MARINE OIL SPILL INCIDENTS FROM SEA-GOING TANKERS:

An idiographic exploration of the spill effects on structure, culture and behaviour in risk and collective incident management

PhD Thesis

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ABSTRACT

The 1967 *Torrey Canyon* incident established that the transportation of persistent oil by sea is a significantly risky business with a potential for great environmental harm. The incident propelled the development of international conventions for standards of operation and payment of compensation to those affected by a tanker oil spill. Affectation has meant going beyond economic outcomes to encompass social and political outcomes particularly where there is a likelihood of severe environmental impact. The oil transportation risk today is therefore different from the risk thirty years ago. As a result the perception and roles of involved parties in managing the risk and incidents have also been affected. However, despite significant investment in plans and preparedness, this has not always brought about full social acceptance, and there has still been failure, indicating that risk management is more than preparedness. It is proposed that management and behaviour during incident management are factors that create uncertainties, despite highly reliable systems. Established methodologies, on evaluating risk, risk management and incident management conceptually and contextually, have been somewhat limited in their ability to view behaviour as a risk factor with direct significance to the management of the risk, incident and society. The study constructs a narrative account of the structural facts and behavioural aspects in oil spill risk and incident management establishing connections between them. Exploration of both the outer-inner and inner-outer context is achieved by way of a case study of the context of tanker oil spills. Observations of behaviour are derived from the interviews with parties involved in risk and incident management and from participation in organised spill incident simulations (both computer-based and physical). The constructs serve to add to the studies on risk and incident management. The study submits that despite the exceptionally organised and co-ordinated preparedness system, it betrays an underlying strained system of roles operating jointly and severally. What is unfolded is that the success of the co-ordinated exercise is not entirely dependent on levels of preparedness but on a cluster of behavioural factors. These factors include the prevalent organisational culture, the level of experience and involvement of each group during incident, the underlying risk base of each group, the resource capability at the exact moment of happening and the communication of information. The study concludes with a model for development of capability for incident management.

Key words: risk management, risk, incident, crisis, behaviour, human action, failure, high-reliability, tanker oil spill, environment, collective operations, culture and perception.

CONTENTS

GLOSSARY OF TERMS

AOPOSC	Anti Oil Pollution Operating Sub-Committee
BOSCA	British Oil Spill Control Association
CCW	Countryside Council for Wales
DAN	Dept. of Agriculture for Food and Environment Protection Act 1985, Northern Ireland
DETR	Department of the Environment, Transport and the Regions
DMO	Director of Maritime Operations (MCA)
EA	Environment Agency
EEZ	Economic Environmental Zone
EHS	Environment and Heritage Service of the Department of Environment (Northern Ireland)
EN*	English Nature
ERC	Emergency Response Centre
FEPA	Food and Environment Protection Act 1985
FSC	Field Studies Council
HMCG	Her Majesty's Coastguard
HOO	Head of Operations (MCA)
ILU	The Institute of London Underwriters
IMO	International Maritime Organisation
IOPCF	International Oil Pollution Compensation Fund
ITIA	International Tanker Indemnity Association
ITOPF	International Tanker Owners Pollution Federation
IUMI	International Union of Marine Underwriters
JNCC	Joint Nature Conservation Committee
JRC	Joint Response Centre (now renamed SRC)
LA	Local Authority
MAFF	Ministry of Agriculture, Fisheries and Food
MAIB	DETR's Marine Accident Investigation Branch
MARPOL 73/78	The International Convention for the Prevention of Pollution from Ships
MCA	Maritime and Coastguard Agency
MEHRA	Marine Environment High Risk Area (derived from the Donaldson Report 1994)
MEOR	Marine Emergencies Operations Room
MRC	Marine Response Centre
MRCC	Maritime Rescue Co-ordination Centre
MRSC	Maritime Rescue Sub-Centre
MOU	Memorandum of Understanding
MVS	Maritime Voluntary Service
NCP	National Contingency Plan
NGO	Non-Governmental Organisation
OECD	Organisation for Economic Co-operation and Development

OILPOL	The Prevention of Pollution of the Sea by Oil
OPA 1990	Oil Pollution Act 1990 (US)
OPOL	Oil Pollution Liability Association Ltd
OPRC (CONVENTION)	International Convention on Oil Pollution Preparedness, Response and Co-operation 1990
OSRL	Oil Spill Response Limited (counter-pollution emergency group based in Southampton)
P&I Club	Protection and Indemnity Club
PCPSO	Principal Counter-pollution and Salvage Officer (MCA)
PR	Public Relations
RAYNET	Radio Amateur Emergency Network – used during the *Sea Empress* incident
ROSC	Regional Oil Spill Co-ordinators (UK) of the UKPIA
SCU	Salvage Control Unit
SE*	Sea Empress
SEEEC	Sea Empress Environmental Evaluation Committee
SOAEFD	Scottish Office Agriculture, Environment and Fisheries Dept.
SOSREP	Secretary of State's Representative
SRC	Shoreline Response Centre
STCW 78	The International Convention on Standards of Training, Certification and Watch keeping for Seafarers.
TCR*	Terminal Control Centre
UNCLOS	United Nations Convention on the Law of the Sea 1982
UKOOA	UK Offshore Operators Association
UKPIA	United Kingdom Petroleum Industry Association
WOAD	Welsh Office Agriculture Dept.
WWF	World Wildlife Fund
WWOPAG	West Wales Oil Pollution Advisory Group

(Note • acronyms made up)

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CHAPTER ONE: UNDERSTANDING RISK -SETTING THE SCENE

This study is an investigation of oil spill effects on the structures, culture and behaviour in risk and incident management. The focus of the study lies in the premise that the key risk factor is behaviour, which in this study is considered as observable action. The study observations hold that formal structures and planned operations which form the basis of risk and incident management theories will remain inadequate until attention is given to issues such as the culture and behaviour of the persons involved in both risk and incident management. The final conclusion, which is derived, is that risk is not the subject matter lending itself to incident, such as oil and its escape, but is essentially behaviour, which is largely uncontrollable and uncertain. For this reason, risk management involves focusing on developing human systems more than on operational systems. Numerous studies have been done in the three areas of risk, risk management and incident management with sub-areas encompassing theories of risk perception, risk decision-making, risk and environment, risk and insurance, statistical techniques, operational management, crisis management, systems failure, emergency planning and the list goes on. Any reader might then question, what more can possibly be added to all these undoubtedly worthy pieces of work in the three main areas. The concept of risk has certainly been the object of much inquiry; the reason in the main for this is, that risk itself is a complex subject and making sense of its concept is difficult and difficult to explain. There is much uncomfortableness in the distinction between risk and what constitutes uncertainty. There is even uncomfortableness in the usage of the term risk. What is risk? The traditional paradigms of risk suggest that there is pre-knowledge or predictability about its existence, so as to enable making of choice and planning to prevent its happening. Yet the pre-knowledge of the probability of an event happening is only a part of the total dimension of what might constitute risk. Undoubtedly knowing probabilities is fundamental to decision-making, though it neither prevents the risk-event from happening, nor halts riskiness when it happens. For example, the probability of a train crashing is critical to safety management, but if the train crashes new uncertainties, some predictable and some not predictable, may arise. The same with a gambler; should the gambler lose, there could be new consequences that could arise, not only financial but also emotional. Therefore the study considers that conceptually risk is linked to failure, meaning damage, loss or injury, and to this extent it is more than about predictability but the ability to

deal with the failure when it happens. The focus clearly is not on the environment in which the subject matter of risk arises, but on human behaviour. Behaviour is what is manifest. It is more than Snyder's (1992:75) behavioural confirmation where people make sense of interactions by behaving as they are expected to do, thus "*creating a sense of an orderly world*". However, crisis management is when the world becomes topsy-turvy and behaviour that manifests itself arises within dynamic conditions creating different levels of expectations and interactions which may conflict with what is expected in an orderly and calm situation. In other words the behaviour manifested during, say, a fire-drill, when conditions are relatively calm, may deviate significantly from the behaviour manifested during a live fire incident.

The study holds firmly to the belief that it is human behaviour which is the risk rather than the prediction and uncertainty of an event happening, and that it is not the issue of risk or incident management that is key but one of behaviour management. The main aim of the study is ascertaining how human behaviour contributes to failure, more than management structures and strategies. The context of investigation and inquiry is marine oil spills, chosen for four reasons. Firstly it formed the early basis of personal inquiry into oil spill incident management (Navare, 1996). Secondly, the nature of the incident is such that it can gravitate from a no loss situation to one that has the propensity to provoke social outcry with severe consequences on all parties involved in mitigating the spill damage. Oil spills being considered a low probability risk begs the question as to the reason for so much legislation, compliance and preparedness. The answer lies in the complex mix of socio/political and economic factors that underlie the motivations for risk management practices and behaviour. Thirdly, the context of spill is open to a wide number of uncertainties, which call for human action and interaction. Finally the incident when it happens invokes public policy and involves numerous disparate groups in a collective action. It provides a rich context to explore and observe the interactions and behaviour in incident management, fuelling the epistemological considerations surrounding behaviour and behaviour management. The study is developed by way of building blocks giving the reader understanding of the concepts, context and practice of risk and incident management in an incremental fashion.

Chapter two explores the extent to which risk is definable and how distinguishable it is from the concept of uncertainty. The exploration demonstrates that risk in conceptual terms is difficult to define. As new paradigms of risk are considered it becomes even more difficult to generalise about what is risk. However, what is demonstrated is that the context of risk is as real as people

perceive it. What is also real is that perceptions can appear irrational (albeit not based on facts) yet, where a perception of risk is strongly held by the public, it can, however irrational it might seem, motivate authorities and organisations, rightly or wrongly, to take action. Social outrage has been significant in influencing governments and organisations to act and be accountable for their actions. Examples such as the Shell Brent Spar incident and oil spill incidents demonstrate that organisations have in such situations borne not only significant economic loss but social and political loss, even though their actions have been based on rational, seemingly correct and responsible, practices. Risk here is clearly the implications of the wrath of the public. Glimpses are taken of the corporatist and risk management strategies of organisations in their attempt to reduce social and political repercussions. What unfolds is the paradox that organisations face between being socially responsible while remaining economically viable. In effect this socio/economic tension has been seen to cause failure. Shrivastava's (1992) case study of the Bhopal Incident is one such case history where the mismanagement of public perception exacerbated the disaster. However there is more to risk than public's perception of it, as public perception can appear irrational and incorrect. Therefore it might be argued that the consideration of what in the sense appears to be biased or skewed viewpoints of risk is a form of failure in itself. Yet not to consider such viewpoints can result in even more disastrous outcomes in economic and socio/political terms. Chapter two develops our understanding of how behaviour is critical in the management of various factors that cluster to make up the risk. There are four fundamental aspects that secure the understanding and inform the reader of the multi-dimensionality of a risk state and of behaviour as the critical factor.

The study explores the work undertaken by Knight (1921), Keynes (1936) and others in identifying distinctions between the concepts of risk and uncertainty. Two critical observations are made. Firstly, it is difficult to disassociate the two concepts totally and what constitutes risk is not easy to establish, making it tricky to define risk. However, from the exploration a definition of risk is developed with the intention that it is not conclusive but that it enables further exploration into its development, and that it creates some base aspect from which developing epistemology and *a posteriori* knowledge is grounded. Secondly, behaviour becomes suddenly important when we start looking at the distinction between the two concepts. The existence of both predictable and unpredictable situations establishes that we cannot plan for all

events and for this reason alone, we need to develop the ability and behaviour of people functionally involved in managing events planned and unplanned.

How perceptions affect the strategies in handling risk is considered to inform the reader that determinable values of risk can be changed and even negated purely by reason of collective perception, irrespective of where they are grounded in rational explanations. Therefore, formal structures that are not geared to adapting to changing values need the help of the human factor in bringing about the adaptation and action. This is to ensure that the outcomes, however disastrous in terms of economic loss, human loss and injury and property damage are enhanced, in terms of trust and social acceptance. In effect although a risk-event might have happened, the "pooling together" of all parties has some effect on riskiness.

The study examines the implications of risk factors on risk management systems and in doing so considers what brings about systems failure. The study moves on to investigate failure in safety management systems, and particularly the work of the high reliability group, to identify whether established causes of failure considered by the group have their roots in perception and behaviour. What constitutes safe and the extent to which perceptions of safety can lead to behaviour that negates policy versions of safety resulting in failure is considered.

Particular attention is given to the implications of cultural dynamics and other variables (such as time for response, inter-group relationships, vulnerability of the situation, experience of group members and risk perception) on systems and how these variables can bring about failure irrespective of strong structural framework for operation.

The study now attempts to link the cause factors to the context of oil spills. The context flags up perception shifts both in aspects of what constitutes the risk of oil spill and in the function of oil spill management. In the former case the shift is from the one-dimensional perception of risk in probability terms to that of a multi-dimensional perception involving both human, logistical and technical factors. The functional aspect highlights the shift from process-based operation to competence-based operations. Both these aspects appear grounded in behavioural rather than functional assumptions.

Public policy is key to the sustained motivation to risk managing spills, driven by public and interest group concerns for greater accountability of action. The study is about sequence, flow process, vulnerability of the situation (Weick, 2001:x) and interactions between experts, with different experience and culture converging to mitigate a crisis. It is less to do with structural

frameworks and allocated roles and more do with social relations operating collectively. Finally it is considered that it is more than the subject matter of the risk that creates the risk; in fact risk is the actual action taken by persons in managing the subject matter of risk. However, it becomes more complex when we start to look at behaviour that stems not only from organisational policies but also from a number of organisations operating jointly and severally in risk managing oil spills. The national contingency plan (NCP) for oil spill management requires organisations, disparate by function and culture, to converge their behaviour in mitigating the spill. On the face of it actions taken by organisations set their rationale on the collective objective which is to mitigate the spill damage. However, observations of process show that sub-groupings occur and action is taken to protect the group's area of interest. As a result, underlying motivations and choices taken in action may be different from what is observed. In other words what is seen is not what is really happening. To understand better there is a need to go inside the collective to observe whether tensions in behaviour affect riskiness and risk management. **Chapter three** considers the implication of public policy on risk management. Demanding compliance may not necessarily prevent failure. It may alert organisations to better preparedness. Failure can result from minimum compliance (Abecassis and Jarashow, 1985). It becomes important to question the extent to which risk management procedures view human behaviour, rather than procedure, as a factor influencing outcome. Procedures are limited; what is predictable in one set of conditions may not necessarily hold in another set of conditions. Required behaviour is therefore more than procedural conduct requiring an ability to flex procedures to meet the dynamic conditions of the situation. The phenomenon of incident therefore requires the observation and understanding of what brings about a change in conditions; behaviour and the flexing of procedures during an incident that could result in the success or failure of management. As Schein (1971:23) puts it, "*the essence of management is to understand the forces acting in a situation and to gain control over*". Oil spill risk management has meant greater emphasis on the efficacy of contingency plans to deal with a spill incident. The stated purpose of the UK NCP 2000 [i] "*is to ensure there is a timely, measured and effective response to (oil spill) incidents*". The NCP makes it imperative for Ports, Harbours and Oil Handling facilities to submit their risk management plans to the government lead body for marine oil spills, the Maritime and Coastguard Agency (MCA). Local Authorities (LAs) (by special power, albeit currently contested), have under the Local Government Act 1972 "*to act with respect to emergencies or disasters*" and to submit risk plans.

Despite significant investment in plans and preparedness (Frend, 1998: 34) this has not stopped incidents and consequentially social outrage. Public policy as a value concept is grounded in social theory based on what society wants done in the case of a risk-event with focus on the management of the event. Having procedures in place is one aspect of manifesting effectiveness of handling the expected; the other is the handling of the unexpected. So for example at the time of writing the great New York disaster had taken place. Public policy was clearly invoked; however, what caught the eye of the public was the handling of the rescue mission in difficult conditions. No plan, however, can foresee all eventualities. Public policy in risk and incident management is determinable as effective on the basis where in being prescriptive it is not preventing adaptability in dynamic circumstances. To do so would be like paying more attention to a screw-joint than to the screw itself. Chapter three therefore reviews the *Braer* case to understand failure points in operations. **Chapters four to eight** attend to the build up the *a posteriori* knowledge by way of investigations into the underlying motivations of organisations and the tensions that these motivations create for the collective operation and management. Interviews with each involved organisation and participation in spill management exercises provide the fodder to reflect on the latent aspects of failure.

In conclusion, the study explores the effects of behaviour (human action and interactions) on risk and incident management in the context of a large-scale oil spill incident. The study approach therefore entails an exploration of conceptual perspectives on what constitutes risk so as to determine what constitutes failure and contextual variables that impact the management of a tanker oil spill incident to reveal what really goes on behind the scenes during the event. The methodological approach is a qualitative construction of issues undertaken in three parts. First: the exploration of the concept of risk, system and failure, which seeks to build the epistemological assumptions underpinning the definitions of risk. Second: the incident management system issues are explored by reviewing research on safety management theories and particularly the work of the high reliability group, together with investigations of the theories of collective actions and examining post-incident reports and public policy procedures. Examination of other incident process models and that of the *Braer* case are used to build an oil spill phase model demonstrating the areas where failure occurs. Third: from idiographs the conclusion is derived that the risk is one of ineffective behaviour in managing the risk and risk-event.

