According to academic literature (geology, management, philosophy, psychology, etc.), the concept of risk has evolved somewhat, but its essential meaning has not changed. For project management experts, where risk is ever present, the concept of risk refers to the probability of an event to affect a situation, a project, or one of its components (Kerzner, 2011).

Proper risk management consists, firstly, of properly identifying risks and determining the criticality of each risk. Criticality, in other words, is the likelihood of occurrence and the degree of potential severity of impact (the vulnerability in dealing with the hazard). Secondly, it is necessary to identify and implement solutions suited to the level of criticality of the risk (Pinto, 2002). The optimal management of an identified and evaluated risk consists of reducing *both* its degree of occurrence and the severity of the potential impacts – something that is generally impossible. Therefore, sound risk management most often entails reducing the degree of occurrence OR the severity of impact, depending of course on the risk's level of criticality. Though, this requires that all risks have been *identified*, which is often difficult to achieve.

In case of a "highly critical" risk (such as the high probability of death if travelling in a country that is exceptionally dangerous, loss of life being of extreme severity), it is recommended to immediately change plans (such as cancelling the trip). In the case of a low risk (such as the possibility of an earthquake while vacationing in Los Angeles, since this risk involves medium severity, with a low probability of occurrence), it is acceptable to carry on as planned (the trip will take place). In the case of major or significant risks (such as recurring, devastating but not fatal flooding), it is best to protect ourselves from any consequences *before* the dangerous situation occurs (placing sand bags around the perimeter of the house to prepare for expected flooding).

Going further, it should be noted that after living through a devastating flood, individuals, for the most part, will try to do everything in their power to protect their homes if another flood is expected. After the ordeal, in some cases, some individuals may decide to move. However, if they have never personally *experienced* a devastating event and are *unaware* of its possible risks, they will be less inclined to modify their surroundings for protection. Even then, however, personal experience and character, as well as cultural background and belief system, play an important role. Therefore, if the individual's home is a cherished place, with historical significance (financial versus social) or symbolic significance (ancestors' home, pilgrimage site), the person may decide not to leave, despite the major "objective" risk that may increase over time despite having experienced a traumatic situation.

For example, for the inhabitants of certain villages in sub-Saharan African, such as Mali, which are devastated by floods that cause many deaths, it is often not feasible to move out of their camps. Every year, the village must be rebuilt on the same site as past tragedies.

In spite of the increasing number of deaths and destruction that take place year after year, and considering climate change, the situation will only get worse with almost no intervention possible, especially support from outside the community.

Many climatologists are shocked and saddened by such situations.

Many emergency managers struggle to understand these "irresponsible behaviours" that strand people on their roof tops when they refuse to leave their precarious situation, even when water levels are rising rapidly around them. It is easy to understand the sentiments of these managers: that witnessing firsthand preventable deaths is a terrible experience. Their work requires, among other things, *avoiding tragedy* caused by severe meteorological events, such as hurricanes and snow storms.

As those examples illustrate, and as scientists have confirmed, when it comes to *prevention,* it is not always easy to manage climate and meteorological risks and to respond effectively (Delevoye, 2015).

For climate skeptics, who firmly believe that climate change is just an illusion (political, economic, etc.), changing people's behaviour is not a consideration. These people believe that there are no risks associated with this "buzz", or the risks would be of such a low degree of criticality it would be pointless to change people's habits right away. At best, some climate skeptics will wait for government policies to change before believing in climate change, but the majority of them will continue to think that there is no room for individual change, and thus collective contribution is not an option. In some situations, enforcing laws seems to be the only legitimate way to proceed.

13.3   INDIVIDUAL CHANGE: A VAST AND COMPLEX TERRITORY

Getting various populations to make *immediate and lasting* behavioural change would be the best way to handle climate risks. Reducing the possible occurrence of a climate risk or the severity of its impact, or assuming this risk and adopting a proactive response would certainly contribute to ensuring the future of the planet. Even though most people cannot individually reduce certain confirmed severe risks, such as the desertification of land or rising sea levels (by passing laws or by making decisions for an entire territory), it is nevertheless true that every individual action counts, as confirmed by Hubert Reeves (2015).

Managing individual change does not come easily. Firstly, the process of individual change will have its highs and lows. Even if there is a willingness to change, individuals will experience confusion, annoyance and anger. In the end, they may even fall back into old habits. For example, a person purchases a bike to travel to and from work, convinced this will be good for the planet and personal health. Yet, after a few trips, the individual may have doubts and feel tired, and decide to go back to taking the subway.

In fact, even if the above example is true of everyone, and even if all scientists agree on the famous V-curve of individual change which shows a drop before it goes up (Tréhorel, 2007), there is no guarantee that an individual can make a change and adopt a new behaviour.

Furthermore, without a positive attitude (i.e. if the individual is unaware or unreceptive to the fact that there is a real meteorological or climate threat in the medium to long term), then change cannot be guaranteed. There will be no intention or willingness to change, and perhaps no concern about the role each can play. There is no question about it, according to Hubert Reeves, who cites the story of the hummingbird who tried to extinguish a forest fire by carrying water in its tiny beak to put out the flames. Depending on the country or the mentality of a people, there is still a need to convince individuals that climate change is underway.

Despite the impressive number of proposed techniques in place to help individuals transition from point A (present behaviour) to point B (new behaviour), the results are uncertain. Even Lewin (1967), a well-known author on individual change management who suggests shaking up people's way of thinking to change their outlook and actions and then support them during the difficult period, acknowledges that his method is not the universal answer.

What makes change management particularly difficult is that each individual is unique. Each person has their own familial, cultural, professional, psychological and social histories. What may seem like a small change for one person might seem overwhelming for another – and perhaps too demanding in the long run.

For example, in the 1990s, adopting the habit of locking car doors in Quebec was a simple action for some drivers and was quickly adopted. For other drivers, it took a number of years before even thinking to lock the car door. Of course, context is important. For example, if you live in a remote area, you may think that locking your

car doors makes no sense since a deer or bear could never drive off with your car. However, acknowledging that your children may drive off in your car may make you *change your mind*.

The current use of cell phones while driving is also an interesting example. Since many people are unaware of the risks involved with texting while driving, it is tempting to conclude that those people will *never* change their behaviour. The truth is, however, that they will, and quickly too if a friend receives a hefty fine or gets into an accident. Strangely enough, as with enforced measures (laws, rules, penalties), experiencing something closely but not directly strongly leads to behavioural change. The transformation occurs then by "contamination". Some authors speak of *viral contamination,* which emerges from a network of closely connected individuals.

