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Toxic fear: the management of uncertainty in the wake of the Amsterdam air crash

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Abstract

This paper examines the management of uncertainty among emergency responders, the media, and the public following the crash of an Israeli cargo plane carrying apparently hazardous cargo in Amsterdam's Bijlmermeer area. While the authorities' management of the emergency created by the initial crash was effective, the long-term crisis management performance was considerably less effective. It is argued that, particularly in hazardous materials emergencies, considerable management attention is required in the long-term aftermath rather than seeking a quick declaration of "all clear" or determination that the crisis is over. This paper examines the roles of all actors in the crisis and addresses the nature of communications in the "disaster after the disaster". The evolution of a "toxic fear" among citizens is documented and the social psychology of crisis management in the aftermath is examined. © 2001 Elsevier Science B.V. All rights reserved.

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1. Introduction: from "caring government" to governmental failure

On Sunday, 4 October 1992, at 6.38 p.m., an Israeli cargo plane crashed in a suburban high-rise area of Amsterdam (The Netherlands). The El Al Boeing 747 freighter, in a desperate attempt to return to Schiphol airport after losing two of its engines, bored its way into two apartment blocks in Amsterdam's Bijlmermeer area. The crash killed 43 people (including the plane's crew) and destroyed 266 apartments. Immediately after the crash, the Amsterdam authorities initiated a massive emergency operation. The days and months following the disaster were characterized by "normal" disaster issues (providing shelter and relocation to immediate survivors; a frantic search for causes; discussions about airport safety; identifying the victims) as well as atypical problems (self-imposed pressure

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to determine the number and identity of victims; mass convergence of pseudo-victims; the emerging issue of illegal immigrants).

The official assessment of Amsterdam's crisis management was quite positive [1]. The *communis opinio* held that the Amsterdam authorities, in particular Mayor Ed. van Thijn, had performed in a calm, effective yet committed manner. In addition to the "normal" managerial sides of the crisis response (the effectiveness of which was facilitated by Amsterdam's crisis management infrastructure), Van Thijn had adopted a philosophy of "caring government". This notion held that all victims, regardless of race and, particularly relevant in the multi-ethnic Bijlmermeer area, legal status, would be entitled to government assistance in refounding their lives. Even when the unintended consequences of this philosophy became painfully clear as many "pseudo victims" sought to take advantage of Amsterdam's perceived generosity, Van Thijn held firmly to his position.

In spite of this successful performance, the Bijlmer air crash eventually developed into what is now widely considered an almost exemplary case of governmental negligence [2]. In 1999, a parliamentary inquiry into the aftermath of the disaster catalogued a wide variety of coordination failures, mostly at the national level, which had resulted in a sustained loss of legitimacy among the victims of the crash and, more in general, the population of the affected area [3]. The Bijlmer Air disaster demonstrated that even initial success is no guarantee for a smooth termination of crisis [4]. In some ways, the "disaster after the disaster" was much harder to deal with than the "classic" crisis challenges that emerged in the first hours and days after the El Al plane crashed.

In this article, we will show how the Bijlmer air disaster developed into a public health crisis. In addition, we will investigate the relation between long-term crisis management performance ("managing the aftermath") and the growing unease among Bijlmer residents; more specifically, we consider the often-heard claim that governmental mismanagement led to public health problems. In the years following the crash, survivors in the area began to link a stream of health complaints to the cargo of the Israeli plane. The failure to establish beyond a shadow of a doubt what exactly had been in the doomed plane created fertile ground for rumors, the politicization and mediatization of victims, and increasing numbers of reported health complaints.

We argue that the administrative reflex of crisis termination, combined with a collective underestimation of the possible effects of "toxic fear", resulted in a heightened sense of collective fear. We will begin in Section 2 with a detailed description of the Bijlmer air disaster and its aftermath. In Section 3, we will chart the health effects that surfaced in the Bijlmermeer. In Section 4, we will discuss the relation between the emergence and persistence of these health effects and the activities, or lack thereof, on the part of public authorities. We will conclude this article with a number of lessons that may be used by public authorities to prepare for similar disasters.

2. From air disaster to political crisis: a chronology of events

2.1. From disaster management to urban crisis management (October 1992)

The initial response to the air crash was quite effective [5]. Fire trucks, police cars, ambulances and other emergency services appeared quickly on the scene. The Amsterdam

crisis center was quickly activated and took full charge within hours. A few “deficiencies” occurred, which would be defined as significant not until much later. For example, the cockpit voice recorder was never found. This mysterious and unexplainable loss — cockpit voice recorders are known to survive explosions and long-term exposure to sea water (among other things) — would later give rise to all sorts of rumors. One persistent rumor held that agents of Israel’s secret service (Mossad) had entered the premises dressed as emergency workers and had thus retrieved the cockpit voice recorder. Perhaps the most significant “error” pertained to sealing off the area; media and “disaster tourists” could easily enter the disaster grounds during those first hours.

In the days following the disaster, uncertainty about the number of deaths dominated the atmosphere in the crisis center. The first impression was that at least 250 people had died in the crash (this assessment was partially based on the number of affected apartments). Even though evidence of a much lower death toll soon became available, the general belief holding that hundreds had died persisted for days. The virtual absence of dead bodies — 48 hours after the crash only 12 bodies had been found — was explained by the heat of the ground fires: many bodies had been “cremated” according to this theory.

The recovery of the damaged buildings was then accelerated, in order to discover whether the “basement theory” held any truth. The subsequent loss of accuracy in the identification process — identification procedures take time and require detailed inspection of the area surrounding the immediate vicinity of the body (parts) — was made up for by initiating a massive police investigation into the list of persons reported missing.

The specific characteristics of the Bijlmermeer area made it hard to reconstruct who lived where. The Bijlmermeer is a high-rise suburb that is connected to Amsterdam by a subway line. Built in the 1970s as an experiment in ideal living, it had effectively become a planning disaster. By the early 1990s, the “Bijlmer” (approximately 85,000 inhabitants) had become a slum area populated mostly by (first- and second-generations) immigrants — many of which supposedly held no legal status. Since it was known, or at least suspected, that many non-registered immigrants lived in the disaster area, little value was attached to the official lists of either the housing authority or Amsterdam’s population register.