PART ONE: CONCEPTS IN CONTEXT

CHAPTER TWO: RISK AND RISK MANAGEMENT CONCEPTS IN CONTEXT

INTRODUCTION

The aim of this chapter is to establish that human behaviour is a critical factor in the determination of what constitutes risk and in the process of managing the risk so determined (risk management) and the risk-event (incident management). It becomes clear in the chapter that the more the definitions of risk are considered the more difficult it is to define it. In effect these definitions build up to the fact that risk is a multi-levelled, multi-dimensional concept. What is risk varies from person to person and situation to situation. At best risk becomes conceptually definable in the context to which the concept is addressed. For example a gambler sees risk as a probability of loss, while an organisation might define risk as a socio/economic failure. Fischhoff *et al.* (1989:158) observed that misunderstandings between persons arose from inconsistent definitions of risk resulting in different actions.

The chapter is split into four sections. The first section of the chapter begins by exploring the definitions of risk and how the definitions have changed to embrace the human factor. Particular focus is given to how the concept of risk is differentiated from the concept of uncertainty, taking into account the thinking of Knight (1921) and Keynes (1936). The distinction between the two would indicate that risk is all about predictable values. It becomes somewhat of a moot point that if it is possible to predict a risk-event, then it is possible to prevent the event from happening. Yet clearly this is not possible. Another dimension to viewing risk is that of the public perception of risk and its significant implications for risk determination. By reason of the interplay between public and expert perceptions of risk, organisations susceptible to risk have had to develop strategies taking account of the changing public ideology. These strategies have also implications for risk determination. For example, an organisation might increase its capital outlay to invest in safety systems; doing so might make the company less socially risky but may increase its economic risk. Some level of tradeoff is critical to ensure that the bottom line riskiness is lessened. Reflections are made as to how organisations seek to trade off high riskiness for lower riskiness. Therefore what constitutes risk management in the context that risk cannot be

determined in totality, is a mix between being prepared for what is predictable and being alive to what is not predictable.

The second section of this chapter gives attention to the make-up of risk factors and behaviour implications in the management of safety systems. The approaches to high reliability operations have developed new explanations in understanding the "incubation" factors of risk and of the supporting strategies in preventing manifestation of risk. What also is observed is that failure occurs not because of the inability to predict outcome but because of the ineffective culture in safety and risk management.

The third section considers the impact of culture, time and relationships in system and risk management It demonstrates that these variables are mutually dependent; failure is prevented where culture is risk responsive, time is used towards developing risk responsive cultures and relationships are formed which bring about greater collaboration and sharing of knowledge and experience. Therefore, where the level of preparedness is low but the relationship between groups is high, this could reduce the probability of failure and *vice versa.*

The final section of this chapter considers causes of failure and how accumulation of failure factors can develop during the management of marine oil spills. The chapter concludes that the concept of risk is a complex issue due to the existence of multiple perspectives making it difficult to establish a single definition. However, having said this, the study suggests a definition that risk is that of failure arising, and the failure is human failure that result in some event that causes damage, loss or injury. Therefore, to ignore the implications of behaviour of experts, technicians, management and the public at large is to ignore a critical factor in the make–up of risk and in turn to subject risk managers to an even greater risk than might have been predicted. Managing risk situations, therefore, involves is a set of actions which ensure that a potentially hazardous event does not happen but if it does, that actions taken reflect the capability of mitigating the serious consequences. In effect risk and incident management are two parts of the same coin. It is not sufficient only to manage the conditions where risk might exist but critical to manage the conditions when the failure begins to manifest.

2.1. SECTION ONE: RISK AND RISK MANAGEMENT CONCEPTS

2.1.1. EXPLORING THE DEFINITIONS OF RISK

Ansell and Wharton (1992: preface) noted that "*neither man nor organizations and societies to which he belongs can survive for very long without taking risks.*" Ansell and Wharton see risk as a central order of human existence and survival. Risk is determinable as a human condition. We live with risk and we cannot live without risk. Yet what is this condition that makes it so imperative to humans and society. The term risk is associated with some danger, slight or serious, for example, the risk of an accident, a plane crash, war or contracting an illness and so forth. Awareness of its existence implies that there is a need for developing sets of behaviour, for example, implementing the green cross code for crossing roads, imposing speed limits, training for airline pilots, developing martialists, effective dietary and healthy living. The awareness of danger therefore brings about a change in behaviour. Richie and Marshall (1993:1) observed that, without risks, there would be no learning opportunity "*to gain information on how to avoid or reduce the threat of the unwanted consequence*". However, the concept of danger of some sort is only what is known and of what is known of the possible consequence. We note an accident as a risk and that the consequence could be death with financial loss for the family. These are known quantities, the uncertainty lying in the timing of the event if it should ever occur. However there is unease that risk is more than what is unknown. Approaches to risk have had little success in identifying the uncertainty. The traditional approaches based their risk determination on probability theory founded by Jacques Bernoulli (1654 –1705[ii]). Critically the attempt was to measure the chance or size, or both, of an outcome. Definitions were in the main supportive of this. "Probability of occurrence" was the focus. However, this was one side of the continuum, the other that began to emerge in the definitions was the outcome. Lowrance (1976) put risk as "*a measure of the probability and severity of adverse effects*". Vlek and Stallen (1981: 233-271) defined risk as "*the expected value of the distribution of all possible consequences*". Rowe (1977) gave explanation to risk being failure: "*the potential for unwanted negative consequences of an event or activity*". Rescher (1983) too considered risk in terms of "*chance of a negative outcome*". Risk was therefore seen to be twofold; the probability of something happening (probability of occurrence) and the consequences from that happening (failure). Therefore to synonymise probability to risk would make the definition insufficient. Probability adheres to the

prescription that risk occurrence has predictable values. The shift from probability to predictability provides some level of concrete values for risk determination. However, despite high level of predictability, elements of uncertainty still exist. Hertz and Thomas (1983:3) saw risk, albeit uncertainty, as "*a lack of predictability.....*". Williams, Smith and Young (1998:4) defined risk as the potential variation in outcomes, signifying uncertainty of prediction. .

Two prominent thinkers, Knight (1921) and Keynes (1936) considered the concept of uncertainty and its relation to risk. Keynes (*op. cit.:* 148) attempted to distinguish probability from uncertainty. In his "*Treatise on Probability*" he emphasised that by *"very uncertain*" he did not mean *"very improbable "*. Improbability assumes knowledge of the facts on which decisions are based while uncertainty indicates that there are fewer or ineffective facts on which a decision may be based. It is interesting that Keynes found that the much of the ability to manage uncertainty was dependent on behaviour. He suggested that risk taking depended on the ability "*to be confident*" in making decisions about future outcome. He felt that the economists' tendency to consider risk in terms of *a priori* probability distributions to describe possible outcomes was not enough. The need to *observe* market and business psychology was important in forecasting and in reducing uncertainty. It is interesting that in the context of high reliability operations, Turner (1978), Gephart (1984) and Sagan (1993) make the point of the need to have not only foresight but also hindsight to establish areas of uncertainty and loss (see 2.2.1.1.).

Earlier Knight (*op. cit.*: 19-20) had attempted to clarify the distinction between what constitutes uncertainty and what is risk. Knight is generally seen to be prime mover in the disassociation of the two terms He explained that uncertainty was "*distinct from the familiar notion of risk, from which it has never been properly separated".* Risk, he suggested, *" means in some cases a quality susceptible to measurement, while at other times it is something distinctly not of this character; and there are far reaching and crucial differences in the bearings of the phenomenon depending on which of the two is really present and operating*".". He stated that measurable uncertainty was what constituted risk and was not in effect uncertainty at all. It may be possible to predict the frequency of risk occurrence. Yet there is no guarantee that the occurrence is likely to materialise on the basis of the predicted values. He attempted to categorise the distinction between the two terms. Risks were that which could be derived by calculating the probability of

occurrence, either on a rational, *a priori* basis or by way of statistical analysis. However, empirical evaluation, although establishing some level of predictability, had limitations as there was no accurate measure that all factors are taken into account and that it may not be able to "*eliminate all factors not really indeterminate*" (Knight *op. cit.:* 225). At best, it was suggested that risk determination would consist of *a priori* truths ignoring *a posteriori* knowledge. Therefore the concepts of risk and uncertainty become inter-definable. Uncertainty, however, is difficult to value. Knight stated that uncertainty exists where analysis is impossible by the fact that events are either "one-off" or where the occurrence does not follow an apparent pattern (pg. 225). This calls for *a posteriori* investigations. This distinction between risk and uncertainty by Knight and Knight showed that the precise meaning of probability and predictable values were not easy notions to define necessitating clarification. For example, insurer risk does not always have regard to the measurability and predictability. The probability of a pianist losing the use of her fingers or the cancellation of a football match because of rain blurs the distinction between uncertainty and risk. These insurer decisions are based on judgements, which may not be easily validated but subject to the level of acceptability or confidence in judgement. This goes back to Knight's third aspect of probability, which is "*estimates or judgements*" and that of Keynes's thinking that uncertainty reduction is as much about behaviour as it is about prediction or measurable values. Measurability itself raises other issues, as not every risk aspect is measurable. It is arguable that the probability of death of select lives for insurance may be more measurable than the probability of finding intelligent life on other planets. The distinction between risk and uncertainty is therefore one of degree. Both predictability and uncertainty vary by degrees. To use risk and uncertainty interchangeably overlooks the existence of multi-levels.

Multi-levelling can arise by way the subject matter of the risk is classified. Ansell and Wharton (*op. cit.*) classify risk at a personal level where a risk carries personal gain or loss and at a general public level that arises from natural and manmade catastrophes. Richie and Marshall (*op. cit.*: 114) split risk by organisational experience, such as market risk, financing risk, resource management risk and environmental risk. Bannister and Bawcutt (cited in Gordon,1987: 10) split risks into commercial and insurable risks, with all commercial risks not being insurable. In insurance theory risks are split into four categories: pure, speculative, fundamental and particular. Pure risk is where outcomes leave the person in the same position as before the risk-

event took place. These are deemed insurable risks (Karten, 1997:516). Speculative or gambling risk is the chance of gain or loss and not insurable as these are non-measurable, uncertain and hence uncontrollable. Fundamental risks are risks that fall outside the control of the risk taker (generally natural hazards). The effects generally have implications for the greater public. Finally, particular risks are those that are more personal in their cause and effect (Diacon and Carter (1992:4-5). Multi-classification of risks creates the difficulty of picturing the total risk for an organisation. Insurance has to an extent helped in pooling and segregating risks for effective management of the risk. The development of property, marine, life, health, motor, employers insurances converge to the usage of the same definition of risk: that of financial loss resulting from loss damage or injury to the insured person or property and to third party property. However, insurance risk theory as with probability theory considers risk in pecuniary loss terms ignoring aspects of social and political risk.

One further risk theory needs to be taken into account and that is tradeoff theory. Tradeoff theory is based on the utility value between gains received now for gains sacrificed at a later date (Varian, 1990: 216). For example, insurers accept a small premium now to cover the claims likely to arise, or, a roulette player may gamble now for potential gains even though the odds indicate otherwise (von Neumann and Morgenstern, 1947). Therefore what is seen is that people's behaviour towards a risk may not be based on the level of uncertainty but more on their expectation of tradeoff (Baumol, 1965). Insurer risk taking is a prime example of such behaviour. The tradeoff theory, however, becomes more fluid a concept when attempting to relate it to the management of the risk and its materialisation into an incident as predictability of outcomes is difficult to measure. Unpredictable situations arise during incidents that could make risk outcomes greater or lesser than predicted with no gain for any party, unless it is argued that newspapers stand to gain from selling a good story. Although media distraction is generally predictable in high visibility incidents, the extent of their interference is difficult to predict and can increase uncertainty. It was recalled in the post-*Zeebrugge*[iii] disaster, "*the....nursing teams were seriously hindered in their work by the great number of press personnel pushing them aside and trying to break through. The flashguns from their cameras made such vital procedures as intubation and pupil control difficult*" (Hodgkinson and Stewart, 1991: 78-80) It is seen despite processes perhaps being well in hand; behaviour remains unpredictable and hence true (non-predictable) uncertainty exists. Unpredictable uncertainty becomes particularly an important

issue for management (Wohlsetter, 1962: 401) but remains difficult to predict. The study therefore takes the definition of risk to include both "economic and social uncertainty (both predictable and unpredictable) arising from an occurrence of loss or failure". Risk management is therefore considered to lie in the continuum between effective risk prediction (for predictable uncertainties) and effective incident management (for unpredictable uncertainties).

The existence of different experiences of risk further adds to the uncertainty. What is also seen is that risk determination and risk taking pre-occurrence is different from risk determination and risk taking post-occurrence. Risk perception can change as the environment changes. The management at a point of crisis could magnify or reduce perception of riskiness. It begs the question as to whether the definition of crisis can be embedded in the definition of risk. Crisis may be definable as risk that has materialised and in doing so creates new points of risk. A crisis on its happening does not automatically negate unpredictability; in effect it creates new unpredictable situations as described above in the *Zeebrugge* incident. The word crisis stems from the Greek word "Krisis" originating in the medical field, indicating a turning point, a vitally important or decisive stage; a time of trouble, or danger. Shrivastava (*op. cit.:* 5) puts it that a "*crisis in social systems refers to situations that threaten the existing form and structure of the system*". Risk, it can be argued is the countervailing effect to a crisis. For example, the risk of maintaining the excess on an insurance policy is worth taking to prevent the financial crisis arising from an incident. It then becomes questionable as to whether it is worthwhile to maintain some level of risk to prevent a crisis. With regard to man-made crisis, the countervailing effect would be the risk cost of investment in safety against the manifestation of crisis. The tradeoff becomes particularly critical when the probability of occurrence is low, requiring risk decisions that may create rather than prevent a crisis; for example, deciding whether to renew equipment regularly for a less frequently occurring risk than for one that occurs more frequently. In summary, Knight (1921) provided the classical definition of risk, seeing risk as a form of measurable as opposed to unmeasurable uncertainty. Most approaches consider probability theory in attempting to determine risk, being based mainly upon predictability of occurrence rather than the predictability of outcome with risk identifiable in terms of economic loss. While it is accepted that traditional risk theorists are not necessarily united in their acceptance of probability as a base notion, there is little doubt about their acceptance that risk is that which is

measurable or ought to be measurable whether the consequences are negative or positive. This observation brings the study to the point where the incorporation of subjective values in risk definition is considered.

2.1.1.1. Subjective values in risk definition

Despite shifts in thinking within the traditional approaches, the assumptions about risk and uncertainty based on scientific, objective rationalism have remained largely unchanged. The problem here is that in accepting these approaches, any attempt at defining risk would subscribe to a definition that risk is objectively defined, ignoring subjective involvement. Knight did attempt to take subjectiveness into consideration in attempting to separate measurable uncertainty from unmeasurable uncertainty. Yet it only touched the surface in the explanation of social and behavioural influences on risk. There have been significant contributions made by risk theorists of the importance of social and behavioural aspects in risk determination. The early concept of "subjective probabilities" set the wheels in motion of considering human judgement, a non-quantifiable element, in risk determination. Kahneman and Tversky (1972: 430) observed that "*the decisions we make, the conclusions we reach and the explanations we offer are usually based on our judgements of the likelihood of uncertain events...*". Their research added the dimension of "*judgmental probability*" to probability theory. They surmised that it was likely that people did not follow the principles of probability on judging the likelihood of uncertain events and that such subjectivity was difficult to eliminate. This is not a far cry from the thinking of Knight and Keynes. Feller (1968) noted that the intensive bombing of London during the Second World War was not random as initially thought, but that evidence demonstrated that there was a tendency to bomb some areas of London several times while others areas were untouched. Lichtenstein *et al.* (1978:555-578) did some experiments in determining subjective probability and discovered that low risks were overestimated while high risks were underestimated. Subjectivity, therefore, created a distortion in the concept of risk, opening up a new mindset in viewing risk. As disasters were on the increase, risk studies in incident management too were considering human behaviour. Blumer (1962, 1969), Goffman (1969)[iv], and Mead (1934:152-164) considered human behaviour in social interaction, developing theories of symbolic interactionism. Other risk approaches included that of collective and co-action (Savoyant, 1984; Leplat, 1991), social and anthropological approaches (Turner, 1978; and

Douglas, 1994) cultural (Turner, 1978; Uttal, 1983), political and management (Rasmussen, 1979, 1982a, 1983; Shrivastava, 1992), techno-socio relationships (Perrow, 1984; Rouse, 1984); perception theory (Slovic *et al.,* 1977) and so forth.

