

Resource Management in Fire Fighting Organizations: Lessons from the Buncefield Oil Depot Fire and the Greek 2007 Forest Fires

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Abstract

This paper explores critical issues in a front-line, emergency service – the fire brigade – in Greece and Britain during crisis management. I examine three aspects of crisis management in the Greek and British fire brigade: first, how the resources of the fire fighting organizations are deployed on the incident grounds, second the incident management hindrances and finally, the fundamental reasons behind various impediments to the effective management of crises. Two cases will be examined, compared and contrasted: the emergency response to the forest fires that devastated Greece during the summer of 2007 and the Buncefield oil depot fire that erupted in Hertfordshire, in 2005. For a period of over three months, the 2007 emergency necessitated an effective response to successive and simultaneous fires around Greece. The Buncefield operations, on the other hand, lasted for three days. In contrast to the 2007 fires in Greece, during the Buncefield operations, fire fighters responded to multiple fires in a single area. Despite these differences, both cases were characterized as major incidents, both involved the response of different agencies and both required a unified command structure for the coordination of the different organizations. Moreover, both raised environmental concerns, as their results spilled over from local to international areas and both inflicted substantial damage to state and private property. As such, the nature and crisis management of both incidents share certain characteristics whose examination can teach us valuable lessons for making improvements in the future.

Key words: *first-responder organisations, emergency management, resource management, decision-making process.*

1. Introduction

This paper looks at how the British and Hellenic fires were managed predominantly, by the fire and rescue services. I will primarily focus on the command structure that delineates decision-making processes and controls actions on the incident grounds. At the same time, I will discuss the deployment of resources on the incident grounds as a result of these decision-making processes. The resources of an organization are usually material but, as is the case with knowledge in particular, they can also be immaterial. Material resources refer to personnel, appliances and equipment. Knowledge as an organizational resource, on the other hand, refers both to technical knowledge and to the 'know-how' of the emergency responders. Technical knowledge refers to the familiarization with the urban and rural infrastructure such as forest roads, power and water supply networks, whereas 'know-how' concerns the rationale of crisis management depending on the type of emergency. It includes organizations' equipment, standard operating procedures, practices and routines. That distinction made, material and immaterial resources are usually tightly coupled. If fire fighting personnel are aware of the proper use of their equipment in relation to the implementation of an effective method of intervention, increase of resources on the incident grounds would be deemed unnecessary. In this way, the organization would succeed in managing its resources more rationally, as well as challenging a habitual, but largely ineffective, practice. Indeed, we have sufficient evidence to argue that a mere increase in personnel on incident grounds does not necessarily contribute to a desirable outcome and to efficient crisis management.

Emergencies are inter-organizational (Hardy & Phillips 1998), inter-jurisdictional and interdisciplinary domains (Comfort 1994). The 2007 forest fires in Greece and the Buncefield oil depot fire underlined the differences in the structure and operation of the Hellenic and British fire and rescue services. On the organizational level, the different 'modus operandi' of the emergency co-participants may hinder their cooperative response. Organization members develop a certain mode of communicating amongst them. As Nonaka and Takeuchi have maintained, "schemata, mental models, beliefs and perceptions" (Nonaka & Takeuchi 1995: 8) are used to achieve an 'everyday sense-making' of the organization that will distinguish it from other organizations. If the organization aims at the development of a common platform for communication and at ensuring the effective cooperation of different organizations that will consequently achieve their interoperability, two parameters should coincide. The first such parameter is an understanding of the routines of first-responder organizations. In order to succeed in such an endeavour, the administration of organizations ought to cultivate the climate so that organization members acknowledge differences in the various organizational routines. Consequently, if such understanding is achieved, the second parameter, namely the implementation of protocols and procedures, is further facilitated.

2. Methodology

As an employee of the Hellenic Fire Corps, I had the opportunity to be a participant observer from the beginning of 2001 until the end of 2004, when I was granted a secondment for my post-graduate research. During that time, I was presented with the opportunity to study archive material, to conduct in-depth interviews and to listen to recorded conversations between fire fighters who have worked in crises situations. During the 2007 forest fires, while still on secondment, I also interviewed four fire officers directly involved in the operations. The data presented here were collected from newspapers and journal articles, press releases, internet sources, and in-depth interviews conducted with Greek and British fire fighters directly or indirectly involved in the cases examined. When the data provided were

contradictory – a possibility I will return to later – I have worked with and used information that was verified by at least two sources.

3. The case studies

3.1. The Greek 2007 forest fires

During the summer of 2007, almost six thousand forest fires erupted in Greece. The 2007 forest fires were the largest and deadliest to have occurred on Greek soil. A series of successive incidents occupied different public services, such as the military, the Hellenic and other, foreign, fire services as well as private organizations, such as industries. The overall amount of damages was estimated to be 3.5 billion euros, and the cost of the fire fighting operations was calculated as approximately six hundred million euros. In total, almost 269.000 hectares of forest land and tillage were burnt, with the fires killing approximately 60.000 farm animals. To give only one example of the speed and magnitude of the disaster, 180.000 hectares were destroyed in just a week, between the 24th and the 30th of August.