It was unclear how many people were present in the apartment buildings at the time of the crash. The Amsterdam authorities tried to compose a reliable list of missing people. Everybody was asked to report missing people; the mayor promised that those with an “illegal” status would not experience negative repercussions. This resulted in a long list of missing persons: at one point, the list held nearly 1600 names. After police detectives had checked the list for redundancies and “fakes” — apparently, a number of persons were reported missing by people who were looking for their debtors, enemies etc. — the list was reduced to 300 people. This number was still much higher than the number of bodies found. The police then tried to narrow the list down by means of house-to-house inquiries and checked the records of the telephone company, the social services and the Amsterdam Housing authorities. On Friday, 9 October, *three* lists were made public: the first list revealed the number of identified victims at that time (9); the second list presented the number of people who were in the vicinity of the apartment buildings at the time of the disaster and who had probably died (48); the third list consisted of the number of people who were still missing and lived outside the disaster area (63).

A few weeks after the night of the crash, the air disaster had developed into a socio-political crisis. This shift in the nature of the crisis was the unintended result of Mayor Van Thijn's public assurance that "illegal" immigrants should not suffer any other negative consequence as a result of the disaster if they came forward. They should have the same right to medical, social and material assistance that was also granted to all other victims of the crash. In fact, Van Thijn implicitly promised that they would be granted the status of legal resident. If they could prove that they had lived in the immediate vicinity of the disaster site (and thus qualified as a victim), Van Thijn would recommend them to the deputy minister of Justice, Mr. Kosto, for a residence permit. It is, of course, very hard for "illegals" to prove they lived somewhere, especially since they tend to avoid any contact with government authorities and bureaucratic agencies. Still, Van Thijn's "caring government" philosophy promised a lenient approach; a few weeks later, hundreds and hundreds of immigrants lined the street of Amsterdam's public register in the hope to make it on the so-called Kosto list. In addition, the Amsterdam authorities began to suspect that many "victims" who were enjoying free accommodation, cash loans and food had never set a foot in the Bijlmer area before the disaster.

2.2. Rumors of a military cargo (October and November 1992)

On 18 October 1992, a new dimension was added to the disaster. A resident of the Bijlmermeer area had found the charred remnants of the so-called airway bills, which had been in the crashed plane. This finding generated much media attention, mainly because one could read "military ordinance eqp" on the remains of the airway bills [6]. Attention was focused on the cargo of the plane again. In the immediate aftermath of the disaster, official readings referred to "flowers and perfume" as main ingredients of the cargo. There was no reason to suspect otherwise, were it not for the nationality of the crashed plane. The media attention led to an investigation by the Dutch Aviation police service. The Economic Control Agency (ECD) also became involved. With assistance of the American Embassy (the El Al plane had loaded most of its cargo at New York's JFK airport), the ECD managed to get a hold of 13 master and 15 house airway bills. Master airway bills provide general information about the cargo of the plane. The house airway bills provide detailed information on every item of the cargo. Even though these documents provided information about only a limited part of the cargo — in fact on only 5% of the cargo, as it later turned out — they did show that the El AL plane had indeed carried military equipment. The ECD could not, however, determine the exact nature of the cargo. No further investigations were undertaken at this point in time, as there appeared to be no violations of Dutch law [7].

2.3. Rumors of a toxic cargo: examining the presence of uranium (1993–1994)

A few months after the crash, only "technical" issues remained (or so it seemed at the time). In February 1993, an Amsterdam newspaper reported that kerosene from the plane had severely polluted the disaster site [8]. The Amsterdam authorities thereupon decided to clean up the disaster site. Almost a year after the disaster, a national newspaper reported that the plane had been carrying toxic materials on its disastrous flight [9]. The Minister of Transport denied that the plane had carried any dangerous materials [10]. At least some Bijlmer residents were concerned about this issue and demanded access to the cargo

documents. A member of the Bijlmermeer district council received an increasing number of telephone calls of Bijlmer citizens reporting respiratory problems. A parliamentary member of the ruling Social Democrats (PvdA) asked the Minister of Transport, Mrs. Maij-Weggen, to respond to these rumors. The minister published a cargo list, which revealed the presence of hydrocarbon; only tiny amounts of other chemicals were reported to be on board.

In October 1993, a Dutch nuclear energy research center (LAKA) added a new piece of disturbing news: the El Al Boeing had depleted uranium on board as a counter weight in the plane's tail (other Boeing airplanes carry uranium as well). Several agencies started to investigate the exact contents of the plane. All investigations concluded that the quantity of dangerous toxic material in the plane could not have caused any public health problems. In October 1993, the Dutch energy research center (ECN) claimed that there was no reason to believe that uranium parts had been released during the inferno. At the same time, however, the Minister of Environmental Affairs reported that the tail of the plane had contained 385 kg of depleted uranium, of which only 112 kg had been recovered up to that point.

In the following months, the newspapers were filled with articles discussing the possible consequences of uranium for the public health situation in the Bijlmer. Both the Minister of Transport and the research center ECN denied any possible public health dangers. An American expert from the Depleted Uranium Network stated the opposite: uranium should be considered very poisonous. Various other research institutes confirmed this. In response to this news, Bijlmermeer residents asked for an investigation into the presence of uranium at the disaster site, but the council of the Bijlmermeer district did not have the money to fund such an investigation, and declined. The Bijlmer residents were furious about this decision.

The mysterious disappearance of over 170 kg of uranium generated fresh questions. Yet another independent research agency took samples from the disaster site in December; no trace of depleted uranium was found [11]. Residents of the disaster area rejected the results of the investigation, questioning its methods and claiming that the soil samples had been taken from clean, untouched spots. They feared having inhaled burnt uranium particles. In January 1994, the Bijlmermeer district council asked the Civil Aviation Authority (RLD), in charge of the technical investigation of the plane, to check the plane wreckage once again. Upon inspection in the hangar at Schiphol airport, where the collected parts of the plane were studied, 48 kg of depleted uranium were found. An additional group of "worried citizens" was immediately "created": those who had worked in the hangar and those who had helped to collect the wreckage.

2.4. No public health problem (1994–1995)

The Amsterdam city administration had developed an aftercare plan, which was aimed at all victims [12]. However, a growing number of victims and emergency workers reported a range of health problems (see Section 3 below). People became especially concerned when they heard about the depleted uranium. In March 1994, local members of the Green Party announced that, according to sources in New York, the plane had also been carrying ammunition. The Green Party also reported that a firefighter, who had fallen seriously ill after the Bijlmer air crash, had been instructed by his employer to refrain from commenting in public on his illness. In the summer of 1994, it was reported that the missing kilograms

of uranium had found their way to a garbage dump in a town northwest of Amsterdam. Workers at the dump and local councilors demanded an investigation.

