# Mastering risks of damage and risks of crisis: the role of organisational learning

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**Abstract:** Mastering risks, accidents and crisis is a complex task, which is achieved by a large number of stakeholders. In order to determine appropriate responses to risk-prone situations, researchers propose a classification in two categories: risks of damage and risks of crisis. Risks of damage correspond to situations that have been studied and for which preventive and protective measures have been taken by the organisation. In other words, there is a plan in place in the organisation. Risks of crisis, on the other hand, correspond to situations where there has been little anticipation and no previous experience and as a consequence, no preventive and protective measures have been taken by the organisation. There is no plan in place or the plan is inadequate or inoperable. Either of these situations may put the organisation into chaos, although chaos and confusion are more likely with risks of crisis. Special attention is given in this paper to the origins of crisis situations and emergence of ad-hoc organisational patterns among their management.

A case study is presented to illustrate how an ad-hoc organisation has emerged during the management of the crisis that followed the Erika oil spill on the French coasts in December 1999.

This paper presents the advantages associated with the development of organisational learning to analyse accidents and crisis: a better sharing of knowledge about identification of weaknesses and strengths, and a deeper involvement of people in risk mastering.

**Keywords:** risk management; crisis management; organisational learning; resilience of organisations.

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## 1 Introduction

Researchers use the verb 'master' to translate the combination of owning the knowledge about risks and having the willingness to prevent causes and protect from consequences. The objectives of risk mastering are to suppress or to reduce hazardous events, but also to

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be able to react in the best ways when risk develops into accidents and crisis. To reach these objectives, organisations establish means and strategies for prevention, protection and mitigation.

If the system (technological or not) that may be at risk and the nature of these risks are well known, then it is possible to build strategies aiming at protecting this system against events that may be at the origin of damage and crisis.

In the last decades, substantial improvements in technology reliability and risk prevention has been observed, but in parallel, a steady increase of system complexity tends to create new kinds of risks:

> "The role of the human being in complex systems is essential: he must achieve programmed and complex operations, but also supervise the system as a whole. In many cases, his job goes beyond the simple compliance to procedures because their only application is not enough to get the production. Moreover, if it were the case, automatic devices would replace people. Quite often, he must check the relevance of the procedure in the real context of the task and, in the eventuality of a gap, he must change procedure, complete prescriptions, or even invent new organisation schemes to reach the goal, despite incidents, while respecting safety requirements." (Translated from Leplat, 1990)

This complexity is often linked to the extension of technology and automatic devices that control the system, but it results also from the increase of the number of stakeholders and relations binding them. In a same way, the development of outsourcing that contributes to the increase of productivity may also bring a loss of tacit knowledge belonging to key people that contribute to the organisation safety, especially if these staff categories have a high turnover ratio.

Even if a part of this complexity can be identified and allow the set up of reliable organisational patterns and transparent flows of information, it also promotes the emergence of drifts, differences among people and dilution of responsibilities, which are key risk factors.

Debriefing incidents and accidents is becoming de facto one of the few ways to identify 'traces of complexity', that is to say to enlighten, through detailed analysis of events and decisions, the behaviour of technical, human and organisational subsystems when facing unexpected situations.

## 2 Mastering risks of damage and risks of crisis

Researchers propose to introduce a classification of risk situations in two categories:

1 risks of damage

2 risks of crisis.

This classification is justified by the differences among situations:

- all that can be anticipated correspond to risks of damage
- unanticipated situations having the potential to destabilise the organisation correspond to risks of crisis.

## 2.1 Risks of damage

If the incidental situation has been anticipated and analysed, for instance during the system design or after a similar incident, the organisation will follow incident procedures. Management will be facilitated by appropriate protection devices and organisational patterns. Researchers call these situations ‘risks of damage’.

Mastering risks of damage corresponds to several kinds of actions:

- Analyse potentially hazardous events and situations and study their origins and consequences.
- Analyse system vulnerabilities: components that may be damaged, persons that may be wounded and functions of the organisation that may be disturbed.
- Set up technical devices and procedures to suppress hazardous events or make them harmless.
- Set up an organisation that favours the integration of a safety culture at all levels.

Preparedness planning is a success factor in mastering risks of damage. Gillespie conceptualises it as a cycle:

- awareness of potential threats
- acquisition of information
- assessment
- knowledge
- planning for preparedness
- practice.