The interest in human behaviour as part of risk theory gained momentum. Risk in its definition took on vocabulary that focused more on behaviour than on probability. Jackson and Carter (1992) saw "*Risk* (as mainly) *a human problem*". Kogan and Wallach (1967: 111, 278) considered human behaviour in risk acceptability theories. Perusse (1980) in his thesis on the recognition of danger talked of danger (risk) in terms of "*human intervention*". Smith, K (1992: *ibid.*) offers that risk is the actual exposure of something of human value happening. The seeming correlation of human behaviour to a particular risk environment is significant to risk outcome, shifting onus from risk arising from physical factors to risk being subject to human control or agency. Douglas (1994), Perrow (1984) and Shrader-Frachette (1991) felt that those key social contributing factors such as human behaviour, politics and social issues were excluded from the traditional paradigms of risk. Beck (1988), White (1974), Giddens (1990), Beck (1992), Irwin, 1997:219), all considered risk issues to be more in the domain of social sciences and now seen to be firmly lodged in this domain (Hood and Jones, 1996:xi). Studies have already shown that human behaviour can bring about failure. This study's interest lies in identifying how behaviour factors and conditions conceptually and contextually interrelate with technical issues to create risk resulting in failure. Section 2.1 on safety management seeks to consider this in the context of collective management structures. Risk determination itself is not enough to prevent failure and it is believed in this study that it is the interrelationship between behaviour and technical controls that brings about failure. While there emerges a new direction in the definition of risk, the appreciation of new ways of understanding the constitution of risk is not intended to result in a polished new definition of risk but is perhaps a step in widening the boundaries of risk definition. The traditional approaches as seen have been concerned primarily with the psychology of choice or risk taking with the normative question being how risk is measurable. However the psychology of risk management reflects itself on the more defining question of how risk is perceived and how this perception affects choice in risk determination and management. The definition of perception as determined by Buchanan and Huczynski (1991) is "*the active psychological process in which stimuli are selected and organized into meaningful patterns*". Perception of

risk according to Brehmer (1987) is somewhat of a misnomer, as he puts it " *we do not perceive risk but perceive various features of decision and problems and this, in turn leads to feelings of risk*". Brehmer suggests, as a result, that it becomes impossible to establish "*correct perception*" and at best it might be possible to compare intuitive risk estimates. Risk is also perceived in the way it is talked about (McGill, 1987:52), and thought about (McGregor, 1991). However if it accepted that perception arises from the acquisition of some level of knowledge arising from one's own or other people's experience of the situation, then the focus lies in human psychology. Psychology here involves how people perceive risks and how they react to the risks based on their perception. Two apparent forms of risk perceptions exist. The first is perception in the risk choice taken by experts and other is the public perception of the risk. Although both perceptions impact outcomes, public perception appears to frames the risk choice of the expert more than probability values. When such framing influences decision choices and the resultant behaviour in managing the risk, the risk definition cannot remain isolated within the domains of probability of risk occurrence but needs to adopt in the definition the anticipated level of public perception. To ignore this aspect, the study suggests, would mean misunderstanding what constitutes risk and creating an ineffectual risk management strategy. TABLE A below summarises the approaches contributing to the changing definitions of risk.

TABLE A: Changing definitions of risk

Risk in terms of probability of failure ---------	Risk disassociated from uncertainty > ---------	From probability to predictability – development of tradeoff theory and game theory > ----------	Subjectiveness in risk. Risk still seen in quantitative terms > ------ >	Risk as a multi-dimensional concept – the commencement of the sociological perspective ----------	Risk as human failure >
Bernoulli, Rowe, Lowrance , Vlek and Stallen, Rescher	Keynes and Knight	Von Neumann and Morgenstern, Hertz and Thomas, Williams *et al.*, Varian	Kahneman and Tversky, Slovic *et al.* , Lowrance, Singleton, Otway, Rasmussen	Lukes, Glendon, Leplat, Rasmussen. Perrow, Fischoff *et al.*, Richie and Marshall, Diacon and Carter	Turner, high reliability group

2.1.2. PUBLIC PERCEPTION AND IMPLICATIONS FOR THE DEFINITION OF RISK

The growing change in social ideology as observed by Dunlap (1997) has been a ***"dramatic increase in societal salience of environmental issues"*. Ward (1983) put it, the growth in the** environmental ideology set into motion the ideology of man with nature and "*the rights of future generations and the ecosphere, individual development and freedom, non material well being and community*" (Dunlap and Van Lierr, 1978). This changing social ideology has meant that

interest in public perception has shifted from being a pure philosophical debate as to how it develops, towards the thinking that it is a significant factor in the influencing of social behaviour and action. It is now seen more so as a significant aspect within the study of social sciences, as a critical factor of influence in the development of social behaviour and action. Evidence has shown that the force of perception can change decisions and actions based on rational foundation to those based on seemingly irrational foundations. This has raised a number of fundamental questions concerning the viability and reliability of decision-making systems, as well as wider issues concerning the causes for the amplification of public perception and the management of these causes. Core to these questions is the question of how achievable it is to measure the impact of public perceptions on risk management so as to manage it. Measuring an intangible and mutating factor such as perceptions is difficult for a number of reasons. Firstly, distinct knowledge of its source is not easy to establish. Is the source the media, or personal experience, or experience of other (fear spreaders) or all or none of these? Secondly, there is no certainty that public perception will amplify. It is interesting to observe that not all, major incidents result in high level of public interest. For example, in the case of tanker oil spills perceptions of the incident appear to be based upon the level of damage to wildlife and flora and fauna. It was observed that, media was influential in downgrading the 1992 *Braer* disaster when it realised that not sufficient damage had occurred and that only few birds were affected (Griggs, 1995). Thirdly, studies on public perception have found that it is difficult to establish any one set of methodological parameters for measurement (Glendon, 1987; Perusse, 1980). One public outcry may result in immediate action taken while another might diffuse as immediately as it started. For example, the Brent Spar incident induced wild-cat boycotts of Shell products amplifying public perception that Shell was not being socially responsible as an organisation, while an IRA attack in London, raised more debate than demands for immediate action, despite interestingly, having more direct impact on people. The impact of public perception is more retrospective, that is, after the risk materialises, and more reactionary than in the proactive determination of risk. As a result what occurs is a crisis, in the sense that public perceived an incident not as an accident but as a failure by those in control to have prevented this. The limelight becomes firmly lodged on how the failure is managed, such as, how the heads of state reacted to the 11th September crisis in the United States. The impact of management action is can be both economic and socio/political, for example, a loss of confidence in the management or loss of votes.

Measurement of socio/political impact, which may or may not have economic outcomes, may be difficult to gauge in advance. Furthermore, public view of a risk has been known to be incongruous to the risk probability of that risk (Brehmer, 1987) and perceived as irrational. For example a motor accident risk, statistically, is greater than a train accident risk, yet public view has known to be the reverse (Lichtenstein *et al.*, 1978). As seen with hazard insurance, there is generally less call for catastrophe cover (unless a legal requirement), before the event, even when the probability of occurrence, within an insurance year, is high. People react to the environment and not necessarily to what is statistically ascertained. Studies observing the phenomena have suggested that some of the reasons for the difference in perceptions between public and experts may be due to; ignorance of the risk (Groth, 1990), the level of visibility of event (Slovic *et al.*, 1977). For example, some of the world's biggest oil spills[v] are not remembered, as the impact was not visible to the public eye. Other reasons include the way risk information is communicated (Combs and Slovic, 1979), dread factor in the risk materialising (Vlek and Stallen, 1981), memory of the disastrous risk-event (Tversky and Kahneman, 1973), among others. Whether these and other reasons spiral public outcry, it is clear that public's perception impacts riskiness as it forces actions, which may not be grounded in rational decisions. It, therefore, becomes particularly important to consider the potential impacts of public's reaction in determining risk management strategy. However, the problem arises where risk management is based on probability assumptions while public's perception of risk may be based on non-measurable factors. This incongruity creates tensions in developing effective risk management plans, systems and a culture that is geared to deal with crisis.

2.1.2.1. Perception and probability

There is much evidence to show that people are poor judges of probability. These perceptions as Slovic *et al.* (1982) point out "*lead to large and persistent biases*" which in turn lead to distortions "*beyond the large and persistent biases*" (Lane, 1991:113). Slovic *et al.* believed that these biases have serious implications for managing hazards. For example, their investigations revealed the disastrous outcomes arising out of the asbestosis outcry in New York where public perceived the asbestosis risk in public schools to be higher than it actually was. This resulted in New York City spending over $80 million for the removal of asbestosis from public schools. The risk of harm, discovered retrospectively, was negligible and with a low probability of affectation,

yet the outcomes were calculable as disastrous based purely on the perception bias of the public. In the aftermath of the demise of the World Trade Centre on September 11th 2001, investigations revealed that if asbestosis cladding around the steel beams of the twin towers had not been removed in accordance to new health and safety regulations, the towers might have stood for up to four hours more after impact.[vi] (The Times, September 18th, 2001). Public perception overtly in the former and covertly in the latter seemingly contributed to a shift from *a risk probability of occurrence*, an occurrence with a potential of some harm, to the *risk possibility of disaster,* an occurrence, irrespective of its probability, that has the potential to cause great societal distress.

There is also a shift from public general perception to one that results in outcry and demands for action and accountability are called for. McGregor (1991: 315-324) cited the link between people's fear of uncertainty about a future event and their perception of the risk of that event and therefore on occurrence of the event; the outcome, he felt, could arouse fierce anger, indignation or outrage. There appears also a tendency towards greater outrage if the cause is man created (TABLE B, APPENDIX A) Some such examples can be seen in cases such as, the *Titanic* (1912), *Challenger Space Shuttle* (1986), *Exxon Valdez* (1989) and the UK Paddington rail incident (1999). Turner (1978) questioned "*how a situation could come about in which reasonable men [sic], attempting to behave rationally, could still be in error*". Later Turner and Pidgeon (1997) considered that it was inappropriate to designate many of the accidents to so called "*Acts of God*" when they appeared to lend themselves to human and managerial causes.

TABLE B (APPENDIX A) adapted from Groth (1990) identifies the oil spill risk characteristics that lend themselves to low or high public "outrage". Slovic *et al.* (1991: 683-696) among others identified that there is high potential for public outrage where it has had less direct control over the risk. Hammitt (1990) observed that people tended to perceive risk as low if there was no hue and cry on the subject. In other words the media and interest groups did not view a problem existed. Hammitt stated that people believed that if there were real risks the government would have taken early action to protect them. This was seen in the recent UK airing on genetically modified food products – people were content to buy these goods until the issue received publicity and anti-GM Foods interest groups took up the cause. Another example of interest-group influence is that of Greenpeace's momentum against Shell Corporation during their

attempt to dismantle the Brent Spar oilrig. Greenpeace believed that there was significant oil still left in the tanks and did not want the dismantling to be done in the sea as it would affect the marine environment. In effect, the oil was determined to be inadequate and non-toxic to marine life. Despite the fact that Greenpeace had perceived the situation wrongly, this did not stop Shell's financial exposure from escalating. Shell put the cost of dismantling the Brent Spar onshore at some £45 million ($71 million) against up to £12 million ($19 million) for deep-sea dumping. The figure excluded the costs of non-usage of Shell products due to the resultant consumer boycotts of Shell products albeit, based on false assumptions. For Shell this was an economic and socio/political disaster, despite the hazard being inconsequential with little or no risk of oil pollution. Public perception is therefore seen as a direct cause of damage and a catalyst to factors leading up to disaster. Where the public view actions as highly risky, this can provoke adverse publicity and demands for punishment (Remer, 1933) or sanctions (Horlick-Jones *et al.*, 1991), increasing both economic and social risk such as loss of business and goodwill. The problem with public perception and resultant outrage is that not only does perception impact on the end value cost, it defies all rules of probability and hence remains difficult to manage. Herrstein (1988a: 1) observed that defects in perceived values affected people's actual rationality. The fact that the public perceives conversely what has been considered by the scientists and engineers to be a low probability risk blurs the distinction between what is statistically predictable and what actually arises. Slovic *et al.'s* (1982) study mentioned above called attention to the fact that "*scientists and policy makers who point out gambles involved in societal decisions are often resented for the anxiety they provoke*". This was seen in the case of the "Mad Cow Disease (BSE[vii])" outbreak in Britain. The public was generally unhappy with the scientists' ruling that there was an over 95% certainty that beef would not result in Creutzfeldt-Jakob Disease (CJD)[viii]. Most people were looking for a 100% clean bill of health indicating that the perceived risk was higher amongst the people than amongst the scientists. Thus, public reaction can be significant in heightening or reducing the incident outcomes thus increasing or decreasing the perception of what constitutes risk. As a result of this growing momentum in social ideology, public perception of risk has become has become a critical factor for consideration by organisations in managing their overall risk and in limiting the distortions in biases. Post-event development of socially responsible policies and legislation also has implications for organisations and increased risk as there is the cost of compliance together with the fact that

legislative dictates have not always addressed the fundamental problems of managing the risk (Elliot, Frosdick and Smith, 1999). Craig Smith (1990) observes in his book "*Morality and the Market: consumer pressure for corporate accountability*" the growing shift toward social control of business. Media and pressure groups have also shown an increase in their dominance in demanding accountability, transparency and a demonstration of sustainability (Hutchinson, 1992). There appear two key risk strategies, which impact the risk definition: corporatism (risk management in partnership) and organisational risk management. Corporatism has sought to tradeoff the socio/political and economic risk by entering partnership for the potential reduction of organisational risk while organisational risk management has sought to increase short-term risk by increasing risk management costs to reduce the potentially disastrous risk outcomes.

2.1.3. RISK STRATEGIES AND IMPLICATIONS FOR THE DEFINITION OF RISK

2.1.3.1. Corporatism

Corporatism is a political system in which economic and social policy is made through agreements between business associations and government to the extent that such an association brings about some convergence of values in decision-making and risk management. Schmitter (1981) defines corporatism "*as a mode of policy formation in which formally designated interest associations are incorporated within the process of authoritative decision-making and implementation*". For example, oil companies have corporatist links with government and chosen governmental environmental and social organisations, and by this structure become a "*veto elitist group*" (Lindblom, 1977) where power is concentrated in the business association. Corporatism, therefore, by the psychology of the *veto elitist* group seeks to bring about a dilution of the power of the democratic public and prevents a shift in the control of business to the democratic public, thus limiting any risk effects to the partnership. In theory, where corporatist controls fail, the power domination shifts to the democratic public. Like all economic actions the corporatist motive is subject to qualifications of what constitutes risk for the organisation. The shift in ideology sees a shift in the participation structure of the "corporate risk" or economic uncertainty concerning the occurrence of a loss (Bernstein, 1996). Corporatism intends to make the partnership of economic and social interests accountable for this risk rather than make one party bear the risk of failure. Changing social ideologies have strengthened the need for corporatism. At the same time the growing momentum of the ideological movement has led to what has been

coined "*democratic individualism*" or as Hay (1996) puts it, a shift (intended) towards the disintegration of the "*corporatist*" consensus. The shift towards social control of business does not however reflect the shift in the bearing of the risk to the public. The conflict between corporatists and ideologists is not new. Trading organisations have argued that in meeting the growing demands of society, the risk to the organisation has increased. Risk now includes failure, as perceived by the public as a whole, in meeting socially acceptable standards. Risk of boycotts and trade interference has proved, as seen in the Shell Brent Spar case, to be disastrous. There is a running debate that part of this risk should fall not only on the trading organisations (such as oil companies) but also on those gaining benefit from the trade (the users of oil). The ideologists, however, base their principles on the concept that the risk lies firmly with the organisations where non-socially responsible actions have been undertaken. Economists however believe that such principles create the "*free rider*" problem, for example, whereby consumers want oil but are unwilling to pay the cost of greater investment in measures for any oil damage. What is seen is a shift from the competitive model of capitalism (Hayek, 1944; and Friedman, 1962) justifying the need for a market economy to promote prosperity and efficiency to the crisis model of capitalism (Marx[ix], Schumpeter[x] and Habermas[xi]). This, however, presupposes inherent tendencies for recurrent crisis (Craig Smith, 1990:21). Ideological interest to shift power from organisations to the greater democratic public can therefore bring about significant uncertainties for organisations in developing their risk strategies. Friedman (1962) has always argued that business is an economic, and not a social function. Consideration of any non-economic criteria results in a cost to the business. Silk and Vogel (1976) agree with the point suggesting that the corporations would be socially responsible if they concentrated primarily on economic aspects of the business and not social. Therefore the argument is that the risk to the organisation is reduced where they are allowed to concentrate on mitigating their pure economic risk. Inclusion of social factors will result in the increase of the risk base for organisations. Interestingly the closure of Barclays Bank branches in the UK created a public hue and cry but it did not impact the wealth maximisation strategy and performance of the organisation.

Others however feel that this "economic "argument is flawed. Simon *et al.* (1972) argue that a greater long-term risk would arise, if social factors are not taken into consideration, as submerging the interests of the society could result in a shift toward greater public demands for

regulation. Society could view that economic strategies could be injurious to society and therefore demand protection against such injury. The Brent Spar incident, genetically modified (GM) goods, the consumer boycotts of Tarmac, MAN-VW; Douwe Edgbert, Nestlé (Craig Smith *op. cit.*: 241-255) were all incidents which forced organisations to change their economic policy to one that considered social ideology of the time. The risk to these organisations was a significant drop in business due to the boycotts of their products. By this reason the oil trade has become a politicised issue driven by public values and not the laws of the market (Craig Smith *op. cit.*: 23). However there is feeling that despite attempts to consider social factors in business, the bottom line consideration remains economic. Saul (1997) views with suspicion, the real motives of business organisations; as he states "*the society (in an ideological state) live in a corporatists society with soft pretensions to democracy*" (*op. cit.*: 34). Organisations moving into corporatist status have sought to demonstrate their links with society. For example oil company links with government, statutory environmental groups, media and some non-governmental special interest organisations (NGOs) have been seen to be a move towards transferring the risk of an oil spill to the corporatist body rather than bearing the risk in isolation.

