



Protecting your business: from emergency planning to crisis management

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Abstract

The forthcoming UK Control of Major Accident Hazards (COMAH) regulations under the European Community's Seveso II Directive will impose a new formal requirement to test emergency plans. This might be approached as an added burden on industry to demonstrate safe operation, or can be viewed alternatively as an opportunity to improve crisis management systems and thereby decrease the risks to the business. Crisis is by nature an ambiguous and complex environment, demanding endless initiative, inventiveness, communication, co-ordination and learning. Because large-scale crises threatening the entire business are not frequent, learning from experience must be replaced by competence-assurance based on systems thinking, on risk assessment, on wide scenario simulations and on rigorous training. This paper discusses the benefits from various types of testing of emergency plans and from a business approach to continuous improvement in crisis management capability. © 1999 Elsevier Science B.V. All rights reserved.

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1. The EC Seveso directives and the UK regulations

The UK and European system of control for major chemical hazards is based on the concepts of identification of relevant major hazard installations, assessment and control of the risks that they pose, and mitigation of accidents. The main elements of mitigation comprise the location of the installation, the emergency planning and the information provided to the public [1].

For emergency planning purposes, the current CIMAH regulations [2] in the UK require that a number of duties are undertaken by both the occupier of the site and by the local authority in whose geographical area the site is situated. These duties require that the site occupier prepares an adequate on-site emergency plan which is kept up-to-date and takes into account material change, that the local authority prepares and

keeps up-to-date an adequate off-site emergency plan after consulting the manufacturer and the UK Health and Safety Executive (HSE), and that the site occupier keeps the public informed about certain measures which are specified in a schedule to the regulations.

There is no specific duty under these current CIMAH regulations to test the adequacy of the emergency plans. Neither is there a specific requirement to alert the public off-site that an emergency is imminent or indeed is actually taking place. The new Seveso II Directive [3] has addressed these points [4,5]. European Community member states will be required to ensure that internal and external emergency plans are reviewed, tested and, where necessary, revised and updated, at intervals not exceeding three years. The Directive also requires that the public is consulted on off-site emergency plans, as provision has to be made for informing the public and supplying information to the competent authority for the preparation of external emergency plans. Data and information to be included in the emergency plans are specified in the Directive.

Both top- and lower-tier sites must also plan for emergencies through the requirements of the Major Accident Prevention Policy (MAPP). It will be mandatory to adopt and implement procedures to identify foreseeable emergencies by systematic analysis and to prepare, test and review emergency plans to respond to such emergencies [6,7].

The local authority must prepare an off-site emergency plan. The issues to be addressed here are similar to those for on-site plans and are specified in an annex in the Seveso II Directive. This is similar to the Seveso I regime [8], but there are new requirements to include provision for clean up and restoration of the environment following a major accident, and to consult the public over the plan [6]. This consultation will probably be done through elected representatives.

The operator must provide information to any of the public who are liable to be affected by an accident on the site. This is also similar to the existing Seveso I requirement, but Seveso II will additionally require Safety Reports to be made available to the public. This information shall include: general information relating to the nature of the major-accident hazards, including their potential effects on the population and the environment; adequate information on how the population concerned will be warned and kept informed in the event of a major accident; and adequate information on the actions the population concerned should take, and on the behaviour they should adopt, in the event of a major accident. Certain information does not have to be disclosed, i.e., information relating to industrial, commercial or personal confidentiality, public security or national defence.

Under the Seveso II Directive, member states (and hence operators) are to ensure that emergency plans are implemented without delay if a major accident were to occur. Operators must report major accidents to the competent authority as soon as practicable. This includes the steps to be taken to alleviate the effects of the accident and the steps to prevent a recurrence.

2. Emergency planning in the UK

The objectives of the emergency plans are to contain and control incidents, to safeguard employees and anyone nearby who might be affected, and to minimise

damage to property or the environment [3]. Effective emergency plans require the close co-operation of the operator, the local authority and the emergency services with contributions from the Health and Safety Executive, the Department of Environment Transport and the Regions and the Environment Agency (SEPA in Scotland), as well as other organisations as necessary in particular local circumstances.

The emergency plans must be capable of dealing with the largest incidents that can reasonably be foreseen, but detailed planning should concentrate on those events that are most probable (i.e. they should be risk based) but testing should cover the full range of risks capable of producing a major accident. Emergency plans must also have sufficient flexibility built in so that the response is tailored to the severity of the incident. This will prevent unnecessary calls on the external emergency services if the matter can be dealt with completely using the operator's internal resources. However, it is even more essential to ensure that someone will call the emergency services as soon as it is evident that an accident could escalate sufficiently to require initiation of the off-site plan [9,10].

A wide range of events may need to be considered in an emergency plan. For example, spillage or release of corrosive, toxic, ecotoxic, flammable or carcinogenic materials, runaway exothermic reactions, dust explosions or fires. The consequences of the various events should be assessed, with due consideration to the environment as well as to human safety.