The Bijlmermeer district council acted upon these growing worries among its population by asking the local public health agency to investigate the relationship between reported health problems and depleted uranium. The director of this public health agency stated, before the investigation had actually begun, that he did not expect to find something of importance [13]. In April 1994, the director and one of his employees talked with five residents of the Bijlmermeer. The Bijlmer residents suffered from a variety of health problems, such as bronchial, intestinal and stomach problems, arm pains, and impotence. The director of the health agency concluded that such a wide variety of complaints could not have been caused by one toxic material (such as, for instance, uranium) [14]. In addition, he argued that this wide variety of complaints made it impossible to commission more reliable research. The director had also approached general practitioners in Amsterdam, as well as the doctors of the Amsterdam police and fire service. None of these medical experts had patients whose health problems seemed to be related to the Bijlmer air disaster. In August 1994, the public health agency recommended that this matter did not need to be investigated any further [15].

The Bijlmer disaster then dropped from the public view for almost a year. There are several reasons why the Bijlmer became less newsworthy. One factor was the “competition” by other crises, which seemed much more pressing at the time to both politicians and media [2]. In August 1995, it was reported that the construction of new buildings could not be started on the disaster site before a thorough soil survey had been carried out. A month later, it was reported that no uranium had been found. However, the opposite was claimed by Omegan, yet another research institute, which had conducted its own soil survey. Although LAKA and Delft University expressed their doubts about the quality of this survey, bewildered Bijlmer residents again asked for an independent investigation into the matter.

2.5. The mystery of the missing airway bills: the search for certainty (1996)

In 1996, the Bijlmer air disaster appeared well settled into collective memory; neither the national political parties nor the press paid much attention to the health issue. In May 1996, opposition MP Ms. Singh Varma (Green Party) asked the Minister of Health, Mrs. Borst, if she would be willing to launch an investigation into the lingering health problems in the Bijlmermeer. New and mysterious health problems had surfaced after the prominent news show NOVA had presented evidence that only a fraction of the cargo was known to the Dutch authorities. The National Aviation Authority (RLD) confirmed the news. The Minister of Health did not see any urgent reason to start a health investigation, but promised to unearth information about the, possibly poisonous, cargo. In May 1996, a few members of Parliament first began to openly discuss the possibility of a parliamentary inquiry into the Bijlmer disaster.

In the following weeks, the issue of the cargo gained much political and media attention. As more airway bills showed up, usually in the news show NOVA, it became increasingly unclear what the cargo of the plane had been. It also became clear that many airway bills were still missing. Mrs. Jorritsma, the Minister of Transport, came under fire in Parliament. She undertook to request additional information from the Israeli airline El Al in order to solve the mystery around the cargo. The available documents (not all documents were

handed over) provided different information yet again. Still no definite answer could be given to the question as to whether the cargo of the plane had contained toxic or nuclear material.

2.6. *New upheaval over depleted uranium: Parliament steps in (1997)*

Opposition MP Singh Varma approached the Minister of Health once again in February 1997. An expert of the Israeli Civil Aviation Authority had made an important statement on the Bijlmer air disaster during a hearing in the Israeli Parliament. The expert declared that highly toxic material had been released after the uranium in the plane had evaporated in the crash; this statement seemed to resolve the mystery of the missing uranium. These materials, according to this expert, could cause cancer and other serious health problems [16]. The relationship with Israel suddenly (and briefly) became a topic of discussion.

The media continued to play an escalating role in the Bijlmer air disaster affair, this time by creating upheaval in September 1997. The newspaper *Trouw* reported that uranium evaporates at a much lower temperature than had been assumed by the Dutch authorities. It also became clear that the National Aviation Authorities had known about the danger of depleted uranium in Boeing planes since 1985. The RLD admitted that their American colleagues had sent them an announcement on this issue in which they were advised to apply strict safety measures whenever depleted uranium was released [17]. Parliament wished to hear from the Minister of Health why these safety measures had been applied in the Schiphol hangar where remains of the plane wreck were kept, while no such measures were implemented at the disaster site. The Minister promised to start an inventory of reported health problems. A day after this parliamentary debate, the Minister of Justice announced that she had asked for the reopening of the judicial investigation into the Bijlmer disaster, which had been terminated in October 1992.

The post-disaster crisis reached new heights when representatives of Schiphol airport reported to have found abnormal levels of radioactivity in the hangar of the El Al plane wreck. A few days later, members of Parliament inquired into the missing airway bills once again, after the news show NOVA had announced that the Dutch authorities had never known the identity of one third of the cargo. The Minister of Transport promised to collect all airway bills of the cargo and to send the information to Parliament. Three departments (and their ministers) were now tied to the Bijlmer air crash, i.e. the Ministry of Transport, the Ministry of Health, and the Ministry of Justice. The Bijlmer air disaster had become a national issue and a hot political potato.

2.7. *Special committees, disturbing research results and new information (1998)*

In February 1998, a special committee — named after its chairman, Mr. Hoekstra, a former secretary-general of the Department of General Affairs — was called into life to investigate the procedures that were followed during the process of collecting the airway bills. In March 1998, public (and political) anxiety was fueled as a result of the published research results of a Swedish research agency. This agency had examined a few Bijlmer disaster victims after *Visie*, a rather vague Dutch organization, had apparently requested the agency to do so. The agency claimed to have found increased levels of uranium in the

Bijlmer residents. A medical professor of Leiden University, who argued that an invalid research method had been used, immediately denounced this claim. But the scare was on.

In that same month, KLM airlines reported that many of its employees who had worked in the hangar of the El Al wreckage suffered from health problems very similar to the Gulf War syndrome. These problems included chronic fatigue, pain at the joints, and respiratory problems. The revelations were packaged in telling headlines: “Bijlmer does not trust the authorities anymore” [18]; “Fire brigade and police are concerned about the consequences of the Bijlmer disaster” [19]; and “Slight panic about uranium” [20].

In April, the Dutch Parliament established “the working group air disaster Bijlmermeer”. This subcommittee was assigned to investigate the causes of the crash and the management of the crisis process. In Parliament, discussions on the necessity of a parliamentary inquiry continued with renewed vigor. It was decided that the newly elected Parliament — elections were due in May 1998 — would have to decide on this.

The stream of new information seemed to make such an inquiry inevitable. In April, two companies that were involved in cleaning up the disaster site announced that several of their employees were to be medically examined. In June, the Minister of Transport asked ECN to re-investigate the possibility that the uranium in the plane had evaporated. The medical examination of Schiphol workers revealed that 55 employees had serious health problems. In July 1998, the Hoekstra committee reported that it had been unable to collect all necessary information regarding the cargo. The exact details of 34 tonnes of cargo remained unknown. In August, the Civil Aviation Authority received more information from El Al about the contents of another 14 tonnes of the cargo. However, the mystery of the unknown cargo could not be solved for the remaining 20 tonnes of the cargo.