> “Ideally, the 5-stage cycle spirals upward with increasingly more refined levels of awareness, assessment, knowledge, preparedness and practice.” (Gillespie, 1993)

## 2.2 Risks of crisis

When external or internal incidents or events affect the situation, people first react by identifying the new situation and applying existing procedures and plans, if any. If the situation escapes from this framework, either because there are no adequate procedures (the incident was not considered and never occurred before) or because defenses have not functioned, then the organisation enters in a crisis and turns to a type of management based on experience and innovation, in which people will do their best to bring the system back into a known and stable state, while limiting damage and accident extension.

During the development of these situations, the organisation in charge of their management may be overwhelmed for different reasons and loose its ability to master the situation:

> “Crises are differentiated from more routine strategic decisions by their attendant time pressures, control issues, threat-level concerns, and response-option constraints.” (Burnett, 1998,p.480)

When situations have the potential to overwhelm the organisation, researchers call them 'risks of crisis'. Generalising the Burnett criteria of crisis-prone situations, researchers propose to define organisation overwhelming as the combination of several causes:

- surprise, speed of development

  > "In crisis and disaster response management, time is too limited for consensus driven decision-making processes that include all those involved." (Heath, 1995)

- spatial extension, number of stakeholders

  > "Some situations exist where organisations are unable to control a crisis, in case where the crisis is widespread geographically or being dealt with by other organisations and is thus too far removed from making needed change." (Ritchie)

- uncertainty and perception gaps among stakeholders, public and media

  > "Organisations or individuals that communicate poorly during crises often make bad situations worse. The TMI nuclear power accident, Exxon Valdez oil spill, and Challenger space shuttle explosion are three well-known examples that demonstrate how inadequate communication strategies can hinder an organisation ability to manage a crisis. Crises, in almost all circumstances, immediately trigger a deluge of questions from an organisation's many different publics." (Marra, 1998)

- lack of flexibility in the decision making process

  > "What is distinctive about High Reliability Organisations (HRO) is that they loosen the designation of who is the important decision maker in order to allow decision making to migrate along with the problem." (Weick, 1999)

  > "Any approach to disaster management that constraints or limits role flexibility and adaptability, therefore, is likely to create more problems than solutions." (Webb, 1999)

- lack of available resources and response options
- loss of communications
- cascade of events and 'domino' effects.

Avoiding crisis needs anticipation and preparedness, while mastering crisis needs to set up an organisation that resists to chaos. In other words, an organisation that is able to manage the situation as a risk of damage, using existing plans, devices and procedures.

This is the general strategy of national agencies (FEMA in US, ministry of interior in most countries), which endorse responsibilities of crisis management when situations overwhelm local authorities.

Another strategy is to provide the organisation with the ability to develop its own ad-hoc organisational patterns when it is overwhelmed, in order to extend its capacities to manage crisis-prone situations.

## 3 The emergence of ad-hoc organisational patterns

When events turn situations into potential crisis, there are simultaneously strong constraints over the people and a combination of factors that may overwhelm the organisation, as the lack of time:

> "If response occurs in the emergency phase then important decisions on the handling of the crisis can be rushed resulting in hasty and inefficient decisions made in the midst of a crisis." (Ritchie)

This creates the need for an adequate organisation able to avoid crisis and form an obstacle to chaos. Which are the key factors that promote the setting up of an organisational structure that would be able to respond to a given crisis situation? One of these factors is the ability of emergency management practitioners for improvisation and preparedness:

> "Without improvisation, emergency management loses flexibility in the face of changing conditions. Without preparedness, emergency management loses clarity and efficiency in meeting essential disaster-related demands. Equally importantly, improvisation and preparedness go hand to hand. One need not worry that preparedness will decrease the ability to improvise. On the contrary, even a modest effort to prepare enhances the ability to improvise." (Kreps, 1991)

Following the detection of alarming signals or the activation of an alert, some elements play the role of guide in the development of the organisation structure. Two kinds of guiding elements can be observed:

1 leaders

2 action plans.

