

The McGraw-Hill Homeland Security Handbook

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CHAPTER 30

The Psychological Perception of Risk

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Risk communication: Provision of concise, comprehensible, credible information, as needed to make effective decisions regarding risks.

INTRODUCTION

The Challenge

Terrorists seek to undermine public morale, to the point where societies collapse or lose their momentum, at home and abroad. The direct route to this goal involves instilling terror, thereby undermining citizens' well-being, ability to function, and confidence in their way of life. One indirect route involves disrupting normal life, by interfering with economic activity, travel, education, leisure, elections, and the like. A second indirect route involves alienating people from their leaders, by throwing doubt on the two cornerstones of trust: competence and honesty. A successful attack (or even a false alarm) may leave citizens feeling that their authorities not only failed to protect them but also denied them the ability to protect themselves (including material resources and candid situation assessments). A third indirect route involves turning citizens against one another, by creating the feeling that they are receiving differential protection, or even that some are profiting from a situation in which others are suffering.

(2006)

New York Chicago San Francisco Lisbon London Madrid
Mexico City Milan New Delhi San Juan Seoul Singapore
Sydney Toronto

In these ways, terror is a continuous "mind game," punctuated by events with horrific physical consequences. As a result, counterterrorism involves a battle of wits, for the hearts and minds of civilian populations. Communicating effectively about risks is one element of that battle. It requires accomplishing three tasks.

1. *Task 1: Manage risks well, so as to have a credible message to communicate.* Without reasonable progress, relative to the challenges, the authorities will find it difficult to inspire confidence in their messages. If terror seems to be managed poorly in other ways, then the credibility of communications will suffer. For example, if citizens believe that authorities have put their own interests ahead of those of the public, then they may suspect that communications are being "spun," complicating their ability to make life-and-death decisions. If the authorities have inconsistent policies (e.g., in alert levels or safety practices), then their messages may prompt further skepticism.
2. *Task 2: Create appropriate communication channels.* These channels not only deliver content but also are part of it. Improvised, fragmentary, and uncoordinated channels suggest poor execution in other, less visible aspects of terror risk management. Having appropriate channels should increase public confidence, by demonstrating that a common framework underlies preparation, alert, crisis, and recovery plans. The accepted standard for risk communication is creating two-way channels, in which recipients are treated like partners, shaping how risks are managed and sharing what is learned about them. In contrast, one-way channels tell recipients that they are being managed, learning no more than what someone wants them to know. Public relations, public affairs, and issues management are all legitimate activities. However, they are not risk communication, which must serve the public's interests.
3. *Task 3: Deliver decision-relevant information, concisely and comprehensibly.* Doing this requires rigorous analysis of the facts that citizens need to know in order to make the choices facing them. That analysis must be followed by empirical study of what they already know, and then the design (and evaluation) of communications bridging the critical gaps.

That design will face tension between condensation and expansion. On the one hand, it needs to use (and be seen as using) recipients' time efficiently. On the other hand, it must provide sufficient background to make the message meaningful, as interpreted within recipients' evolving "mental model" of the situation.

These three elements interact. Terror risk managers inevitably make assumptions about behavior that is shaped by their risk communications. For example, to what extent will people comprehend, trust, obey, and effectively execute instructions to evacuate, shelter in place, get (or avoid) medical treatment, leave children in school (or collect them), surrender personal data, report on neighbors' actions (or suspicious packages), maintain emergency supplies, and install computer firewalls? The answers to these questions will depend on the faith that the authorities have generated over time, as well as on the technical execution of specific communications.

Incompetent risk communications can further terrorists' short-term and long-term goals. For example, a common misconception is that people panic during a crisis, behaving irrationally at the individual and group level.¹ That belief is contradicted by a large body of research, which has found that people respond reasonably, even bravely, to such challenges.² People may act on the basis of poor information, making their reasonable actions ineffective. If so, however, the fault lies with the inputs to their choices, not with their decision-making processes. In hindsight, citizens will be critical of authorities who failed to collect the right information; they will be unforgiving of those who failed to disseminate it or misrepresented it for some unacceptable reason.

Deliberately ignoring behavioral research entails assuming that, somehow, everything is different with terror—or else preferring hunches to science. In the specific case of perpetuating the myth of panic, the likely result, in order to manage a public that is not trusted to behave responsibly, is the unwarranted use of coercive measures (e.g., hiding risks; sending soldiers rather than first responders, to emergency scenes). Doing so takes the short-term risk that coercion will be less efficient than relying on the self-organizing properties of a motivated, intelligent populace. It takes the long-term risk that needlessly coercive measures will be seen as violating the social contract between citizens and authorities. If not, then social fiber may

be sacrificed. In a misguided attempt to protect physical well-being, Terror is a multiple-play game. Actions that undermine a society's cohesion reduce its ability to defend itself, as well as forfeiting some of what it values.

THE RESOURCES

The confrontation with terrorism has revealed new risks and changed the shape of old ones (e.g., risks to aviation and to shipping). The new risks and the new wrinkles are often intellectually and emotionally challenging. They involve complex, novel phenomena. They require expertise distributed over multiple disciplines and cultures. They are dynamic and uncertain. They pose difficult trade-offs: your money or your life, your life or your liberty, my freedom or yours. They require vigilance, from already weary people. They evoke social tension, in an already complex time.

Although the legacy of existing risks adds to the stress of managing the new ones, it also provides resources. These take several forms. One is providing people with knowledge about related risks and control mechanisms. A second is providing them with analytical strategies for extrapolating beyond direct evidence. These strategies have been documented in behavioral decision research and behavioral economics, overlapping fields which study behavior in ways that allow comparison with formal models defining optimal performance. Doing so shows how much specific imperfections matter, how they come about, and how they might be corrected (if need be). The basic research has been applied extensively with health, safety, and environmental risks. Many of these problems are intellectually and emotionally challenging, in ways like those of terrorism. Applying this research to terror constitutes a "defense dividend" from investments in research into these (peaceful) problems.