The promised inventory of health problems had not started yet. The Minister of Health had waited for the findings of the Hoekstra committee. Only after serious parliamentary pressure, did she agree to start the inventory [21]. In September 1998, energy research center ECN published the results of its investigation into the uranium issue: the evaporation of uranium immediately after the crash could not be ruled out. Only 2 weeks later, it became public knowledge that, in addition to uranium, the El Al plane had 240 kg [22] of ingredients for the toxic gas Sarin on board [23]. Governmental reassurances had failed yet another credibility test, creating further unrest among Bijlmer residents.

2.8. *The parliamentary inquiry (1998–1999)*

On 30 September 1998, Parliament launched a parliamentary inquiry into the causes and aftermath of the Bijlmer air disaster. On 27 January 1999, the inquiry committee (Meijer Commission) interviewed its first witness. The hearings soon generated a political crisis, as the stream of “normal” coordination errors and new revelations severely undermined governmental credibility (this time also outside Amsterdam). One of the witnesses, a general practitioner in the Bijlmer, reported an increase in health problems, such as miscarriages, bronchitis, thyroid gland problems and cancer. It was also revealed during the inquiry that El Al had informed the employees of Schiphol air traffic control the night of the crash about the toxic cargo of the Boeing, while at the same time asking them to keep this information secret. This revelation led to the suspension of various senior-level bureaucrats of the governmental organizations involved. Earlier statements claiming that the National Aviation Authorities

had known about the nuclear material in the tail of the plane were confirmed. The inquiry committee also managed to find what nobody else had done before: they got a hold of all airway bills.

In April, the inquiry committee presented the conclusions and recommendations of the parliamentary investigation. The committee concluded that toxic material had been released when the plane crashed in the Bijlmer area. It was suggested that some chronic health problems of a number of people were related to the crash [24]. The committee advised a serious investigation into possible health problems for residents and emergency workers, if only to quell social anxiety created in the past years. A wide-scale medical investigation should help to generate objective information and put the fears of toxic affliction to rest. In addition, detailed treatment plans for victims of the Bijlmer air crash were to be formulated and more information about health problems related to the disaster should be dispersed. For the future, the Ministry of Health was advised to train and inform general practitioners on the consequences of disasters; in the case of a new disaster, epidemiological research was to be initiated at an earlier stage. It was noted that the various governmental organizations, in particular the Ministry of Health, could have acted more swiftly in response to persistent signs of health problems [25].

2.9. After the inquiry (1999–2000): vindication of the victims

The Ministry of Health immediately began to organize a health investigation after the Meijer Commission had published its findings and recommendations. The Ministry invited three hospitals to carry out this investigation, but none of these institutions was really interested. The academic hospital that had taken care of the 1998 health inventory immediately refused the invitation, claiming that further medical research was of no use. The other two hospitals expressed serious concerns about the scientific reliability of the research design. The Minister then agreed on a substantial revision of the research design, which would involve over 6000 people. The actual research program would not get started before January 2000, accompanied by substantial criticism on the part of various health experts. The group of 6000 people — 2400 residents, 3250 emergency workers and 385 hangar workers — was to participate in a general physical check-up and an epidemiological examination; they were also asked to fill in a questionnaire. A control group of 7500 people was arranged for as well. At the same time, the cabinet decided to create a fund for those Bijlmer victims who could not get reimbursed for financial or psycho-social problems.

3. Health problems in the Bijlmer

The Bijlmer air crash caused a relatively low number of deaths (43) and injuries (26). The Amsterdam city council was aware from the beginning that many more people could suffer from the disaster in an emotional and psychological sense. Immediately after the crash, the mayor of Amsterdam therefore asked the local medical services (GG&GD) to formulate a plan for the long-term aftercare of survivors. The plan should aim at preventing psychological and mental damage from happening. The plan was based on two ideas. First, it was aimed at providing integrated care to the survivors, meaning the combination of

material and psychological care. Second, existing networks within the city were to provide the services.

The aftercare program prescribed an information center of modest size for survivors with questions, a meeting point, a coordination center for the provision of mental aid, and the organization of activities for children and the elderly. The information center was open for three weeks and received 644 questions in that period [26]. In the year following the crash, 700 people asked for help at the local psychiatric services (Riagg) of whom 80 people were still receiving treatment in October 1993.

In April 1993, a study was conducted among 136 survivors of the disaster. These people were interviewed in order to establish whether they suffered from post traumatic stress disorder (PTSD). PTSD is a mental disorder, which is characterized by a “feeling of loss of control over one’s life that results after a trauma leads to an arousal state in which the person is constantly alert and on edge, as if the event might be repeated” [27]. A person was diagnosed with PTSD if s/he suffered from three groups of symptoms: the re-living of the event (intrusive thoughts; nightmares, flashbacks; emotionally upset), avoidance symptoms (avoidance of thoughts and feelings, of places and activities; psychogenic amnesia; loss of interest; detachment from others; restricted affect; foreshortened sense of future) and hyperactivity symptoms (sleep disturbances; irritability; difficulty concentrating; hyperaltness; increased startle; physical reactivity). A person diagnosed as having one reliving symptom, three avoidance symptoms and two hyperactivity symptoms, was labeled a PTSD patient. Partial PTSD was diagnosed when people “scored” one of the above symptoms [28].

This particular study found that a significant number of people suffered from PTSD symptoms such as sadness when remembering what happened (52%), extreme watchfulness (40%) and regularly returning memories of the disaster (39%). It was concluded that 26% of the group studied suffered from PTSD; 44% was diagnosed with partial PTSD [28]. The study was repeated a year later: 24% of the respondents still suffered from PTSD, whereas 32% suffered from partial PTSD [29]. In addition, 10% of the respondents had developed other disorders and stress reactions.

PTSD is a regular (if often unrecognized) result of tragic events, but it only affects a relatively limited number of survivors. The group of patients suffering from this disorder is unlikely to grow in the course of time; with proper treatment, the number should steadily decline over the years.

But in the years after the disaster, the media reported quite regularly about a growing number of survivors of the Bijlmer disaster who apparently suffered from mysterious health problems. One fireman, Carel Boer, became somewhat of a public figure as he claimed to have suffered physical problems (respiratory and skin problems) for which he received treatment in a hospital. In May 1994, a representative of an association of survivors informed the press that survivors were suffering from unexplainable health problems, such as kidney problems. The Amsterdam health authorities paid no serious attention to these complaints, but national MP Ms. Singh Varma kept calling for a medical study as many people apparently called her and informed her about their health problems.