2.1. Testing of emergency plans

The original European Community Seveso Directive [7] includes requirements for companies operating major hazards plants to make internal emergency plans, and for relevant authorities to prepare external emergency plans. The new Seveso II Directive [3] and forthcoming UK COMAH Regulations [8] require the review, and testing every three years, of both internal and external emergency plans.

In the UK, the 1984 CIMAH Regulations [2] apply until they become replaced by the forthcoming COMAH Regulations. These CIMAH Regulations require operators of major hazard installations to prepare on-site emergency plans, but did not specifically require that rehearsals or practices should be carried out. However, the guidance [11] points out that this would be an effective way of ensuring that the on-site emergency plan was adequate, and would have a bearing on the operator's obligations (a) to demonstrate safe operation and (b) to take adequate steps to provide persons working on-site with the information, training and equipment necessary to ensure their safety.

Effective emergency plans require the close co-operation of the site operator, the local authority and the emergency services. The business concept of a value chain can be usefully applied here, in designing, reviewing and preparing to test the emergency plans. Each component of the plan (link in the chain) has suppliers and a customer, and the challenge is for the suppliers to provide the service to the customer in a fashion which adds value (i.e. effectiveness) by meeting the customer's needs [12]. Helping everyone involved to understand the larger system in which their components of the emergency response are implemented helps them to make better decisions. Knowing what value each element in the chain adds and knowing what characteristics are important to each link in the chain are basic building blocks of an informed emergency response

workforce [13]. The chain metaphor is also relevant to the basic rule that no one should drop a problem, even if it is outside his or her competence, until it is certain that someone else has taken proper charge of it [14]. Those people who have worked together in planning, testing and reviewing emergency plans will have had the opportunity to learn each other's strengths and limitations. Such people will provide a much more effective response than those who come together for the first time when a major accident strikes.

The complete emergency plans including both on-site and off-site components should be exercised. 'Table-top' exercises are very cost-effective because they do not interrupt the day-to-day running of the plants, and also because many events can be rehearsed in one session, but they are not sufficient and need to be complemented by live on-plant exercises. Full scale practices involving all concerned at suitable intervals are necessary to give the maximum possible confidence that all reasonably practicable measures have been taken [10,15]. The clear view of HSE in the UK as competent authority is that 'testing is not a single activity' [16]. Instead, effective testing comprises a range or portfolio of activities including seminar exercises (e.g. structured discussions and operability studies), table-top exercises, 'control-post' exercises and live exercises.

The general principles of emergency planning should be adopted for every organisation, whether they operate a major hazard installation or not [17,18]. For all organisations employing 5 or more persons, the Approved Code of Practice to the UK Management of Health and Safety at Work Regulations 1992 [19] states that it may be advisable to carry out exercises to familiarise employees with emergency procedures and to test their effectiveness. The UK Health and Safety Executive's Chemical Manufacturing National Interest Group has issued a leaflet which is a pointer to essential aspects of emergency procedures [20]. This includes a prompt to check whether operating staff could cope with the stress and workload when handling the early stages of an emergency.

2.2. Integrated simulations at MFETC

Since table-top exercises are useful, but not sufficient, and since full-scale practices are too expensive to run frequently, the benefits of low cost and high realism have been combined in the major emergency management simulator at Montrose Fire and Emergency Training Centre. State of the art software systems, linking with a major capital investment in a suite of control rooms, allows any site-specific control system to be mimicked. Control room operators can practice simultaneously but separately from management teams, and both can practice in integrated exercises with emergency response teams while the latter are at the incident scene (on the fire training ground, Fig. 1). All groups can therefore rehearse together, with realistic communication links, stresses and 'gremlins', all in real time [21].

This style of training and assessment has been found to meet the exacting needs of the latest offshore safety case regimes, and to give benefits for onshore major hazard industries. The latest developments at MFETC allow the control system simulator to be portable, thereby bringing such training and competence assurance local to the COMAH site [22].