Given the urgency of terror risk communication, we can ill afford to reinvent this research—unless we have powerful evidence that the usual rules of behavior are repealed when people face terrorism. As a result, the remainder of this chapter begins with research into other risks, then proceeds to guarded extrapolations to terror. The next three sections deal with the three tasks facing risk communication, as listed above. We begin with the second task, creating appropriate channels. These channels determine the content

and character of the communications. Within these constraints, decision-relevant facts must be communicated concisely and comprehensibly. We then consider the science relevant to this third task. It leads to treatment of what risk communication contributes to the first task, managing terror risks effectively.

CREATING APPROPRIATE COMMUNICATION CHANNELS

Other Risks

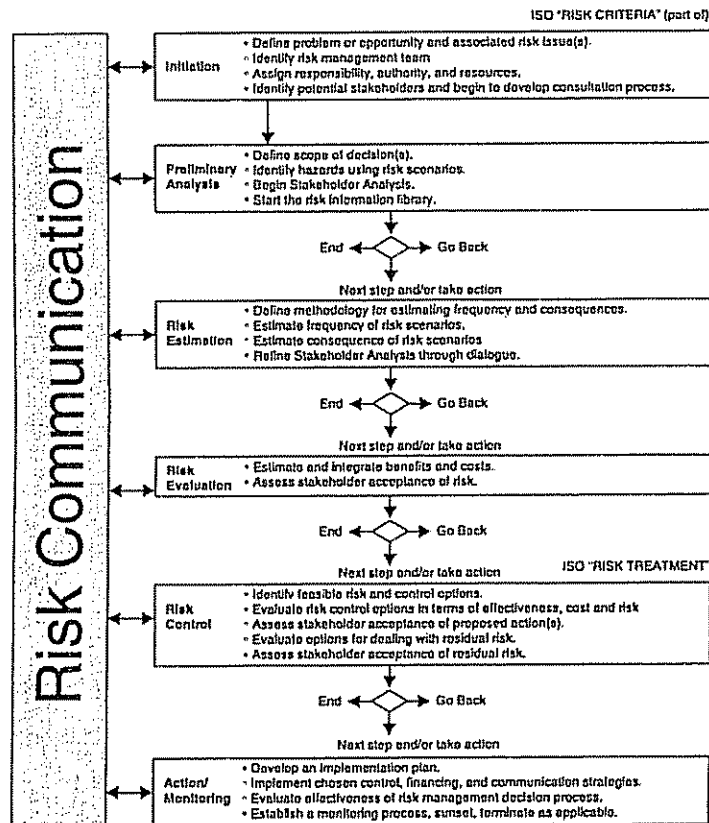
Health, safety, and environmental risk communications are a central social function, shaping relationships between citizens and authorities.³ Experiences with them provide both lessons and expectations for terror risk communication. In the western democracies, the evolving standard calls for a high degree of shared responsibility. It reflects faith (and hope) that authorities can create the facts that the public needs for effective decision making and can deliver those facts in a comprehensible, credible form. The outcomes of this social experiment will depend on both institutional commitment and technical execution. By facilitating the technical execution, risk research may enhance institutional resolve, by showing that public engagement is possible.

Figure 30-1 shows how the Canadian Standard Association (1997) has conceptualized this process. On the right appear the standard steps of risk management. The scheme is unusual only in requiring an explicit evaluation at each transition. That is, the model recognizes the possibility of having to repeat the work until it has been performed adequately—and that this goal might not be achieved. The left-hand side shows a commitment to two-way risk communication at each stage of the process. Both the comprehensiveness and the reciprocity of this involvement are noteworthy. In this view, citizens have a right to hear and to be heard from the very beginning, when risk analyses are initially formulated. Moreover, citizens have expertise that should shape the terms of an analysis and inform its content. This is a striking departure from the one-way communication strategy, sometimes called "decide-announce-defend."

Similar policies have been advanced by the Presidential/Congressional Commission on Risk (1998) and the Environmental

FIGURE 30-1

Steps In the Q850 Risk Management Decision-Making Process—Simple Model.



Source: CSA, July 1997. Risk Management: Guideline for Decision-Makers (CAN/CSA Q850-97) Canadian Standards Association.

Protection Agency (2000) in the United States; and by the Royal Commission on Environmental Pollution (1998), Health and Safety Executive (2001), Parliamentary Office of Science and Technology (2001), and Cabinet Office (2002) in the United Kingdom. All endorse involving the relevant publics, focusing on their informational needs, and taking advantage of their expertise. All recognize the importance of trust for risk management, and the centrality of open, competent communication in securing it.

The evolution of this philosophy is reflected in a series of reports from the U.S. National Academy of Sciences. The "Red Book"⁴ recognized that risk analysis inevitably reflects both science and politics. Even if scientists could scrupulously avoid the influence of vested interests, the choice of analytical topics and focal outcomes reflects what matters to those commissioning an analysis. So do the decisions to invest in creating data that could support or undermine particular concerns. The Red Book advocated recognizing these issues explicitly, thereby framing analyses in ways relevant to stakeholders. Doing so requires hearing stakeholders describe their concerns (through case-specific deliberations, supported by research into general concerns). Although this stance in the Red Book presaged the current (two-way) communication standard, the immediate response was a quest for fuller separation: scientists would assess the situation, while politicians would decide what to do about it. That separation was designed to keep scientists from spinning their results and politicians from claiming unwarranted expertise. It was naturally appealing to scientists hoping to perform purely objective research (and ignore how political power shapes research agendas).