A general practitioner reported an increase of 20% in the number of abnormal pregnancies in his medical practice, which was close to the disaster site. He also observed an increase in cases of bronchitis, intestines cancer, thyroid gland problems and diabetes. In addition,

it became known that two other firemen, who suffered from the same mysterious health problems, had died since the crash; a third had committed suicide, reportedly because his story had not been taken seriously by the Dutch authorities [30].

In 1998, the Amsterdam Medical Center started a study on behalf of the Ministry of Health. The inventory consisted of three phases: (1) interviews were conducted with 55 general practitioners in Amsterdam; (2) in June, a telephone center was opened for 2 months where people could report their health problems; and (3) the health problems reported were checked against the medical files of general practitioners. In total, 903 persons called the telephone center, of which 300 were emergency workers, mostly from the police and fire brigade [31]. A total of 3463 health complaints from 846 people were analyzed for the study [29]. Only 143 of these people had actually seen the disaster happen [31]. From these respondents, 1% still suffered from PTSD and 11% suffered from partial PTSD [31]. Each respondent reported an average of four health complaints. The people calling in predominantly mentioned the following complaints:

- general physical complaints (tiredness) — 77%;
- psychological complaints (fear, concentration disorders, depression) — 42%;
- respiratory problems — 33%;
- skin problems — 25%;
- problems with movement — 22%.

The researchers noticed that the five clusters of health problems mentioned above were very similar to the symptoms of the so-called Gulf War syndrome. Although the Gulf War resulted in a minimal loss of American soldiers, many soldiers reportedly came back with unexplainable physical complaints, similar to the symptoms of the five clusters [29]. In other words, people felt ill, but the medical specialists could not diagnose them with a (known) disease.

From the interviews with the general practitioners in the vicinity of the Bijlmer it was estimated that a total of 5500 people were somehow involved; 300 people had health problems (especially mental problems) that could be linked to the disaster. Another 400 patients claimed to have health problems related to the disaster, but the general practitioners could not find any proof [31]. The study showed that immediately after the disaster most health complaints were mental; when the uncertainty and corresponding unease about the cargo of the plane increased, the number of physical complaints increased as well [31]. People who were directly involved in the disaster suffered more from mental problems (PTSD-related symptoms), whereas those living in the wider vicinity of the disaster site suffered mostly from physical problems.

A special category of very serious health complaints came to the forefront as a direct result of this study. The Academic Medical Center found some very rare autoimmune diseases. The Center suggested that a combination of various health problems could mean that some victims suffered from an autoimmune disease [31]. This type of disease was taken into account in the subsequent study of medical files. Of all health problems reported to the Center, 13% appeared to have existed before the crash [32]. Eleven cases of auto-immune disease were discovered, although the authors of the report did not believe this number to be abnormal and therefore not directly related them to the air crash [33]. In the end, the medical researchers could not establish a link between the diverse health problems reported and the

Bijlmer disaster. The university hospital implementing the research therefore recommended terminating further medical investigations.

The media continued to report on mysterious health problems. For example, there were reports on a high number of residents of the “Kruitberg”, one of the apartment buildings hit by the plane, who apparently suffered from thyroid gland problems [34]. Thirteen employees of two waste processing firms involved in the clean up of the disaster site claimed to have fallen ill [35]. In 1999, a newspaper reported high percentages of auto-immune diseases among emergency workers [36]. In January 2000, a large-scale medical investigation was started in response to the recommendations of the parliamentary committee. In the end, 8900 people registered for the investigation, which should be completed by March 2001.

4. Uncertainty, fear and stress: can governmental mismanagement make us sick?

We have documented a rise of reported health complaints in the course of the Bijlmer aftermath. It is fair to say that it is this long-term persistence in health complaints on the part of Bijlmer residents that played a significant part in the parliamentary decision process to initiate an inquiry. In this section, we will argue that government authorities, at both the local and the national level, consistently underestimated the importance of post-disaster care. This form of negligence was not intended, but resulted partially from ignorance with regard to disaster impacts on individual well being, partially from fumbling authorities fanning the fires of discontent. This policy fiasco can therefore be characterized in terms of prosaic failure [37,38]: many factors interacted in unforeseen yet quite destructive ways. Let us reconstruct what is essentially a vicious circle of increasing distrust (on the part of citizens) and decreasing responsiveness (on the part of authorities).

4.1. The recognized effects of trauma

In the immediate wake of a disaster, the emergency response tends to focus on the wounded, the threatened and the dead. The affected community is characterized by “collective stress”: this situation occurs ‘when many members of a social system fail to receive expected conditions of life from the system’ [39]. In the traditional view of collective stress, public authorities are tasked to return the situation to normal (thus removing the antecedents of collective stress) [40]. The focus in traditional disaster research has predominantly been on group behavior in the immediate aftermath of disasters; the long-term consequences for individuals and families have remained somewhat under-researched.

It should come as no surprise, then, that public authorities are usually ill prepared for the psycho-sociological impact that disasters may have in the long run. We know now that the so-called PTSD normally affects at least some survivors of large-scale disasters. In other words, after the collective stress has disappeared a number of individuals may still be suffering from the impact of the disaster. Erikson [41] describes the symptoms, which he recorded in his study of several traumatized communities. The classical symptoms of trauma range from feelings of restlessness and agitation at one end of the emotional scale to feelings of numbness and bleakness on the other. Victims scan the surrounding world anxiously for signs of danger, breaking into explosive rages. Above all trauma involves a

continual reliving of some wounding experience in daydreams and nightmares, flashbacks and hallucinations, and in a compulsive seeking out of similar circumstances.

These effects are real. Symptoms may include helplessness, increased heart rate, hyperventilation, nausea, extreme trembling, excessive sweating, blurry vision, diarrhea, incontinence, hot flashes, headaches, sleep disturbances, difficulties in concentration and outbursts of anger [42]. The effects are also hard to detect [43]. Symptoms are presented as physical rather than psychological distress. People seek “real” causes, as they do not wish to be placed in the “psychological category”. In addition, symptoms may not emerge immediately, but after many months.

Some groups are at higher risk for psychopathology: ‘the bereaved, the severely injured, people with prior mental illness, low socio-economic status, or multiple sources of stress, the elderly, children and adolescents, and those with few or no social support system’ [12,44]. The population of the Bijlmermeer, with its vast majority of immigrants from all over the world (legal status or not) and its relatively high share of unemployed, single mothers and otherwise financially disadvantaged, was indeed the most vulnerable population group in Amsterdam.