13.4   CHANGING BEHAVIOUR THROUGH CLOSE CONTACT?

The above examples of locking car doors and using cell phones while driving clearly support the findings of many scientific studies (Bernoux, 2015; Jaujard, 2013) on individual change: *social connections and close contact* are very important in individual change. They can facilitate, mobilize, and even stabilize change. Going back to the bike versus subway example, if two people decide to bike to work together, it is easier for both individuals to change and maintain their habits. Close contact with another person or more is key. Group change encourages individual change, and this method appears to be more effective than traditional communication strategies.

Support associations have been using this method for decades, if not centuries, often without realizing how powerful it can be. Anonymous group meetings are not simply regular meetings, they show how others are progressing, exploring and trying on their journey to change. An individual seeing loved ones adopt a new behaviour is encouraged to do the same. Marketing experts could talk about this at length.

This model works as well in terms of meteorological and climate risks. If your neighbours place sand bags around their homes to protect against flooding, this reinforces your decision to do this. Note however that the opposite is also true. If your neighbours don't support your decision to use sand bags, this may not seem like a good idea to you anymore, and it is uncertain if you will purchase more sand bags in the future.

With these examples, it cannot be concluded that social connections alone can change behaviour, or that other methods are not suitable or effective. On one hand, enforcing laws is a plausible option. However, communication is essential for changing individual or collective behaviours.

To determine the potential role of communication in individual change, we must first reflect on the term *"communication"*, as it has many meanings. As a result, a number of communication approaches coexist in change management that can be very different. There are many differences between communication as an instrument or a tool for individual change and communication as a driver for individual change in terms of implementation methods and the role of individuals.

13.5   COMMUNICATION AS A TOOL FOR INDIVIDUAL CHANGE

Some communication approaches are instrumental in encouraging and helping individuals change their behaviour. Often, these approaches are unilateral, going from the change sponsor (or sender) to the individuals who should/will/need to change (usually called the receivers). Bareil and Savoie (2002) divide individual support into seven sequences, based on information, explanation, and persuasion and sharing. The main idea is to reassure receivers of their capacity to change. Other change management experts suggest long-term individualized psychological support in addition.

In these situations, communication focuses on listening to the expectations and concerns of the individuals in change transition and on their future needs. It does not, however, aim to define what should be changed, or to identify priority risks. What should be changed (such as moving in case of flooding, purchasing specific insurance, getting new alarm systems, etc.) is already decided by the authorities (in this case, the sender, such as public authorities, a public company, city hall, a regulatory body).

In this situation, an individual is required to comply with decisions made based on expert analysis. In general, this is difficult to do, and support should be provided.

13.6   USE NON-TECHNICAL LANGUAGE, INFORM, REPEAT X 3

In the case of climate risks, *instrumental* communication has a role when it comes to changing behaviours, particularly since it entails various options. Informative communication is one of many choices: climate risks should be communicated and explained to avoid tragedy, even if there is insufficient information, because in the actual situation, the average person will quickly forget the information received. Even if individuals have reviewed this information, more often than not, they will not know where to find a certain document or know which website to consult in a panic. It is also imperative to ensure that recent scientific information is in non-technical language, so individuals can stay up to date and filter out obsolete information. Repeating simple messages through select media (traditional and social media) is also part of the informative communication toolkit. The use of influential communication (Pastor, 2010), such as working with credible and reputed spokespersons (such as Hubert Reeves and David Suzuki), makes it easier to anchor and convey messages imperative for change.

Beyond the somewhat traditional informative communication is "sensitive" communication (Liebaert, 2013), which creates a deeper awareness in a large number of individuals (mass) by addressing the core of their current concerns. This communication will encourage listening and reassure clearly identified groups about climate risk.

Following the trend of *instrumental* communication, whose goal is, again, to implement change as defined by experts (and not to collectively engineer change), is mobilization communication. This type of communication directly encourages taking action and changing behaviours (immediately if possible). Here, the sender gives irrefutable orders, such as in an imminent disaster situation. For example, an order from a fireman is clear: "Leave your home. The fire has been fueled by strong winds and has engulfed the building." Of course, when it comes to managing *risks* (prevention or intervention before a tragic situation), this type of communication is not easy to establish. Most individuals *do not see* the need to react immediately if the sender gives orders on *long-term risks*.

Of these sometimes-abrupt methods that directly require individuals to quickly change their behaviour, some have recently been developed that use mobilization communication in tandem with other methods. One such approach stands out: the Nudge.

13.7   USING THE NUDGE

Thaler and Sunstein (2008), two well-known American researchers in the field of behavioural economics and law, developed the Nudge method. This method is based on the principle that a small and gentle nudge is highly effective in changing deeply ingrained habits (according to a number of articles and experiments since 2010).

Some Nudge tactics include a well-designed form, community feedback, technical default settings, and a well-timed pop-up, to name a few. The Nudge leaves decision-making in the hands of targeted individuals and enables them to move in a new direction to make changes to their behaviour. According to the creators of the Nudge, education, persuasion, and legal restrictions are relevant but have limitations. Those tactics speak a great deal to "our rational and calculating systems" but very little to "our intuitive and passive system" (Singler, 2015).

A well-known example of the Nudge in Canada is a breast cancer prevention effort where a short message was printed on the shower handle encouraging women to do a self-exam in the shower. The message was clearly displayed and strategically located to encourage women to perform a self-exam.

In the case of climate change management, and more generally safeguarding the planet, as discussed in *Green Nudge* (Singler, 2015), the author gives several examples of countries (Germany, Great Britain, Costa Rica, India, etc.) that have reduced energy, water, and paper consumption by using the Nudge technique.

Singler identifies ten types of possible levers for quickly changing individual behaviour, but when it comes to climate risk communication, only a handful of options seem viable. A sunscreen company in Brazil is one example. To address the increasing skin cancer rate and educate young people about the related risks, the company gave dolls to children on the beaches that would eventually turn red in the sun if they were not protected.