However the co-existence of economic and social groups has meant jockeying for equal bargaining positions. This is not so much for the equal sharing of the risk but to "*to raise the political salience of many policy areas and have forced their way into long established policy communities*" (Latham, 1969; Gustafsson and Richardson, 1983). Their main motive is to get businesses to share the public ideology either by negotiation or by influencing legislators Lindblom (1968) more than in the participation of risk. What this growing momentum has meant is that risk taking and risk management strategies have had to take into account management of social influences. The word perceived becomes particularly significant, as there have been many instances where although there has been no actual or potential threat of disaster, the public has widely ignored expert evaluations of risk and perceived the risk to be riskier than it is. In effect what is seen is that the term "risk" may mean something totally different to the public from what it might to organisations and academics. Therefore, unlike Friedman (1962) who favours an economic approach to risk, the existence of a corporatist society implies a shift in the definition of risk. Furthermore the economic definition refers mostly to measurable values of experts instead of those of the public's frame of reference. The dominant involvement of interest groups, media and the public has meant that risk is one that is more than pure economic loss. It needs

therefore to take into account economic loss arising from social perception of risk and social repercussions (such as loss of votes for the locally elected council). The extension of the risk definition has also brought about a shift from the attempts of defining risk to the adaptation of risk strategy in the social context. For example, an oil spill incident clearly reflects how public control arises. At the time of occurrence there is minimal public regard to consequences due to society's reliance on experts. As soon as there is a spill and the property of the public is affected, control shifts to the democratic public with interest groups lobbying and the media taking control of the situation, resulting in political amplification of the risk (Wilkins and Patterson, 1990). Once this happens, the government becomes involved and the question of social responsibility arises and sanctions and legislative solutions are sought (See - phase model). Over time, however, there is a need for greater *"flexibility and negotiation* (Borodzicz, 1997) and a shift from crisis to compromise arises (Honor and Mainwairing, 1982). The corporatist strategy works to the extent that it is perceived as a joint sharing of responsibility. Where there is a bigger power among the players it becomes questionable as to the extent risk remains in the control of the dominant body. The democratic view being that where there is unequal bargaining power the more powerful should have public accountability (Medawar, 1978). This clearly brings us to Boehmer-Christiansen's (1994) principle of cost-benefit relationships and inquiry as to who should bear the burden of accountability: the dominant body or the collective. Silk and Vogel (1976: 136-7) and Locke (cited in Vogel 1975) suggest that organisations are not always clear as to what form (or level) public accountability should take. Government intervention and prescription is one way in which public accountability is ascertained. The problem with prescription is that it underlies the commercial disquiet that the function of the "free economy" is threatened (Craig Smith *op. cit.* : 89). There is also a "spin-back effect" on the public. Apart from the significant cost outlay to the commercial businesses there is also a cost outlay to the taxpayer in supporting the creation of regulations and by way of increased product costs to the consumers. The problem for organisations is further exacerbated when operating in a soft (highly competitive) market, whereby investment in compliance can make it non-viable for industries to continue (Weidenbaum, 1979). This in effect makes it more risky for businesses. The problem with public wants and organisational or corporatist response to these wants goes back to the concept of the association between the two being a political process. Wynn (1982) believes that public have fixed views and the role of the political process is to bring about some reconciliation of the

disparate views and to set agenda. Wynn believes that the use of scientific rationality is a way of bringing about a reconciliation of views. However, as discussed earlier, the scientific rationality use to diffuse the BSE crisis did not alleviate fears and to a greater extent consideration was given to behavioural aspects, such as the Minister of State making his daughter eat beef.

2.1.3.2. Organisational risk management

The study considers how risk management in organisation came about and the implications of this development on the determining risk.

2.1.3.2.1.The development of risk management

As early as 1949, Fayol identified risk management as a prime function of management that is to securitise property and persons against damage and destruction. In the last two decades risk management was seen to be more than a general management function; it was fast becoming a discipline with specialist ability to understand not only risks and their conditions but also the context in which the risks arose. The concept of risk management was initially seen to be a process. Dunsire in 1978 (*ibid.*) considered risk management as a three-staged process of goal setting, information gathering to action while Glendon and McKenna (1995: 10) considered it a four-staged process involving, risk identification, risk evaluation, develop/implementation and feedback. The focus on procedures implies a way of behaviour in the actions to be taken. Williams, Smith and Young (1998: 244-265) explicitly state that the key emphasis of risk management is the avoidance, prevention and reduction of uncertainty and exposure to risk. Focus on human systems rather than on procedures is not a new feature of risk management. Heinrich in 1959 introduced two views to risk management and control, the engineering view and the human-relations view. The former related to the physical causes of accidents while the latter required human action to be taken into consideration as most of the accidents were recorded as related to human failure. Today Heinrich's approach is still the mainstay of many system-based models (Douglas, 1992; Toft, 1996; Waring, 1996). However, Heinrich's focus on human action received heavy criticism at that time because of the seeming minimisation of the focus on physical factors. There was feeling that sound controls and management of the physical causes of risk could override human incompetence. The pro-Heinrich argument on the other hand suggested that too much emphasis on procedures could create conflict between controller and those who were participant in the control procedures, as it could be perceived as a management

ploy to shift responsibilities through the control procedures on those who were controlled. Legislation, however, has brought about some level of political balance by instituting accountability on the part of management, bringing about a new mindset and behaviour.

From the late seventies, there was a high number of natural and man-made disasters recorded such as the US Three Mile Island disaster, Zeebrugge incident; UK Hillsborough football stadium disaster; London King's Cross fire and similar incidents. Studies by Stallings and Quarantelli (1985: 93-100); Baum, Fleming and Davidson (1983: 333-354) and Barton (1993) among many others saw the conceptual development of crisis management approaches. These approaches included both managing the technical and human systems in incident management including "incubation" factors of failure (Turner, 1978 [xii]; Turner and Pidgeon, 1997; Toft and Reynolds, 1994); Rasmussen, 1979, 1982,1991; Reason, 1990; and Perrow, 1984). These studies considered the development high reliability organisations. The other aspects of incident management were the post-incident issues. These covered issues such as the management or psychology of the post-event crisis (Charlton and Thompson, 1996; Adshead *et al.*, 1995:5-12; Hodgkinson and Stewart, 1991, 1998; Taylor and Frazer, 1982:4-12; Lindstrom and Lundin, 1982); Dyregrov, 1989:25-30; and Dyregrov *et al.*, 1996:541-556; and many more). As crises increased, that is, disasters, emergencies, or events with a potential to high levels of danger, the concept of preparedness took root. Preparedness meant not only "*being prepared*" but also " *being better prepared*" (Taback, 1991). To be prepared meant having knowledge of the conditions of risk and if human behaviour is to be accounted, then being prepared for human failures. This meant ensuring that investment of time and resource was dedicated to the function of preparedness, prompting effective response, management and planning during incident (Pidgeon, 1988). Preparedness also included planning, public education, and training potential service providers (Hodgkinson and Stewart, *ibid.*) and testing of prompt and efficient responses both by individuals and group (Smith, 1992: 88). Although much can be gained from learning from past trends (Baldissera, 1987), new approaches considered management at the point of incident (Drabek, 1986; Britton, 1987; Comfort *et al.*, 1989: 17-39; Lebedun and Wilson, 1989; Dyregrov *et al.*, 1996). Preparedness for incident, therefore, involves training and development of pre-determined skills and the understanding of procedures including experience gained in managing a live incident and "on the spot" uncertainties. Thus, the picture shows that the discipline of risk management has significantly broadened.

2.1.3.2.2. Effects of risk management on risk definition

There are two aspects of risk management. One is the management of the risk before it materialises; the second is the management of risk during its materialisation. Managing the risk involves risk evaluation and preparedness including being compliant to legislative requirements and investing in training, education and research. If it is to be accepted that risk is to be defined as some form of loss, a problem lies in explaining what is meant by loss. There appear to be two theoretical limitations here. Firstly, that risk is perceived as no more than financial loss (Ramani and Finlay (1991)[xiii]; Richie and Marshall, 1993:146). Relating only to monetary values as mentioned above is restrictive. The second difficulty lies in establishing the loss dimension. Is loss a) the costs of outcome and/or b) the inclusion of the direct and indirect costs of preparedness? Willet (1951) includes cost of losses and cost of uncertainty in his definition of risk cost. For example, there may be a situation where the event happens but there is no loss in outcome (either preparedness or event losses) terms, or there are excessive costs involved in preparedness but there is no event. In the case of the former the risk has materialised with no loss and in the latter the loss is incurred irrespective of risk materialisation; hence if risk costs include both preparedness and event losses the definition of risk as probability of occurrence has no meaning (Hedge, 1987). Furthermore, different risk groups view loss in different terms. For example, insurers consider risk in terms of financial loss resulting from direct physical damage while LAs may view loss of votes and the resultant loss of office as loss. Financial loss, therefore, is not the only measure of loss and is a fragment in the larger scheme of events that may or may not only bring about financial loss but also losses or gains in operational or political terms. The study, therefore, determines risk in terms greater than simply determinable financial loss. Besides, the knowledge of what constitutes total risk situation seems to arise more after the risk has happened than before the event. It is therefore accepted that the basis of study has to transgress the concepts of quantitative risk determination to identify factors greater than probability that contribute to occurrence of event. Furthermore risk is not only one–dimensional, it is multi-dimensional (varying by degrees), dynamic (changeable), and phased (occurring at varying times). Taking again the case of an oil spill, the risk is different at each stage of the spill response operation: failure in the mobilisation of emergency units, failure in the measures taken, the risk of non-detection and non-prevention of latent effects and so forth. There is variability in the risk (levels of risk) and changeability of the risk at each (phased) stage of the oil spill

response. Also the contributing factors to risk assessment and risk acceptance may vary significantly from pre-event to post-event. Pre-event functions, measures and time for preparedness may have a direct link to post-event response and eventually to the end value misfortune and loss (EVML). Hence, time, and efficacy of roles undertaken are some of the factors that contribute to behaviour, which in turn contribute to outcome in terms of failure or success. These factors are considered in more depth further in this chapter (See 2.2.2).

TABLE C Behavioural implications on risk and risk management.

Impacts	**Situation**	**Behaviour**	**Action**	**Implications for organisations**	**Implications for risk definition**	**Implications for risk management**
Public perception I I I V	Large and persistent biases ----------	Outrage resulting in the shift from capitalist to crisis model > ----------	Call for punishment and greater accountability > ----------	Increased risk cost > ----------	Public perception and behaviour as a risk factor > →	public considered in preparedness for post-event consensus
Corporatism (partnerships) I I I I V	Tradeoffs sought between trading organisations, government and democratic public ----------	From crisis to compromise Tension of "free rider" economics >----------	Sharing accountability *Tension –that the most powerful body in partnership accountable > ----------	Sharing of risk cost > ----------	Organisation behaviour as a risk factor > →	Shift from individual preparedness to sharing practice
Risk management Strategies of risk organisations ----------	Tradeoff between risk cost today to socio/economic cost latter > ----------	Managing process to managing behaviour > ----------	Preparedness against financial and socio/political outcomes > ----------	"Be seen to be doing good" > ----------	Organisation behaviour as a risk factor > →	Focus on managing behaviour

2.1.4. CONCLUSION OF SECTION ONE

The observations above demonstrate that to define risk in probability terms alone is somewhat reductionist. In fact definition of risk in generic terms is not only difficult but would have little meaning. It is being observed that risk is not about a concept but about a context. Contexts vary and factors affecting context vary. However what seemingly appears to be constant is behaviour. When context is uncertain, it becomes critical to focus on a constant. As has been discussed, the constant appears to be predominantly the process of management. However, process relates to a one-dimensional context. Yet context during events is mainly multi-dimensional with new intervening variables affecting process. Yet what is significant in any event is how it is managed. It is seen that behaviour impacts on behaviour. Public perceptions and calls for action, organisational behavioural strategies, all call for particular sets of behaviour at the time of event

which focus on relationships between all parties involved. It was interesting to observe, in the aftermath of the attack on America in September 2001, public concern was less on how the rescue process was carried out than on how affected parties were managed. Most discussions were based around how the President of the United States spoke, his behaviour during the crisis, the behaviour of other heads of state and other dignitaries during the period, how funerals were carried out and the way services for the dead and affected were held. There might have been outrage if the reassurance was not provided and the risk was not the occurrence of another incident, but how the reassurance were put into place to bring about a feeling of solidarity and support. Probability as a particular method or system of measurement of the possibility of outcome, despite being well founded in risk decision theory, therefore has little meaning for events that have a low probability of occurrence but with a high disaster and public involvement element. TABLE C demonstrates how risk is not much about when it might happen but what would be the consequences (to the organisation, its stakeholders or the greater public) when it happens. The approaches to risk and the management of this risk that have continued to develop have in effect achieved a creation, albeit loosely, of a relationship framework between the existence of uncertainty arising from an event and the people involved and affected. The tradeoff values go beyond the concept of individual indemnification to considering the risk to and from the society at large, even where a crisis that affects the society does not affect the organisation. For example, the financial consequence of a crisis may be insurable yet social outrage has to be dealt with. Therefore where the quality of social life is affected, this is no longer a risk that is governable by economic, albeit measurable, uncertainty but one of socio/political uncertainty which is less easily predictable and manageable. Therefore, In defining risk the probability of occurrence and the forecastable economic consequences are of little relevance. Multi-dimensional and multi-levels of risky situations exist, making it difficult to provide a generic risk definition. However, some definition is required to understand and capture the relationship framework that is susceptible to riskiness, and that focuses on two factors: the context and behaviour. Risk is therefore *the failure of a perceived successful outcome.* It arises out of *the relationship framework that constitutes behaviour of people both managing the risk and those being affected by the risk-event.* By perceived, it is in the sense of subjective evaluations of expected (by experts and stakeholders, including the public) outcomes and to this extent anything short of these expectations may be deemed a failure.

2.2 SECTION TWO: RISK AND BEHAVIOUR WITHIN SAFETY SYSTEMS

2.2.1. UNDERSTANDING SAFETY AND FAILURE IN RISK MANAGEMENT SYSTEMS

This part of the chapter attempts to explain how perceptions of safety, resultant behaviour and failure affect systems design and management. Focus is put on two critical aspects. Firstly, the impact of disparities in the perception of safety and failure causes and how these disparities affect behaviour. Secondly, the identification of cause and effect factors of safety considered in the studies on high reliability systems. The understanding derived will provide some explanations as to human behaviour as a risk factor in structured processes.

Perceptions of what constitutes safety vary significantly and induce different actions. Festinger (1954.) in his theory of cognitive dissonance suggests that people induced to act inconsistently with their attitudes will often change these attitudes in an effort to eliminate the feeling of dissonance. For example, a fast driver may rationalise his actions by scorning the efficacy of the traffic penal system. In effect how the driver behaves may relate less to her ability to drive but more to her perception of the road safety system. For example, quoting a colleague penalised for speed: "*I've always had a clean record but with the cameras, I find that my driving has become slower. I find myself driving less safely and more liable to have accidents*". The statement negates a policy perception of what is safe. Behaviour relates to not what ought to be considered safe but the attitude to the policy of safety. As Morgan, Frost and Pondy (1983) aptly observe, individuals create and sustain images "*of a wider reality in part to rationalize what they are doing*". What therefore is safe is based on the interpretation of the situation at a particular time. Is it safe to have convicted murderers rehabilitated? It may be rational for the authorities to consider the convicted child murderers in the UK James Bulger case safe for rehabilitation, yet the public has been shown to be divided as to whether this decision would be safe or not. Therefore it becomes difficult to decide a starting point of what constitutes safe. Yet not to attempt some definition of what constitutes safety would deny a platform from which to build observations and undertake some level of testing. Therefore safety is considered a situation that does not lend itself to failure causing loss, damage or injury. However, the perception of safety may not mean that the situation is safe and therefore the prerequisite for safety is the clarification of perceptions and a convergence of these perceptions.

To consider safety conceptually is also to consider safety contextually. How safety is seen within a particular setting becomes important. Thus, fire-drills as a policy are perceived as contributing to safety, yet they may result in unsafe action. For example, in the case of the 1930 Ohio State Penitentiary arson disaster, despite signs of smoke and yells, "*the guards mindlessly following orders, tried to force them into their cells*" (Davis, 1993: 202). The case demonstrates that strict adherence to safety procedures can make what is safe unsafe, resulting in failure. Therefore safety is the degree of interpretation of the situation, using judgement and procedures where relevant to make safe what has become a danger. It therefore also becomes important to separate what is instituted as a safe system from the interpretation of it. Building safe systems demands an acceptance by those who seek to effect these, that there is a convergence of values; and an acceptance that the systems will improve safety. However the interpretation of safety during an event may vary; for example, a person dashing through flames to save a life may take a gamble as to what is safe at the moment in time, despite the reality of danger. Gephart (1992: 119-120), in exploring the nature of organisational accidents, observed that failure occurred where differences in perceptions and interpretations of the situation existed between top management and technicians.