*Improving Risk Communication*⁵ asserted the public's right to know the results of risk analyses. That commitment envisioned a less passive public, doing more than just waiting for scientists and officials to manage risks. It reflected a view that the public can understand risks—contrary to many experts' belief in citizens' incompetence (captured in phrases like "real versus perceived risks," "hysterical public," or "panic"). The report concluded that citizens could fill a constructive role, if provided with diligently prepared communications.

One body of research evidence supporting this conclusion provided a richer context for interpreting disagreements between citizens and experts, rather than just assuming citizens' ignorance or stupidity. It showed that any account of disagreement between laypeople and experts must consider whether they (1) use terms differently (e.g., which outcomes they treat as the "risk" of a technology; how they weight catastrophic potential); (2) are prey to self-serving biases, assuming the worst about the others' motivation and biases; and (3) are insufficiently critical of their favored information sources. A common finding is that citizens are most skeptical of claims for which experts' evidence is weakest, such as assessments of low-probability, high-consequence events.⁶

*Understanding Risk*⁷ revived the Red Book's intertwining of science and values. It challenged the assumption that scientists can simply do their work and leave the politics to others. Rather, it showed how the framing of a risk analysis must express some values. They are seen in its choice of topics (why some outcomes are studied and not others) and definition of terms. For example, *risk* could mean just mortality or also include morbidity; its definition must assign relative weights to different consequences. Even weighting all deaths equally expresses a value: not assigning greater weight to deaths among young people (with more lost years) or those exposed to a risk involuntarily.⁸ The report argued that these definitional choices should be made explicitly, by stakeholders (those whose fate depends on them) or their representatives.

Involving citizens in priority setting was further endorsed by the congressionally mandated Committee on Setting Priorities for the National Institutes of Health.⁹ It led to the creation of a Citizens Advisory Panel, chaired by the head of the institutes. *Toward Environmental Justice* called for "participatory science"¹⁰ involving citizens in the design and conduct of studies affecting their community. That participation takes advantage of their expertise (e.g., in exposure processes), while seeing that they learn as much about their conditions as the outsiders examining them. It should improve citizens' scientific and policy-making sophistication, while increasing the chances of their accepting the results of risk analyses (which they now see as collaboratively produced).

Terror Risks

At this writing, terror risk communication is in its infancy, as is research into the efficacy of that communication. As a result, this section will focus on how a consultative process, integrating risk analysis and communication, could be adopted to the demands of several terror risks.

Smallpox Vaccination

In 2002–2003, the United States sought to vaccinate first responders and health care workers against vaccinia, a disease closely related to familiar strains of smallpox. The campaign generated considerable acrimony, over issues including the magnitude of the risks faced by

health care workers and compensation for health problems that they suffered or caused, by transmitting diseases to others. A small fraction of the initial vaccination goal was achieved (with disagreement over whether this reflected a partial failure or reassessment of needs).

Whatever the lesson of this campaign, mass vaccination is a plausible prospect in the struggle against terror, not to mention pandemics of infectious diseases arising from natural causes.¹¹ The risks and benefits of such campaigns are sufficiently uncertain that responsible risk management must begin with a formal analysis of the anticipated impacts of alternative programs. A two-way risk communication process would begin by enlisting stakeholders to identify those consequences that matter to them. For health care workers, their personal health risks would obviously be on that list, as would the health benefits for others. Nonetheless, having them nominate those consequences would be an important courtesy. Their list might also include effects on their future insurability, ability to provide emergency services and legal liability for secondary infections. An analysis that neglected vital outcomes would be guilty of misplaced precision in its analyses of the factors that it did consider.

As the analytical process continues, healthcare workers (or their representatives) would be able to follow its work, ensuring that the results are comprehensible and credible. They would be able to contribute their knowledge about how things really work (e.g., needle stick rates and compliance with recommended precautions) and how they might be improved. Analogous consultations could shape the analysis to meet the informational needs of other stakeholders. For example, representatives of immunocompromised groups might want estimates of disease and side effects refined by populations. First responders' representatives might provide input into the roles and concerns of their members. Minority groups might identify their communities' special suspicions and ways to address them.

Domestic Surveillance

Managing terror requires police work. That means placing people under some degree of surveillance, reflecting some measure of suspicion. By design, the process reduces their privacy. Almost inevitably, some (if not most) suspicions will lead nowhere. Nonetheless, they will impose costs on the individuals involved. It might be as little

as a note in their file (indicating a suspicion that was raised and dismissed), or as much as a lingering shadow of doubt complicating their jobs, health, etc. These risks to innocent civilians must be justified by reductions in terror risks. The cleared suspects (e.g., travelers who undergo airport screening) benefit from that reduction. Other benefits might include reducing the chance of discrimination against "people like them" following an attack. Thus, even at the individual level, the benefits may outweigh the risks, for all but the guilty. Even where that is not strictly true, most people will pay some personal price in order to protect their community.

Explaining the risks and benefits of surveillance programs is a familiar chore for police officials. Controversies over profiling show the difficulties of getting it right, played out against the history of relations between the police and the community, constrained by the limits to what can be revealed without compromising the operations. Approached as a risk communication task, terror-surveillance procedures would be accompanied by an ongoing dialogue with stakeholders. As elsewhere, the act of respectful, proactive communication would itself carry a message. Its content would improve understanding of both specific plans and general principles (e.g., how legal protections work). Content would flow in both directions (e.g., informing authorities about community sensitivities, discussing program designs that might address them without reducing effectiveness).