It may also be relevant, and simpler, if organizations' computers were connected to meteorological alert systems where pop-ups would announce short- and medium-term threats, and encourage the employees of these organizations to take measures in the hours and days that followed. Pop-ups could also appear on smart phones, identified by their precise geographic location and made available through geolocation. Those receiving these notifications could then react quickly – faster than receiving an email or going to a website.

Small investment, big impact? In any case, the interest in the Nudge predominantly lies in sending brief preventative messages in the short term and, at the same time, planning precise action over the long term through education, repetition, and awareness.

13.8   GETTING INVOLVED IN AWARENESS ACTIVITIES

In keeping with instrumental communication, among the more contemporary approaches that use less-traditional methods of communication are also participatory approaches, which are compelling to roll out and produce results on a medium- and long-term basis (Tréhorel, 2007).

Here, individuals can join others in clearly defined awareness activities. The most widely known is the annual fire drill, to remind each person of what to do in case of a fire in the building.

A valuable option is to organize workshops for the public (children, families, youth, seniors), which can be done as mini-events. Interested individuals can actively take part in the safety exercises and be introduced to basic skills, such as first aid. Touring workshops are particularly interesting as they could represent local "not-to-be-missed" events. In France, trains are used as both media and technical support to announce awareness activities for the public. However, the various levels of government must provide funding for these workshops. Therefore, these highly relevant approaches can often be viewed as political gestures or involving excessive costs.

As for participatory communication, there are activism initiatives from associations dedicated to sustainable development, safeguarding the planet and protecting the environment. These are ecological, citizen-led and humanitarian initiatives. They also stem from public organizations and private foundations, such as Emergency and Development Architects, Geoscientists Without Borders, the French Association for Natural Disaster Reduction, Ouranos, United Nations Development Program, etc. These organizations work to effectively implement climate risk communication through their information campaigns and real-time presence in emergency situations, assisted by their volunteers.

Another example of those types of initiatives is the WARN! movement (We Are Ready Now!), which primarily involves students. Its mandate is to raise local awareness about climate issues among students, so they can facilitate individual change.

13.9   COMMUNICATION AS A DRIVER OF INDIVIDUAL CHANGE

As explained above, communication is not just a tool for change, it can also be *a driver of change* (Lehmann, 2010). Thus, individuals lead their own change, and are not simply recipients of information.

There are several communication approaches for change that focus on the importance of shaping change collaboratively for quick adoption by the individuals concerned. Thus, they will be inclined to quickly take action since they are fully engaged in the change, i.e. they are *active builders* of transformation, and *not simply passive receivers*, as is the case of instrumental communication.

13.10   USING COLLABORATION AND CHANGE WORKSHOPS

Here, communication is truly a driver of change: it creates and then implements the change. It is more multilateral than bilateral. Action is collective and decisions are guided, shared and at times delegated. Collaboration workshops and other types of collaborative meetings are organized with the explicit goal of jointly defining what needs to be changed. Note however that this is not setting up consultation meetings or discussion forums, where participants give their opinions for consideration by experts and authorities. On the above, the International Association for Public Participation (IAP2) clearly distinguishes between consultation (opinions are recorded and then assessed by decision-makers), collaboration (various proposals are explored collaboratively so that decision-makers can choose one of the options), and co-innovation (stakeholders are involved in making choices alongside decision-makers), which we will explore further in this chapter.

There are already numerous initiatives of this type where communication is the driver for individual change. They are established all over the world and correspond, for the most part, to different audiences and different action modes. For example, CliMates is an "international laboratory for ideas and actions on climate change composed strictly of young volunteers" (Blumereau, 2015). Simulations, innovations, and research are offered by this organization known as YOUNGO, part of the United Nations Framework Convention on Climate Change (UNFCCC). A number of collective projects should be mentioned that correspond to different approaches where communication is the driver of individual change. The LiWa project

in Peru uses international workshops, collaborative platforms and distance education. University researchers, administrative organizations, training organizations and students have worked together in developing and implementing innovative ideas, accessible to all residents, to reduce waste of urban drinking water (Mennerich, 2014). The collective project LiWa fostered behavioural change in hundreds of thousands of people.

The same can be said of the urban agricultural site project in Casablanca for poverty reduction and innovation in agriculture (Prystav and Helten, 2014). Urban meetings, conferences, roundtables, sharing of expertise, training, practice communities, architectural contests and change workshops have enabled the creation of urban micro-farms, some of them run by women.

Such approaches are generally part of "capacity development" programs, well known in the field of international development. Researchers and experts in specific fields travel around the globe to share emerging practices with local actors (usually in underprivileged countries). The principles of active pedagogy are applied in such cases, which lead experts and learners to work together in creating new meaningful practices in specific areas. Collaboration (as to co-elaborate or to co-develop) widely prevails over cooperation (as to co-operate or to co-execute).

13.11   ORGANIZING LIVING LABS

Another path, similar to those explored above, is known as co-innovation, or open innovation (Chesbrough, 2003). This brings together various stakeholders (from a project, territory, city) with varying, and often different, perspectives. Through a series of well-organized meetings (lasting several days or weeks), short-term actions will be developed and subsequently implemented by the stakeholders themselves. At the heart of this approach, users are the priority stakeholders and they drive the entire process. Of course, when it comes to climate change, we are all daily users of our planet's resources.

The co-innovation approach known as Living Lab (LL) is based on the principle of shared knowledge (Trépos, 2007). Everyone (experts, laypeople, specialists, authorities, youth, seniors) has knowledge that is relevant for sharing and cross-reference purposes to achieve a shared vision of a project or service. From discussions and shared exchanges, combined with *experiential* knowledge, will emerge some clear and

realistic ideas that participants will be ready to try and implement. Those ideas are almost exclusively their own. Various professionals also participate in this approach. They refine and evaluate proposals, without which final ideas could not be achieved. Although these experts offer their support; they are not project directors. The process is highly structured and the overall approach should be well organized. Generally, information technologies are often used to facilitate the work of the various stakeholders.

Throughout a LL, stakeholders will be asked to co-create, explore, experiment and evaluate the various collectively developed options (Lehmann *et al.*, 2015). At those times, meetings take place in realistic settings (on site), and not a venue such as a hotel lounge. At the end of the process, all participants will have a solid understanding of the subject matter, as well as the skills to implement the chosen options. Their individual change will have taken place step by step throughout the entire LL process.