Bjordal (1987:41) defines safety as a mix of feelings (individual), mode (the organisational assessment of the frequency of accident) and a goal (for individual, organisations and society). The first is an inconstant factor while the latter two remain in the main invariable and one–dimensional. In other words safety systems are seen as rational systems, a view which takes account of pre-conditions of context and variables, while behaviour may be more deep-rooted and difficult to rationalise. Bjordal saw safety as a concept more than one-dimensional, for safety perceived by one person may be viewed entirely differently by another. He takes the example that a rock climber's feelings of safety may be different from those of a non-climber. This makes safety, like risk, more complex to measure except by way of a record of the frequency of accidents. However, statistical values of safety may have little bearing on a person's view of safety. For example, Formula 1 motor racing is seen to have proportionately (in terms of its participants) a higher accident rate than rock climbing. The Formula 1 driver, however, may consider the sport more safe, having being involved in significant safety procedures, perhaps more than required by his insurers who from probability derivations determine the sport to be of

high risk. The point of contention is the extent to which differences in the interpretation of safety have implications for risk determination and risk management. For the Formula I driver, the demands by insurers for greater levels of safety to enable the reduction of risk premium may demonstrate that perceptions of safety are not necessarily different. It may be argued that both the driver and his insurers would want to ensure that the end result is not failure (i.e. injury or death). However, the extent of the difference lies in how each person or group responds to dealing with the prevention of failure. Glendon and McKenna (*op. cit.*: 36-37) provide an example demonstrating how a highly trained and experienced bungee jumper, in showing another less confident participant the sport, forgot to check his own rope anchorage and dived tragically to his death. In this case neither wanted failure; and safety was ignored not because one felt safer than the other but because the teacher, with the habitual knowledge of what constitutes safety, simply forgot to ensure that the level of believed safety continued to exist. Therefore failure resulted not from the perception of safety but from the assumption that all safety precautions were taken. This case has a greater tale to tell. It brings home the aspect that knowledge and continuous performance of safety measures are not sufficient to prevent safety. Therefore, observations such as by Sinclair Knight Merz (1995), that the more trained the persons the less the likelihood of failure, are limiting in that there is more than mere training that brings about a mitigation of failure. Failure can arise by mistaken assumptions of safety or, as Sagan (1993) puts it, by reason of diminishing foresight (see 2.2.1.1). This leads us to explore the conditions of failure. Safety becomes a cultural issue.

Kletz (1991: 87-88) in his assessment of disaster saw failure as something more than technical failure. In the Clapham Junction railway accident in 1989, the immediate cause was noted as technical violations, such as wiring errors, whereas the key causes of failure, as he put it, were those that were "*underlying*". These causes were attributed mainly to management behaviour e.g. ineffective supervision such as "*turning a blind eye*", failures in communication, failure of employing competent personnel. Failure according to Kletz lay with management whether by reason of slips (potentially observable) or lapses (failure in judgement e.g. negligence). Reason (1990: 8-9); however, distinguishes between "*slips and lapses*" and "*errors*". In quoting Norman (1983), he defines error *as "planned* .....activity that *fails to achieve its intended outcome"[sic]*, while slips and lapses were "*execution failures*". The distinction between

planned and execution failures, lies in the fact that planned failures could arise from "*higher-level processes*"(*op. cit.:* 8). Reason (1985) concludes this point aptly in stating that "*systematic error and correct performance are two sides of the same coin*". Errors, slips and lapses are, however, manifest failures; what is not easily observable are occurrences that are latent and systemic such as those arising out of "procedural drift" and "error reworking". The former arises where there is an shift away from procedure which then becomes common practice, possibly leading to failure, while in the case of the latter, there is a constant re-correction of procedure or work undertaken as failed in its outcome leading to greater resource utilisation and hence failure. These occurrences are systemic, the build-up of which, create a drag effect with failure manifesting not immediately but over a period of time. Diagnosing failure in such cases is difficult. In such instances, Woods (1988: 141) considers, "*all evidence is not available at once because it comes in over time or because it must be actively acquired with associated costs (effect and risk)*". This begs the question as to how the level of uncertainty can be reduced effectively where there arise latent but systemic failures.

A system has been generally agreed as an integration of human and mechanical elements (Reason (1990:200). However, failure may be viewed as more than only managerial and technical hiatuses. The emotional response to outcome can bring about failure. That is, failure is deemed failure only if it is so perceived. Smith and Kleugal (1982), in their studies of emotions of success and failure, stated that failure represented feeling of disappointment or frustration and that failure resulted by reason of circumstances outside their control. Wernimont and Fitzpatrick (1972) consider failure in terms of what is socially acceptable or not. However, both studies focus primarily on personal failure rather than on system failure, but this does raise the point that failure has something to do with the failure of ability as seen in the eyes of society.

Systems failure, therefore is seen as the culmination into an event (man-made failure) or the non-effective management of an uncontrollable event (man-managed failure). Failure may not result in exacerbating the consequences but may be at a technical level, which could be noted as inefficient requiring improvement. For example, it was observed that during the *Sea Empress* oil spill, the lack of high profiled Marine and Coastguard Association (MCA) personnel present on site through with communications effected from a distant location could result in failure

(SEEEC Report 1997). Although this had no major social or organisational consequences, there was failure in the sense that there could have been consequences of ineffective or delayed communications in circumstances other than those that had occurred. Failure whether perceived as emotional, technical or managerial is linked to the risk definition. If it is accepted that risk is defined as the "possibility of failure" then failure is the happening of the risk-event. It may however be that a risk-event does not actually bring about failure where management of the event has been successful. Then although there is some level of failure the outcome is successful. Therefore, the definition that risk is the possibility of failure is not adequate. Risk is more than this. Risk could therefore be the happening of an event that results in the failure of a successful outcome.

Turner (1978) and Perrow (1984) considered that failure could arise by reason of neither of mechanical nor human factors. In effect failure, they stipulated, arose by reason of the unforeseen linking together of several diverse events, each important in the cluster of events but independently ineffective. These observations indicate that there are resident factors that can be destructive if conditions make them operational. As Reason (1990: 197) also points out "*At any one time, each complex system will have within it a certain number of latent failures, whose effects are not immediately apparent but can serve both to promote unsafe acts and to weaken its defence mechanisms*". He likens this to resident pathogens in a human body a sort of cancerous effect, which is created and grows out of control if not detected early. Such a notion offers a starting point in viewing the make up of a safe operational system, that is an organised scheme or plan of action.

Hale (1987) observed that human and material elements "*interact within a defined system boundary to produce a dynamic, adaptive response to that system's environment and to move towards system goals*". This observation appears to suggest conforming to a given set of environmental conditions to ensure effective response capability. The finger, therefore, is pointed at the efficacy of management in handling and reducing failure. Conditions, however, vary where remedy may be more than a planned response. Therefore how variant conditions are built into operational systems becomes important. Systems may be developed by way of procedures or dynamic modelling or both. Procedures are a series of rules and actions at each

phase of operation while modelling is a mathematically derived simulation, which seeks to develop scenarios demonstrating how a system or device behaves with time, particularly in response to external circumstances. Typically systems design should take into account tensions and behaviour in the existing system, the potential enhancements, and the training of those involved with the system without being exposed to dangerous conditions (as seen with a flight simulator). Simulations, physical or computer based, seek to mirror the continuous efficacy of system and the behaviour in dealing with the system over long periods of time or in one-time frame. The efficacy test is that the system when operational produces a high rate of reliability and flexibility to manage the changing conditions of risk event. Richie and Marshall (1993) suggest that operational systems involve both hard and soft parameters. The hard parameters involve the empirical derivation of risk such as probability and measurable cost/benefits arising from the institution, usage and "*efficacy*" of the system. The latter involves the normative concepts of "*safety, benefit and equity of distribution*". Manyon-White (1993) observes that both hard and soft approaches "*have weaknesses, which can be overcome by using methods that draw from both*" He quotes Checkland (1981b) who suggests that the "*terminology of system*" is avoided and a structure of shared ownership (social and technical) is considered in systems design. In effect this indicates not so much developing a tangible framework for operation but more so a culture of safety. As technology has developed, Rouse (1984), as many others, saw the use of computer-assisted simulation as a way to bring about more effective integration and mirroring of continuous behaviour. Structural efficacy and the interplay of cultural elements are more easily distinguishable from such simulations than might be from one-dimensional testing scenarios.

2.2.1.1. Further explorations into the work on "high reliability organisations (HROs)"

The high reliability group research on man-made disaster has provided much knowledge on the preconditions of disaster and the factors that bring about vulnerability. However, knowledge is only one part of the formula for success. How this knowledge is translated into understanding and resultant behaviour that is flexible enough to meet the varying conditions of crisis is the critical other part. Furthermore the development of a safety culture is important to organisations but critically more so where there is collective inter-organisation activity. The works of the high reliability group and that of Turner's (1978) man-made disaster model have been instrumental in

framing the theory of "safety culture". The works consider behaviour and learning issues affecting organisations and undertaking of simulations as forms of continuous cultural adaptation.

In considering the integration of approaches, hard and soft, it may be worth considering as a starting point Lowrance's (1976) two ratios of *Safety: risk* and *benefit: efficacy*. Taking the first, acceptable risk in systems design is deemed to be that which would provide a maximum level of safety (perceived as such by experts and externals) with minimum likelihood of risk (system failure and the failure of successful outcomes). The ratio is sustainable to the extent that effective measures are taken and maintained technically and, importantly, communicated internally and to the wider public. As stated earlier both Turner (1978) and Reason (1990) argue that risk of failure is more than emotional, technical and managerial. Failure arises from the accumulation of unnoticed sets of events, which bring about the precipitating event. Turner puts it, that failure is invoked mainly by reason that the "*radius of foresight*" is shorter than the "*radius of action*". Gephart (1984) emphasised the relationship between hindsight and foresight. He stated that issues such as communication problems and unheeded warnings, as considered in Stages 1-3 (from the "*Notionally normal starting points*" to the "*precipitating event*" stage before onset) of his disaster development model, should be part of hindsight as they exist in most disasters. However, he does distinguish between warning signals as opposed to normal signals, which are distinguishable after the event. Sagan (1993) further observed that organisations with an apparent good safety culture were also susceptible to accidents, partly by reason of diminishing foresight. Fischhoff *et al.* (1989), however, believed that the link between hindsight and foresight is tenuous as "*in hindsight, people consistently exaggerate what could have been anticipated in foresight. They not only tend to view what has happened as having been inevitable but also to view it as having appeared "relatively inevitable" before it happened.*" In effect the suggestion is that there is a mistaken presumption that people feel that they can anticipate better than they actually do in reality. What appears to be emerging from these observations is that the complexity of socio-technical systems makes it difficult to ensure full efficacy of hindsight and foresight. Turner explains (1978 cited in Turner and Pidgeon, 1997, Ch.7) that although a "*logical and determined pattern of pre-conditions is easy enough to construct with the benefits of hindsight, these patterns are far*

less apparent in advance (foresight)" bearing in mind that the socio-technical systems are significantly complex".

Perrow (1984) believed that failure was inevitable unless attention was paid to factors that bring about the "incubation" of failure with particular focus on cultural systems. Earlier, Turner (1978) had identified the importance of crisis incubation followed by some serious work done on high reliability organisations by persons such as, Sagan (1993), Perrow (1984) Roberts (1989), Roberts and Rousseau (1989), Reason (1990), Gephart (1984) and Toft and Reynolds (1994). Incubation of failure meant more than the objective control of process failure. Rasmussen (1982b), Marek *et al.* (1987) suggest that risk control system designers and emergency planners suffer the perception trap by being concentrated on the objective control of failures rather than on human error and the subjective experiences of risk of the persons involved in risk management. Lord Rothschild during a televised lecture suggested that the efficacy of risk management lay in understanding the subjective experiences of the risk. He advocated that it was necessary *"to go inside the head of the beholder and understand how he or she sees the situation that is thought to be characterised by risk for what you then do about the risk depends entirely on how the person sees it*". It is, however, difficult, despite simulation modelling, to characterise exact values in ascertaining the efficacy of human and mechanical interfacing.

As obvious as it is that the benefits of any system design have to outweigh the risk, the ratio of benefit to efficacy is in reality a more complex measure. What constitutes benefit has only been easily derived in terms of reduction in the frequency of accidents or events. Measures such as accident or injury rates are used to demonstrate that systems are working. However it is difficult to measure whether a system is more efficient by reason of circumstance rather than its fitness. The greater part of this difficulty arises out of human control of systems.

That a system may be designed and maintained at very high standards does not preclude the possibility of human error or some unpredictable intervening variable to bring about the risk-event. Insurance case histories have demonstrated that events other than so-called "acts of god", arise from manmade disasters. Estimates at the 1994 International Union of Marine Insurance (IUMI) conference held that 60% (3 out of 5 claims) of shipping losses are caused by human

error. Miller (1994) observed that even amongst properly trained personnel there can be carelessness in responding to commercial pressures, and that more than a quarter of the major marine insurance claims were put down to human error. It has been suggested that the existence of temperamental factors such as discomfort, boredom, anger and stress contribute to human error and all these factors need to be taken into account in risk assessment. Singleton (1984:107:116) saw the control function as an interaction between error and skill. Evidence from studies undertaken by the "high-reliability" group of researchers has sought to address error control by ways more than the *" analytical means based on empirical data from incidents and near misses*" (Rasmussen (1990:11). Rasmussen goes on to suggest the use of probabilistic risk analysis in initial system design considerations, with the need for considering assumptions underlying the risk analysis. Shrivastava (1992 *op. cit.*: 43) in his Bhopal[xiv] incident analysis linked strategic and operational neglect as preconditions to disaster. Dörner (1990: 21) in attempting to understand the logic of failure saw the precondition of crisis to be the behaviour of the controllers who often act ""*ballistically", (taking) measures without checking the effects of these measures later*"[*sic*]. Dörner is far from alone in this thinking. Reason (1990), Shrivastava (1992) and Rasmussen and Pedersen (1984) are some of the many profound thinkers who believe that active and latent human failures are the key cause of crisis. The problem, however, with human reliability according to Reason (1990b: 27), is the lack of attention to cultural factors. La Porte and Consolini (1988 cited in Reason (1990: 35), in their study of air traffic controllers, state how informal groupings pool together to improve safety by their actions more so than through formal vertical structures of operations.

The studies undertaken by the high reliability group reach the conclusion that however reliable a system is, safety cannot be guaranteed. However, their empirical evidence demonstrates that there is need for safety to be considered as high priority in the corporate objectives, a development of a strong culture of reliability and continuous learning and feedback potentially from "simulations of possible futures" (Turner and Pidgeon *op. cit.*: 189). However, this brings up further distinctions as to what constitutes reliability and the efficacy of culture development. Taking the former, the dimensions of reliability used by Perrow (1984) are system complexity, a degree of tight and loose coupling of events and decision-making values. By coupling Perrow meant the degree to which the system is flexible to respond to systems with value based on the

risk decision-making behaviour going beyond the concept of risk to power. This takes the two–dimensional approach of risk (i.e. acceptable risk and risk cost) as put forward by the US groups of researchers such as Fischhoff *et al.* (*ibid.*) to a three dimensional approach which embraces issues such as individual differences and environmental conditions. As Glendon (*op. cit.*: 102) puts it, "*if risk is being considered beyond the individual behaviour level, then the three dimensional approach must recognize that power differences and associated conflict are inherent in social decision-making processes*". Shrivastava (*op. cit.*: 2-3) in his exploration of the Bhopal crisis said that failure of reliability "*goes deeper than mere technology. It extends to the organizational and socio-political environment in which the accident occurred*". The fact that the Bhopal plant had a low safety priority culminated to a highly unsafe environment.

The advocates of high reliability organisations in the main see the need to integrate mechanical (processes and procedures) and human behaviour (both active and latent). Reason (*ibid.*) believes that to manage behaviour there is a need to develop a culture of a motivated and skilled workforce and have effective controls with constant feedback. Weick (1995) also plugs cultural development, seeing the need for collective identity. He captures the application of symbolic behaviour in his notions of "enactment" and "sensemaking". Organisations work within a framework which is commonly understood and shared, and which generates human action. In a way the development of systems is an expression of symbolic integration of human understanding of values, beliefs and expectations with the technical aspects of the operation. In considering collective operations particular attention is given to symbolic interaction.

2.2.2. Developing From Turner's Notion Of Safety Management

Barry Turner was instrumental in the development of the theoretical understanding of crisis generation (Smith, D: a) and in influencing the concepts of high reliability and opening the debate and discussion in the crisis incubation. Turner's work initiated a whole range of empirical investigations into factors such as hazard, process, culture, codes of practice, laws, collective interactions and also time in terms of phases (Model A pg.51). Toft and Reynold's (1994) SFCRM model developed Turner's approach and also critically focused on the culture and experience of the handlers. Turner's key point was the fact that disasters occurred out of socio/technical factors, rather than technical factors. His model on the time sequence in the

development of a disaster suggests at the notionally normal starting point, that what is perceived as safe is generally determined by adherence to a set of normative prescriptions. These normative prescriptions are "common-sense" values "*embodied in law or codes of practice*"(Turner and Pidgeon (*op. cit.*: 71) of what is safe practice. Failure arises where there is a violation of these laws and codes of practice. So for example, a slow-down in preparedness for an oil spill might result in failure. Turner suggests that there is no need for cultural readjustment at this stage as the mere fact of an occurrence strengthens the convictions for the need to adhere to the normative prescriptions. However, whatever the cause it is too late to allow violations. Kletz (*op. cit.*: 12) quotes an incident where an experienced operator was crushed to death as he was less than alert to instructions in undertaking system repair. The accident happened the night before the operator's annual holiday and it could well have been the case that his mind was elsewhere. Such accidents have forced a change in management of systems and changes in the law.

Turner's second stage, and by far the most revealing of thought processes, is the "incubation stage" and the suggestion that cultural collapse happened due to accumulation of a number of disparate events over a period of time, similar to a cancerous growth. This point took root with Reason (1990:197) in his development of the "resident pathogen" metaphor. The remedy for this goes back to the thinking discussed earlier: the need to develop "foresight" rather than hindsight, although Fischhoff *et al. (ibid.)* believed that this too, may not be easily achievable. Reason (1990: 198) aligns the resident pathogen notion to indicators of "system morbidity" prior to failure. Reason, as did Perrow earlier, suggests that failure occurs where the systems are complex, highly interactive, tightly coupled and opaque as opposed to the more transparent simpler systems. However in simpler systems the few resident pathogens could "*wreck greater havoc*" than in the complex ones as they tend to be less evolved in the build-up of defences. The problem with the resident pathogen theory is that it not an easily workable theory in practice, partially as it relates to complex systems and partially by the difficulty in detecting resident pathogens before failure happens. The complexity increases where different organisations involve disparate systems into a collective activity where resident pathogens within one organisational system become entangled with resident pathogens of another. This discussion is taken further in chapter three.