These communications must be grounded in formal analysis, no less than ones regarding hazardous technologies—especially given the challenges of conducting the conversation without revealing details that compromise a program's efficacy. In this case, the critical issues are likely to be the rates of true and false choices possible with surveillance methods of varying intensity and targets of varying frequency. Other things being equal, there will be more false positives (e.g., arrests of innocent people), with less discriminating procedures, rarer targets, and greater aversion to false negatives (missing guilty ones). For example, if there are very few guilty individuals, then the only chance of finding them all is with very intrusive procedures and arrest rates. These relationships are thoroughly understood by decision scientists.¹² However, applying them requires an institutional commitment to estimating the rates. Such quantification may be uncommon. It may be opposed by those who prefer to rely on intuition. Unfortunately, people intuitively exaggerate how well

many diagnostic procedures work and underestimate how difficult it is to detect rare phenomena.¹³ The authorities commissioning a program are, of course, also stakeholders. They need an ongoing communication process in order to shape programs to their needs, and create realistic expectations about its capabilities. It's important to know when the best possible program is still very porous.

Decontamination Standards

Attacks by chemical, radiological, and biological weapons impose both immediate and longer-term costs. The latter arise from their ability to disrupt everyday life. One determinant of that disruption is lost access to contaminated areas. The benefits of avoiding such areas come at an economic cost, from lost business, relocation, reduced property values, etc. There may also be health costs, arising from the stress of dislocation (e.g., lost income, inconvenient circumstances, family tension, and difficulty maintaining health care regimens). A comprehensive analysis of decontamination standards would consider all these effects, then determine acceptable trade-offs. There is no logical reason why the resulting exposure standards would be those adopted elsewhere, with differing control options and distributions of risks and benefits (e.g., for radiation exposure to patients and health care practitioners, or for nuclear power plants and hazardous waste sites). Moreover, all standards reflect an imperfect resolution of conflicting political and economic pressures and hence have inconsistencies, in terms of the protection bought per dollar spent.¹⁴

Homeland security situations require their own cleanup standards, informed by scientific research and social values. In the absence of explicitly developed and adopted standards, multiple competing ones may be advocated, adding confusion to an already stressful situation. The winners in this competition may reflect bureaucratic politics rather than public needs. In particular, they may be much more stringent than citizens want. In an emergency, a small increase in lifetime cancer risk might be an acceptable price to pay for returning to home and work.

Establishing cleanup standards requires a socially credible process, informed by research into the effects of both radiation and the disruptions caused by reducing radiation risks. None of the stakeholders will be familiar with all the technical issues. Neither will

any of the experts (e.g., health physicists will know the effects of radiation, but not those of stress). As elsewhere, consultation is a communication act that lends credibility to subsequent communication of its conclusions. Materials developed for standard-setting deliberations can be adapted for broader distribution. Creating and disseminating sound explanations should reduce public anxiety over these risks—as should the observation of a deliberative, participatory approach.

DELIVERING DECISION-RELEVANT INFORMATION CONCISELY AND COMPREHENSIBLY

Other Risks

The logic of creating the content of risk communications is simple: (1) Analytically, determine the facts most relevant to predicting the outcomes that matter most to citizens. (2) Empirically, determine what citizens know already. (3) Design messages to close the most critical gaps, applying scientifically sound information-processing principles. (4) Evaluate the impact of the messages. (5) Repeat the process, as needed, until an acceptable level of understanding is achieved.¹⁵

Prioritizing information is important because the communication channel is often narrow. Citizens may have other things on their minds (e.g., they may be suffering from a medical condition or may be angry because they do not feel respected). Poorly chosen content can narrow the channel further: Why pay attention to experts who say things that are irrelevant or that don't need to be said? Why trust communicators who omit crucial facts or who treat people as if they are stupid and need to have obvious things explained?

People poised to make well-formulated personal or policy decisions need *quantitative* estimates of the probability and magnitude of each relevant consequence. Often, though, people also need *qualitative* information regarding the processes underlying those estimates, creating and controlling the risks. Such knowledge can give the quantitative estimates intuitive credibility, allow citizens to follow the discussions, and confer a feeling of competence.

Formally analyzing information needs is straightforward, if technically demanding.¹⁶ A typical analysis examined the importance

of knowing about each of the many possible side effects of carotid endarterectomy, which involves scraping out the carotid artery, for patients with arteriosclerosis. Although successful surgery can reduce the risk of stroke, many things can go wrong. However, the analysis showed that only a few risks were sufficiently likely and severe to matter to many surgery candidates.¹⁷ While no risks should be hidden, communication should focus on these critical ones (death, stroke, and facial paralysis).

In another typical study, we examined what teens need to know about HIV-AIDS, in order to make effective choices (reducing the risks, without unduly constraining their lives, ostracizing others who may be ill, etc.). To this end, teens need both quantitative information (e.g., prevalence, transmissibility), in order to evaluate options; and qualitative information (e.g., prevention strategies, modes of transmission), in order to fashion options. Interviews with teens revealed that they knew much of the relevant qualitative information. In part, that reflected general knowledge of infectious disease. In part, it reflected society's intensive HIV-AIDS education. However, there were significant gaps in their knowledge, reflecting omissions in that education. These gaps included both quantitative information, which is rarely presented anywhere; and qualitative information that some venues find too sensitive (e.g., explicit descriptions of safe sex practices or explanations of risk levels). We reduced these risks by plugging these gaps with an intervention that also stressed self-efficacy, the grounded feeling of being able to manage the risks.¹⁸

Although communications must address the specifics of particular decisions, they can draw on design principles, identified in the basic research literature.¹⁹ For example, one long-standing focus of decision-making research has been how people's current beliefs shape their future understanding. Knowing about these processes is essential for effective communication. People's ability to process risk communications depends on their numeracy and literacy. Numeracy is required to understand how big risks are (and the cost-benefit trade-offs of risk-reduction measures). Language literacy is required to process written messages. Scientific literacy is needed to grasp the content of messages that, with terror, can span many domains. The greater the base, the further that communications can take them.