Living Labs began in the 1990s at MIT in Boston, and were quickly adopted throughout Northern Europe. For several years, the European network of Living Labs (EnoLL) worked towards achieving accreditation and improving the LL approach. Since 2010, Living Labs have gained momentum globally, for several reasons including social acceptance. When a project is accepted, this means that it will be carried out and implemented. This is especially important in current times when cost reduction and innovation go hand in hand. Living Labs are no more expensive than the Nudge approach, which claims to be "low cost", and thus are now an integral part of the current landscape in the era of knowledge and idea economy (Cohendet, 2010). LL sponsors are both public and private, and oftentimes, they are initiated by partnerships between associations, citizens, public authorities and companies.

For example, numerous LL projects in the healthcare sector developed new "caring" approaches for the elderly, who collaborated in the design of many of these innovative services themselves. Several Living Labs have been organized in North America (including Quebec) and Europe within institutions specialized in long-term care, rehabilitation and children's hospitals (including Sainte-Justine Hospital in Montreal). Many other LL projects recently took place and are ongoing in urban development, where there are many future challenges (McKinsey, 2013).

In terms of the environment, an example is the European STAR-FLOOD project (Strengthening and Redesigning European Flood Risk Practices: Towards Appropriate and Resilient Flood Risk Governance Arrangements, March 2016). This project was mainly carried out using the Living Lab approach. Recently, LLs on urban and non-urban agriculture have taken off. Several initiatives are taking place in Canada, including some in Quebec. Farmers (livestock farmers, grape producers, farmers) come together to discuss solutions to adopt to deal with climate and meteorological problems they encounter in their particular areas. When communication plays an essential role in these exchanges, this moves well beyond the traditional top-down approach where public authorities and scientists share their findings and subsequently give their directives to the farmers. With Living Labs, the change in farmers' attitude and behaviour (and other stakeholders, including local authorities) takes a new turn as these stakeholders willingly participate in the initiative.

Thus, by regularly bringing together stakeholders with a common problem, which could be "the preventive measures to adopt in an urban area for severe thunderstorms". By active participation, residents and city administrators can work collectively to find solid SMART solutions (specific, measurable, achievable, realistic, time-bound), which will quickly become rooted in daily life for everyone.

A Living Lab could be also established to identify the priority risks in a given area, with the various local stakeholders as project leaders. It is important to remember that all users of a specific area have a skill, area of expertise or experience (doctor, manager, skilled worker, student, retiree, citizen, homemaker, engineer, lawyer, teacher, bureaucrat, association director, etc.). Consequently, every on-site user has knowledge that is useful in identifying risks, discussing them, finding appropriate solutions, and determining how to apply these solutions collectively and individually.

In anticipation of a flood in a given area, a similar approach could be a series of collective workshops organized on the following topics: What can families do who live on spongy terrain? Should sand bags or plastic bags be used? Are there other strategies that are easily accessible? In the LL approach, the residents of an affected district or city would lead the project, supported by professionals. The LL approach should not be considered to be just another consultation approach. As with any other open innovation approach (as outlined

by the 2016 report on open innovation published by Action Canada), stakeholders participating in LL are decision-makers and determine the action to be taken, which assures effective deliverables and practices.

13.12 THE ROLE OF DIFFERENT ACTORS IN CHANGE

There's a short path from Living Labs to stakeholder commitment. To conclude this overview, the previous paragraph leads to the discussion of the role of the various actors in climate or meteorological risk prevention, and their scope of intervention, always from the perspective of changing individual and collective attitudes or behaviours.

From the various ideas discussed in this chapter, it is evident that different actors hold specific positions regarding their possible involvement for proper climate risk management. It would be easy to separately categorize, public authorities on one side and activist associations on the other, with experts at the top and the public at the bottom. However, such categorizations are neither relevant, nor interesting. This is reductive, simplistic, and does not provide any direction in terms of what can be improved or set in motion. Going back to the LL approach, where various stakeholders work together regardless of their jobs or origins, points to the limitations of such categorization.

An extensive consultation process on "actors' roles in natural risk prevention" was conducted in France, in 2008. Important findings came out of that process in terms of the necessary *skills, tools and activities* to help the various actors in their role in climate risk prevention.

First, the designated roles of the representatives of civil society and public organizations in natural risk prevention should be noted. Without delving too deep into this subject, it is important to clarify that their mandate includes the *acquisition of new knowledge about risks, monitoring, preventive information and education, risk awareness in land-use planning* for which they are responsible, as well as *implementation of risk mitigation measures.*

For instance, elected representatives and civil servants must stay abreast of new laws, directives and regulations on natural risks, and enforce them (urban planning, zoning, etc.). It is also their duty to join various advisory bodies and committees (on environment, pollution, waste management). In turn, the public safety authorities at various levels of government (mayors, police officers, firefighters) are responsible for enacting and implementing certain risk prevention plans.

On the other hand, *managers of public infrastructure networks and their private subcontractors* or otherwise (engineering firms) must know and comply with the current measures. *Professional associations*, such as professional orders and other similar groups, should, at minimum, keep a close eye on their members.

These professionals are required to ensure rules and regulations are respected in the field. *Manufacturers, owners, citizens and recognized non-profit organizations* have a duty to learn about new regulations. Finally, *local and national* media are also stakeholders expected to be involved in risk prevention.

13.13 THINKING OF CHANGE IN TERMS OF LEADERSHIP AND OPENNESS TO NEW IDEAS

This brief review of the tasks assigned to different stakeholders represents only the "reasoned" side of things. It is important to consider leadership, values, and vision of the various parties involved, which (too) often are overlooked, although many scientists and practitioners (McKinsey, 2013) list these as key success factors in large scale behavioural change.

For example, while it is well established that an important actor in the community taking a public stance can change public opinion, the leadership aspect is often overlooked in discussions on natural risk prevention, which are *generally focused on the technical and economic aspects.*

Openness to new ideas, the capacity to learn through others, empathy, trust in others and "kaleidoscope thinking" are, according to change management experts, crucial skills for facilitating individual and organizational change. Those skills, however, rarely appear in recommendations for improving natural risk management.

Furthermore, in *many scientific and professional conferences* on environmental issues, discourse is still largely "rational", as if the social and psychological aspects were frightening or insignificant. Therefore change comes from the heart and mind.