In the first case, there is a leader, whose role in the organisation, charisma or reputation will attract people, who will set the first directions. In the second case, there is a known action plan that can be used by a first group of people as a reference. With the development of the situation, this kernel of organisation will evolve due to creativity process that will generally keep only the main directions from the initial plan:

> "Creativity is a kind of human-environment interaction, by which we mean part of an evolving ecology of local demands, existing resources, individual skills, and organisational dynamics." (Kendra)

In both cases (leader or plan), it can be observed that the complexity of crisis situations moves rapidly away from the hypothesis of the initial plan or from the first leader's indications. '*Procedure is weak when confronted by urgency*' (translated from De Coninck, 1995). The constraints that exert crisis situations on people (dangerousness, dissemination of hazardous materials, media impact, etc.) drive the development of the organisational structure and its adaptation to the context to prevent chaos.

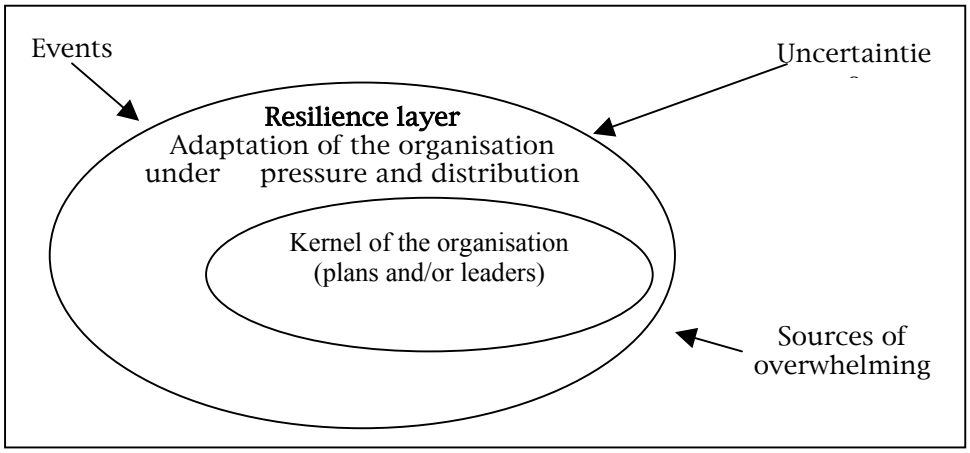
Researchers use the term 'resilience' to qualify the ability of organisations to resist to dangerous situations with the minimum of damage. In the domain of mastering risks of damage and risks of crisis, the resilience of an organisation is built up in two phases:

1 At the design stage, by promoting the design of safe systems, and by developing preparedness.

2 During the life span of the system, by developing vigilance, organising exercises and debriefing accidents, in order to assess system weaknesses and strengths and to learn lessons.

In most cases, organisations demonstrate efficiency and resistance to chaos. It is not by chance, but rather because they follow a general scheme, based on the availability of an organisation kernel (leader or plan) and on the existence of constraints and stress around this kernel. If these constraints go beyond a given threshold, which corresponds to the individual or collective acceptability of risk, then a new part of the organisation will grow around this kernel and distribute constraints. Researchers call it the 'resilience layer'. Its goal is to shoulder constraints while protecting the system against damage (Figure 1).

**Figure 1** Adaptation of an organisation faced to risks of crisis




This resilience layer may represent the involvement of new stakeholders, adaptation of strategies and actions, extension of information management or introduction of new resources. The main factors that participate to the setting up of a resilience layer are:

- external factors: pressure of events, uncertainties and organisation overwhelming
- internal factors: commitment of people and willingness to limit consequences.

To identify this resilience layer, it is needed to analyse examples of crisis management and to identify the parties who have played key roles. By this way, the analysis of each crisis management enlightens in the general architecture of the organisation, individuals and groups of people who have been involved and their relations among themselves and with the outside world, whenever they belong to the organisation or they are volunteers or opinion relays. The analysis of the different networks that have 'emerged' during crises reveals what form the resilience layers, which constitute the strengths of the system when these ad-hoc organisational patterns have been able to manage efficiently the risks of crisis:

> "What emerges in disaster situations are new behavioural expectations and social structures that represent populations of systems being born." (Drabek, 1986)

> "The level of reliability of an organised system depends on the capacity of its parties to develop cleverness clues needed to achieve informal settings in order to continuously correct and amend a set of structurally incomplete rules and devices." (translated from Bourrier, 2001,p.18)

### *3.1 An example: the ERIKA oil spill and its management*

On December 12th, 1999, thousands of tons of heavy fuel escaped from the tanker 'Erika' which sank 300 km from the French shore. This fuel drifted for two weeks in the ocean and it was very difficult to predict its course because it didn't float on the sea surface (Its density being equivalent to water). The day before Christmas, 400 km of the French coast along the Atlantic Ocean was suddenly covered by this viscous pollution. The public and authorities were surprised by the location of the pollution, hundreds of kilometres further north than predicted. This was the first factor of organisation overwhelming. The second one was the amount of fuel and the length of the polluted area.