But despite the ecological disaster, by far the worse outcomes of the 2007 forest fires were the hundreds of injured and the seventy three human fatalities. Even though the majority of the victims were civilians, the fires also claimed the lives of two military pilots, navigators of a water-bombing aircraft and of nine seasonal employees of the Hellenic Fire Corps. In addition to this tragedy, the fires claimed approximately 4.500 houses, and left 16.000 people homeless.

3.2. The Buncefield incident

Located on the edge of Hemel Hempstead, the Buncefield oil storage and transfer depot fire was set off by the largest explosion since World War Two, in the early hours of the 11th of December 2005. Within three hours, sixteen storages were on fire. Overall, more than 1.000 fire fighters operated on twenty oil storages that took fifty nine hours to extinguish. Forty three people were injured. The emergency response cost seven million pounds and the short- and long-term business recovery was estimated to £2.2 million and £100 million, respectively.

4. Incident analysis

Whilst I was searching for the relevant material, governmental institutions had published very few reports concerning the 2007 forest fires, and none of these reports were detailed or systematic. Moreover, with the exception of the on-line frequent press releases, the Hellenic Fire Corps (HFC) did not render any of its reports concerning the examination of its operations, the misconducts and the consequent lessons learned, accessible to the public. In contrast, the Buncefield major investigation website, posted by the government's Independent Committee for Investigating the Buncefield Incident, provided the public with relevant material for all aspects of the incident. At the same time, the Hertfordshire fire and rescue service drafted a report regarding the fire fighting operations. However, in order to access this significant document, one needs to purchase it as it is not available online in full text for the general public.

These differences in the patterns of action adopted by the Hellenic and British organizations indicate how bureaucratic structures and practices vary. The lack of an official systematic

investigation in the Hellenic case resulted in the concealment of the misconducts and inefficiencies of the system, faced by such large-scale incident responses. This was perceived as an attempt to maintain the solidarity among, and cooperation between, state institutions. In the British case, on the other hand, the decision to disclose the information underlined an effort at transparency. This was made so as to ascribe accountability specifically to the organization responsible for the misconducts.

4.1. The Incident Command Structure

Past literature has indicated that the principal problem in inter-organizational analysis is the co-ordination of the participant organizations. Up until the late 1970s, inter-organizational coordination was hindered because of the lack of a structured authority (Litwak & Hylton 1962). But, over from the early 1980s onwards, both academic and non-academic commentators on the subject have emphasized the development of the Incident Command System as an emergency management technique that systematizes the roles of responding organizations to emergencies and, hence, consolidate a structured authority. However, major disasters such as the 9/11, the Katrina Hurricane and the continuous Mediterranean forest fires have underpinned not the ineffectiveness of the emergency system, but rather, the difficulties which the participant actors face when attempting to integrate such a system in their responses.

In Britain, when responding to a major incident, three stages of decision-making are put into motion. First, the top tier of the emergency management command structure is the Gold command in which delegated representatives set the strategic aims of the response. Second, the Silver command which, in drawing upon the strategic aims already established in the previous stage, manages the organizations' tactics, i.e., the ways in which the organization deploys its resources and, therefore, the course of action on incident grounds. Finally, the Bronze command directly supervises operations on site. There can be tensions between these stages. During the Buncefield emergency response, for example, fire fighting personnel claimed that the Silver command failed to determine the necessary tactics, therefore, shifting responsibility for tactical concerns to the Bronze command. Many of my interviewees and some fire fighting personnel who spoke to the newspapers, asserted that this multi-sectional decision-making may be responsible for untimely operations.

However, and in contrast, the lack of a clearly defined process of decision-making appears to be responsible for the mismanagement of emergency responses. In the Hellenic case, the British Gold (Strategic), Silver (Tactical) and Bronze (Operational) command decision-making structure is not applicable and instead, crises are managed on a national, regional and local level. During the 2007 forest fires for example, the command structure broke down. First, no single organization was responsible for the primary strategic decision-making on a national level. The General Secretariat for Civil Protection, which should assume this responsibility, failed to put in motion the *Xenokrates* emergency plan. Delegated representatives of the emergency co-participant organizations were not called up to discuss the strategic aims and each organization's involvement in the emergency response.

The tactical command was assumed almost separately by the supervising officials of each participant organizations. On a local and regional level, the local authorities are responsible for the implementation of the emergency planning and the coordination of the resources as defined in the plans drafted prior to the emergencies. However, during the 2007 forest fires, the local authorities' who were designated to act as Incident Commanders, failed to

undertake their role leaving it, instead, to the local fire stations. In turn, as the emergency response progressed, the local fire stations had to request more resources. The HFC was planning the management of its own resources on the incident grounds regardless of the other co-participants' responses. This was especially the case in remote rural areas. The Athens' fires were more effectively coordinated through the Command and Control Centre of the HFC. However, it was the operational command fire officers who were the predominant decision-makers. Yet, as it becomes evident from the data collected, some of these officers based their actions either on their own assessment of the emergency or on orders provided by the senior fire officers in the Command and Control Centre. Moreover, according to a number of newspaper articles in the mainstream press, some of the officers who assumed the role of decision makers during the fires, even assessed crises and their management on the basis of requests made to them by politicians, who were considering their own financial interests in the compromised areas.