It should also be noted that the tools and methods used by stakeholders to carry out their respective mandate are rarely discussed. Public managers, just like citizens, need to stay up to date in terms of their knowledge and skills on the subject. For example, public e-participation in prevention has been used for several years and has

generated good results on attitude and behavioural change when the process is well organized from beginning to end. Northern European communities have championed this approach on social and economic risk management.

CONCLUSION

As highlighted in these last remarks, and outlined throughout the chapter, there are many innovation opportunities in the field of climate and meteorological risk communication. Many relevant approaches for issues and emergencies already exist for various stakeholders as a priority. Certainly, the use of legal means should be considered. Getting a ticket represents "getting caught, being taught", and raising awareness of a risk may follow in the same vein.

Just as analysis of the context is essential, a touch of leadership will always be welcome. Since the road between acceptance and action is long and uncertain, collective action in real situations is likely to persevere in the long haul and prove more powerful in changing habits than (several million) "posts" or "likes" on social media.

One thing is certain: the emergence of new approaches, such as the Nudge and Living Labs, shows that the choices for changing attitudes or behaviours in the face of climate risks are ever-expanding. Lastly, innovation belongs to everyone.

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EXERCISES

1. Clearly indicate that there are different levels of climate risk criticality and different responses for each level: acting immediately or preparing a contingency plan. Organize a participatory workshop on this theme with an actual exercise on climate risks if possible.

2. Show how changing individual behaviour is generally difficult for anyone, and particularly difficult when the threat is uncertain. Furthermore, the path to follow for changing behaviour depends on experience and individual characteristics. Emphasize that making changes with somebody else is easier than doing it alone. Encourage testimonies of personal and professional change from each participant.

3. Raise awareness of the fact that communication is a multi-meaning term, which translates to a wide range of activities with varying functions and characteristics. Give participants the opportunity to express their ideas and experiences on this topic.

4. Establish a clear distinction between:
   - communication as a **tool** – mostly unilateral, "top-down" and informative approaches used to impose change
     - E.g.: The dissemination of explanations/instructions, awareness workshops, the nudge, injunctions or orders that serve to convince and enforce behaviour change.
   - communication as a **driver** – mostly multilateral, "bottom-up", pull and participatory approaches used to induce change.
     - E.g.: Collaboration and co-innovation workshops that serve to define and implement collective change.

5. Use and collectively discuss a real case to analyze an issue from different perspectives. Organizing a co-innovation workshop is also suitable to present and collectively discuss these topics.

6. Focus on the limitations of traditional communication for change in the face of climate risks. Focus on the significance of collective action (such as LL) to facilitate behaviour change. Invite experts or participants of a LL to talk about their experiences.

7. Stress the fact that persons in charge, experts and decision-makers have a responsibility to develop new climate risk management approaches, aligned with the current demands of society and its communities. Leadership is needed to realize collective change.

Note: Working on the above topics in a workshop and in a simulated or real situation could be an asset in understanding themes and suggestions presented in this chapter. Keep in mind that participants should have changed their point of view, attitude, and behaviour regarding climate risk management after having actively explored the elements discussed in this chapter in class workshops.

14

SYSTEMIC APPROACH IN METEOROLOGICAL AND CLIMATE RISK COMMUNICATION

by Jean Bernard Guindon
and Bernard Motulsky

This final chapter summarizes the systemic approach for many topics explored in this book. These include risk perception, involvement of the public, social networks, and change management, with a focus on the need to develop an organic system founded on properly controlled spatial and temporal dynamics along with the necessary resources. A suggested model is outlined, followed by a philosophical consideration of the systemic approach. Inserts are provided to show this in concrete terms.

The challenge we face is how to confront a chaotic situation and manage it at the same time through a systemic approach. In risk management mode, crisis or disaster preparedness allows for the development of a systemic model based on rationality, to reduce uncertainty and prevent the most serious danger. In crisis management, chaos and systemic rationality merge in real time. When these two dimensions come together, crisis ensues, meaning that this is the breaking point where chaos ensues because of its ability to weaken prior preparedness measures and place decision-makers into a state of disarray and paralysis. In communications, the major challenge is when piecemeal, contradictory, fragmented, complex information disrupts the systems that were put in place to manage this situation. Quick and appropriate decisions need to be made in a context of chaos and, at the same time, the most consistent possible communications must be conveyed to prevent loss of life or serious injuries and loss of integrity. This takes place in a backdrop where information may be altered or even contradictory, which risks adding to the chaos experienced by the population impacted.

According to some skeptics, it is futile to prepare when facing a risk since in any event, decision-makers and communicators will all be overwhelmed. They claim that intuition and improvisation are the way to deal with a chaotic situation. They are correct in believing that preparedness and prevention cannot eliminate disaster or crisis situations since a hurricane or tsunami cannot be stopped. What can be done, however, is to strengthen and intensify systems that handle these situations. A good option is to systemically eliminate potential issues that might worsen a situation. For example, for a hurricane, reinforcing dykes, as in New Orleans, can prevent catastrophic flooding. For tsunamis, such as Fukushima, making sure that nuclear power plants are not constructed near the sea can eliminate the devastating effects as well as permanent and fatal effects of radiation.

Connecting all the components needed to develop a systemic approach for risks and crises is done through an iterative interface between the parties involved in risk management and the potentially impacted populations. In simple terms, we will touch on the concept of danger, a universally recognized term to understand the overlap of hazard and vulnerability (see Chapter 2).

14.1   DANGER: THE COMMON DENOMINATOR IN A SYSTEMIC APPROACH IN RISK COMMUNICATION

The term "danger" is used as outlined in **danger sciences**. This field of knowledge is not as known as it should be. Yet the ideas of danger sciences are commonly used without being specifically mentioned. Below are some general principles.

Because "danger" is a word understood by everyone, there is little doubt about its meaning. When we speak of dangers, we convey attitudes toward the dangers: attitude of scientists, engineers, specialists, communicators, and the target public.

Scientists use concepts that change over time: research-based knowledge, mathematical models, and forecasting models, such as in meteorology. Scientists and other specialists consider themselves to be experts in their fields. When considering the aspects of danger, it is a more global approach that must be adopted, calling upon people with the knowledge and the know-how to adopt a cross-functional, cross-disciplinary, and inter-organizational perspective. The system that will emerge to confront the danger is not one based on individual disciplines but instead integrates all disciplines in order to best understand the danger phenomenon, and identify the most appropriate safeguard and protection methods.