People's responses are also constrained by their cognitive capacity. Given its limits, they must either acquire domain-specific knowledge or rely on robust but imperfect heuristics. Such rules of thumb simplify problems and provide approximate answers, at the price of somewhat predictable biases. For example, people seem to count, almost automatically, how frequently they see events. Those estimates are useful for estimating frequencies—unless appearances are deceiving, making some events disproportionately visible. People often do not think about the representativeness of the evidence. When they do, they have difficulty adjusting adequately from what they have seen to what is actually out there.²⁰

Researchers who rely on psychological theories and methods have found it possible to increase people's understanding of many risks. Some concepts require special efforts. One challenge is giving a feeling for very low probabilities. There are about 290 million people in the United States. It is hard to bear that denominator in mind, when thinking about a risk with a few highly salient casualties in the numerator. Another challenge is conveying how risks accumulate through repeated exposure. An improbable risk might merit attention, given enough chances to happen (e.g., driving without a seat belt). A third problem arises with verbal quantifiers such as "likely," which may mean different things to different people in one situation, and different things to one person in different situations. Communicating with words, instead of numbers, sets a trap for the audience.²¹

People have difficulty making decisions about events that they have never experienced. In effect, they do not really know what they want or what it would mean to them. Such uncertainty about values has methodological as well as practical and theoretical implications. Conventional survey research is ill suited to eliciting preferences among unfamiliar prospects. Rather, people need help to understand the options and how their basic values should be articulated for them. Such measurement, called constructive valuation, integrates behavioral decision research, which provides understanding of the factors shaping values, and decision analysis, which provides a disciplined approach presenting alternative perspectives in an unbiased way.

One aspect of that challenge is predicting personal emotions. A simple example is fully anticipating how one will feel if an investment goes bad or one becomes sick. Current emotions can color

those predictions. For example, anger increases optimism, as well as the tendency to blame other people, rather than complex situations, for problems.²² Those shifts might be useful in mobilizing for an immediate fight. They might undermine policy making by amplifying the natural tendency toward undue optimism.

Terror Risks

Although complex, these processes have been extensively studied in research that could be applied to communicating about terror risks. Ignoring it would fail to serve the public interest. However, there are institutional barriers to avoid this form of professional malpractice. Because terror is so new, many risks have yet to be analyzed at all, much less from the perspective of citizens' decision-making needs. New groups of experts are thrust into the front lines of communication, without knowing their audience or its problems. They must make rapid progress on the communication learning curve if they are to earn trust that is hard to restore, once lost.²³

Unfortunately, many experts' first response is telling citizens to "go away while we figure things out." If people persist in wanting to hear something immediately, it is tempting to tell them what they ought to think, rather than leveling with them and providing the facts that they need for independent choices. It is tempting, at some times, to magnify risks in order to motivate citizens. It is tempting, at other times, to trivialize their worries, with comparisons like "why get so excited about terror, when you're still smoking" or "only five people have died from anthrax [so far], compared with 40,000 annually from motor vehicle accidents." The rhetorical tone of such comparisons puts many people off, especially when the options differ in other ways (benefits, alternatives).

One common institutional response is training experts in communication skills (like those in the appendix to this chapter). That training might reduce experts' misconceptions about the public, like the belief in panic. However, it is difficult to change behavioral patterns, especially when people tend to regress to old behaviors in stressful situations. Moreover, even if the training is successful, demeanor can go only so far, with an audience wanting to know "What is happening?" and "What should I do?" The best communicator is badly exposed if denied the staff work needed to provide the content of concise, comprehensible messages.

The rest of this section sketches the conclusions about content that might emerge from systematic treatment of the three examples. These speculations are no substitute for systematic analysis, design, and evaluation.

Smallpox Vaccination

Interest here could be prompted by various specific choices, such as whether to support legislation creating a national stockpile, to consider the 2003 vaccination campaign a success or failure, to seek vaccination proactively, to participate in an emergency campaign, and to help someone who has been exposed. Somewhat different information is critical for each choice and hence should be emphasized. Inferences about each will draw on a common set of beliefs, which will, in turn, be supplemented by the beliefs extracted from new messages. The more complete people's mental model, the less needs to be said in a new situation. As a result, each communication has a role in creating the background needed by later ones.

In the absence of directly relevant information, people will draw on seemingly related beliefs. In the case of smallpox, these might include beliefs about other infectious diseases and vaccines. Communicators should be particularly alert to cases where such inferences lead in the wrong direction. For example, a survey conducted by the United States during the run-up to the vaccination campaign of 2003 found that few people confidently believed that vaccination could be effective after exposure. That easily understandable fact was, obviously, not made salient (if it was said at all). A similar communication failure was not conveying the fact that anthrax is not easily transmissible, apparently buried in the massive reportage during the crisis.²⁴

With health matters, mental models naturally include the other people involved, including those delivering and managing health care. Many vaccines are surrounded by controversy, including some childhood immunizations (in the civilian population) and anthrax vaccination (in the military). In our survey, most people endorsed the statement "If smallpox breaks out somewhere, we should quarantine the area." Thus, at that time, there was the trust needed to support such a draconian program. This valuable resource could be imperiled in many ways, including a tendency to disparage the public for failing to know facts that experts had communicated poorly.

Domestic Surveillance

Citizens evaluating domestic intelligence policies need both quantitative and qualitative information. On the one hand, they need to know the magnitude of the threat, the chance of identifying legitimate suspects, and the damage done by false positives. On the other hand, they need to know how the system works. For example, pulling in a class of individuals (e.g., male students from a given country) could yield valuable information about them, as individuals and as a class. However, it is a reactive form of measurement. It might deter some targets, while radicalizing others. It could have unpredictable effects on future visitors.