French authorities developed in the 1980s a number of emergency plans to manage large oil spills, following a series of accidents that occurred in France and in other countries. These plans are known as 'Polmar' plans (for Marine Pollution). There are two Polmar plans:

1 offshore plan

2 coastal plan.

They describe the organisation to set up, the means to allocate and the sharing of responsibilities. The authorities of every coastal region in France are in charge of adapting these general plans to the local conditions and organising preparedness exercises.

Since the publication of these plans and their initial adaptation to the regional contexts, France has never been directly concerned by large oil spills and these plans were rarely updated or used in local exercises. When the fuel from the Erika reached the coast, the Polmar coastal plan was used as the initial kernel to set up the organisation and manage the situation.

Researchers studied during six months the management of this oil spill in four municipalities, each one having a different context. From this analysis, researchers discovered that each municipality had to face conditions that went far beyond the limits of the Polmar plan. After a period of surprise and the set up of a first response, all municipalities faced the problem of organisation that proved overwhelming and therefore entered into chaos. Chaos resulted from the combination of several factors:

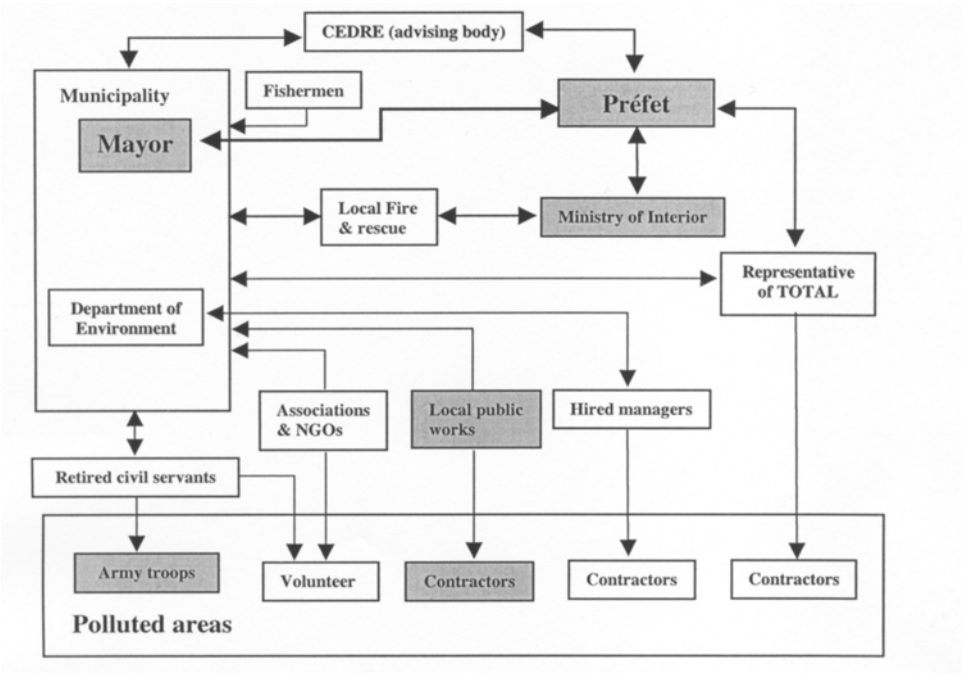
- Amount of fuel to remove and the chemical properties of the oil that appeared resistant to known cleaning practices.
- Climatic conditions: winter storms, high tide, etc.
- Volunteers: a huge number of people came in the days following the oil spill, from all regions of France and from many other countries. This created unplanned difficulties for hosting, feeding and training these people, but also to organise the cooperation and sharing of tasks with other parties (local staff, army, civil security, contractors, etc.).

- Evacuation of polluted sand, soils and tools from the shore to temporary storage places and then to recycling facilities. This difficulty concerned mainly portions of shore and islands that were hard to reach and islands.

Among the four municipalities that were studied, researchers present the case of Belle-Île, an island located in the south of Brittany. Belle-Île is one of the most famous spots of the area because of the beauty of its landscape. Inhabitants suffered a lot from this pollution and there was a very high level of commitment for participating in the organisation of the cleaning of their island.