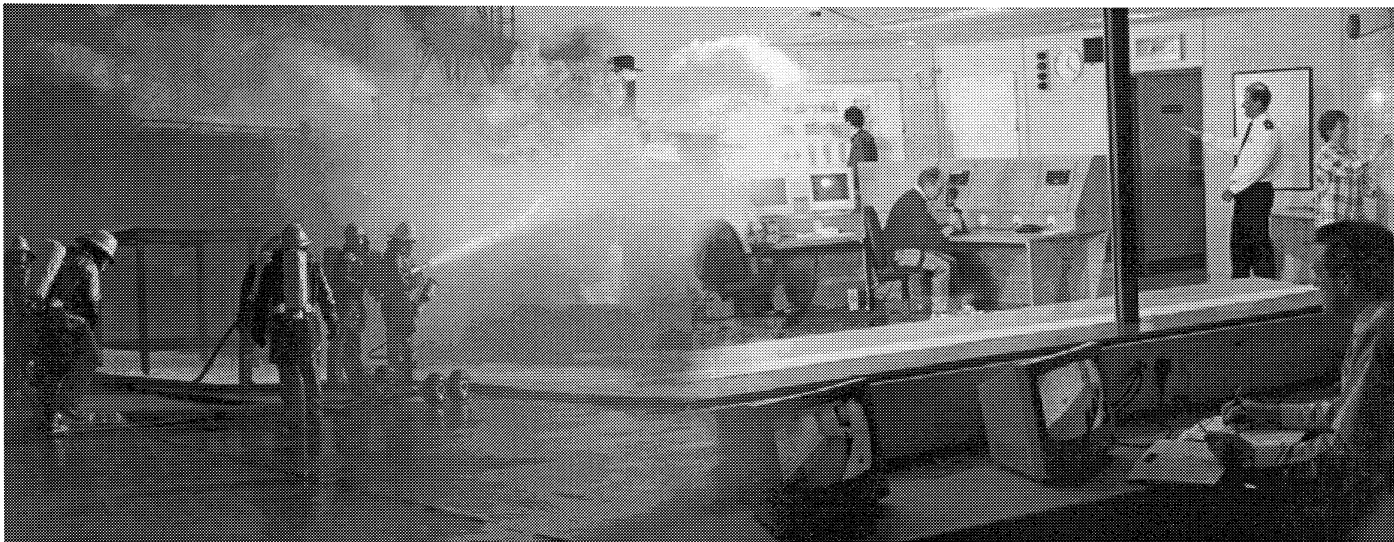


Fig. 1. Integrated fire ground and control room exercises at Montrose Fire and Emergency Training Centre.

2.3. Full-scale high-reality major exercises

In designing and implementing high-reality major emergency exercises which deliberately include high stress, care must be taken to manage the risks which are introduced by that process, especially in major hazard plants which remain operational during the exercise. It would be absurd if additional safeguards introduced during training defeated the objective of the training, but it would be unforgivable not to ensure robust safeguards [23,24].

Emergency exercises using high-reality simulation are obviously more expensive to stage than control-post or table-top exercises. Full-scale live exercises testing both on-site and off-site plans need to be planned in secret, but once they are underway, the local public will inevitably notice unusual activity on and around the site. Such exercises can often be newsworthy, especially for the local media. It is therefore essential that when full-scale high-reality major exercises are staged, the organisation is both mature enough to benefit fully from them, and also sufficiently competent (with the component parts well rehearsed in previous tests) so that it does not suffer a demotivating and damaging humiliation in front of the public and media. High reality simulation applies stresses and motivations which cannot be achieved otherwise. Factors such as time pressure, psychological stress, fatigue, physical obstruction and perceived danger all have significant effect on the performance of individuals and teams. The purpose of the simulation of reality is to encourage a situation where all those observing a scenario see the same imitation of reality. This avoids the 'unfair' type of confusion which derives from misunderstanding the scenario intended by those directing the exercise.

The planning for a large-scale emergency exercise can typically take 6 to 12 months. This is after the organisation has reached a stage of competence where they are ready to undertake a complex exercise involving on-site and off-site personnel. Reaching that state of competence can take several years. A planning team of between 4 and 6 has been found to provide sufficient resource, provided that this small team makes careful plans to be augmented during the exercise by additional observers who can help while the core team implement the simulation and steer the exercise [22].

It is impossible (or unsafe) to provide real simulation of all aspects of the exercise scenario. In such circumstances, the scenario can be described to the participants by the issue of prompt cards. A major exercise typically requires a carefully pre-planned and self-consistent series of such prompt cards, issued throughout the exercise according to a pre-determined schedule, and sometimes accommodating different options depending upon the decisions taken up to that stage by the exercise participants.

The amount of wisdom and the benefit that can be gained from an emergency exercise is highly dependent on the quality of the recording for subsequent analysis. It is preferable to combine video recording, still photography by field observers, observers log sheets, participants log sheets and transcripts from tape recordings of radio and telephone communications. Although this creates a need for many observers, most of them can be notified only just before the exercise, provided that the planning team quietly ensures that equipment is prepared and available at appropriate locations. (Camera equipment may need to be operated under hot work permit procedures.) Synchronisation against a common time base is essential, and it is useful to place spare

radio receivers against the microphones for the video cameras, to superimpose sound with the video pictures.

In the best managed enterprises, series of emergency exercises are run in differing environmental conditions. While weather is an uncontrollable variable, exercises should be run in hours of darkness as well as during daylight. It can be helpful to issue special prompt cards to mobilise field lighting, not least for the benefit of the video and photographic record.