The attention that the authorities pay to civil liberties issues, when conducting such surveillance, will affect these processes. It might reduce the yield from questioning, by restraining interrogators; or increase the yield, by convincing participants that they can speak freely. It could alienate or draw in the target community. The attention that the authorities appear to be paying will inform people's beliefs. Of course, the methods and effects of these programs are, by their nature, incompletely visible. Outsiders cannot see the evidence supporting (or contradicting) the decision to question (or ignore) someone. Nor can they see problems averted or deterred by a program. Indeed, even the authorities cannot be sure of its effects. As a result, citizens need theory to supplement their observations, regarding both the effectiveness and the costs of such programs.

That theory will come from their mental models of how such matters work, supplemented by what they hear from various sources, weighted by their credibility and comprehensibility. A consultative process can help with both. It will have to overcome availability bias, arising from the observation of unrepresentative evidence. That could be incidents depicted as harassment or interceptions. Given the natural tendency for initial beliefs to shape later ones, proactive communication is important.

Decontamination Standards

At the time of a dirty bomb attack, citizens will want to know what to do in order to protect themselves and others. They will want to know whether to shelter in place or try to evacuate, what they can eat and drink, what to do with their clothing, and so on. Their inferences will shape their approach to subsequent decontamination, just as they will be shaped by previous encounters with radiation issues and the

authorities managing them. Those may include beliefs about nuclear weapons, power, and medicine.

The research on these risk perceptions shows predictable misunderstandings, but also manageable ones, given proper communications.²⁵ People confuse radioactivity (the potential to do damage) and radiation (the release of energy that does damage). Treating the former eliminates the latter and is often possible (e.g., removing clothes and showering after exposure). As a result, it is critical to preserve the cleanup option (e.g., by avoiding the inhalation of particles and closing external air ducts). Without clear messages, citizens cannot know whether the dose is like medical X rays or domestic radon (which many accept, within reason) or like that of nuclear weapons or high-level radioactive waste.

As elsewhere, messages will be interpreted in the context of the messengers. The institutional legacy here is a difficult one. Managing nuclear materials has been among society's most contentious issues. The authorities involved with decontamination will have to distinguish themselves from those associated with Hiroshima, downwinders, Three Mile Island, Chernobyl, Yucca Mountain, and the like. That will be hard to do without a deliberative process involving stakeholders' representatives.

MANAGING RISKS WELL, SO AS TO HAVE A CREDIBLE MESSAGE TO COMMUNICATE

Other Risks

Experts are people, too, with uncertain beliefs and emotions. Complex, novel risks can draw them into areas that no one understands very well. They must interface with other experts, from unfamiliar disciplines. Decision makers (whether authorities or citizens) need the best expert judgment available. However, in order to use it well, they need to know how good it is. That trust is a function of (1) how completely the relevant topics are covered, (2) how well the pieces are integrated, and (3) how candidly they are qualified. To this end, experts need to have—and convey—a realistic assessment of their own competence, bounding their domain of expertise and coordinating with experts from other domains. That requires overcoming the territorial and commercial imperatives that lead disciplines and consultants to exaggerate their capabilities.

One way of disciplining expert judgment is to perform formal risk analyses. That involves identifying valued outcomes, the processes affecting them, and the experts for each. These experts must then pool their beliefs, uncertainties, controversies, and omissions and then subject their work to independent peer review. Although the basic formalisms of risk analysis are well established (and under constant refinement), their implementation is a human process, which requires attention to how groups are assembled and how their judgments are elicited.²⁶

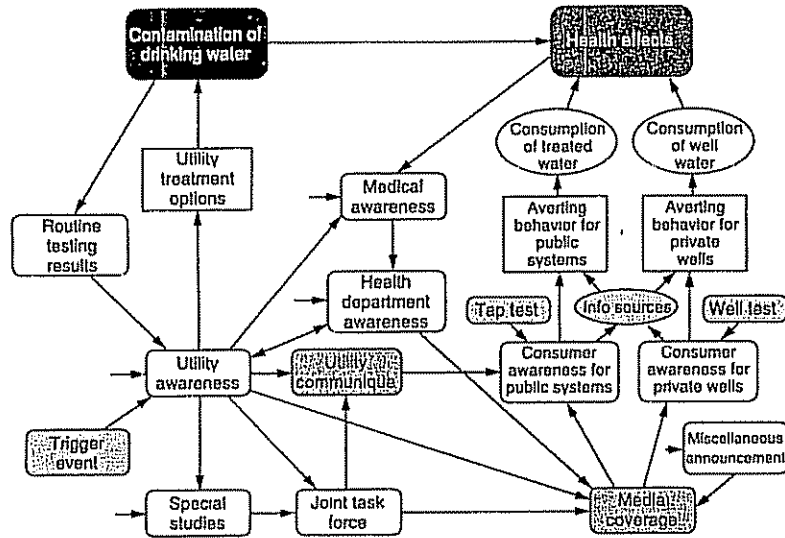
One statement of these issues emerged in a National Research Council report (1994) in the Red Book series. *Science and Judgment in Risk Assessment* recognized the central role of judgment in risk analysis—given the great uncertainty surrounding many novel issues, with complex conjunctions of environmental, industrial, social, psychological, and physiological processes. It offered standards for diagnosing and disclosing the role of expert judgment, and for eliciting it in a disciplined way. Further critiques have warned about risks of risk analysis. One is stifling creativity, by focusing on the justification of existing proposals. A second is emphasizing readily quantified factors (e.g., monetary costs) over more qualitative ones (e.g., impacts on public morale or minority groups' feelings). A third is disenfranchising those unfamiliar with model formalisms, even if they have or need substantive knowledge of risk topics.