In any case, this non-predetermined command structure hampered the decision-making processes. Failure to set the strategic aims on a national level and to coordinate the mobilization and deployment of resources on a local or regional level left the operations units with the responsibility to manage the incident ad hoc. Operations units on the incident grounds were de-organized. Tactical command failed to establish sectors and appoint incident commanders for each of the sectors. When incident commanders were actually appointed, they were not always able to manage the deployment and monitoring of the resources available to them. Operations crews would be given contradicting orders or would be reappointed to different sectors without prior notification to their commanding officers. Due to the confusion in the command structure on the incident grounds, some teams would self-deploy. Furthermore, there were too many fire officers as compared to the number of fire fighters and at times they would be appointed in sectors with no fire engines. Soon after that, personal conflicts between incident commanders (*Axia* 2007: 48-49) jeopardized the outcome of fire fighting operations. It is self-evident that this in turn affected the relations between the different organizations involved in the control of the fires.

4.2. Inter-organizational cooperation

The importance of inter-organizational cooperation is based on the premise that the material or knowledge resources of a single organization do not always suffice to mitigate the consequences of a major incident, such as the 2007 forest fires in Greece. An orchestrated action on the incident grounds instigates an effective response. But in order for organizations to be able to cooperate on an international level they must first work together effectively on a national one. Likewise the principle of inter-organizational cooperation applies to similar (i.e. two fire fighting organizations) as well as different (i.e. fire fighting organizations and military) organizations while handling an emergency situation in an effective manner.

4.2.1. The national level

One of the most significant characteristics of the Buncefield emergency response was the tight coupling of the inter-organizational cooperation at least on the level of Gold command. In regards to the fire and rescue services on an operational level, thirty one brigades cooperated on-site; amongst them, the Essex, Staffordshire, Norfolk, Yorkshire, Kent, West-Midlands and London Brigades. The British fire and rescue services' cooperation may be considered as inter-organizational due to the fact that, in contrast to the HFC, these services are organized on a regional level. Although general guidelines – that is an official rationale –

concerning the function of the services are issued by the central government, each fire and rescue service develops its own protocols and routines.

The first issue to be addressed was the self-deployment of these services. Officials from the fire service with jurisdiction over the compromised area, argued that their neighbouring brigade proceeded on the incident grounds prior to its assistance being requested. However, the latter refused any idea that they had self-deployed and asserted that, according to the British practice for mutual assistance, they were on a stand-by mode, ready to be deployed when requested. The second issue arose when first-responders from other Brigades were on-site. These first-responders lacked both knowledge of the area and specialized knowledge of extinguishing practices. Therefore, they needed to learn where and how to operate. This, however, would have been the concern of the Silver command, which was malfunctioning. The third issue concerned the actual, real-time communication practices between the different services. Variations in protocols, equipment and operations' practices stirred 'communication breakdowns'. The problems were identified and addressed timely. The brigades required the assignment of liaison officers who counter-balanced the lack of familiarity between the Brigades and clarified any misconceptions regarding operational practices and equipment.

In contrast, in the 2007 forest fires in Greece, failure to set the strategic aims of the response resulted into failure to effectively coordinate the action of the 'should-be' participants in the emergency organization. One principal participant in such large-scale emergency responses is the military. In contrast to the emergency management in Britain that is entrusted to the three principal first responder organizations – the police the fire and rescue and the ambulance services – in Greece, the military is a significant co-participant. In Britain, if absolutely necessary, the military may contribute for the first 24 hours of the emergency; such cooperation will be essential in case of terrorist attacks or natural disasters. After the first 24 hours any further assistance has to be paid for. Hence, in order to avoid additional costs for emergency response, first responder organizations are orientated towards organizational autonomy. The fact that the military is neither allowed nor available to assist the fire service in crisis, may have led the British fire and rescue services to a higher degree of preparedness.

For its part, the HFC liaises with the military during wildfires on two levels: prevention and intervention. In regards to prevention, joint patrols are organized throughout the summer period so as to secure the forest areas. As far as intervention is concerned, according to the standard operating procedures (SOP) military camps in the area where a forest fire incident occurs are immediately alerted, along with the police, the local forestry and the civil protection offices operating in the municipalities of the compromised area. The military's role is to provide assistance when requested by the Fire Authorities. However, the main concern is that the training provided to their fire fighting personnel varies from that of the professional fire fighters. This may cause disruptions in large-scale emergency responses. During the 2007 forest fires, however, military forces were not deployed on time. For example, the Chinook helicopters did not engage in the fire fighting operations for the first sixty hours into the response, after the 22nd of August when the most catastrophic forest fires erupted in the peninsula of Peloponnesus. Furthermore, the Super-puma helicopters were not immediately employed to evacuate the villages threatened by the fires; neither were the armoured vehicles nor the specialized military units for the mitigation of disaster. In addition, although during critical emergency responses, the incident commander is entitled to requisition the

resources of private organizations, such as heavy-duty machinery, this opportunity was not taken up by the Incident Command structure.