Judging from the declining number of PTSD patients, the Amsterdam (health) authorities seem to have acted in a competent manner. But the effective treatment of PTSD-related afflictions may have concealed the growth of a second group of long-term disaster victims. The central challenge, according to psychiatrist Gersons, is to re-establish trust among the affected population [45]. If the victims suffer from a feeling of loss over their life, as Gersons and Carlier [12] assert, it is the government’s task to provide victims with a sense of renewed order. Local authorities may have facilitated the (eventual) return to normalcy for many PTSD patients, but it appears that many others did not benefit from this targeted approach.

4.2. *From individual to collective trauma (and back): the new species of trouble*

Individuals who experience a disaster, may suffer from a mental disorder known as PTSD. A small group of people did develop this affliction; mostly people who lived in or near the disaster site. After years of treatment, the group gradually diminished. But something strange happened in Amsterdam. An increasing number of people who did not live in the immediate vicinity of the site developed strange, mostly physical symptoms that we have come to refer to in terms of Gulf War syndromes. These appear to be collective forms of stress, which are the result of uncertainty and fear as Erikson [46] explains in his book *A New Species of Trouble*. The resulting state of anxiety with regard to causes and consequences is a source of individual stress, which, in turn becomes manifest in the various symptoms described above.

Erikson [46] makes a difference between the impact of natural and man-made disasters. The ‘new species of trouble’, involving man-made disasters such as toxic-ruined societies, make up a special category: the community splits up into factions of those who were spared and those who were not, creating feelings of injury and vulnerability, especially when responsible organizations deny their responsibility [47]. In this perspective, it is not so much the disaster agent itself as the governmental response to the disaster that lies at the heart of the traumatized community.

It should be pointed out that it is the *normal* practices of government that cause the problems. The administrative reflex in the aftermath of crisis is to terminate the crisis as

soon as possible and return society to normalcy [4,48]. The sense of threat diminishes over time, time pressure subsides; crisis managers, emergency workers and media representatives get tired — the “usual” business of government demands attention again. Even when crisis managers cannot get enough of the situation and victims are in need of more attention, routine processes or, in some cases, other crises divert attention from the crisis at hand. In short, the short term drives out important issues of the long term. The “disaster after the disaster” can, in fact, be more challenging than the precipitating event.

Governments everywhere are often under-prepared when it comes to long-term issues such as relocation [49], compensation [50], political accountability [37] or psychological aftercare. Experts are needed to define the issue, recognize the victims and offer assistance. But experts rarely agree on definitions, causes or solutions [51,52]. For instance, some response organizations use the “debriefing” method as a means of dealing with traumatic experiences; other experts consider this method as counter effective (by reliving the traumatic experience, it is “engraved” in the brain or so this argument goes) [53]. Gersons and his colleagues advised the Amsterdam government to set up an information center for victims, but the local medical service [GG&GD] attached less importance to this suggestion. When professional services fail in their efforts, feelings of anger and distrust are fueled rather than dampened. The local psychiatric service [Riagg] reportedly tried to help victims, but failed — the beginning of a vicious circle of diminishing trust was thus created.

The spiral of distrust is fueled by rumors. The El Al plane proved an endless source of rumors. Any disaster will generate rumors, especially in the first hours after the onset. These rumors tend to follow the familiar pattern of disaster myths [54]. For instance, the first reports on the number of victims are usually exaggerations (“250 feared dead in Bijlmer plane crash”). Another myth pertains to the often-reported “looting in the streets” whereas, in most cases, looting does not occur. Rumors are, of course, a way of dealing with acute uncertainty [55]. As soon as the normal institutional structures are back in place to guide collective sensemaking, rumors disappear.

In the years following the Bijlmer crash, the rumors got wilder and wilder. The rumors circulating in the first days (the disco under the apartment buildings; the “illegals” shacking together by the dozens in one apartment; the many poor souls jumping to their death, their bodies evaporating in the intense ground fires) were typical attempts to explain the uncertainty with regard to the number of dead. But in the course of the disaster, we read about Israeli Mossad agents in moon suits stealing the cockpit voice recorder from the disaster site, cargo loads of ingredients for chemical warfare and, to recite another bizarre tale, the finding of human remains (arms and legs) on a garbage dump. In hindsight, these rumors can be seen as clear indicators (if not causal agents) of lingering uncertainty with regard to the cargo of the plane and the health effects.

It proved exceedingly difficult to reconstruct what had been in the plane. Routine procedures of extracting information proved ineffective. The available cargo documents — air bills and houseway bills — reflected only a tiny fraction of the cargo. The authorities did not understand the relevance of this information until much later. The international dimension of the cargo issue — loaded in New York in an Israeli plane — made matters extremely complicated. The less than forthcoming attitude of El Al was initially unquestioned by understanding Dutch authorities (the Gulf War, which had generated massive sympathy for Israel, was still fresh in the memory); not until much later did Dutch authorities become

annoyed with the evasive attitude of their Israeli counterparts. As long as the issue remained unsolved (until the publication of the findings of the Meijer Commission in 1999), new rumors continued to emerge and made the headlines.

The challenge awaiting crisis managers is further compounded by the role of the media. In recent years, the role and impact of media during crises has dramatically changed [40,56]. The definition of seemingly objective features of a situation have become the prerogative of media reporters. Health authorities can conclude, on the basis of available evidence, that there is no scientifically supported relation between a disaster and subsequent health problems; but the people in question need to be convinced. When media define the situation as a crisis in public health, it has in fact *become* a public health crisis.

In their efforts to make sense of the situation, victims begin to organize themselves [44]. The conventional view is that disaster trauma ‘damages the texture of community’ [57]. But disaster traumas can also create smaller forms of social organization: “It can happen that otherwise unconnected persons who share a traumatic experience seek one another out and develop a form of fellowship on the strength of a common tie” [57]. Victims tend to organize in the wake of a disaster [58]. Their common ground is initially defined by shared experience, but is soon widened by judicial and financial concerns. While these organizations tend to dissolve in the longer term, they can become a force to be reckoned with by government. In other words, the actions (or inaction) of government can be incentives for a widening organization of victims.

If crisis authorities intend to deal with long-term effects of a disaster, they have quite a few challenges to consider. Even if crisis authorities would be aware of these challenges, it still would not make much difference. As soon as the crisis ends (and sooner or later it is formally terminated), the aftermath and its problems fall within the “routinized” domain of public healthcare. This flaw in the institutional structure can have serious consequences, as the Bijlmer aftermath has shown.