Belle-Île experienced many overwhelming factors that created a crisis situation. For instance, in the first days after the disaster, around 600 volunteers arrived every day! This chaotic period was rather short (three weeks) and was followed by the emergence of a resilience layer that transformed the initial Polmar plan into an ad-hoc organisation that proved to be quite efficient at the end. Figure 2 presents the ad-hoc organisation that emerged in the Belle-Île community after the chaotic period. Colored items are part of the initial Polmar plan indications. White items correspond to the resilience layer: new stakeholders that were involved in the ad-hoc organisation.

**Figure 2** The 'ad-hoc' organisation in Belle-Île (in Grey: stakeholders suggested by the Polmar plan)




Among people that took an important role in the management of that crisis, the three 'retired civil servants' that assumed the tasks of managing army troops and volunteers are a good example. Since the very first days after the arrival of pollution on the shore, a number of volunteers arrived on the island, followed by groups of military troops. Organisation was in the chaotic phase and no existing plans ever mentioned the participation of volunteers in oil spill management. These people, having an experience

of organisation and a good knowledge of resources available on the island, emerged in the global organisation and found solutions for welcoming, lodging, feeding and training all people. Their participation in the organisation lasted more than one year.

There are more and more examples of that kind of implication of locals in emergency management. Kendra quoted an analysis (Stallings, 1985) of a similar example that occurred during a 1970 Southern California fire:

> "Civil authorities were burdened by proliferating demands and, unable to cope with the evacuee-processing challenges, turned to the local community for assistance. An officer of a women's club and her husband volunteered to help, and soon organised a system for tracking donations and offers of assistance and for assigning tasks to incoming volunteers. A friend was recruited to divide supervisory responsibilities and to help manage the storage and disbursement of supplies, the establishment of a medical treatment area, and other relevant tasks. As this example shows, emergence is a significant coping response in times of crisis, augmenting the capacity of established organisations to meet shifting demands." (Kendra)

The interesting aspect is that all ad-hoc plans elaborated and adapted during the Erika crisis by municipalities in cooperation with national authorities were successful and the pollution was removed before the 2000 summer season from the most valuable locations:

- harbours for fishing
- sand beaches for tourism.

Removing fuel from steep rocky spots was much harder and took 12 months more in some places.

## 4 The contribution of organisational learning to resilience

Learning from exercises is the most common way of getting experience in emergency management, in relation with preparedness planning. As Gillespie points out:

> "Planning for preparedness is followed by practice or implementation of disaster plans. Through implementation, the strengths and weaknesses of preparedness are assessed, which leads back to the first level of awareness and adds to it." (Gillespie, 1993)

On the other hand, learning from the management of accidents and crisis has a strong potential to improve the ability of organisations to manage risks of damage and risks of crisis:

- Learning increases the knowledge of causes and consequences of accidents, so it is possible to improve prevention and protection, but also vigilance by identifying signals and events to monitor. By this way, learning from accidents improves the efficiency of mastering risks of damage.
- Learning from unplanned situations provides knowledge about actions and organisational patterns that proved efficient or inadequate. It increases the experience of people and their ability for innovation, by providing references of what should be tried or avoided in similar situations. By this way, learning from accidents improves the efficiency of mastering risks of crisis.

Among the benefits of debriefing and analysing accidents and crisis management unfolding, the identification of the strengths of the system that must be promoted and weaknesses that need to be corrected, is probably one of the most promising one. It provides knowledge about the behaviour of the system beyond its planned limits and allows the identification of key people, information flows and resources on which the system may rely to anticipate, prepare and manage hazardous situations. Developing this knowledge, sharing it and improving the image of people who own it are, along with prevention, the most important ways of increasing the resilience of organisations to hazardous situations.