Surprise is an important element in the exercise. It is helpful to announce that an exercise is planned, as it motivates site personnel to study their emergency plan. But, if the date, time or nature of the exercise is known on-site, then the element of reality is lost, and there is a risk that the exercise becomes a poor sham, exploiting privileged knowledge and specially mobilised resources.

Exercise 'Black Tide' was held over 2 days in mid-summer to test the Sullom Voe oil spill plan at the top limit of its design capability. The exercise simulated an oil spill of 2000 tonnes of light crude. The spillage was simulated using about 1800 cubic metres of finished fluoro-protein fire-fighting foam, deployed by a Port Authority tug at the bow of the tanker (Fig. 2). The finished fluoro-protein foam used to simulate the spilled oil lasted well for the first 2 h, but broke down rapidly during the third hour. An environmental risk assessment undertaken during the exercise planning stage had predicted negligible harm, and the ongoing routine environmental programme at Sullom Voe later confirmed no lasting damage.

The most important consideration during emergency exercises is the protection of people, the facilities and the environment. The top safety priority is to ensure clear and robust procedures to terminate the exercise for any reason, such as the coincidence of a real emergency during the exercise. At major industrial sites, it may be quite likely that other emergency alarms will be activated during the exercise timescale. Emergency response capabilities must be kept separate and readily available to investigate these emergency alarms, and to abort the exercise if necessary. Robust means to terminate the exercise must be able to work well despite an unknown spectrum of scenarios and problems. More than one method must be available to communicate the termination of the exercise unambiguously.

A continuing challenge to the team implementing the exercise is, as far as is safe, to allow its course to develop naturally in response to the reactions of the emergency response teams. This means that the planning team must accommodate a spectrum of reaction scenarios, as far as possible anticipating the unexpected and innovative. There are few occurrences more demotivating than to participants in an exercise than to be impeded by those steering the exercise after each and every action taken. The pre-planning can be assisted in working out a safe 'operational envelope' for the exercise by use of cause and effect analysis and event-tree techniques (Fig. 3).

2.4. Learning from post incident reviews

An incident does not end once the fire has been put out or a leak stopped. Often the true crisis management starts here. Most companies and emergency forces recognise that



Fig. 2. Fire-fighting foam deployed for oil-spill simulation at Sullom Voe oil terminal (1988).

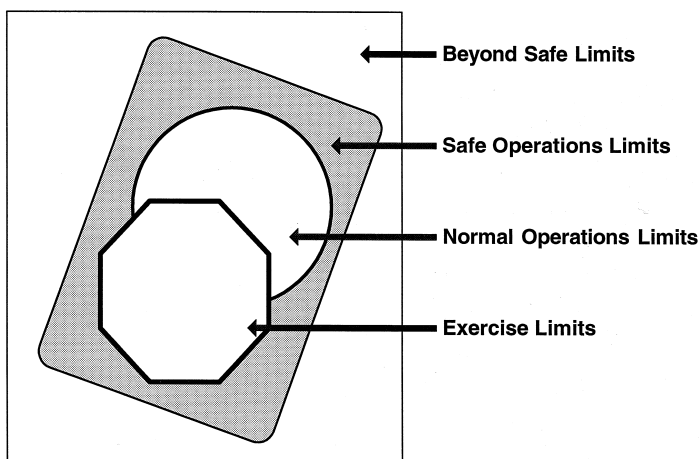


Fig. 3. Keeping inside the safe operational envelope.

there are still many more essential actions to prevent further hazards at the incident ground and to learn lessons for the future.

At the scene of the incident, all contaminated plant and equipment needs to be adequately decontaminated. Care needs to be taken to prevent hazardous materials from the decontamination being washed into drainage systems or water courses. There is increasing awareness that the health of emergency responders needs to be monitored after an incident to pick-up any delayed effects of exposure to chemicals or smoke. Where the incident has involved loss of life, there is growing use of treatment for 'post-incident trauma' for emergency responders to prevent longer term psychological and emotion problems. This may also be necessary for members of the public who were alarmed by the incident or affected by any evacuation.

Most now recognise the benefits of early and thorough debriefing of all those involved in the incident so that the problems encountered can be discussed and documented. These reviews take place within each of the involved organisations and emergency services. It is important that a full review is held which is attended by all so that experiences can be shared and problems of co-ordination and communication aired. All the lessons learnt should be taken forward to allow their incorporation in the written plans, and minimise the risk of repetition in the event of a future incident.

Many companies recognise the need to involve members of the public and their representatives in the post-incident review process. They need to be informed of the cause of the incident and the steps being taken to prevent it happening again. They will also be interested in the lessons learned from the emergency operation and how these are being acted upon. This process should seek to reassure the public and can act as an investment towards their confidence in the company, that in the future it will conduct its undertakings in a safe manner with minimal risk to the public. They should also be reassured that the emergency services have learnt from the incident and have taken steps to ensure that their own actions to protect the public will be even more effective in the future.