Communicators' attitudes are generally focused on message content, based both on scientific and technical knowledge and the target public's potential reactions. Communicators may be part of the media who employ them or the companies that pay them to protect their interests. In both cases, their messaging must reflect their perception, including their attitudes in respect to the dangers: fear, panic, alarm, either by contributing to these states, or by avoiding them at all costs, which risks unduly diminishing the clear facts.

Target public attitudes are highly diverse and reflect the many individual perspectives, experiences with imminent and past dangers, family, social, and financial affiliations or simply individual interests

related to personal livelihood. It is virtually impossible to develop targeted messaging without a clear understanding of the target public audience.

Since communications are intended for individuals facing a dangerous situation, message content is important as well as an iterative process, called the "iterative analysis and communication system for danger", in light of danger sciences (Wybo, 1998, p. 180-182). This involves:

14.1.1 COLLABORATION OF ALL ACTORS INVOLVED

- Collaboration is defined by an issue (the erosion of the riverbanks on Côte Nord – North Shore of Quebec), an organization (electric power for Hydro-Québec), a common problem (watershed management of water levels and flow). These are systems that are sufficiently clear to generate stakeholder interest.
- During the 1998 ice storm, all Hydro-Québec partners needed a crash course on electricity to understand the production, transport, and distribution systems of electricity in Quebec. The transport and distribution sub-systems had been severely damaged by freezing rain, causing power outages affecting about three million and that lasted many days or even over a month. Had the information been conveyed before the event, less time and energy would have been spent in managing this gap.
- Collaboration generally includes what precedes and what follows the central core, which is the centre of gravity. It addresses the dependencies and inter-dependencies for the system analyzed. It requires open, ongoing communication with as little secrecy as possible, which is challenging for many organizations. In the case of the electrical event, the culture of secrecy during the ice storm of 1998 was an ongoing barrier, in spite of the subsequent agreement by the partners to share information in real time.

14.1.2 INITIAL SCIENCE-BASED ANALYSIS

- Science involves data, analysis of this data and sharing this analysis for validation and adjustment purposes. Science is not a monopoly for a single discipline, such as meteorology for example, which may be central to understanding

bad weather and its disastrous effects. But meteorology alone cannot explain a global situation resulting from weather hazards.

- Science is constantly changing. Any science that claims otherwise would simply be an historic memory from the more or less distant past. The public often has unrealistic expectations from science. In analyzing potential destructive effects, the available and changing knowledge of the situation changes quickly and requires constant adjustments. We need to be prepared to explain these changes to the public to foster a culture of openness to changing instructions that may ensue.

- Science cannot be viewed in silos. Sciences overlap, support each another, and provide mutual clarification. They are not only basic, but also experimental and applied in engineering and technology.

- Science often moves beyond its expectations and is used for forecasting. Therefore, weather forecasts are only models used to make projections about known conditions. Meteorologists need not be blamed for predicting conditions that differ from what has actually occurred. When there was more snow than predicted in the 2016 New York snow storm, the public legal action against American meteorologists was not successful. There was no promise or objective involved, the prediction was based a provisional forecasting model despite the most disciplined efforts on the part of meteorologists.

14.1.3 Field Communication of the Scientific Analysis

- This is the part of the systemic cycle of risk communication that is most often overlooked, for it may be the most challenging and even the most dangerous. It requires scientists to address the target public audience to communicate their risk analysis findings. Reasons cited to refuse this are "We are not responsible for putting this in simple terms"; or "This is not our job, but that of communicators."

- This communications activity may take a number of forms:[1] focus groups are of particular interest, because they provide immediate interaction with a sample of the target population and their actual verbal and non-verbal perceptions are

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1. Refer to Chapter 13, which proposes field approaches to manage change resulting from risk communication.

expressed. Other forms include door-to-door visits, target public meetings, or meetings with social and community organizations, social networks (provide immediate reactions), folders or pamphlets (asking for feedback post event). Choices are made based on the defined objectives, relevance of the tools, and technical and financial means. However, combining different means in a concerted strategy is the best approach.

• Gathering feedback is critical at this stage. Vague impressions are not sufficient, in-depth consideration of the perceptions of the individuals consulted or involved is needed. This step requires reporting on communications activities in order to use the information in the next step.

14.1.4 Integrating Field Feedback Into the Scientific Analysis for Public Information

• This vital integration phase involves the target public's perceptions in the analysis of the dangers. These perceptions influence the entire communications system and ensure rigour, relevance and robustness of the system.

• While maintaining the scientific component, scientists and decision-makers are challenged to redefine their analysis to ensure that the target public's perception remains top of mind so that subsequent messaging is effective in both risk and crisis management.

• These perceptions may involve underestimating or overestimating the real dangers depending on the historical component. For a flood-risk area, such as Quebec's Richelieu River shoreline, reactions might involve diminished or increased perceptions of the destructive and disruptive effects. Communicators have therefore a challenge.

14.1.5 Understanding Public Perception During Alerts, to Better Develop Messaging

• The challenge is to address the public impacted, not only on a rational level, but also on the emotional level about the perceptions generated.[2] The communications strategy

2. See Chapter 4 on risk perception.

therefore must take an overall view into account that is comprised of scientific knowledge as well as known or expected reaction from the public involved.

- This strategy involves selecting the tools with the most impact and using them to ensure overall consistency despite the occasional unavoidable potential slip-up, especially with social media. If an agreement can be reached with the traditional media to avoid these kinds of slip-ups, controlling information and reactions through social media is more challenging but can be achieved[3] if individuals are assigned to monitor social media to rectify or mitigate the situation or even contain the most negative effects.

- With its positive effects or failings, social media can be relevant by indicating perceptions and even spontaneous actions taken to support public authority actions. Some examples are Twitter posts during the Paris terrorist attacks offering people a place to stay who were not able to leave.

14.1.6 New Analysis Integrating Scientific Aspects and Perceptions by Integrating New Data: Feedback from Experience

- There is no situation that equals a crisis in further advancing the analysis of risks and integrating the new risks that come to light during a crisis. There are always new destructive and disruptive effects involved in every crisis situation. These become critical indicators in developing or improving the interpretation of dangers that threaten targeted populations.

- The process at this stage is called **feedback from experience** (Lapointe pp. 697-738), involving two types: hot and cold.