Turner suggests that to pinpoint the moment in time when incubation begins needs to commence at a point far before what is the obvious beginning of the causal chain. For example, in the case of tanker accident, it would be before building the tankers or loading the oil. It would consider issues encompassing organisational, national and individual and business cultures and structures of operation. This however is more complex than easily practicable. D. Smith's interpretation of Turner's argument aptly sums the problem. "*The combination of poor communication, a bounded mindset, and the failure to recognise the inherently uncertainty in decision-making creates a culture which both prone to crisis and resistant to learning*".

Toft and Reynold (*op. cit.*: 12) suggest that there are two feedback loops around the operational socio/technical system within this stage adapted to Stage 1 of their SFCRM model. There is both negative and positive feedback. The former is a series of signals that oppose the change in operational parameters defined by the system, for example in the Bhopal incident spotting the irregular temperature inside the storage tank (Shrivastava *op. cit.*: 1). The latter is a feedback loop, which amplifies the input, for example, breaking rules, which if not checked can lead up to a catastrophe. In the case of the Bhopal incident, it was noted that the plant was ridden with unsafe practices (ineffective supervision, low levels of manning, ineffective information and training and so (pp 41-43). As researched by the high reliability group, the incubation of disaster results not from the direct cause of failure but from a complex set of interdependent human, organisational, and technological (HOT) factors

***Model A*- Turner's model**

Stage 1	*Notionally normal starting points* (a) *initially culturally accepted beliefs* – about the world and its hazards (b) *Associated precautionary norms*: set out in laws, codes of practice, mores and folkways
Stage II	*Incubation period:* the accumulation of an unnoticed set of events which are at odds with the accepted beliefs about hazards and the norms for their avoidance
Stage III	*Precipitating event*: brings attention to itself and transforms general perceptions of Stage II
Stage IV	*Onset*: the immediate consequences of the collapse of cultural precautions become apparent.
Stage V	*Rescue and Salvage – first stage adjustment*: the immediate post-collapse situation is recognised in *ad hoc* adjustments which permit the work of rescue and salvage to be started
Stage VI	*Full cultural readjustment*: an inquiry or assessment is carried out and precautionary norms are adjusted to fit the newly gained understanding of the world

Source: Turner and Pidgeon (1997:72)

The third stage manifests the cracks in the system. For example, a tanker is in trouble but the oil has not yet spilt. This could be the result of a technical (e.g. engine breakdown) or a socio/technical (e.g. a cigarette fire in the bunker) cause. Although Turner's focus is that

disasters arise from man-made causes, natural phenomena can create situations that precipitate the onset of crisis; for example, encountering a tsunami, a sea storm or surges (albeit it is debatable whether early information can prevent this) or being hit by a rogue whale, among other uncontrollable events. This could bring about the immediate onset of crisis, which may or may not be progressive (Carr, 1932[xv]). The skill here lies in the technical ability of managing the onset, for example, manoeuvring the tanker expertly.

The fourth stage is the onset stage where in the case of the oil tanker this may be damage to oil bunkers bringing about an oil spill and risks of danger to on-board personnel and other consequences. Moving on, Turner's fifth stage is where rescue and salvage become imminent. So far failure management lies in the hands of the specialists, where expert structures, management (social and technical), leadership and skills are called for in dealing with failure prevention and failure management. The final stage, however, involves the wider democratic group bringing about a realignment of issues. The stage sees not only a period where indemnification for damage is sought and settled but also where the outcome is a disaster, the case for a public inquiry followed by new laws and codes of practice. The result forces the need for a change of behaviour, which becomes absorbed into a new safety cultural dimension. Toft and Reynolds (*ibid.*: 13-14) in their SFCRM model, suggest that this stage (stage seven in their model) provides a negative feedback loop scenario ensuring that system parameters are readjusted to ensure another disaster does not take place. The only problem is that there is an assumption that the changes required will be taken on board, unless there are legislative dictates. Toft and Reynolds (*op. cit.*: 14) note that piecemeal actions may make the organisation marginally safe, or that the organisation may accept the recommendations but do very little so that a full cultural readjustment is not achieved. This includes a change in the safety culture, improved learning and information, in effect, creating new structure/cultural values that incorporate into not only "fit for the purpose" but develop the scenario of best practice.

2.2.3. Developing the Concept of Safety Culture

Turner (1994), Weick (1976), and Roberts and Gargano (1989), among others from the high reliability group, suggest the need for extremely highly reliable operations, to avoid "*the rapid transmission of the consequences of failure*". The clear underpinning theory for this group lies in

the fact that organisations become susceptible to failure, where there is interactive complexity, both human and technological, in the presence of tight coupling of activity (Perrow, 1984; Weick, 1987; Sagan, 1993), albeit, there is evidence to suggest tight coupling improves reliability (Roberts and Gargano, 1989). So to become highly reliable, consideration was given critically to loose coupling with a number of variables. Firstly, system integration (Weick, 1977; Miller, 1978:109) against criteria of flexibility, ability to improve and self-design capability. Secondly, decentralised and differentiated systems (Miller, J, *ibid.*), bounded rationality (March and Simon, 1958; Thompson and Tuden, 1959; Simon, 1997). Thirdly, the development of mental processes that focus on efficiency (Weick and Roberts, 1993) and flexibility (Miller, 1978) Fourthly risk management (Maronne and Woodhouse, 1986), emergency management (Rasmussen, 1984, 1986). Fifthly, effective designs (La Porte, 1982; La Porte and Consolini, 1991; Roberts, 1990; Weick and Roberts, 1993).

Complexity itself is a difficult concept clearly to define. Ashby (1956) defined complexity as that, which relative to the capacity of the mechanism, seeks to control the system. Perrow set up criteria of index as part of his Normal Accident theory, as to what constitutes high and low complexity (TABLE D). It is seen that complexity is considered part of the complex whole; whereby a high number of complicated and related activities operate interdependently which together do not allow for easy analysis or disentanglement. The system, by nature of such complexity, involves tight coupling, or close meshing of activities making it difficult to disassociate activities for management.

Table D- High Complexity: criteria of index

Tight spacing of equipment	very close production space	Unfamiliar and unintended feedback loops
A limited possibility of isolating failed components	Limited awareness of interdependencies because of personnel specialisation	a multiplicity of common mode connections of components
Many control parameters with potential interaction	Indirect and inferential information sources	Limited substitution of supplies and materials
Limited understanding of some processes	Tight coupling with little slack	Buffers and redundancies in-built with low level of substitution of supplies and resources

Source: adapted from Perrow (1990)

Sagan attempts to differentiate high reliability theory from Perrow's normal accident theory (see TABLE E below). Both theories however lend themselves to more easy analysis than applicability. The development of the safety culture is more pervasive and continuous. Training and simulations (models and physical simulations) can be instituted but there are limitations. As

Rasmussen (1991: 255) points out that despite high level technology offering effective tools for simulation of complex systems, simulation is itself complex.

Simulations to be successful need to represent "classes not instances" and all that will be learnt is from an "*ad hoc* demonstration of selected examples". This would not take into account all sets of dynamic circumstances that could possible arise so as enable learning. Real–life performances provide descriptors of events yet as Davidson (1967) points out there should be a distinction between "causal descriptors and causal laws", although Starbuck (1993) suggests that "*when faced with incomprehensible events, there is often no substitute for acting your way into the eventual understanding of them*". Despite this thinking, empirical investigation, however, has its place in bringing together the experiences of behaviour with operational understanding. As Weick (2001: 296) puts it "*theories, diagnosis, strategies and plan serve as plausible interim stories that mix ignorance with knowledge in different patterns*". Much of this thinking has found its way into post-modern organisational, using imagery (Weick, 1995, 2001), metaphors (Morgan, 1980,1997; Handy, 1985) and personal descriptions (Mintzberg, 1987; Chia, 1996) to make sense of events and behaviour within organisations operating in a time-compressed environment.

TABLE E- Distinctions between high reliability organisations and normal accident theory.

HIGH RELIABILITY THEORY	**NORMAL ACCIDENT THEORY**
Accidents can be prevented through good organisational design and management	Accidents are inevitable in complex and tightly coupled systems
Safety is top organisational objective	Safety is one of a number of competing objectives
Redundancy enhances safety: duplication and overlap can make " a reliable system out of reliable parts"	In-built redundancy causes accidents as it increases interactive complexity and opaqueness and encourages risk-taking
Decentralised decision-making necessary for developing flexible field-level responses to surprises	Paradox: decentralisation needed for complexity but centralisation required for tightly coupled systems
A "culture of reliability"	A military model of hierarchy (Ashby 1956), intense discipline, socialisation and isolation
Continuous operations, training and simulations necessary	Training difficult for highly complex and dangerous and politically unpalatable operations
Trial and error learning from accidents can be effective and can be supplemented by anticipations and simulations (although always possible in the case of safety critical systems (Weick ,1987)	Problems of denial of responsibility , faulty reporting and reconstruction of history seen to cripple learning efforts

Source adapted from Sagan (1993:46) cited in D. Smith(a)

2.2.4. CONCLUSION OF SECTION TWO

It is recognised that the development of a safety culture in complex organisations covers attention to a variety of interdependent areas: structure, decision-making authorities, coupling of activities, system design, organisational objectives and strategies and continuous training and simulation (empirical and technological) to produce "a culture of reliability". Yet the limitations of bounded rationality and developing of flexible cognitive behaviour, plus the ability to diagnose and act on errors, requires more than the knowledge that these studies mentioned above state. It is human to slide back to what is comfortable, rather than take risks of investing into new avenues of thinking. Trial and error therefore become critical actions, as are failures, if learning is to be gained from this. It is indefensible for organisations to act on past experiences because they have worked or not to act because they have failed; however, what is more indefensible is for organisations to act only where safety issues are visible rather than to develop a integral culture of safety. The pedagogical thinking is reversed from that of "safety management" to one of "safety culture". Safety culture is behaviour, which has a tensile relationship between two forces: the management of the system and the management of the global reverberations of failure. The examination of risk in the context of high reliability operations and the increasing need for adequate control highlights that to develop a more secure level of error-free outcomes requires more than technical adjustments. The neo-Turner approaches indicate that the critical errors lie in the management capability of developing a culture of safety. Perrow's normal accident theory semblance of military efficiency is over-ridden by the high reliability theorists' thinking that hierarchical values are not effective enough in the development of the "culture of reliability" and that safety measures required orientation toward control of culture together with the maintenance and control of systems. Generally it seems that when faced with systems management, the approach is not to commence with error detection but to go back to the causes that are like to "incubate" failure. This means greater attention to undertaking simulations to identify the incubation factors and to change to culture. It therefore becomes critical to consider risk management as an aspect of culture rather than structure. Structures maintain a sense of prescription in behaviour, for example, what must be done or not done to ensure an error-free outcome. Cultural emphasis is less prescriptive but more developmental. In other words it is "how we choose to behave" and not "how we are required to behave". Therefore as new risks emerge, the handling of these will be done out of personal

values to safety built out of organisational values to safety. So, going back to the Ohio State Penitentiary case, the guards, in using their common-sense values of safety rather than what they had been trained organisationally was safe, might have prevented such a high number of deaths resulting. Safety engineering, especially in highly complex and tight-coupled systems, has a further problem. This detection of error is not easily achieved as in less complex and loosely coupled systems. Error-control emphasis is on design rather than maintenance. This demands a more extrinsic safety consideration rather than attempt to find out what the problem within the system is; besides by that time it might be too late. If Bhopal is anything to go by, then the management failed not to prevent the disaster but to mitigate the outcomes of the design. So as Shrivastava (*op. cit.*: 106) suggests the emphasis has to be on safety and maintenance (as far as it is possible). TABLE F demonstrates the change in emphasis.

TABLE F – Design features in high complex and low complex systems

	Highly complex design	**Low complexity**
High impact of failure	Emphasis on: • Design (loose coupling to enable maintenance) • Effective encasing of outcome – ways of ensuring that consequences have little impact on community. • Building safety culture • Simulation of disaster – trial and error manipulations • Developing community network to speed mitigation • Greater level of transparency	Emphasis on: • Maintenance procedures and error checks • Effective encasing of outcome – ways of ensuring that consequences have little impact on community • Building safety culture • Simulation of disaster – trial and error manipulations • Developing community network to speed mitigation • Greater level of transparency
Low impact of failure	Emphasis on: • Design - strong technical and operational guidelines • Building safety culture • Building community network • Greater level of transparency	Emphasis on: • High level of technical and operational guidelines

Adapted from the high reliability approaches

If such a concept is used then it is questionable as to the extent that it is viable for co-active operations as in the case of oil spills. The emphasis lies not on the level of impact but on the fact there is likelihood of some impact.

2.3 SECTION THREE: INTEGRATING RISK VARIABLES CONTRIBUTING TO FAILURE

The studies undertaken by the high reliability group have put much emphasis on "incubation factors" and critically on cultural aspects, intra-organisation. However the emphasis on "cultural as source of high reliability" (Weick 2001: 330) needs to be considered in context of other simultaneously operating variables both intra-organisation and also inter-organisation (with numerous organisations coming together). This is partly to enable understanding of these individual variables that cluster to accumulate towards failure. What is felt is that the existence of culture tending towards low reliability itself may not cause failure, although it exists as a key catalyst to failure. Therefore likening this scenario to the resident pathogen metaphor, it can be said that the eating habits of individuals may by themselves not trigger cancer but other variables such as stress, level of exercise taken, immune system and the existence of other impairments may together develop a cancerous situation. The other part is to extend the thinking of the high reliability group towards inter-organisation situations, where there are difficulties in establishing the "collective mind" to bring about convergence of values in crisis situations.

2.3.1. DYNAMICS OF CULTURE AND OTHER VARIABLES ON SYSTEMS AND IN RISK MANAGEMENT

Any system designer is concerned that the system *per se* reduces both the risk of technical and behavioural failure. Lawrence (1974) stated that the ultimate aim must be to reduce the incidents by having a better understanding of the factors. Turner (1978) and Reason (1990), among many others, put significant emphasis on the word "culture" and "safety culture", although there is a significant distinction between these two terms. This section of the chapter seeks to understand both cultural and safety cultural variables. In doing so the wider aspects of culture are explored.

2.3.1.1. Culture and Attitude –setting the scene for the discourse on culture and failure

The commencing premise is that attitudes to risk and risk management cannot be separated from the linked dynamics of the variables of culture, time, relationships between individuals, groups and organisations and vulnerability of context. Ribeaux and Poppleton (1978) consider attitudes as a "*state of readiness or tendency to respond in a particular way*". Attitude indicates a convergence of disparate cultures towards a particular way of behaviour, and in risk

management this would be developing an attitude to safety. Mullins (1996: 326) suggests that "*attitudes are often shared within organisations and as such are embodied in the culture of the organisations*". They become, as Handy (1979:176) states, *"sets of values and norms and beliefs*". Gross (1968) also makes an apt link between culture and attitude. He suggests that "*to convert a belief into an attitude, a "value" ingredient is needed which, by definition, is to do with an individual's sense of what is desirable, good and valuable, worthwhile and so on*". The importance of attitudes and its link to risk and risk management has challenged the thinking of many researchers in various disciplines of social science. This includes decision-making attitudes (Kahneman and Tversky, 1973; Bassler *et al.*, 1978); perception and risk acceptability theories (Slovic *et al.,* 1982); change theories, (Kanter, 1983; Morgan, 1997; among many others); Cognitive dissonance theories (Festinger, 1954; Heider, 1946); feminist approaches (Alvesson and Du Billing,.1997; H. Brown, 1997; Blakemore and Drake, 1996); shock events (Perrow, 1984; Turner, 1978; Shrivastava, 1992; Ansoff (1988), Quarantelli, 1983, 1984). Three key conceptual questions are developed. First, what is the significance of culture for risk and incident management systems? Secondly, what constraints exist that prevent cultural convergence or the development of the safety culture? This takes a look at the concepts of rationality in decision-making and implication on safety culture. The exploration considers the impacts of time, relationship and context vulnerability in identifying the tensions bringing about failure of systems in general and collective operations in particular. Finally, what factors can be developed to prevent the development of culture that brings about systems failure?

2.3.1.2. The High Reliability Group view of culture

As mentioned above, Perrow's (*ibid.*) work in the United States springboarded the development of the high reliability group of researchers giving attention to factors bringing about failure with particular focus on cultural systems. In the United Kingdom too, there was much work done on systems failure. Turner (1978) in his pioneering work concentrated on two key aspects of failure, the existence of cultural factors and what he coined crisis "incubation". His work, as discussed above, springboarded the new and nascent work in the approaches for high-reliable organisations and systems globally. Research led to the development of the Man-Made Disasters (MMD) model in framing the theory of "safety culture"(Turner and Pidgeon, 1997). Turner's starting point was that there exists a number of pre-conditions which "incubate" causing

"*cultural collapse*" resulting in disaster. The focus here was on existing beliefs and norms bringing about incongruent behaviour to an assumed safety culture.