The evacuation of the compromised areas proved problematic due to the largely missing, inadequate, or inapplicable evacuation plans. Delegated local authorities personnel, the police or the local fire services employees did not suffice or were unaware as to how to coordinate the evacuation procedures. As a result, civilians were provided with contradictory advice as to whether they should leave their villages or remain until first responders arrived to create an evacuation route. So they began deserting their villages randomly. The lack of evacuation procedures, amongst other issues, identified the ineffective communication between the local authority personnel and the public at the level of prevention. This affected the intervention tactics of the emergency responders. Fire fighters would have been primarily engaged in fire fighting, if other emergency co-participants had implemented evacuation protocols.

The aforementioned events delineated a situation where first responders on the incident grounds were operating autonomously, according to what actors thought their role in the emergency response was. Even though inter-organizational cooperation may be the means to effective crisis management, such practice must be based on a clearly defined hierarchy in regards to the roles assigned to each party. Otherwise, as was often the case with the 2007 fires in Greece, an organization's actions may actually jeopardise the harmonious and effective cooperation presupposed in such major crises. The European Union and the Greek government sought to solve this problem by means of an international cooperation, which they thought would be based on sharing of resources.

4.2.2. The international level

The Gold command of the Buncefield emergency response did not request any more fire fighting resources than the ones already provided by the British fire and rescue services. The successive 2007 forest fires in Greece were the first of such magnitude to engage the Civil Protection of the European Commission in emergency operations in an EU Member State. The Greek government contacted the Monitoring and Information Centre of the EU to request assistance on four occasions during the summer period of 2007. The response of European countries to requests for assistance was immediate, despite the fact that some of them, such as France and Spain, were fighting their own forest fires. According to the European Civil Protection, more than four hundred specialists were sent on site, including aircraft crews, fire-fighters and logisticians. The Monitoring and Information Centre mediated for a total of thirteen water-bombing planes and twelve helicopters. Although the resources were essential in the fire fighting operations, there was confusion as to how they would integrate with the operations launched, as well as with national resources already deployed.

Hence, this international inter-organizational cooperation encountered technical and organizational impediments. On a technical level, incompatible telecommunication systems, of different types of water-bombing aircrafts, hampered the communications between the fire fighters operating on ground and pilots navigating planes over compromised areas. The disrupted communications may not have assumed the characteristics that depicted the communication conducts during the Katrina emergency response where "people were literally writing messages on paper, putting them in bottles and dropping them from helicopters to other people on the ground" (Townsend et al. 2006), or the military dropping a message in a bottle to warn first responders about a dangerous gas leak or using human runners to

physically carry messages between deployed units and first responders. However, as far as managing smaller water-bombing aircraft, in order not to release its water supplies where the ground teams were operating, fire fighting units on the ground had to establish visual contact with the pilots in the air.

On an organizational level, the distribution of the incoming resources required a team of HFC employees who would speak at least English, as well as be in constant communication with the Incident Commanders and the Command and Control Centre of the HFC. Eventually, instead of a team, only one person was assigned to deal with these issues. That was a junior officer, appointed to receive and distribute the resources offered from abroad. The authority she was entrusted with allowed her to give directions to senior officers on how to manage the resources distributed. However, power related issues emerged as some of the senior fire officers appeared unwilling to accept recommendations from a subaltern.

4.3. Knowledge as a 'resource'

Both in the Greek and British cases, knowledge is an essential resource to emergency operations. Both technical knowledge and 'know-how', enriched by experiences gained during emergency operations, is, or should be, acquired prior to responding to emergencies. The significance of both technical knowledge and the 'know-how' of crisis management becomes particularly obvious when specialization is required after the occurrence of major incidents. In such case, another, third type of knowledge emerges, when specialists outside the organizations are called to augment both further advice and the technical knowledge of the existing members of the organizations.

Almost a year prior to the Buncefield oil storage depot fire, the Essex fire and rescue service, had taken an initiative to train at least one of their personnel as a petrochemical officer. After the oil depot emergency response, the fire officer commented that the 50 year old static climate of the fire and rescue service did not have the experience to support either the processing or the management of technical knowledge within the organization. This deficiency decelerated the process of attaining knowledge, by increasing the bureaucratic procedures. The "old structural fire fighter" was initially self-educated so as to achieve the same level of the industry experts: "in the UK fire service the decision-making process is heavily reliant of formal proposals being drafted and submitted for official approval" (*Industrial Fire World* 2006: 5). After the expiration of that period, the officer had to submit a paper reasoning the value of such a position. Before the expiration, the Buncefield incident occurred. Specialists, such as HAZMAT (**Hazardous Materials**) officers, are expected to provide operational advice and to manage any given incident involving hazardous material. This increases both the organization's own reliance upon knowledge and specialization, as well as the trust of its members in their specialized colleagues during operations.