- Hot feedback is provided as soon as possible after a disastrous event, in order to obtain emotional and visceral reactions from partners when these reactions are still dominant and detectable through defence mechanisms. To successfully obtain hot feedback, it is best to involve individuals report on this who were not involved in the crisis situation in order to avoid biases that could distort the interpretation of the facts. Dialogue is certainly the best way, allowing people to express themselves freely, in an environment free of

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3. See Chapter 9 on social media.

blame, guilt or that seeks to justify rationale. Listening and an unstructured format is the best option, so there is no imposed and restricting format or agenda.

- The individuals gathering the information should structure the discussion according to three time periods: before, during, and after the event. It should also focus on three viewpoints: what worked well, what could have worked better, and recommendations. Discussion with the parties involved will then comprise an initial hot reaction report, which will be given to participants in the feedback groups.

- Cold feedback should be obtained after a reasonable period of time once emotions have lessened. Discussion will involve the hot feedback report to identify the major issues to assist in being better prepared for future disastrous events, and better organized for any new event. The cold feedback findings should be developed into actions or recommendations for the partners.

14.1.7 RETURN TO DIALOGUE BETWEEN PARTNERS

- Based on the action items or recommendations, the partners will develop an action plan for implementation, secure financial or other resources to carry out the plan and then set up a follow-up mechanism. Without this, any subsequent communications and feedback-based action items would be in vain.

- This renewed foundation for dialogue between the actors should break down barriers, remove obstacles, and reduce ambiguities.

- Specifically, this makes it possible to work on obstacles that cause lack of inaction and paralysis. Obstacles stem from defence mechanisms, which are not easy to set aside. They can be structural, cultural, legal, technical, or interorganizational. It is important to see how to deal with these obstacles to create a more consistent and robust system. Potential gaps in the system can be addressed to avoid the same operational or communicational failures.

Multi-Risk and Watch and the Montreal's Civil Protection Portal

Following the January 1998 ice storm, public authorities obtained feedback, which led to an inter-organizational action plan. The report produced by the ex-Urban Community of Montreal and the broader Nicolet Commission on the ice storm highlighted issues that needed to be addressed. One of these was the creation of a multi-risk watch system for Montreal.

The report findings highlight a lack of an inter-relation in risk identification and analysis, with each risk handled in a silo by the organizations involved. This limited the scope of any early warning system. Hence, one of the challenges of the feedback on the ice storm was the need for an early warning system for the greater Montreal area. This would become possible only with a cross-functional and crossover detection system of risks in the area.

In 1999, Richard Lessard, then Director of Montreal Public Health (Direction de la Santé publique de Montréal), and Jean Bernard Guindon, then Montreal's Director of the Center for Civil Protection (Centre de sécurité civile de Montréal), combined efforts to conduct this project, which is explored in Chapter 12 of the book, *La Communication des risques – Un nouveau défi* (Maisonneuve, 2005, p. 147-156).

The system objectives were:

- Upgrade our risk analyses, in order to be able to develop a homogenous picture of the overall risks

- Set objectives to reduce vulnerability

- Improve the state of our preparedness in regards to risks that have been detected and analyzed

- Conduct risk communication throughout the entire process (Lessard and Guindon, p. 153).

For the first step of the process, the Centre de sécurité civile de Montréal and the Direction de la Santé publique joined with the Chair in Public Relations and Marketing Communications at the UQAM (University of Quebec in Montreal). Ultimately, a 75-page report was produced by the Chair with the following findings:

- Few partners provide data in real time

- Many privacy issues were identified

- Incompatibility between the different data collection systems made it impossible to identify relevant data when collecting data (Lessard and Guindon, in Maisonneuve, p.155-156).

These are significant challenges, but hard ongoing work done in good faith between the partners led to the creation of a watch system, still not yet perfect, but that can be viewed on Montreal's civil protection portal: http://ville.montreal.qc.ca/portal/page?_pageid=7637,81857660&_dad=portal&_schema=PORTAL.

This is first and foremost, a public communications system that provides partners or members of the public with information on the status of risks in Montreal, and access to early warning systems. This system is organized through various communications methods: social networks, warning sirens, community statement service (Reverse 9-1-1), and many other *ad hoc* methods.

Source : http://ville.montreal.qc.ca/portal/page?_pageid=7637,81857660&_dad=portal&_schema=PORTAL.

INSERT 14.2
Risk Communication Campaign of the CMMIC (Joint Municipalty, Industry, Public Committee) of Eastern Montreal

This particular case is provided as an example since one of the authors of this text (Jean Bernard Guindon) was directly involved, and it shows a relatively good application of the theoretical framework outlined in Chapter 14. This exercise, involving large-scale industrial risk communication in Eastern Montreal, was organized by the CMMIC (joint municipality, industry, public committee) of Eastern Montreal, a group of volunteer stakeholders, with representation from high-level governmental ministries and organizations.

This campaign was in line with collaborative initiatives developed in Canada after the incident in Bhopal, India, in 1984, which marked a turning point on a global scale for reducing the risk of major industrial accidents. This case has historical value since the campaign allowed for a reference to be developed in the field of risk communication.

This Eastern Montreal initiative received Federal funding and consisted of public communication about major industrial risks in Eastern Montreal. It was organized by Montreal's Center of Civil Protection, which assigned two employees to this initiative.

The communications campaign took time to get off the ground, because there was division between the partner's decision to move forward and hesitation on the part of the industrial partners, who were reluctant to publicly disclose information. The culture of industrial secrets was highly present, as well as the sector's protection of their corporate image.

The campaign comprised three components:

- Disclosure of risks to public and corporate citizens
- State of public preparedness
- Public alert and required behaviours to adopt

The campaign began in the fall of 2003, and used a variety of tools to reach as many people as possible:

- Pamphlets
- Door-to-door with written information and invitations to activities
- Full-page ads in the local media outlets
- Three public information meetings
- An information day for the public, with public and industry partner booths
- Publication of information sheets on the risks for each industry
- Pamphlets, cards, pens, and other promotional items

Each industry information sheet contained:

- Company profile
- Measures in place to manage major industrial risks
- Scenarios for major industrial accidents

The social fabric of Eastern Montreal was totally engaged: meetings with directors and teachers in schools; visits to residences of the elderly and the physically challenged, other healthcare establishments, and every community and socio-economic organisation, etc.