The problem, which the HRO studies identified, was that to surface these underlying cultural tensions was not easy. Culture as a concept is omnivalent: conceptually and longitudinally (Johnson, 1987); relates to pre-scientific aspects of risk, (Hovden and Larsson (1984); is deep (Schein, 1985; Mitroff *et al.*, 1989), integrated (Pettigrew, 1985a), and time-related (Deal and Kennedy, 1982; Pfeffer, 1981). This makes it difficult to establish what constitutes culture and how it develops, let alone to establish safety culture in the context of systems. Reason observes that there is no universal definition of what is considered to be safety culture but quotes as the most applicable Uttal's (1983) definition: "*shared values and beliefs that interact with an organisation's structures and control systems to produce behavioural norms*". Pfeffer (1981) believed that the set of beliefs evolves over time. Reason attempts to distinguish between "what the organisation is" (the cultural norms) and "what the organisation has" (structures). It is apparent from Turner and Reason that, as part of systems development, culture (in whatever form) co-exists with and within structures. In effect culture arises through this interrelationship with existing structures. Turner (1971) noted that systems tended to be prescriptive, having elements of what "ought " to be done. This assumes culture as a non-dynamic state. Handy (1986:188) saw, in spite of set structures, culture as a constantly changing phenomenon: "*what suits.....at one stage is not necessarily appropriate for ever – strong though that culture may be*". The dynamic nature of culture however makes it particularly difficult to identify, and therefore to manage, it. To establish high reliability of cultures is certainly more difficult than to ensure reliability of structures. Taking Weick's (1993) point that safety (or what is deemed safe) is invisible as a result, it is not easy to establish what constitutes a "safe" or "reliable" system. Schein (1985), however, believed that culture both visible and invisible was determinable. Schein came to this belief by analysing the values that govern behaviour and by uncovering the hidden assumptions which determine how organisations "*think, feel and react*". He admits that it is not very easily achieved but suggests that by treating culture as a tangible and adaptive learning process by way of constant analysis of responses and reactions, it could be possible to understand values and to influence behaviour. Schwartz and Davis (1981) go a stage further, conceptualising the term "cultural risk". Their observation was that organisations should in

considering culture take into account the possibility of failure at each stage of operation. By doing this, management would be able to use its judgement as to how important it becomes either to do nothing or develop or change values to achieve the highest level of efficacy. Meek (1988: 469) alternatively reflected that culture was not something that you could simply "*turn on or off*". On the other hand, Uttal (1983) felt that although this may be true in the short term, cultural manipulations and required behaviour were possible over a longer period of time. Psychological studies have observed some link between time and human behaviour (Orstein, 1975; Michon, 1985; Adam (1990). Time and its interrelationship with culture and resultant behaviour therefore need particular consideration.

2.3.1.3. The Time Dimension

Culture, as a belief system, is more than the involvement of anthropological and social values. The dimension of time in experience terms can bring about a revocation and a replacement of values. This thinking is by no way new. Going back to the days of Hegel (1807, referenced Hegel, 1967) who pointed out in his *Philosophy of History* " *What experience and history teach is this- that people and governments have never learnt anything from history or acted upon any lessons they might have drawn from it*". Experience as a base of beliefs is not time-linked and what has been learned can be unlearned. Weick (1995: 189) sets out two types of time links. The first is what was done and the second was what is done now. The former reflects the latent experiences and past sharing of experience, which could result in strong cultural values or creating the "glue" in social relationships (Smircich, 1983). As Hofstede (1991) stipulates, could bring about "*collective programming*", a "*common mindset*" relating to a manifest convergence of values and behaviour. This questions whether it is more beneficial to invest in long-term cultural development than on short–term training exercises. Weick (1995:180) too sees the need to share experience in order to bring about a convergence of values.

In considering the culture-time paradigm, what is initiated is a wider range of investigations into the relationship between the perception of time and the interrelationship of these perceptions with culture. A time perspective can vary not only from process to process but also from person to person and culture to culture, and by relationship to relationship. A time condition may be seen as static or dynamic. Static time is where conditions are seen to remain unchanged from

what was originally perceived. Dynamic time condition is independent of variations in the control processes but considers how the control system behaves within the time period, particularly in response to external circumstances acting upon it. Time also may be perceived in terms of duration, or tied to the culture of the person or country or time-perspective hidden in the nature of the work itself which (Hägerstrand, 1985: 5) calls embedded time or sub-time lag. The implications of the "social glue" culture do not automatically assume a culture that lends itself towards safety consciousness or to reduce the level of human error. The Hawthorn experiments demonstrate that strong groups can become risk averse and too "safety engrossed" to be flexible. While it has been demonstrated that groups become significant risk takers, they can at times ignore safety (Phillip, 1993).

The concept of time in risk and operations management is one variable that is not easy to analyse both cognitively and behaviourally but is recognised as an important factor of management and a key variable in dynamic environments (Rogalski, 1991). Handy (*ibid.*) puts it "*the management of the future has to go hand in hand with the management of the present*".
It is undoubted that the centrality of risk control is that of processes and the centrality of processes is that of knowledge of risk, past, present and future. The very essence of risk control is that it is based on temporal conditions, that is, it supports the synchronisation and sequencing of processes and the timing of such synchronisation and sequencing. Van Daele and De Keyser (1991) considered the context of managing processes in real time and the synchronisation of actions. Lanir (1991) observes that organisations function within numerous timescales and those that do not monitor numerous timescales could be subjected to "*fundamental surprises*". Rogalski *(ibid.)* observes that time is more than duration and that it embeds into issues such as usage of time within different relationships at different levels of operations, which can impact the distribution of information and decision-making. The post-modern period is characterised by the acceleration of time compression. The existence of short-time frames to operate exposes socio-technical relations. However, what emerges is that to view time purely in linear terms is not sufficient. This paper therefore reflects on three particular dimensions of time: dynamic time in response (the time-value), the time relativity of behaviour and the concept of embedded time. The dynamics of time in response at the point of incident and during incident are critical (Schultz, 1971). Lukacs (1971) suggests that risk management cannot be considered in terms of

"frozen realities". However, management is relative to the conditions of which time is one. The time-value of rational decisions is greater during preparedness as there is time to respond (Ansoff and Sullivan, 1993), but there may not be during the point of incident. The "on the spot " or synchronic analysis of human actions and behaviour becomes critical as action time may vary from preparedness time. It is suggested that ignoring the dynamic time can bring about a shift from risk to disaster (FIGURE 1).

FIGURE 1

TIME IMPACT AND RISK

CONCEPT OF RISK	>>>>>>>>>>>>>>>>>>	CONTEXT OF DISASTER
TIME-VALUE OF PREPAREDNESS	>>>>>>>>>>>>>>>>>>	TIME-VALUE OF RESPONSE

2.3.1.3.1. Time relativity of Behaviour

Einstein's (1915) theory of relativity, although unconnected to social science, provides a dimension of thought that time cannot be absolute but is relative to its context. For example, the more frequent an occurrence; the time for preparedness will be less (so the time period for preparedness is short). Alternatively, where the occurrence is infrequent, there is more time for preparedness. The behaviour in preparedness will vary simply by relation to the time perceived as available before the next event. For example, fire events being more frequent than oil spills so the level of preparedness is time linked, in that there is greater emphasis on ensuring fire prevention and fire controls being in place. An oil spill on the other hand may have a sophisticated risk plan, but if events remain far and few between, there could be complacency. As one UK county contingency officer stated to the author "*ironically we need more oil spills to demand more resources*". The relativity of behaviour to frequency of event itself thus produces sub-time lags, or as Hägerstrand (1985: 97) puts it, "embedded time". It may be that where an oil spill does not happen for many years, and the drill for spill preparedness becomes lax, this increases the time element for operational set-up and implementation for action, thus increasing the behavioural relativity to risk making the operation more risky. The time relativity to the frequency of event therefore fundamentally affects behaviour.

Relativity of time is particularly critical in the operational contexts. Operational systems have to take into account the time conditions of the risk control/ preparedness stage, the time conditions in the social structuring of action phase and also the time conditions during the social structuring

of the period post-risk event. There are also different time considerations within each of these stages. For example, during the preparedness stage, disaster modelling and plans as a rule view time in a linear monochronic way (Hall and Hall, 1990). The plan and pilot training exercises involve synchronic time-values while the actual activities during the incident are polychronic (time is perceived as more than linear). Shrivastava (*op. cit.*: 5) in his Bhopal case identified polychronic behaviour where the Bhopal railway stationmaster ignored survival time to arouse other stations to the disaster and to stop trains from coming into Bhopal, thus saving lives and creating even more of a disaster. Other stationmasters were able to stop the trains. Yet part of the result of the accident was due to the time-space compression (Harvey, 1989) whereby it could be argued that the failure in the systems operations was due to Union Carbide's compression of time by reducing investment to increase profitability. Gergen (1991) argues that time compression exposes people to a wide variety of experiences with actions and thoughts informed by multiple perspectives and values, creating a blurring of role boundaries, therefore multiple role performance within a narrower time frame. Weick (2001: 100-121) in reassessing the 1949 Mann Gulch incident in the United States where 13 fire-fighters, out of a group of 16, lost their lives. The group did not follow their leader as the urgency of the fire reaching them made members take decisions against those of their leader. Time was significantly compressed and roles changed and people took on the responsibility of managing their escape leading to deaths.

It becomes important to understand the relationship between systems of risk and incident management, and time relativity of behaviour, as many systemic failures stem from this connection. Incident plans and high reliability systems can lead to fail because of monochronic view of time. There is an expectation that the operational ordered sequencing of events assumed in one time context shall be replicated. In reality the probability that conditions will be replicated is exceptionally low. New interactions arise at random and may bring about disorder. The interactions may not actually bring about disorder or chaos in the usual sense of the word; it may appear to be chaotic because it does not support predictions made under the operational plan. Such a disorder can affect the time perspective for action. Once an incident happens it sets into motion the planned series of synchronic and linearly dictated (planned) set of actions. At the same time it also sets into motion a series of random actions. For example, the human resource capability may be lacking, or information that would be normally available is not so because of

communication system difficulties. These new conditions will have a strain on time for action and may result in dynamising the time conditions leading to entropy. Energy diverted into action is no longer able to be converted into results, causing further disorder and collapse of systems, or in other words a desynchronisation. A good example of this is seen in the crisis at Bhopal recorded by Shrivastava. Shrivastava opens his study with these comments " *At about 12.40 A.M. on December 3, 1984. ..Dey* (the control room operator at the Union Carbide pesticide plant) *looked at the gauges on the control panel in total disbelief. .... Bewildered by the readings, Dey ran to the storage tank area to investigate,. ..... Dey, along with the ...supervisor on duty.... And several operators, attempted to control the gas leak by turning the safety devices...When all efforts failed they fled the plant in panic*" [*sic*]. Time was of the essence, safety procedures were attempted, but the result was disorder and eventual chaos. However, further exploration into the case revealed embedded time-values where safety was strategically neglected to the point of recklessness. Despite its existence, the safety system was of little value because of the accumulation of behaviour such as provision of fewer resources, less training, less information and inadequate management of the system. The Bhopal plant was a time bomb ready to erupt. Boisot (1995: 326) makes the link between cultural manipulation and the reduction of entropy. As D. Smith (:16) puts it, "*the creation of the corporate mind-set which is loathe to accept any challenges...lies in the heart of crisis incubation within organisaitons.*". The attitude and behaviour of organisations therefore is paramount in the mitigating of failure.

It also becomes critical to know from what time perception risk controllers approach the risk. If they approach the risk from a technical perspective, time-values may take on a different dimension from the time-values arising from a strategic perspective. A strategist may place more emphasis on a historic time context (decisions based on events history or other strategic factors) while the technical perspective may be based on experience and knowledge of the risk. The perspectives are different, and if it is considered that perspectives have a direct link to the approach to risk control, then their approaches to the time-value of the risk must have significant effect on the control mechanism and hence eventually on risk output. What, therefore, emerges is that if organisations strategically put a low priority on safety, however professional the technicians might be, time therefore becomes inconsequential, as there is greater certainty of

event. On the other hand if high value is put on safety strategy which is unsupported by the technicians, the same outcome is likely to emerge.

Emerging thinking has been influential in linking human behaviour with concrete decision-making processes. What constitutes reality is more than structures and process. If it is assumed that organisations are culturally driven then the reality of risk management and problem solving involves the shared values of its members. As Jaffe (2001:7) puts it, that if there has to be "*a definition or construction of reality*", it is "*for people to act and organizations to function*". Decision-making theory, traditionally is based on rational choices and these rational choices were linked to economic rationality, i.e. achieving maximum subjective expected utility (SEU. Simon (1983), however, observed that rationality was constrained or "*bounded* ". The SEU theory somewhat illogically presupposes that the risk assessor has access to data and function so as to make probability judgements. It further assumes that accurate information is available to allow for an effective set of alternatives; finally equipped with this information, the risk assessor is able make a decision based on maximum expected utility. As seen in the Bhopal incident this was far from the case. Simon himself admits that constraints exist: " *human beings have neither the facts nor the consistent structure of values nor the reasoning power at their disposal that would be required..... to apply the SEU principles*". This develops the debate between what is assumedly rational and what is seen as optimal.

2.3.1.3.2 Rationality and Time

Einhorn and Hoggart (1981) argue that this distinction (between rationality and optimality) is not only one of degree but of kind. The association between the two is not only reliant upon the staged evolution of their interdependency but also by reason of being exclusively independent in their behaviour. For example, shipowners may rationally consider the need to invest to make their ships safer but at the same time may be aware that it would "*not be economically, operationally or commercially desirable to comply with the stringent regulations required of them*" (Abecassis and Jarashow, 1985). This financial constraint may result in a choice supportive of optimal usage (what would be good for the organisation) rather than a choice based upon rational usage (what would be good for all).

Herrnstein (1988) suggests that the subjectivity of utility (economic preference for one against another) is motivational while the subjectivity of time probability of risk is cognitive. That is, it does not depend on the risk acceptor's behaviour in facing the risk and is therefore independent of the knowledge of the risk acceptor. Subjective probability is defined as the degree of belief in the occurrence of an event, and cognitive subjective probability being that this belief is based upon some perception that the occurrence is likely to happen. Therefore, it could be argued that cognitive values could well in themselves be motivational, as the measure of belief is based on the duality of the cognitive and motivational behaviour. It, therefore, becomes difficult to evaluate a risk to a finite degree of accuracy. The observation is that rationality and optimality could become mutually exclusive and that if decisions were based on motivational values, this would in turn indicate choice for optimum utility rather than for rationality. This could pose questions such as: is it important to override the decision for economic optimality where human lives or property is endangered while using more cost-effective services for lesser effects. What risk control policies would violate the social contract? Are policy decisions guided by the organisation's values or by what society considers they should be (Fischhoff *et al.*, 1989)?

Therefore behaviour related to economics (time-payback), which is the probability of not achieving effective payback on investment, may result in failure as much as that related to the perception of value of cognitive errors (time–reliability) where probability of failure resulting from decisions was made to prevent a risk event. Predictive techniques such as THERP (technique for human error rate prediction) by Swain and Guttmann (1983) and Human Reliability analysis (HRA) (Schurman and Banks, 1984) have been developed as well as techniques concentrating on the changing culture of personnel involved in safe systems management.

Adam's (1990) suggestion that the time dimensions are not only to do with length and precipitating effects but also synchronisation, sequencing, controlling and measurement signifies that not considering time as a behavioural factor would limit the understanding of what constitutes an efficient risk and incident management system.

In effect the time–behaviour continuum views a risk situation from the opposite direction from people to risk rather than from the direction of risk to people. Both action (control) and risk are therefore fundamentally interconnected with time and without the necessary understanding of this interconnection it becomes difficult to establish the concept of dynamic risk.

Texts on organisation behaviour emphasise the important of changing cultures by way of training programmes, effective leadership and change strategies. A person's ability to make rational judgements about a risk situation may be based on a developed culture by way of training and experience. However, when handling a crisis, there may arise a new set of values, which may require a breaking out from one cultural mode to another.

2.3.1.4. Organisation Culture-Time Aspects

Culture –time variable varies by the nature of work, place and situation. For example a dealer in the futures market may need to work to short time-frames and take high risk decisions while a civil servant may be able to schedule work to meet events (such as implementing governmental policy), taking little or no risk overall. Risk systems in one organisation will not replicate the same cultural conditions in another. It gets more complicated where there is co-action particularly involving a number of different organisations, which are also culturally different. Therefore to attempt to distinguish between the cultural systems, Deal and Kennedy (1982) put forward the view that there is a need to categorise cultures according to two determining factors: first the degree of risk associated with the organisation's activities and second, the speed at which organisations and their employees receive feedback on the success of their decisions. The two factors of risk and time of feedback give rise to four generic types of culture: tough-guy, macho culture; the work-hard/play-hard culture; the bet-your-company culture; and the process culture.

Tough –guy, macho culture: Here individuals in organisations have a high risk-taking culture and require quick feedback to their actions. Generally members operate at a fast pace, occasionally taking short cuts.

Work-hard, play-hard culture: Here individuals take few risks but require quick feedback to their actions. Generally there is a high level of low risk activity that takes place. Computer departments are generally work-hard/play-hard cultures.

Bet-your-company culture: Here individuals take large risks but do not expect quick feedback; at times it could be years before feedback is achieved. Generally activity is in stages and part of a bureaucratic process. For example, research departments are generally happy to wait for the results of their experiments.

Process culture: Here individuals take very little risks and do not require quick feedback to their actions. Lack of feedback results in a shift of focus from what is done to how it could be done, and culture lends itself to a "covering your back" mentality. Bureaucratic in culture with outcomes predictable and systematically derived. Civil service, government departments or large (generally hierarchical) organisations sport this culture. FIGURE 2 considers the behavioural forms of the four corporate cultural types.