During the 2007 forest fires, failure to effectively use the available resources was detected on both operational and administrative level. Some of the fire fighting personnel had very little knowledge of the telecommunications, power, hydrant, and road networks to be found in the compromised areas. Others were not aware of which emergency plans to implement. When emergency plans have not been internalized as an organizational routine, organization members remain unaware of either their existence or their effectiveness and therefore override them. The fire personnel failed to use the available electronic systems of calculating the direction of the wind. Furthermore, experts, such as foresters, were not consulted on a strategic level. In addition, the administration of the HFC was accused of removing old and

experienced personnel. This accusation was made on the grounds of nepotism, that is, those individuals were favoured, and who were 'friendly' with the chief and senior fire officers.' In contrast what happens in the BFRSs, this perception of the 'old and experienced' fire fighter is perpetuated in the HFC. During the 2007 forest fires, statements and interviews with fire fighting personnel published in various Hellenic newspapers raised two vital concerns underpinning these accusations. First the indicated that very few people considered how the 'old and experienced' fire fighters were individuals that operated under different circumstances that entailed different types of risks. Secondly, they are rarely up-to-date with the new risks followed by different operational procedures.

As indicated by the data collected, lack of systematic training in regards to standard operating procedures, practice and equipment, as well as clientelism were regarded as two of the most significant issues the Hellenic fire service needs to address.

4.4. Material resources: personnel and equipment

The Buncefield emergency response underpinned a significant problem: the lack of an appropriate type of foam to extinguish the tank fires. Foam, as an essential extinguishing material, presented the incident command structure with certain concerns. First, a decision had to be made in regards to giving approval for wide-scale use of foam agents on-site (*Industrial Fire Journal* 2007: 18). These environmental concerns were raised due to the fact that the chemical consistency of foam could contaminate the drinking water supply for North London (*Industrial Fire World* 2006). The second concern regarded the effectiveness of the various types of foam used for the fire fighting operations. The proper kind of foam, kept in the industrial facilities, was destroyed in the fire that followed the explosion. The fire and rescue services involved in the operations did not have the appropriate type of foam. The foams immediately available would either blow over the dikes or become so hot from radiated heat that they would allow the vapour to reignite. However, specialists have claimed that, if fire fighters used aspirating nozzles when applying protein-based foams had got the application rate high enough, they could have extinguished the fire faster. Almost twenty four hours into the response, new appropriate type of foam was provided by the industry producers with whom Hertfordshire had a signed agreement for extra foam if required. Incorrect type of foam was allegedly supplied by other fire and rescue services on the incident grounds (*Industrial Fire World* 2006: 9).

An additional issue was the mismanagement of the rotation of the fire officers on-site. The magnitude of the incident alerted the 'home' fire and rescue service which sent all available officers on-site, without planning ahead the necessary reliefs. However, this tactic did not apply to the operations units. This is a phenomenon that occurs widely in the Hellenic cases, and especially during large-scale incidents, where both fire officers and fire fighters work ceaselessly, without being relieved. This creates a fatigue that may further endanger the lives of first-responders and hamper emergency responses, due to the fact that first-responders may not have clear enough minds to communicate amongst themselves on the incident grounds.

During the forest fires, the HFC assumed the task of coordinating resources to manage the fire extinguishing operations. The material resources of the HFC were inadequate. Lack of personnel and personal equipment, old fire engines and fire fighting aircrafts were only a few of the significant issues the HFC had to address. The tabloid *Espresso* (2007: 18) delineates the lack of the material resources provided to HFC employees: "French commandos and

Greek fire fighters; the former 'cold blooded-killers', up to their necks with fire fighting gear; the latter, scattered all over the place, emotionally charged, de-organized with no gear but 'the heart of a lion'. Every year they pay for the inadequacies of the Administration, the sins of their chief fire officers, and lift the bodies of their dead colleagues from the ashes of the fires." Even with a shortage of professional fire fighters to such extent, the HFC avoided integrating seasonal employees and volunteers into the fire extinguishing operations systematically and formally. Seasonal employees are individuals employed on a temporary basis, for no more than five months per year, from the 1st of May until the 31st of October. However, HFC seasonal employees are not considered by their professional counterparts as eligible to participate in fire and rescue operations. Seasonal fire fighters are insufficiently trained and therefore considered a liability when participating in fire fighting and rescue operations. Finally, they do not carry the absolutely necessary equipment (*Rizospastis* 2008).

The newspaper *O kosmos toy Ependiti* (2007: 37) reported that when the fire erupted in Parnitha, one of the mountains of Athens, the president of the Pan-Hellenic Association of Reserved of the Armed Forces (PARAF) volunteered to proceed on the incident grounds with his specialized unit and their own equipment. However, he requested the provision of a vehicle in order to reach the site. The commander of the Command and Control Centre replied that first, the HFC was short in types of transport; second, he did not want volunteers to engage in fire fighting operations during the night in order to avoid potential accidents; and third, fire fighting is a task to be performed by professional fire fighters. The reply, according to the testimony of the major, president of the PARAF, remained negative even when the major asserted that the weather conditions favoured the fire extinguishing operations during the night and that they would make up for the time the aircrafts were not operating. Other volunteer groups testified that the police were instructed to keep them away from the jeopardised areas, despite their efforts to access the incident grounds in order to reinforce whatever operation were taking place.

Mismanagement of personnel resulted into untimely responses that hampered the outcome of the fire fighting operations. According to one of the basic rules of fire fighting, if the fire is not contained during the in the first few minutes of its eruption, then it may be very difficult to contain. In both the Hellenic and the British cases, after these incidents the fire and rescue services could have requested additional equipment; but they both failed to do so.