The Health and Safety Executive has published a number of reports of major accidents subject to the CIMAH regulations, and has compiled a list of lessons relevant to on-site and off-site emergency planning [7]. Lessons from older UK accidents were published in 1990 [25] and similar lessons learnt from studies of emergency management in 12 EU countries have been summarised [26].

3. Towards crisis management

The aim is to prevent an emergency becoming a crisis, and to prevent a crisis becoming a disaster. As Senge has emphasised for business, leaders are able to ‘design the future’ because they understand how systems work [27]. The same is true for emergency planning and crisis management. Those charged with responsibility for the systems can design improved future systems when they understand how the system works and how its components link together to meet the overall aim. Understanding the system model, in a business enterprise modelling concept, is therefore an important capability.

Three levels of sophistication and maturity in enterprise modelling can be recognised (Fig. 4). At the basic level, the enterprise is modelled in order to communicate and share an understanding of the system. At the second level, the enterprise model is used to investigate options for improvement, by exploring the ‘what if’ questions. At the third level, which should only be invoked after careful consideration and when sufficient resources are available for development, refinement, operation and maintenance, the model is used to control the carrying out of the specified activities. For many organisations, this third level might invoke too great complexity and too much risk.

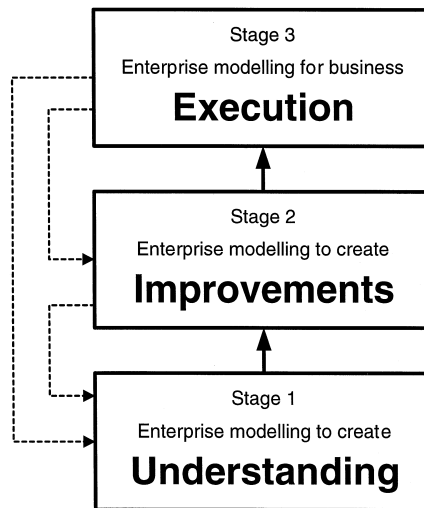


Fig. 4. Stages in enterprise modelling.

The basic-level enterprise modelling in order to promote understanding of the system offers major opportunities for improvement in many organisations. In the author's experience, many emergency and crisis management plans are documented in text format as long, turgid essays. These are difficult to appreciate, troublesome to update