Collaborative schemes, as in Figure 30-2, reflect recognition of risk communication needs, within expert communities, as well as between them and their clients. Figure 30-2 shows a risk analysis combining social, biological, and engineering knowledge, with a problem involving the role of communications when typically benign systems misbehave.²⁷ It looks specifically at outbreaks of *Cryptosporidium*, a protozoan parasite that can enter public water supplies through sewage effluent discharges and fecally contaminated storm runoff (e.g., from feedlots). Although many infected individuals are asymptomatic or recover within two weeks, the disease can be fatal to immunocompromised individuals (especially those with AIDS).

Figure 30-2 has the form of an influence diagram.²⁸ Each node represents a variable. An arrow connects two nodes, if knowing the value of the variable at the tail facilitates predicting the value of the variable at the head. For example, the greater the water utility's awareness of outbreak potential, the greater the chances that it

FIGURE 30-2

Influence diagram for predicting risks from *Cryptosporidium* intrusion in domestic water supplies.



Source: Casman et al. (2000).

will conduct special studies or create a multiagency task force. Estimating the model requires inputs from multiple disciplines, including microbiology (dose-response relationships), engineering (filtration and testing), ecology (land use), communications (message penetration), and psychology (perceived risk, actual response). Applications specify values for each variable and dependency, then predict the risks and uncertainties.

This model was created as the integrating core of a project intended to reduce *Cryptosporidium* risks, by communicating with consumers. However, running the model revealed that current testing is so ineffective that an outbreak will probably have passed (or at least peaked) before its source is detected. Thus, even if every consumer got a perfect message and followed it precisely, an emergency system relying on "boil water" notices would not protect the most vulnerable. Such a system may threaten health by taking the place of more effective controls.

The same system might, however, be adequate for a readily detected pollutant, such as the many strains of *E. coli*. Even current *Cryptosporidium* testing may be adequate for decisions about land-use or filtration systems—if testing provides a (forensic) diagnosis of an outbreak's source. In descriptive research, to determine message content, citizens often raise questions about the system that creates (and controls) these risks (e.g., where did this problem come from, and who was issuing "boil water" notices). A satisfactory message might need to convey (1) why one's water is vulnerable, (2) how all uses pose danger (even brushing one's teeth), and (3) what "boiling water" entails.

Terror Risks

Research on risk perception and communication can contribute to terror risk management, both by improving performance and by clarifying its limits. Planning is ill served when citizens' abilities are overestimated (e.g., as with *Cryptosporidium*) or underestimated (e.g., in panic myths). An indirect contribution is that these researchers are sometimes the sole social scientists on risk management teams dominated by engineers, lawyers, and natural scientists. As a result, they may play a translational role, showing where social science research can replace intuitive theories, while helping social scientists make themselves more relevant. The following paragraphs briefly sketch issues that might emerge from systematically treating the three examples.

Smallpox Vaccination

The optimal allocation of vaccine resources will require people to understand their personal risk, in order to take proper action and accept the authorities' prioritization. One possible barrier is feeling an exaggerated sense of personal invulnerability, as has been found in many situations where people can imagine some sense of control: e.g., being able to tell who is a carrier;²⁹ surprisingly, adults are, if anything, more prone to this illusion than teens. A contrary barrier is not knowing that one could be vaccinated after exposure. Any plan for smallpox will make explicit or implicit assumptions about these behavioral variables. Those plans create, in turn, the circumstances on which laypeople's future inferences will be based.

Poor communication can itself undermine decision making, by undermining trust in authorities to manage supplies effectively (or fairly). The anecdotal reports of runs on ciprofloxacin, during the anthrax attacks of 2001, were partially attributed to such distrust.³⁰

Domestic Surveillance

People's ability to judge others is one of the most heavily studied topics in psychology. The overwhelming result is that making complex judgments (e.g., personality, dangerousness, propensity for taking risks) is a skill that is acquired slowly, even under favorable conditions for learning (concentrated trials with prompt, unambiguous feedback). However, people do not recognize their limits, exaggerating how well they (and others) can make such judgments. Indeed, the processes generating such exaggerated faith in intuition are extensively documented. For example, convincing stories and scenarios can have much greater impact than is warranted. Simple statistical models routinely beat even experts' intuition.³¹ As elsewhere, policy makers need to know how good even the best evidence is.

Decontamination Standards

Expert panels are a natural way to set cleanup standards. Participants seek reasonable trade-offs between their detailed understanding of the residual risks of possible standards and their more intuitive understanding of the associated benefits. The recommendations of a successful panel both predict and shape public acceptance. Threats to success include (1) adopting standards from other domains with qualitatively different risks or benefits; (2) adopting standards that reflect political compromises, rather than cost-benefit trade-offs; (4) adopting unintuitive standards without explanation; (5) misreading citizens' concerns (e.g., the price of extended dislocation, or worries about profiteering); and (6) arousing suspicions—easy enough in a domain (radiation) fraught with controversy. A consultative process might reduce these risks by improving the standards, educating citizens, and demonstrating respect.

CONCLUSION

Terror risk communication faces some challenges. It requires diverse specialists to collaborate, in creating integrated risk models,

combining theoretical understanding with historical statistics. It requires addressing citizens' hearts and minds, beliefs and emotions. It requires demonstrating competence and honesty, subjugating private motives to the national interest. However, although the details of these challenges are unique, the fundamental issues arise with communicating about many complex, uncertain threats. As elsewhere, terror risk communication must (1) manage risks well, so as to have a credible message; (2) create appropriate communication channels, and relations, with the public; and (3) deliver relevant information concisely and comprehensibly.