There is an unlimited number of organisation types and combinations of actions that may put an end to a crisis situation. During these situations, as in the Erika case, one may often observe the emergence of leaders and innovative organisational patterns: the resilience layers:

> "Crisis creates heroes. They also, however, provide myriad learning opportunities for the organisation (e.g., How well do we adapt to unexpected threats? What changes, if any, in organisation structure and policies would enhance our sensitivity and responsiveness to crisis situations?)." (Burnett, 1998,p.486)

The different kinds of knowledge that are used or built during the management of such situations constitute an important wealth for organisations and companies, if they are able to locate and collect this information:

> "The actors involved in safety system failures are frequently the primary, sometimes the sole, source of information about what happened and why. The capacity to learn from accidents and develop preventive measures therefore depends on the ability to elicit information." (McDonald, 1997)

Knowledge imbedded in experience of individuals is difficult to grasp because it is spread throughout the organisation and it is often tacit among groups. Moreover, it can only be revealed at the time of 'problems' that are often kept hidden when the organisational culture is based on a strict application of plans and on the sanction of failures:

> "Given the emphasis on plans, even those that are impossible to execute, it is not surprising that departing from them is often cited as evidence of a failure. Disasters, however, break the rules that guide the ordinary conduct of business and government, at least for a period of time. Disasters create new environments that must be explored, assessed, and comprehended, change the physical and social landscape, and therefore require a period of exploration, learning, and the development of new approaches." (Kendra)

This set of knowledge often informal, tacit and acquired through years of practice, failures and successes, constitutes individual experience of people and is essential in confronting difficulties and adversity. But this wealth of the institution is fragile. It may vanish if the organisation is not aware of it, if the people who participated in setting up resilience layers are not rewarded for it and if it is not transmitted and shared among people, hierarchies and generations.

It is usual to limit analysis to the search for technical factors that will be fixed or human failures that will be sanctioned. This kind of strategy turns out to have a limited efficiency and the frequency of incidents stays at a level that cannot be lowered anymore.

The introduction of more refined debriefing methods may reveal structural factors that are the root of these incidents and therefore contribute to more efficient solutions:

> "Organisational learning requires that event analysis traces the causal factors and determinants of an event both further back into the past, and further up the chain of management control." (Hale, 1997)

Setting up and developing an organisational learning scheme to make this knowledge visible and formalised is crucial. But it needs to establish a progress loop based on three principles:

1 respect of individuals

2 trust in their ability to manage unexpected situations

3 dissemination of information among stakeholders.

It is also a way to reinforce the feeling of people to belong to the organisation, which is a key factor for motivating them and encouraging their commitment in the development of a safety culture within the organisation:

> "The definition of safety culture tries to bind the sphere of individual behaviour (attitudes) and human errors, objects of predilection until the eighties, to the sphere of organisation, structures and social behaviour, objects that were not so much tackled until now." (translated from Bourrier, 2001,p.21)

Inside a group of people, organisational learning also results in the creation of communication and sharing of knowledge among individuals, whatever their missions or level in the hierarchy:

> "The reliability of learning of an organisation is if it develops common understandings of its experience and makes its interpretation public, stable and shared." (March, 1991)

This kind of communication gives opportunities to anyone to raise the standing of his own expertise and to learn from others: '*managers tell the reasons why; operators tell the way to'*.

## 5 Conclusion

Mastering risks in an organisation is a complex task. Coping with risks of damage can be achieved by preparedness planning and ensuring the maximum efficiency of prevention and protection devices and procedures. Planning and anticipation are the key factors for mastering risks of damage.

Coping with risks of crisis requires more attention as these situations result from the overwhelming of organisations and the lack of control with existing means and strategies. Balancing conventionality and innovation, and learning from the analysis of crisis management are the key factors for mastering risks of crisis:

> "Social roles are never performed mechanistically in rote fashion; rather, role performances always involve at least some degree of improvisation. At the same time, social roles are never completely improvised or invented from scratch; rather, role performances always involve some degree of conventionality."

> "In a practical sense, a better understanding of how individuals improvise their role performances during the emergency period can help responding agencies and organisations better prepare for future disasters." (Webb, 1999)

Managing accidents and crisis is always a matter of exceptional situations in deteriorated contexts. The experience gained by people is, with its successes and failures, an invaluable source of improvement. Accidents and crisis may become, beyond simple debriefing sessions, opportunities to reinforce the trust bindings among people, contribute to promote their skills and provide a better knowledge of the system complexity. Enlarging this perspective to set up a real organisational learning scheme sets the path to new goals that participate to the development of a safety culture and system resilience.

Based on the notions that have been presented in this paper, a methodology for setting up organisational learning has been developed (Wybo, 2002) within an interest group composed of:

- academics
- companies
- public bodies.

This methodology was validated with the Erika case and is presently applied to different kinds of hazards:

- natural
- technological
- food-related.

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