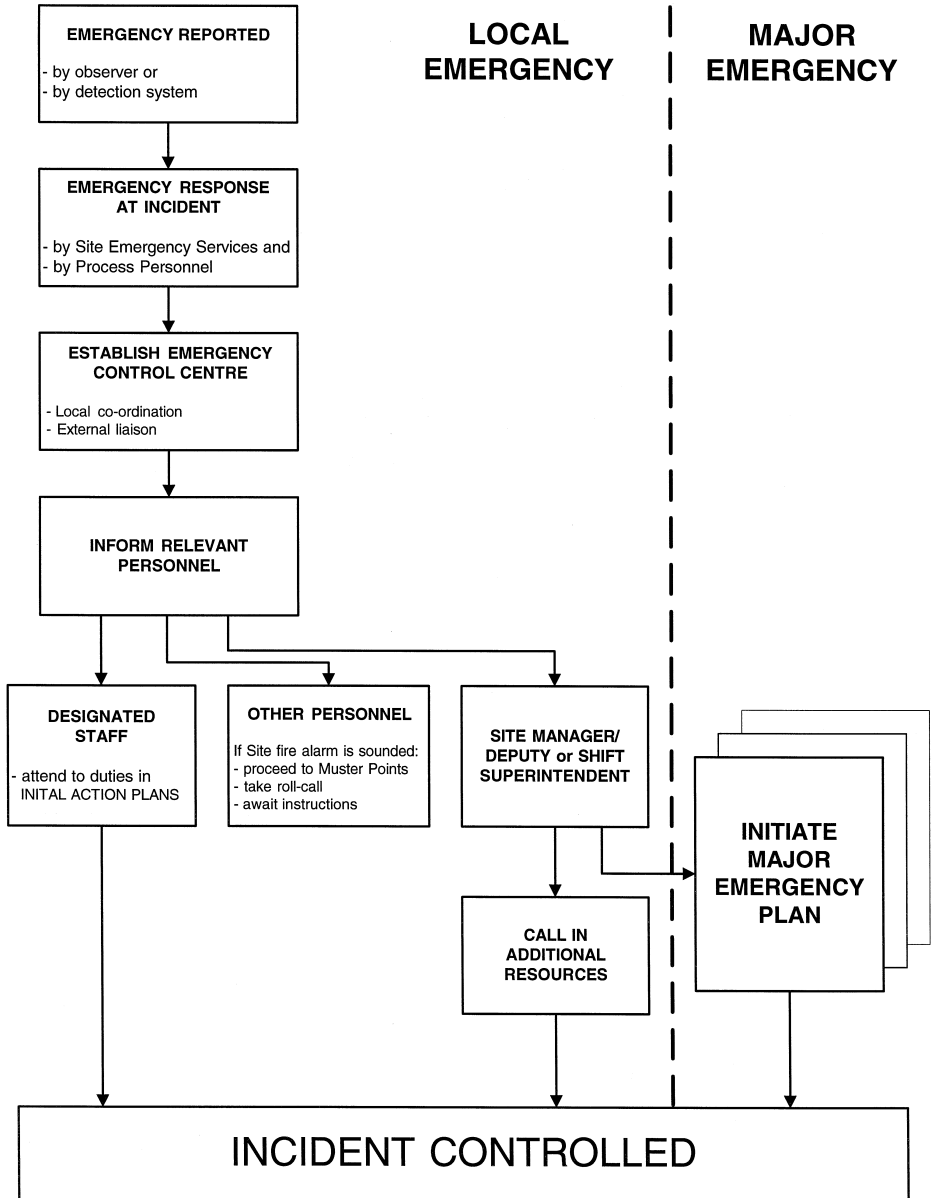


Fig. 5. Outline of emergency plan for a top-tier CIMAH Site (1985).

and rarely achieve effective communication. Often such documents are little more than valiant attempts to describe dysfunctional systems whose flaws remain hidden by the complexity of the text. In the past decade, in the timescale over which many companies have taken advantage of the stimulus of the CIMAH regulations to improve their emergency response capabilities, there has been a widespread increase in the use of flowcharts in business. This has been driven primarily by the ‘quality system revolution’, but empowers many companies to model their emergency and crisis management plans more effectively.

Fig. 5 shows an early flowchart which summarised the emergency plan for a top-tier CIMAH site. Although the diagram is not rigorous in modelling the work flows, it represented a major advance in simple and effective communication with the hundreds of site personnel and contractors who needed to become involved. Moreover, the draft

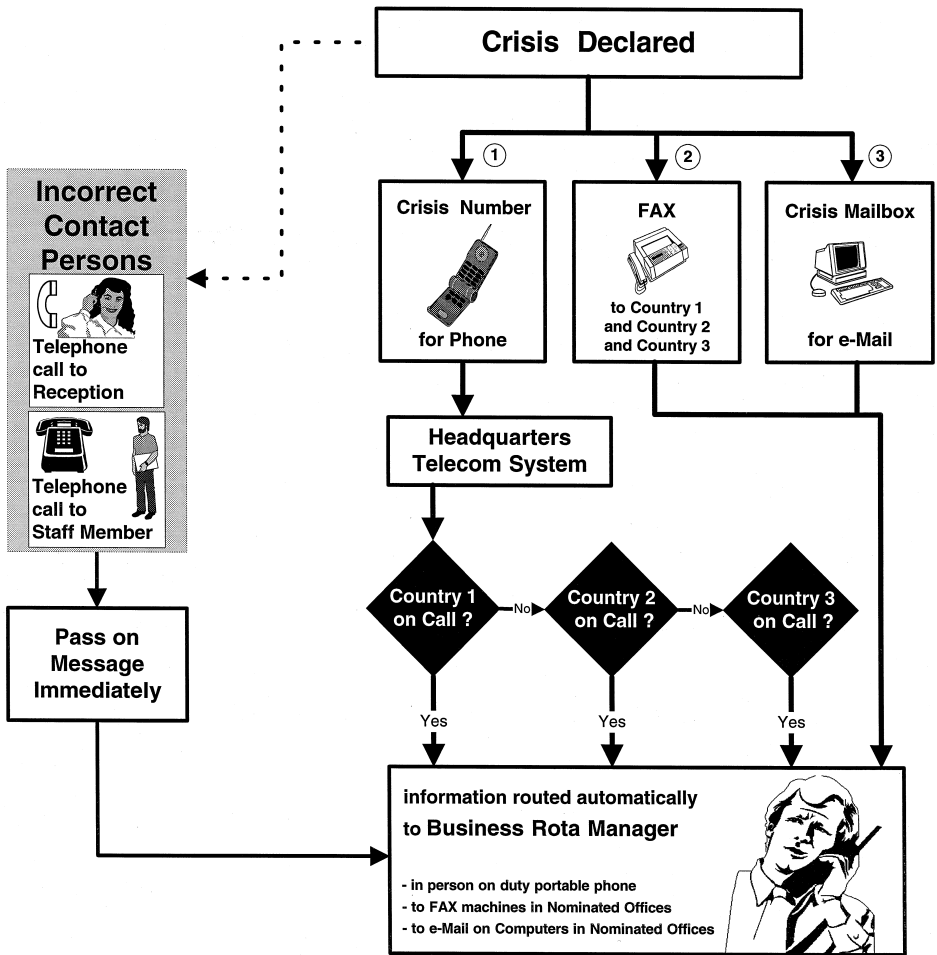


Fig. 6. System to process the crisis alarm call for a pan-European organisation.

versions of this flowchart clearly identified the disfunctionalities in the previous system, and led quickly to improvements to create a self-consistent emergency response plan.