Given the experiences with other risks, implementing these practices is a known craft. There are many functionally equivalent guidelines for setting the tone for interacting with the public during difficult times. In effect, they interpret normal human relations for risk situations. (This one was written for, and disseminated by, the American Psychological Association, during the sniper attacks of 2002 in the area around Washington, D.C.). They require a consultative process, like that in Figure 30-1, for the tone to match the reality.

Selecting the content of messages is, however, inherently situation-specific. As described above, one must (1) determine the facts central to the decisions that citizens face, (2) determine what they know already, and (3) design messages closing the critical gaps—repeating until an acceptable level of understanding has been achieved. The design can (and should) draw on the extensive basic and applied research into judgment and decision making, showing which concepts are difficult and what is known about communicating them. Producing the messages will require a clear division of responsibility among these essential functions: (1) scientific accuracy of the content, (2) relevance of that content to the audience's decision-making needs, (3) comprehensibility of the content, (4) design of the material and delivery method, and (5) the institutional concerns (legal, political) of the source. Unless these roles are defined, the product and process will be incoherent.

Risk communication is a primary contact between authorities and citizens. It determines citizens' ability to make effective choices both during crises and between them. It shapes citizens' faith in the competence and trustworthiness of the authorities. As a result, risk communication can strengthen (or weaken) a society's ability not

only to weather a protracted struggle with terror but also to emerge stronger for it.

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APPENDIX: A STRATEGY FOR THE CONTENT OF RISK COMMUNICATIONS

Note: Explanations are italicized.

1. Acknowledge the gravity of the events and the tragedy of those who have suffered.
2. Recognize the public's concerns, emotions, and efforts to manage the risk.

Everyone is needed to keep society functioning in a time of stress, and all should be rewarded for doing the best they can. Emotions are an important and legitimate part of responding to extreme events. Recognizing their existence creates a human bond with the audience. Recognizing the legitimacy of emotions can help people take the steps needed to manage them. Individuals needing special attention should be afforded ready access. However, the tenor of the communication should be adult to adult, assuming the ability to cope.

3. Assure the audience that the relevant officials are doing all that they can.

The communicator cannot vouch for the competence of all officials or for the adequacy of the resources at their disposal. However, it should be possible to attest to their commitment.

4. Express a coherent, consistent communication philosophy (for all risks):

—We will do all we can to help you to make responsible decisions for yourself and your loved ones.

—To that end, we will provide you the best relevant information that we can, along with an idea of how good that information is.

—We will not engage in speculation.

—We may need to withhold information that may aid or comfort the enemy. Recognizing our duty to inform, we are following a socially acceptable procedure for deciding what to withhold.

The commitment is to a partnership, with officials attempting to empower citizens to master difficult and potentially protracted challenges. The communicator will leave speculation to others (e.g., news media, ordinary citizens), knowing that many ideas will be

discussed in a democratic society, preserving the role of being the definitive source for vetted information.

We currently lack mechanisms for withholding information in a socially acceptable way. Although the social acceptability of mechanisms is an empirical question, I anticipate that it will include the involvement of ordinary citizens, serving in an advisory role.

I did not include withholding information that might cause panic. The disaster literature predicts little mass panic, unless officials behave in ways that erode trust in them. Withholding vital information might be construed as such behavior. People do not want to learn that they have exposed themselves and their loved ones to risks because they were not trusted to act like adults.

5. Provide quantitative risk estimates, including the attendant uncertainties.

People need to know how big risks are, in order to decide what to do about them. Often those numbers are missing, because the experts have not produced them or have not disseminated them. Sometimes the numbers are incomplete, as when people see the death toll but not the total number of people exposed. An intuitively appealing message is, "The risk of X is smaller than being struck by lightning." However, it often offends people by trivializing their concerns, and misrepresents the risk by ignoring the many ways in which X differs from lightning (e.g., the associated uncertainty). It often appears manipulative, undermining the credibility of the source. Just giving the numbers, and uncertainties, is safer. Doing so requires the staff work needed to produce those estimates.

6. Provide summary analyses of possible protective actions, considering all the expected effects.

People may ignore the fact that actions reducing one risk may increase other risks. They may not recognize the psychological costs and benefits of actions that reduce risk. They may not see the things they are losing (i.e., "opportunity costs") when they forgo activities in order to reduce risks. They may not be able to estimate the effects of their actions, exaggerating some, underestimating others. Presenting the best available understanding of these issues, in a standard format, should help people to develop coherent decision-making strategies. It respects individuals' right to make different choices, reflecting their personal values.

7. Lead by example, showing possible models for responsible bravery.

People expect leaders to conduct themselves professionally, including their own exposure to risk. Such behavior can have a calming effect and model the sort of quiet "soldiering on" that many people want to show, in their own way, appropriate to their own circumstances.

8. Commit to earning and keeping the public trust.

We want to achieve market share as the source of unbiased information. Having such a source is essential for social coordination, in both the long and the short run. Communication processes should be evaluated to ensure their continued success. They should solicit continuing input from the public to ensure their relevance.

CHAPTER 31

The Homeland Security Advisory System

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THE NEED FOR INTELLIGENCE AND EARLY WARNING

The 2002 National Homeland Security Strategy, established by President George W. Bush, defines six areas critical to protecting U.S. citizens from transnational terrorism.¹ The first critical mission area, intelligence and early warning, includes activities related to detecting terrorists and disseminating information and warnings. Central to its success is the development of programs for sharing intelligence across the public and private sectors. The Homeland Security Advisory System (HSAS), established by Presidential Homeland Security Directive 3 in March 2002, is designed to do just that. Designating various levels of national preparedness in anticipation of a terrorist attack, HSAS alerts government agencies, the private sector, and American citizens.

This chapter examines the origins, structure, and functions of HSAS. Because the system has been, and remains, under continuous development, assessments published by Congress's Government Accountability Office (GAO) and various studies on the implementation and coordination of public alert systems will also be considered.