4.5. Technical impediments

During both the Buncefield and 2007 forest fires emergency responses, telecommunication hampered first-responders communicative interactions. Radio congestion during the Buncefield emergency response resulted into the fire fighters using their mobile phones to contact each other. However, this communication venue was also compromised, as first the mobile networks were overburdened by the sudden and prolonged use of mobile telephony in the wider area of the compromised industrial facilities; and second, there were no provisions made for recharging the batteries for the mobiles. An additional recommendation was that ear pieces for radios should be introduced to enable communications while wearing a helmet.

During the 2007 forest fires, organizations such as the HFC, the forestry service and the military units, operating on the incident grounds were unable to coordinate their actions, not only due to the lack of a unified command but also due to the incompatibility of their telecommunication systems; the congestion of frequencies; the lack of coverage for the mobile network and the difficulties using the landlines primarily because the network of

pylons for landline communications was destroyed by the blaze. So, the primary emergency communication and the back up systems were either destroyed or compromised by the fire.

Related to material resources, the lack of telecommunication equipment stirred confusion as to the progress of fire fighting operations. The operations crews were unable to contact the regional Command and Control Centres (CCC) because some of the radio transmitters in the fire engines were old and dysfunctional. Moreover, a number of appliances did not have radio transmitters. As a result, most of the fire fighters were using their personal mobile phones to establish communication with the CCC. Mobile phones however, presented their users with two problems: first, that in certain areas where operations are held, telecommunications are disrupted due to the lack of coverage; second, the prolonged and constant use of mobile phones resulted in discharging their batteries. Consequently, the communication between operations' teams and the CCC was interrupted. In those cases where the radio transmitters were operable, congestion hampered the real-time communicative interactions between the fire fighters on-site and the CCC. Furthermore, incompatibility of the radio system, the lack of pre-positioned back-up equipment, and the lack of designated mutual-aid channels, did not allow interconnection between the operations' crews of the HFC, the FS employees, military units and the water-bombing aircrafts and helicopters that were not directly managed by the air force or navigated by the pilots of the air force.

4.6. The pragmatic infrastructure

Amongst all the resources available to fire brigades, water supplies are certainly the most significant asset. Both the Buncefield and the 2007 forest fires highlighted shortage of water supplies as a significant problem. Ideally there should always exist contingency planning concerning secondary and tertiary systems of water supplies.

During the Buncefield emergency response, all gas, electricity, telephone and road networks were compromised. The largest hindrance to operations was constant disruption of water supplies. Because the nearby drinking water supply of Northwest London could be polluted, the authorities cut off the water that was used for the fire fighting operations (*Industrial Fire World* 2006: 16). Subsequently, the 'foam-blanket' that the fire fighters were trying to maintain on the surface of the burning fuels was constantly breaking up. Moreover, the depot's fire water pump station, usually located in industrial facilities in case of emergency, was also destroyed by the explosion (*Industrial Fire Journal* 2007: 6; *Industrial Fire World* 2006: 2). Hence, the entire independent fire water system was disabled. The next available source, a canal close to the industrial facilities, was not utilized because of the assumption that its bank could not sustain the weight of the fire pumps. A small lake almost two miles from the site was eventually used for the control of the fire. Nevertheless, the distance between the lake and the fire as well as the topography of the wider area, raised further difficulties. For example, according to *Industrial Fire World* (2006: 6) and the *Industrial Fire Journal* (2007: 18), with little hard road access, "authorities had to use cranes to lift the pumps in the proximity". Eventually, fire officers had to carry out some infrastructure work, such as preparing the farmland to ensure that their vehicles could access the water supplies without interruptions. One of the officers on site noted that, "this was one example, in hundreds of colossal tasks, facing Gold Command throughout the incident" (*Industrial Fire Journal* 2007: 18).

Similarly, the 2007 forest fires revealed that the most significant problems were lack of electric power and shortage of water supplies. The network of the power pylons is installed

above the ground; when the fires erupted, parts of the pylons' network were destroyed. The consequent lack of power resulted in additional water shortage. Large capacity pumps were rendered inoperable and therefore water from wells could not be used. Fuel engines, with smaller capacity too, could not cover the demand for water supplies. Moreover, power failure inactivated the automatic extinguishing systems. Secondary contingency planning, including the use of large capacity generators, was not put into place. As far as water supplies were concerned, the allocation and operability of the hydrant network was compromised.

In general, the allocation of hydrants and the inspection of their operation are vested in HFC personnel (Service Order 5285/ 2006). However, when requested, the placements of the hydrants and the necessary repairs are undertaken by the municipalities. Local authorities are responsible for maintaining the urban infrastructure, i.e. streets, hydrants, draining systems. As a result, any negligence in maintaining the infrastructure hinders the operations of first responders when they are called to manage a crisis. For example, both my personal experience while serving in the HFC and the recordings which I have examined as part of my research, suggest that although the official Service Orders specify that water storages have been created in areas that have been risk assessed (Service Order 5196/ 1999; Service Order 1476/ 2006), these storages are not adequately maintained.