The challenges in creating an effective crisis management system at a corporate level are made much more complex in the global business arena. The membership of corporate crisis teams often spans different countries, or even different continents, and yet the need remains for clear, simple and robust systems to mobilise such teams when necessary (Fig. 6). Pictograms are particularly beneficial when the audience is international and has a diversity of core language skills.

The three phases of crisis management are shown in Fig. 7. Several generic principles in crisis management can be defined. First, the emergency response action must be led by persons who are present at the site of the emergency; it is dangerous and impractical for remote managers to interfere. Secondly, the person managing the local response should preferably be different from the person charged with protecting the organisation's corporate business interests. In other words, the emergency response should be separated from the business crisis response. Thirdly, clear definitions and robust procedures need to be agreed, formulated and implemented in order to predefine the stage at which an emergency has become a crisis. Fourthly, business continuity planning cannot be improvised during stages 1 and 2 unless it has been pre-planned and pre-organised long beforehand.

3.1. Systematic approach to crisis management

The emergency plan is part of a system for the wider aim of crisis management. As the quality guru Dr. Deming taught, it is the duty of management to optimise the entire system. As is often the case in business, emergency plans and crisis management can suffer because individual components of the system are optimised, at the expense of the capability of the overall system. Optimisation requires each component (of hardware, peopleware, organisational-ware) to be judged by its contribution to the overall system, rather than to the excellence of the component.

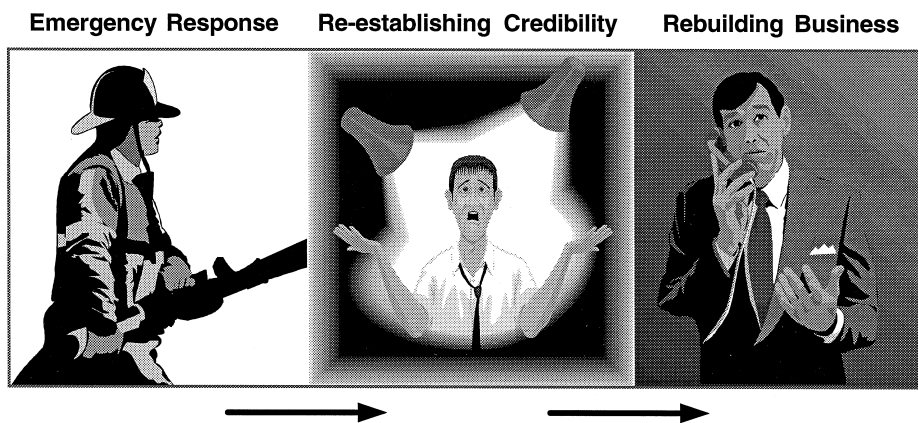


Fig. 7. The three phases of crisis management.

Table 1
Crisis management HAZOP guide- and property-words

CRiMAN HAZOP guide words	
No	Incorrect/Inappropriate
Failed	Too Late/Soon
Impaired/Damaged	Congested/Overloaded
Fails During	Not Recognised
Not Done	Ignored
Inadequate/Insufficient	Too Much/Little
Crisis management stage	CRiMAN property words
Recognising the emergency	Response Communication
Raising the alarm	Alarm-system (system, information) Response Communication (system, information)
Mobilising the crisis response team	Response Communication Mobilisation Knowledge (key roles) Support Consistency Responsibility
Looking for information	Communication (system, information) Information Personnel (knowledge)
Recording the information	Systems Information Personnel (knowledge)
Planning the response	Systems Communication Personnel (on-site, off-site) Decision Equipment
Communicating	Systems Communication Personnel (on-site, off-site) Decision
Implementing the response	Systems Communication Personnel (on-site, off-site) Equipment
Resumption of normal activities	Systems Communication Personnel Equipment
Reporting and notification	Systems Communication Decision

Worse than sub-optimisation is the occasional practice of testing emergency plans in order to put a ‘tick in the box’ (Emergency Plan Tested [✓]). To any remaining organisations adopting that approach, it may be helpful to point out that ‘*those who do not obstinately prepare to face crisis will soon be subjected to its reign*’ [19].

3.2. CRIMAN HAZOP for upgrading crisis management systems

DNV has often found that organisations are keen to improve their emergency preparedness and crisis management capabilities, but are uncertain where to start and how to proceed cost-effectively. This need has been met by use of DNV’s CRIMAN HAZOP technique, which systematically stresses the crisis management system in response to each identified type of hazardous scenario. As in a conventional HAZOP undertaken when designing or reviewing a chemical factory [28], benefit and wisdom come from the multi-disciplinary team approach and the commitment of formal effort in a rigorous, documented process. Moreover, the site staff are directly involved, and therefore take ownership of any improvement needs in the crisis management system. Hearts and minds are therefore more readily won over, and the processes of continuous improvement and innovative thinking are nourished.