4.3. *The vicious circle*

The public health crisis that developed in the Bijlmermeer over the years was the outcome of a slowly escalating vicious circle fueled by distrust and negligence. The Amsterdam authorities created expectations with their philosophy of “caring government”. The vulnerable population in the Bijlmermeer was explicitly promised that the survivors would not be left behind; the Bijlmer would itself become a target of government efforts to bring improvement to the area. Health authorities, together with local experts, set up an aftercare plan (with a strong emphasis on PTSD victims). At this point in time, relatively few complaints had been registered.

As more pressing matters pushed the Bijlmer disaster in the background, the victims became impatient with the slow handling of housing matters and financial compensation. The crisis center had been dissolved; the outstanding problems were delegated to the complex bureaucracies that normally deal with these matters. The bureaucratic standards of fairness predict that crisis victims will not receive special treatment (which they thought they were entitled to).

The subsequent handling on the part of local government of emerging health problems and the bits and pieces of information on possibly poisonous cargo helped to create a picture

of “arrogant” government. In an economically and socially disadvantaged neighborhood, it does not take much to tap into the latent feeling of discontent. Whereas local government perceived the cleaning of the disaster site as a technical problem (handled by the very technical division for construction and housing), residents began to construe this as a signal of disinterest. Whereas Amsterdam authorities felt that they had created a psycho-social network for Bijlmer victims (which in fact they had), the latter demanded concrete interventions that would address their *physical* complaints.

The interaction between rumors and symbolic incidents that seemed to confirm these rumors, further undermined the trust in governmental empathy. While governmental policies and actions with regard to the Bijlmer were founded on the conviction that public health had not been threatened during or after the disaster, evidence to the contrary emerged. The media were quick to report on new indicators of military cargo, uranium and ingredients for chemical warfare. The victims, in turn, began to make use of their organizational networks: working the media and “recruiting” new victims into their organization. As long as victims can present the media with faces and human-interest stories, the crisis has not passed [59].

The case of the victims is sometimes served by so-called “crisis entrepreneurs”. These are public figures that use their position and influence to bring the cause to the attention of the general public and the political arena. During the Bijlmer crisis, the social-democratic MP Mr. Van Gijssel earned himself the nickname “Bijlmer boy” as a result of his relentless pursuit of rumors and complaints. It was at least partially due to his efforts that the Bijlmer disaster remained an item on the political agenda and, eventually, even came to dominate the agenda.

The vicious circle was maintained, paradoxically perhaps, by the attention that national politicians finally began to pay to problems in the Bijlmermeer. By making local problems a topic of parliamentary discussion, the responsibility for solving the problem was squarely placed at the national level. Not only were expectations raised, but also no administrative infrastructure existed at the national level to deal with the long-term aftermath of a local disaster (a central finding of the parliamentary inquiry). The more ministers and their departments got involved through questions, unkept promises and revelations, the more complex did the coordination problem become. As a result, the Amsterdam authorities were effectively relieved of their responsibilities and quietly disappeared out of public view.

The Bijlmer air crash thus became a “long shadow crisis” [4]. In an effort to explain the scope and duration of this crisis, we have to make a distinction between first-order or “root” causes (why the plane crashed) and second-order causalities (how government made things worse) [60,61]. The apparent success of the initial emergency response seemed to allow for a rapid return to normalization. This case shows, however, that things will never be the same after a disaster. If public authorities are not aware of the vulnerable texture created by the disaster, their “routine” approach to a traumatized community may give rise to a host of unintended and undesirable consequences.

5. Conclusions: lessons and recommendations

5.1. *The fear of the unknown*

There is some debate between sociologists and psychologists on what really matters in the aftermath of disasters. Not surprisingly, psychologists focus primarily on

psychological problems that victims have to deal with. Traumas are normal experiences after an abnormal situation. Some people, however, will be affected by this traumatic experience for years and years on end, heavily influencing their day to day life. This is referred to as a syndrome or a disorder. Much attention must be paid, psychologists rightly argue, to the sometimes-problematic coping mechanisms of individuals. Sociologists tend to focus on other issues such as material aftercare, the speed and quality of rehousing and the overall recovery of the social texture of the stricken area.

It is now quite clear that certain man-made or technological disasters have different, some say more severe, consequences for the various categories of affected people than natural disasters may have. The fear of the unknown and the possible toxic substances that are (probably) involved form the basis for these severe consequences. The fact that the most dangerous substances (radiation) cannot be seen or otherwise detected causes major depressive effects for those involved [46]. The potential health hazards of these substances are oftentimes unknown (but feared always). The feared exposure to toxins and the long-term health threat (carcinogenic consequences) are most important differences between a natural disaster and a technological disaster [62]. Natural disasters usually do not result in massive long-term health problems for survivors.

Disasters involving toxic substances therefore pose hard questions to crisis managers, for whom it often is very difficult to find answers. Who are the victims (can we prove who has been exposed to the toxins)? What was or still is the extent of the exposure? What are the consequences of these exposures both in the short and long run? What measures can be taken to diminish the possible consequences?

People that were exposed to disasters like Bhopal, Chernobyl or Seveso, but also the victims of much smaller accidents (gas-leaks, oil-spills, ground contamination), share an unfortunate uncertainty: the potential for developing some sort of chronic disease. It is therefore one of the main tasks for the authorities to limit the time that people are exposed and the intensity of the exposure as much as possible. This can be implemented by such measures as permanent relocation (Chernobyl), decontamination programs and protecting rescue workers. But authorities are often reticent to take such drastic measures in the absence of absolute proof.

Long-term psycho-social impacts of a disaster are not only affected by victim characteristics but also by the patterns of aid distribution and the access to that aid. These interdependencies between material and immaterial aspects will be even greater as toxins are involved. Uncertainty, cover-up stories and lack of adequate information about the degree and kinds of exposure will strongly influence the fear afterwards and, as a consequence, the level of psychological stress. It is plausible that psychological stress influences the physical condition. This explains the rising level of health complaints in the years after the Bijlmer air crash.

A disaster can thus become front-page news for years and years on end. This in itself increases the tension among victims. New information is discovered; dissatisfied people initiate actions; problems arise with the handling of the contaminated ground. Uncertainty makes things worse for all those concerned. The impossibility to give (and get) sound and clear answers to the probing questions becomes more of a problem than the consequences of the exposure itself.

5.2. *Dealing with uncertainty: the importance of information*

If uncertainty and fear constitute the source of long-term health problems, it is the task of government to reassure and inform the affected citizens. A key factor then becomes the provision and communication of “good” information. This information has to be disseminated, both within and between the organizations involved as well as towards the various categories of victims, the broader public and the mass media. Correct and sufficient information thus becomes a most valuable “commodity” in resolving (or preventing) the “disaster after the disaster”. Different steps can be taken to ensure a steady flow of reliable information.