5. Conclusion

The uncontrollable size of an emerging incident, that oversteps the resource capabilities of a single organization, call for "widespread cultural readjustment" (Turner 1976: 380) where an optimum use of limited resources under urgent constraints of time is required (Comfort 1985). As maintained by a number of interviewees in the HFC and the BFRSs, this readjustment does not require organizational assimilation. Flexibility, adaptability and integration appear as the necessary processes to achieve understanding and, thus, attain synergy during emergency responses.

Organizational, technical and infrastructural issues such as routines, commitment to formal procedures or informal interactions, undisciplined actions breaching standard operating procedures and consequent reactions, lack of retrospective disciplinary measure or emendatory training, are tightly coupled in inter-organizational communication conducts as well as in intra-organizational communicative interactions. The latter affects the former via the organizations synergistic interactions (Perrow 1999: 98; Manning 1992) both off- and on-site. Inter-organizational communication varies depending on the organizational structure and the communication actors. Organizational "actions and interactions are channelled and constrained through structured resources and through networks of relationships" (Zeit 1980: 73) that practitioners do not, generally, and should not, fail to take into account (Schneider & Barsoux 2003: 85). These different bureaucratic structures and patterns of action are the ones that create a cultural distance between organizations.

5.1. The cases examined

The 2007 forest fires in Greece underlined the leading role of the fire service in undertaking the management of major incidents. Inter-organizational cooperation in the Hellenic case indicates that the decision-making process is centralized. The HFC undertakes the coordination of emergency responses and rarely delegates the power on the incident grounds to other first-responder organizations. The lack of well-thought-out standard

operating procedures sustains the development of informal relationships and empowers the role of its organization members off-and on-site (Hofstede 2005; Schneider & Barsoux 2003). This however, emerges as a result to the lack of coordinated actions on the strategic and tactical level that allows the autonomous and independent operation of what should have been emergency co-participant organizations. Despite the ineffectiveness of the fire fighting operations, in a survey published on the 1st of January 2008 (*Kathimerini* 03/01/2008: 213-225) the HFC occupied first place in regards to civilian trust in governmental institutions. According to the survey, the HFC is considered as the best chance of alleviating the civilians' concerns. Interestingly enough, this trust in the HFC remains constant even when operations do not end in a desirable outcome. In the British case, the fire services are generally perceived as merely a ring in the long chain of joint decision-making and actions on- and off-site.

Whereas questions of prevention versus intervention become a priority in the British case, the Hellenic incident indicates a different approach in the policy making, on both the organizational and the institutional level. As a result of the magnitude and the mismanagement of the crisis, a blame-game was instigated amongst the organizations involved in the operations on a series of different but interrelated levels. On a political level, the central government blamed the local authorities for an inability to maintain urban and rural infrastructure. At the same time, the central government also accused the municipal authorities of a failure to coordinate organizational resources in view of such a large-scale emergency response. For their part, local authorities blamed the central government for not providing them with adequate appropriations. Delegated personnel from both ends asserted that the cooperation was minimal and that the financial resources provided by the central government were inadequate. Overall, the management of the 2007 forest fire fighting operations revealed that effective or ineffective cooperation of different organizations does not always result from the existence and implementation of standard operating procedures. Rather, it largely depends on the people who are running the organizations at a local or regional level. The national government appeared to instigate the coordination of the resources of co-participant organizations. As an extension of this traditional approach, that concentrates too much power in the hands of the central government, local authorities appear to have failed to sustain the necessary urban and rural infrastructure. But even more tragically, they failed to support or create evacuation plans that would have secured the lives of civilians.

Moreover, personnel in key positions accused each other of being unable to manage the tasks assigned to their respective positions. The reason provided for these accusations was clientelism, a pattern of inter-organizational interactions with two different, but usually interrelated, dimensions. First, non-qualified individuals, hired on a non-meritocratic basis, were holding key positions. Not only do positional criteria and the participation of these individuals in the decision-making process during the emergency management jeopardize management of the crisis, they also challenge what should be the state's rational role in the mobilization of an effective mechanism of protection. Second, instead of protecting and safeguarding the compromised areas, emergency responders were looking after the politicians' estates that were located within or close to these areas. Professional and rather more conscientious fire fighters, the press and the general public accused this illogical rationale of breaching emergency plans.

Close to these phenomena, on the inter-organizational level, communication was one of the first issues to be addressed, due personal conflicts between the head officers of the Hellenic

Fire Service and the Secretariat General. According to the mainstream press and prime-time news shows, this debate focused on the fact that, essentially, one would undo what the other was trying to do. This blame-game was further supported by the lower in rank HFC personnel, asserting that emergency plans where existent, were not implemented. At the same time, on the intra-organizational level, segregation between higher and lower ranked personnel were introduced. For both the general public and the government, the lower ranked personnel were elevated into 'heroes', who dedicated and, occasionally, even lost their lives while saving civilians from the inferno. The heroic profile, which the media created so thriftlessly, lauded the lack of training, lack of knowledge, lack of coordination and undisciplined actions and reactions of the professional fire fighters. If the fire fighters had actually followed standard procedures and regulations, they would have secured the lives of the first responders that perished during the fire fighting operations. Instead, whilst they were confronting an immediate and threatening dead-end situation that required them to be disciplined and rational, they reacted nervously and spontaneously. This, however, does not imply that first responders should always follow procedures in an inflexible manner. For example, McLennan, an expert on emergency management has maintained that "better-performing teams change their strategies as the fire situation unfolded. They redistribute their appliances to meet emerging demands and communicated these changes to other team members. Poorer-performing teams, on the other hand, tended to persist with initial strategies." (McLennan 2006: 29) In the 2007 Hellenic case, the poorest-performing teams did not have the initial strategy in mind. Lower ranked personnel failed to adduce the fact that not all emergency plans were up-to-date or effective. Moreover, and concerning these emergency plans, lower ranked personnel also failed to adduce the fact that, whereas some of them were completely unaware of these plans, others who knew them simply chose to ignore them.