The final component of the campaign focused on warning sirens and behaviours to adopt and, in particular, the development of appropriate reflexes (staying indoors instead of leaving in case of a toxic cloud). To achieve this, a variety of tools were used:

- Slogan: *Quand la sirène crie, tout le monde à l'abri* (At the sound of the siren everyone must take shelter)
- Sirens installed in three companies
- New information leaflet
- Cartoon
- Colouring book
- Posters
- Articles
- Internet site

- Fridge magnets
- Promotional DVD
- Door hanger
- Restaurant napkins
- Brainstorming sessions for youth
- Focus groups
- Press conference
- Various activities to raise awareness

The targeted population consisted of 30,000 people and 14,000 house-holds in Eastern Montreal. The goal of reaching 100% of the public was achieved in June 2005.

The main challenges during the campaign were:
- Concern from companies and partners about communicating
- Feeling of not being prepared
- Animated discussions on what, when, how to communicate

The main outcomes were:
- Overcoming psychological resistance
- Progression to an overall cohesiveness
- Progress on prevention, intervention, and communication work
- Development of sustainable communications tools

- Direct contact between the public, companies, and responders
- Public and partner satisfaction
- Reduced anxiety to continue the process

INSERT 14.3
Global Collaboration on Climate Change or the Challenge in Setting Up a Systemic Approach

According to Thomas Homer-Dixon, there are four critical planetary challenges or major PROBLEMS in humanity:

- Major power outages
- **Climate change**
- Communicable diseases
- Economic crises

Climate change requires a global systemic approach, to curb the increasing effects greenhouse gases. The World Health Organization governs global public healthcare. Economic crises rely on a few international institutions, such as the World Bank and the United Nations and its various institutions. However, controlling greenhouse gases is not part of any systemic approach.

Because of the disparity between positions of State-run organizations and their diverse levels of greenhouse gas production levels, as well as their economic and social limitations, the outcome is only voluntary approaches based on non-binding agreements to reduce emissions that are reached individually according to the specific decision-making structure in place. There are many holes in the system that will have a major impact on the future of our world!

Risk communication is handled in a somewhat random fashion, since it relies on even more diverse factors, such as people's culture, the existence (or not) of appropriate means, the variable social awareness of the issues, the lack of belief in science, or simply the losing battle between the economy and the environment.

Given the existence of social networks, would it not be possible to develop a systemic approach to communicate a global campaign to demonstrate the harmful effects, known and proven, of climate change? And post the success stories in many parts of the world, particularly in reconciling economic and environmental issues?

> This would involve a long-term and sustained campaign, similar to campaigns promoting smoke alarms in the home or wearing seat belts in the car. But results can only be achieved through repeated efforts over a number of years. Only the recurrence over many years would produce any significant results. There would still be many holes in the system, but they would be smaller than the holes left by State-run organizations that are poor, negligent or even rogue.
>
> This type of campaign could be funded by the United Nations member States, with support and collaboration from the Organisation for Economic Co-operation and Development, or any appropriate world organization.

14.2   THOUGHTS ON A SYSTEMIC APPROACH

Risk management is particularly complex as there are many factors and variables that have to be taken into account in potential situations to which we might be exposed. Risk communication is even more complex. What can we learn from the systemic approach in managing complexity? That the best way to manage a problem is to view it as a system, which means that it is a set of related components influenced by their environment. By making a clear distinction between what is derived from the system and therefore can be controlled, and what cannot be controlled, we can set up a systemic approach as a pragmatic analytical tool, empowering us with actions that will have reasonable effects on the course of a situation. Potentially, this will lead to resolving the problem.

Such an approach is based on the philosophical viewpoint that we are not dealing with objective, natural systems. On the contrary, we can build a model that represents a partial view of a reality adapted to results we are aiming for and to the intervention we actually want to carry out.

By building a system that reflects the vision of an organization in a particular situation, we can more easily select the actions to take, and try to anticipate the possible consequences.

Risks are not abstract, unchanging forces. They are events that have a direction, a meaning, and potential impact on human beings. It is from this point that we can create a system representative of the vision for this group, where we can more easily identify the action items. Risk communication involves modelling for a situation to which

a set of specific individuals is exposed. This modelling relies first of all on properly identifying the organisation for this modelling: each situation will involve different individual perspectives and understanding individual positions is critical.

Then it is important to define the components of the system: who are the persons involved? The groups involved? What is the operational structure of those in the system? And finally what are the environmental factors that will most likely impact the functioning of the system. The art of communicating risks should thereby support the flow of messaging within the system, and between the system and its environment. The focus should be on ensuring that the system is sustained and, ideally, that it evolves and develops.

CONCLUSION

To sum up this book, it should be mentioned that the authors who made this possible started from very different perspectives and visions. What ultimately emerges is that this diversity, far from fragmenting knowledge on risk communication, has resulted in an unplanned convergence of thought. Quite naturally the authors were part of the development of a new understanding of risk communication: an understanding that resided within each author, but which evolved in a new synergy, to produce an outcome that together is greater than its individual parts.

We hope that those reading this book will be able to put the concepts into practice and explore new avenues, which will contribute to subsequent writings on this topic.

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EXERCISES

1. If you are part of a risk management process, develop a draft communication plans by considering the steps of the systemic approach.

2. Critically analyze an event involving risk or crisis communication and refer to the systemic approach parameters to identify success factors and areas to improve.

3. Many issues involve diametrically opposed positions such as pipelines, legalization of marijuana or climate change. Select an issue and two organizations that have opposing positions (such as the Suzuki Foundation or any employment council). Identify their key messages and evaluate their performance in terms of communications strategy.

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We are all exposed to meteorological and climate risks that impact our daily lives to some degree. A number of organizations with professionals from various areas of expertise provide solutions to prevent and manage these risks. It is critical to adequately communicate these issues to individuals who may be impacted and to the various actors involved in managing these problem situations to offset any harmful effects.

The purpose of this book is to convey the role of communications in risk management. In this book, practitioners and researchers share their experiences and observations and through examples, reflections and practical exercises, they equip readers with a range of tools to improve their communications and understanding of events involving the transmission of messaging.

This book deals with risk communication concepts, the actual practice of communications, communicating in a digital environment, and the overall repercussions. Readers who are either risk management and communication professionals or students are shown how they can assume an enhanced participatory role in implementing effective and relevant communications strategies that minimize the negative impact of crisis situations.

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