After a disastrous situation has occurred, authorities should initiate a well-staffed information unit that can function for quite some time (years on end if necessary). This unit can be the intermediary organization — the linking pin — between different groups of victims and the many organizations working on all aspects of material and immaterial aftercare. People need a place to go to with all their questions. The unit can monitor questions, topics and major problems that victims confront them with. Peaks and patterns in “question behavior” draw attention to more structural weaknesses or latent problems in the relief work. The information unit thus effectively becomes an early warning instrument. An effective information unit can also become the organization that initiates “outreach programs”, which are proactive approaches to certain categories of victims. As the victims become known in the unit, their level of involvement (death of family members, extensive property loss, prolonged disruption of life) and, possibly, their prior psycho-social status can be used to identify high-risk survivors [62].

The Dutch have recently had the (unfortunate) opportunity to put this lesson into practice. In the week after a major explosion in a fireworks storage in the eastern town of Enschede (13 May 2000), an information and action center (IAC) was installed. The Ministry of Health was the key stimulator of this IAC, following up on an important recommendation of the parliamentary inquiry into the Bijlmer air disaster. This IAC will be in function for at least 5 years.

In addition, research has been initiated in order to determine possible exposure of inhabitants to fireworks chemicals. A population research was carried out within 6 weeks after the explosion. In the weeks prior to this investigation, more and more people called attention to the possibility that different types of toxins could have been released in the explosion. Everyone who suspected or feared exposure was invited to participate in the population research. Several blood samples were taken and persons were asked to complete an extensive questionnaire (50 pages) about their activities in the first hours and days after the disaster, and about their personal, physical and mental condition before and after the explosion. The blood samples will be kept for an indefinite period of time. Should new problems arise and new rumors spread about mysterious health problems, the stored samples can be compared against new samples.

The local government of Enschede did not support the idea of this research, but the Ministry of Health carried it out anyway. Local authorities argued that no toxins were involved. They feared that the population research might unintentionally cause problems. Ultimately, about 4000 people showed up for the research and the initial results were not alarming. The potential benefits, however, are two-fold: “First, it will ensure that new data collection during the unfolding of the disaster will tap the concerns of the community and

thus will more precisely measure the mental health among the survivors; and second, it will provide a background of trust between the community and mental health professionals that might facilitate the successful implementation of intervention activities” [63].

The Amsterdam experience predicts that an open attitude, well-structured information and well-organized communication can diminish the problems that may occur during the aftermath of a disaster. During the Bijlmer aftermath, local and especially national authorities apparently expected that rumors and stories about possible hazards would eventually die down and disappear. This did not happen. The administrative neglect of admittedly weak and distorted signals, combined with the growing suspicion among survivors that they were not being taken seriously, fueled feelings of impotence and lack of control amongst them. If crisis authorities take the pains to set up firm structures for long-term aftercare, the process of refounding community will be greatly facilitated.

5.3. Facilitating self-help organizations

In the aftermath of disasters, various types of self-help organizations can spring into existence. For instance, shortly after the disaster with the *Herald of Free Enterprise* (1987) survivors created the Herald Family Association. The primary goal of this association was to help its members cope up with the disaster [64]. But it also aimed to improve the safety of other so-called “ro-ro” ferries and to raise the issue of corporate responsibility in all its forms. Authorities, corporations and other relief organizations are often less than enthusiastic about the activities of these self-help organizations.

It is true that a collectively organized interest group can be quite difficult to deal with for authorities. These organizations have easy access to media attention and are known to monopolize the moral high ground. Nevertheless, a cooperative attitude towards these groups is likely to have more advantages than disadvantages in the long run. In fact, we suggest that authorities should stimulate if not facilitate the forming of self-help organizations. These organizations can help diminish the collective stress after the disaster and help individuals cope up with their traumas. In addition, close contact with these groups makes it easier to monitor emerging and persistent problems; self-help organizations may function as one of the best early warning instruments.

5.4. Dealing with uncertainty: investigations, evaluations and the litigation process

A very important aspect of uncertainty has to do with the causes of the disaster. Survivors are very interested in all stories, rumors and facts about the accident or disaster that they have endured. Newspapers and television programs are closely watched when “their” disaster is in the news. Official investigations into the causes of the disaster are intensely monitored. All involved want to know what happened and why it had to happen that way. Many want to be heard by the investigators; they feel entitled to a hearing of their views.

The effective management of the disaster aftermath requires a strategy with regard to the causes of a disaster. Problems arise when different reports and evaluations communicate opposite opinions and conclusions. As there are many interests at stake in the analysis of disaster causes (the “guilty” party can expect huge bills, years of litigation and criminal prosecution), conflicting conclusions are likely to emerge.

Moreover, the complexity of technological or man-made disasters virtually ensures that a “simple” and widely agreed upon explanation of causes and responsibilities will not arise. Disasters are nearly always the unique product of interacting failures that find their roots in individual error, organizational pathologies and unforgiving environments [65]. Operators broke seemingly insignificant rules or procedures; inspections were rarely held; certain warnings were denied or forgotten; the rescue operations were not as good as they could have been and the public warnings turned out to be quite ineffective. These features are rather typical for technological disasters.

This creates quite a challenge for crisis managers. Victims and survivors are keen to learn the complete story of causes and backgrounds; they must know whether their families have been exposed to dangerous substances. But there are individuals and organizations that may have much to lose; transparency and integrity may require self-incriminating practices. Indeed, some involved parties may cover up, stonewall or blame others. This type of practices increases uncertainty and helps to generate rumors. The end result is that victims become even more frustrated in their attempts to understand what has happened to them.

Officials and authorities should try to initiate and stimulate an independent and integrated investigation, which focuses not only on the causes, but also on the state of preparedness and the quality of the response. The investigation should not be aimed at allocating blame, but it should facilitate learning processes. This may require institutional change in countries where no independent evaluative bodies exist. An independent, authoritative body of expertise can become the anchor point in the confusing aftermath of a disaster.

In conclusion, it can be said that disasters involving toxic substances are very complex in nature. Complex problems defy simple solutions. One should be aware that no matter what authorities do, their actions will always be criticized [66]. But the Bijlmer case shows us that doing nothing is not an option. Inaction on the part of authorities leads to sustained uncertainty, which, in turn, feeds a sickening fear among survivors with regard to their health and the health of their families and loved ones. The first step for crisis managers, therefore, is to keep the longer term in mind while dealing with immediate and pressing problems. Only if crisis managers become aware of the potential problems that may arise during the aftermath, can the disaster after the disaster be averted.

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