Finally, in contrast to the British Fire Rescue Service's management of the Buncefield incident, during the summer forest fires in Greece, the media constantly arose as the neutral party, the mediator. Technically as well as technologically prepared to encounter telecommunication problems and broadcasting on a 24-hour basis, the Hellenic media became the nemesis of the 'operational incompetence of the government's mechanism to manage the crises. They became "crucial gatekeepers" in the "political processes of crisis construction" (Edelman 1977; 't Hart 1993; Rosenthal et al. 2001). But at the same time, they also spread an understandable uncertainty as regards the state's mechanism of intervention.

All these indicate that in the future, crisis management will not be in the hands of the local or central governments alone, but rather also in the hands of various other specialized organizations. There will be a negotiation between governmental institutions and private organizations (Rosenthal et al. 2001: 18), so as to circumvent the shortage of resources and the structural impediments that hamper the inter-organizational communication between the municipal, regional or central FRSs and the other emergency co-participant organizations.

References

'Refinery firefighting operations & mutual aid: Industry & municipal services working hand-in-hand', (2007), *Industrial Fire Journal*. www.emergency-directory.com/images/pdfs/ifj/07-03/2.REFINERYFIREFIGHTINGOPERATIONS.pdf (accessed 12 December 2007).

'The federal response to hurricane Katrina: lessons learned', (2006), available at <http://www.whitehouse.gov/reports/katrina-lessons-learned/> (accessed 27 February 2008)

Comfort, L. (1985), 'Integrating organizational action in emergency management strategies for change', *Public Administrative Review* 45(special issue: Emergency Management): 155-164.

Comfort, L. (1994), 'Self-Organization in complex systems', *Journal of Public Administration Research and Theory*, 4(3): 393-410.

Edelman, M. (1977), *Political Language: Words that Succeed and Policies that fail*. New York: Academic Press.

Hardy, C., and Phillips, N. (1998), 'Strategies of engagement: lessons from the critical examination of collaboration and conflict in an interorganizational domain', *Organization Science* 9(2): 217-230.

Hofstede, G. (2005), *Cultures and Organization: Software of the Mind: [intercultural cooperation and its importance for survival]*. New York; London: McGraw-Hill.

http://ec.europa.eu/environment/civil/forestfires_el_2007.htm (Accessed 7 April 2008).

<http://www.buncefieldinvestigation.gov.uk/index.htm> (accessed 10 March 2008)

<http://www.fireservice.gr/pyr/site/home/LC+Secondary+Menu/deltia+tipou.csp> (accessed 15 March 2008)

<http://www.innews.gr/php/main.php> (accessed 7 April 2008)

Litwak, E., and Hylton, L. (1962), 'Interorganizational analysis: a hypothesis on coordinating agencies', *Administrative Science Quarterly* 6(4): 395-420.

Manning, P.K. (1992), *Organizational Communication*. New York: Aldine de Gruyter.

McLennan, J., Holgate, A.M., Omodei, M.M., Wearing, A. (2006), 'Decision making effectiveness in wildfire incident management', *Journal of Contingencies and Crisis Management* 14(1): 27-37.

Nonaka, I., and Takeuchi, H. (1995), *The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovation*. Oxford: Oxford University Press.

Perrow, C. (1999), *Normal accidents: Living with High-risk*. N.J.: Princeton University Press.

Presidential Decree number 123/ 2003, Government Gazette no 108/ 8 May 2003.

Rosenthal, U., Boin A., and Comfort, L.K. (2001), *Managing Crises: Threats, Dilemmas, Opportunities*. Illinois: Charles C. Thomas-Publisher LTD.

Schneider, S.C., and Barsoux J.L. (2003), *Managing Across Cultures*. 2nd ed. Essex: Pearson Education Limited.

Service Order protocol no 5285, F.702.7/ 03-02-2006.

Service Order protocol number 1476, F. 702.15/ 09-03-2006.

Service Order protocol number 5196, F. 702.15/01-02-1999.

't Hart, P. (1993), 'Symbols, rituals and power: the lost dimension of crisis management', *Journal of Contingencies and Crisis Management* 1(1): 36-50.

Turner, B. (1976), 'The organizational and interorganizational development of disasters', *Administrative Science Quarterly* 21(3): 378-397.

White, D. (2006), 'Historic U.K. oil terminal fire still under official review: Buncefield: one year later', *Industrial Fire World*. <http://www.fireworld.com/pdf/BuncefieldFire.pdf> (accessed 12 February 2007).

Zeitz, G. (1980), 'Interorganizational dialectics', *Administrative Science Quarterly* 25(1): 72-88.