Also like a conventional HAZOP, it is best if the components of the crisis management plan have been flowcharted, thereby clearly visualising the ‘design intentions’ of the plan or system and each of its components. These intentions are then stressed using a special set of guide words and property words until a deviation is identified (Table 1). The robustness of the system against such deviations is then assessed, and recommendations for system upgrade are proposed. The team works in the context of the ‘Y-model’ for management of change, as shown in Fig. 8 [29]. The effectiveness of the multi-disciplinary team sessions is greatly increased by use of modern HAZOP recording software, which allows real-time projection of the record on a large screen as the team conducts its systematic process, and thereby allows real-time alignment of the record with the teams intentions.



Fig. 8. The ‘Y-model’ for change management.

Although no crisis is precisely like any other, there are a surprising number of similarities. Finding and understanding these similarities is the key to planning to avoid a crisis, and moderating its effect when such avoidance is not possible.

3.3. Media response preparedness

In the event of a large scale accident, it is the human, environmental and economic consequences that will drive the media interest. If there are connections with previous similar incidents then the importance of reporting the news is strengthened. One noticeable aspect common to media reporting about risks that have suddenly been realised in the form of accidents and disasters is that the event is depicted as having been caused by some characteristic of a company or organisation [30]. Risks tend to be perceived as more serious and newsworthy when there is someone to blame [31].

Table 2
Key media-management recommendations in 1990 and 1998

1990	1998
E. Smith and G. Purdy [25] 'Lessons Learnt from Emergencies after Accidents in the UK involving Dangerous Substances'	UK Home Office [32] 'How Resilient is your Business to Disaster'
Industry needs to recognise that information management is a form of damage control and that an industry spokesman should be briefed and made available for the press to interview.	The nomination of official media trained spokesmen.
Any press statements made are preferably 'joint' statements from all those involved to prevent the Press 'picking off' one service or the company concerned.	Co-ordination of media management with the emergency services and other affected businesses (i.e., everyone should 'sing from the same hymn-sheet').
At the scene of the incident the Press need to be controlled but that exclusion of all can lead to unnecessarily alarmist reporting. Where a large number of Press ask for access to a site, it is reasonably for the Press to provide a representative team that can share information.	
There must be pre-arranged access to local radio stations to broadcast messages.	Contact lists of journalists and radio/television stations.
Companies and the emergency services need to plan in advance how they will inform members of the public and how they will control the media.	Consideration of the need for a public relations consultant.
The establishment of a Press Centre facilitates control of the press.	Access to specialist facilities, e.g., telephone answering services in cases of product contamination.
Communication with the local community should not stop once the acute phase of the incident has passed. Time spent in meeting the public and their representatives through a local 'liaison' committee after the incident, to inform and reassure, can help to allay the inevitable public concern and is an investment for the future.	Placement of advertisements in local or national papers to inform the public and customers of the situation.
The statements [for broadcast] must be prepared, as much as possible, in advance.	Production of an emergency newsletter to staff, customers and associated organisations.
	Pre-prepared background facts on the organisation, functions, safety record, personalities, etc.,

If a company is not adequately prepared to communicate with the media, then the opportunity to keep control of the situation could be lost. As a matter of course other avenues of information gathering will be exploited. These are often one-sided, filled with rumour and misrepresentation and if left unchecked could result in loss of confidence in the company's ability to manage its affairs.

Lessons from emergencies and accidents have revealed some basic points on managing information and media response. The basics have remained rather similar over the past decade, as shown in the comparison given in Table 2 of key points from 1990 [25] and 1998 [32]. However, some of the detail in the approach has evolved. For example, it is crucial that the company, emergency services and other authorities co-ordinate their information on public health, safety and welfare such that they 'sing to the media from the same hymn-sheet' during the emergency response stage. Joint press conferences at this stage are the norm. However, nowadays the emergency services and authorities will want to be seen to be separate from the polluter, and will stand back from any involvement in the later stages of the crisis management when the company is seeking to re-establish its credibility and rebuild its business.

A company must have spokespersons that are trained to deal with the media in a crisis and an up-to-date robust media plan that looks further than an incident to ensure business continues in the future. The system must be exercised regularly to enhance the performance of all personnel in gathering and communicating quality information. Dealing with the media is known to be a cause of stress to senior emergency services personnel as well as company representatives [33]. The UK Home Office has noted that 'live exercises provide the only means of fully testing the crucial arrangements for handling the media' [18].

The media offers a conduit through which the defence and promotion of a company's actions can be communicated in order to take full advantage of preserving confidence. Lives, reputations, corporate credibility and ultimately financial viability depend on the company's response. Poor handling of the media has led to the destruction of companies, whereas skilful handling of the media can be instrumental in defusing potentially hostile comment [32].

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