FIGURE 2 – BEHAVIOURAL FORMS OF DEAL AND KENNEDY'S CORPORATE CULTURAL TYPES

R= Risk, T= Time to respond, V= Vulnerability to conditions: H= lot of time to respond; l= little time to respond: Risk (h) – high risk situation; Risk (l) = Low risk situation.

- *The tough –guy macho culture* – R(h) = T (l) + V(h) The culture is one of thriving on high risk scenarios with little time to respond.
- *The work hard/ play hard cultures* - R(l) = T (l-m) +V(l-h) The culture is one of thriving on high level of activity but in a medium risk scenario.
- *The bet-your-company culture*- R(h) = T(h) + V(h) The culture is one of thriving on high risk situation with a low vulnerability scenario.
- *The process culture* - R(l)= T(m-h) +V(l) The culture is one of thriving on medium level of activity but in a medium risk scenario.

Adapted by the author, using Deal and Kennedy's four cultural types.

Deal and Kennedy's generic types provide some link between culture, time and risk. To view culture purely in terms of structures (Harrison, 1972) and national cultures (Hofstede, 1980; Trompenaars, 1993) provides single dimensions of culture. If the implication is that culture is central to making a system vulnerable, then viewing culture demands understanding of not the form of culture but the behaviour of individuals in involved in risk and systems management. Organisations or collective operations may be high risk requiring individuals culturally framed

to deal with high risk activity. It would therefore need to go beyond the generic type to how a culture change strategy might be instituted. The word "instituted" is important and points the finger to the organisational role in culture formulation and system failure mitigation. Boisot (*ibid.*) captures this feeling well: "*culture is the institutionalised application of intelligence...*". The level of system vulnerability, therefore, is determinable by the usage of the value of time. What is considered next is the link between three contexts: the response or preparedness context; the culture context; and the relationship context, the key variable being time.

2.3.1.5. Risk and Response Time

Gabor and Pelanda (1983) stipulated that response to an incident varies by frequency of risk occurrence and levels of preparedness. For example, the more frequent an occurrence is, the lesser the time for preparedness and more dedicated resource is required for action (so the time period in action is shorter by reason of routine preparedness). Alternatively, where the time frequency of occurrence is less, this results in an increased time duration for preparedness and a greater time set-up for action. R (h)= P (l) +V (h): [R= Risk; P= preparedness; V= vulnerability; H= high; l = low]. This equation of vulnerability, by Gabor and Pelanda, overlooks the fact that high level of preparedness may not necessarily decrease the risk but may increase it if the systems are not managed effectively, and vulnerability remains high. A low time level to respond, lack of adequate management or adverse risk conditions can bring about a high level of vulnerability.

Low preparedness and high vulnerability = high risk	R (h) = P (l)+V (h)
Compare with,	
High preparedness but high vulnerability = high risk	R (h) = P(h)+V (h)

2.3.1.5.1.Time values in the risk /response equation

It may be that if an oil spill does not happen for many years, the preparedness may become lax, and despite time abundance response preparedness is weakened, in turn weakening the response if the event should arise, thus making the total operation more risky. Therefore, if the relationship between preparedness and time is considered the impact on vulnerability could be as follows. (Tv = time-value)

• Vulnerability is high, despite high time duration to respond as low preparedness. Therefore should an incident happen the risk is high R (h) = Tv (h) + P (l)

2.3.1.5.2.Time-behaviour continuum

Assuming that the relationship between activity and time manifests itself in the form of preparedness, the following model has been derived. FIGURE 3 (APPENDIX H) illustrates the relationship between high and low level of activity to high and low level of time available for preparedness in graphical terms demonstrating the areas that failure can arise.

MODEL B: Time-behaviour relationship outputs:

• Low activity / time duration low –	R(h) = P(l) +Tv(l)
[Chance of high risk of failure]	**HIGH RISK OF FAILURE**
• Low activity/ time duration high	R(h) = P(l) +Tv (h)
[Investment in preparedness needs to be high priority]	**FAILURE ZONE**
• High activity/time duration low –	R(h) = P(h) +Tv(l)
[If capability weak the risk of failure is high]	**FOCUS ON CAPABILITY**
• High activity/ time duration high	R(l) = P(h) +Tv(h)
[Risk can be lowered where focus is on continuous preparedness]	**READINESS**
• Medium activity/time duration medium-	R(m) = P(m) +Tv(m)
[Most probable scenario- as full preparedness may not be possible]	**FAILURE ZONE**

Model B demonstrates that the relationship between activity and time although definable does not provide concrete evidence that this relationship will affect the risk-state or riskiness. However it does provide a reminder that without preparedness of some sort, there is potential, although the riskiness is high, that that the mishandling of the situation, whether by lack of preparedness or not, might increase the levels of risk vulnerability. The model will be viewed further in the context of the empirical study.

2.3.1.5.3. Applying the time-culture context to oil spill collective operation

Using the adapted model of time above:

Before the event

Most organisations are low risk with plenty of time to respond to preparedness and vulnerability to conditions is low:

R (l) = Tv (h) + V (l)

MCA and other emergency groups – work hard /play hard

R (m)= Tv (m-h) +V (m-h)

Oil companies (and to some extent Port authorities) – work hard /play hard –

Oil companies and port and harbour authorities because of the risk of spillage from loading and unloading operations, have less time to respond. Risk therefore is medium with low to medium time to respond and again low to medium vulnerability to conditions:

R (m-h) = Tv (m-l) + V (m)

Environmental and research groups – The bet-your-company culture-

R (h) = Tv (h) + V (l)

Local Authorities – The process culture – R (l)= Tv (h) +V (m)

During the event:

During the event the time to respond is low and vulnerability is extremely high

R(h) = Tv (l) +V (h).

It can be seen during the event there is a shift in the vulnerability conditions. The time to respond becomes a critical factor and the urgency in operation is no longer in low to medium vulnerable conditions but in high vulnerable conditions. Even the environmental and research groups respond to the change in vulnerability, for example, dealing with injured birds and animals and human health issues. Culture is therefore linked to both time elements and behavioural requirements arising out of the roles in incident management. In effect the time–culture context, views a risk situation from people to risk rather than from risk to people. Culture and behaviour are interlinked and to this extent behaviour is a risk factor itself and cumulative behaviour that arises out of disparate cultures, perceived risk and ability to manage that perception and risk becomes particularly critical. Both action (control) and risk are also fundamentally interconnected with time and without the necessary understanding of this interconnection; it becomes difficult to establish the concept of dynamic risk.

This brings the exploration to the final theory in this chapter: that the level of congruent activity (that is relationship between the parties) has a direct link to the level of risk.

2.3.1.6.The Link between Risk Environment and Relationships

Trist and Bamforth (1951) consider the degree of relationship between individuals to be a critical aspect of risk management which as Perrow (1984) stated, if not properly controlled could bring about failure. Marwell and Schmitt (1975) stated that the key variable to affect the relationships between the behaviour of disparate groups involved in the co-operation was the level of risk vulnerability: the relationship between the level of risk in which the co-operation was to happen and the effects of time.

Propounding four risk/relationship situations below demonstrates how human interaction is affected by the vulnerability of the environment in which relationships exist. Four continua are considered:

- Low risk /high relationship continuum;
- Low risk/low relationship continuum;
- High risk/low relationship continuum;
- High risk/high relationship continuum.

As before, high risk is where response to risk is immediate. Low risk is where there is sufficient time to plan and undertake a response.

Low risk /high relationship: In this environment the risk of spillage is low or non-existent but the interrelationship between the groups forming the collective operation is high. An example would be in the case of simulated disaster planning exercises where all involved know that there is no risk and all attempts are made to collaborate towards one single objective – disaster mitigation. The fissures in this relationship would be in the discussion of issues such as logistics, and procedural flaws. These would be obvious and visible issues for discussion and development.

Low risk/low relationship: In this environment the risk of spillage is low or non-existent and the interrelationship between the groups forming the collective operation is also low. An example here would be the case of segregated simulated disaster planning exercises where those involved are members of a particular group or organisation. The members have a double agenda: one of disaster mitigation and the other to ensure their organisation's objectives are adhered to.

The fissures in this relationship would be issues such as intra-procedural flaws. These would be obvious and visible issues for discussion and development for the members of the organisation but not for external interests.

High risk /Low relationship: In this environment the risk of spillage or event is critical but the interrelationship between the groups is low. One example can be drawn from the Ohio State Penitentiary arson disaster in 1930. Despite signs of smoke and yells, "the guards mindlessly following orders, tried to force them into their cells" (Davis, 1993:202). If the focus has been not on procedure but on disaster mitigation, a riot would not have ensued, and the death rate may have been less. The fissures in this relationship are issues such as procedural dogmatism, blind adherence to orders and lack of adequate empowerment.

High risk/ High relationship: In this environment the risk of spillage or event is high and so is the interrelationship between the groups. This would be seen the case of high levels of empowerment and working collectively towards the main objective rather than towards self-interests. The fissures in this relationship would be issues not directly under the control of the involved parties, such as lack of available and adequate equipment.

The distance in the continuum between a low relationship and high relationship environment is the behavioural determinant. To narrow the distance calls for a well-defined interfacing and the development of a congruent culture.

2.3.2. COLLECTIVE OPERATIONS AND FAILURE

The studies undertaken by the high reliability group are predominantly concerned with systems-failure intra-organisation. The influence of the "collective" inter-organisation raises some important questions. It begs questions as to what constitutes a "collective" and the extent to which such a collective may contribute to failure. It therefore becomes interesting, if not critical. to consider whether collective operations operate similarly intra-organisation, in joint (inter-organisation) operations made up of a number of organisations brought together to manage the risk and incident, as in the case of the national contingency plan for marine oil spills.

To comprehend the implications of the "collective" in risk management and to identify points of failure, there is firstly a need to understand the meaning of the word "collective". The term collective is not as simple as it appears. Savoyant (1984) and Leplat (1991:52) attempt to

distinguish the nature of collective activity (execution requires several levels of operators) from collective task (whose execution requires several operators). Leplat observed that the mere existence of several operators was not sufficient to formulate a collective task and that a collective task need not necessarily constitute a collective activity. Savoyant (1984) defines collective activity more specifically, where subjects have the same goal but each sees his contribution forming part of the whole outcome. This, Savoyant suggests, is the causation of the collective group. Herbst (1974) developed a matrix between task and role. He proposed four variables: i) *Task relationship*: tasks carried out together or separately; ii*) Role differentiation*: tasks carried out are identical or different; iii) *Task dependence*: tasks may be dependent, interdependent or independent and iv) *Goal dependence*: goals are shared, independent or unreciprocated supporting. By combining these variables, Herbst attempted to develop the relationship between tasks and roles developing a further four relationship dimensions. First, tasks are pulled together to obtain a final result, such as rowers rowing together with or without a coxswain to win against another set of rowers. Second, where the group's output is reliant on the least proficient member, that is, the work is only done at the ability of the least able, as might be seen in assembly line work. Thirdly, where outcome is reliant on the most expert of the members, as might be achieved through strong leadership of the activity. Finally, where there are discretionary or divisible tasks, the group seeks to integrate members' contribution. This is seen in joint operations made up of disparate expert groups working collectively to achieve an output. It is this final scenario where attention is focused whereby the levels of interaction and integration between the disparate groups may become important factors in bringing about failure or success. To understand how integration and interaction work requires a little more understanding of the concept of the collective activity.

The definition of collective activity is not fully settled. Aspects of collective tasks and co-activity have arisen, distinguishing these from what is considered a collective activity. Leplat distinguishes collective activity from co-activity. Like Savoyant he defines collective activity as individuals working together and sharing the same motive (for example individuals working in organisations). On the other hand, co-activity is defined as individuals working together but having different motives (for example, where disparate organisations come together). Leplat and Cuny (1979) and Vandevyver (1986) observed that accidents at work arose by reason of the

different levels of co-activity. Savoyant (1979) further distinguishes co-action as steps toward becoming or converging into a collective action from co-action that is stabilised where actions are not transformed into to the collective. For example, the national marine oil spill contingency plan would be considered to be a series of co-active steps towards a collective action (marine response or shoreline response). On the other hand, co-action would be where a number of people participate in an archaeological dig, where although working co-actively, there may be different groups with different motives, seeking different finds: material, geological, skeletal and so forth. There can be success or failure in both instances. Therefore, it has to be questioned whether successful outcome is dependent on the convergence of goals. Also situations exist, where goals (or as Leplat considers them, sub-goals) remain disparate but there is convergence with respect to the main goal. For example, under a disaster plan, different organisations participate, each with different motives. However all organisations have the overriding motive to ensure that the disaster is effectively averted or mitigated. The representation of co-action in the collective lies in its ability to transform its focus to the collective; where this is not done then failure might arise. Two cases recorded from Turner and Pidgeon (*op. cit.*.) make this point. In the 1973 Summerland fire incident on the Isle of Man (pg 45), although there was co-action involving a number of parties (the local authority, the leisure company, the designers, the architect and associate architects and the public), there was little collective action. The groups were operating interdependently, independently and within "old boy networks" with little convergence of communications of key problems. In the 1967 Dudgeon Wharf explosion incident (pg. 99) three organisations were involved, the demolition firm, the principals and the fire brigade. Each had the misperception that the job was being carried out safely when it was not. The non-ensuring by each group of the safety issues led to the explosion.

These observations and event histories show that it is the level of relationship or interdependence between members of groups with similar or disparate motives that contribute to some degree of failure. Much earlier, Ouchi (1977) and Weber (1922/1968) had regarded the level of interdependence to be an important factor of performance. Ouchi identified the problem of "goal incongruity" where members had different interests and therefore acted in ways that would advance self-interest. Gerlach (1992:3) studied the Japanese *Keiretsu*, an inter-corporate alliance characterised by "*institutionalized relationships among firms based on localized networks of*

dense transactions, a stable framework for exchange, and a pattern of periodic collective action". Ouchi believed this *Keiretsu* to fit his model of the "*normative clan*" characterised by informal and familial-type interactions, a common culture, trust, loyalty, obligation and responsibility, social, economic and moral. Weber on the other hand as part of his *rational-bureaucratic* model of organisations, considered the necessity for behaviour converging through formalised structures towards the clearly defined organisational goals. The interdependence of tasks formed part of the co-action leading to the collective activity.

Other variables have also been considered in the context of the "collective". Stoelwinder and Charns (1981) called attention to contextual vulnerability. They stated that interactions between individuals and levels of control could vary in high uncertainty situations from that of weak uncertainty situations. Crozier (1964) and Etzioni (1975) also observed that where there was high uncertainty then high level of controls were used which affected collective activity. Simon (1957) in considering "*bounded rationality*" and Breaugh and Becker (1987) in considering autonomy as variable of work, both regarded the levels of organisational constraints as having an impact on collective activity. Perrow (1984) considered that the level of activity structuring was higher in highly stable organisations than in organisations operating in uncertain environments. Organisations geared to uncertainty therefore tended to develop interactions that were more flexible and capable of dealing with changing situations.

The critical *macro-level* factor in the concept of the "collective" therefore seemingly lies in the values of structural functionalism rather than that of convergence of goals or sharing of values. At a micro-level the theory of symbolic interaction aims at analysing individual level social interaction and interdependence. Mead (1934:152-164) and Goffman (1969)[xvi] both concentrated on the relevance of symbolic interactionism with emphasis on social construction and the sharing of values. They observed that groups by their very nature involve the sharing of values and social interaction and that members learn through a process of interaction with others within the group and with society as a whole. The symbolism within groups was central to the defining culture or the "collective unconscious[xvii]"of groups. Blumer (1969) defined symbolic interaction "*as interaction as it takes place between human beings*" focusing more on the interactional aspects of behaviour than on the sharing of values. Fine (1993) observed that "sensemakers" invoked

imagery of the symbolic nature of interaction associated with elements of action and interpretation. This is seen in examples of media reporting of high profile incidents, where sights of conservation groups working with dead or oiled birds in the event of an oil spill evokes the image of a disaster. Weick (1995) noted that Blumer however, was hesitant *in "overestimating the extent to which social sense-making means simply shared understandings*". Blumer's distinction between symbolic interaction and theories of collective operation is that humans interpret each other's actions and use symbols instead of simply reacting to each other's actions. In effect it creates a process of interpretation (of language and actions) between stimulus and response. Organisations, like individuals, are also situated in the symbolic context where individuals respond by way of a process of interpretation between stimulus and response. For example, the imposing of performance related pay creates a symbol for responding to a stimulus for greater rewards. The culture of the organisations becomes therefore definable by creation. The concept of symbolism is to gear individuals to be motivated to change or shift their behaviour towards organisational goals. Mead (1934) suggests that any action arises from the collection of individual motivations and not from group motivation. However it was observed by Janis (1982), who researched failures in collective action, that mistakes within groups were made as a result of "group think", that is where unanimity is sought which overrides the individual's motivation realistically to appraise alternative courses of action. It therefore becomes debatable to what extent groups of interdependent risk controllers affect behaviour. Going back to the days of the Hawthorn experiments[xviii], these highlighted examples of the intricate interactions between management and employee groups. The key findings here indicated that groups responded to inter-group motivations which were not linked to what management assumed might motivate them. For example one group agreed to work to a certain level of production so as to safeguard all the jobs in the groups. The social connection and the valued scenario of inter-group paternalism were more important than a higher level of reward. The complexity of the collective was particularly highlighted in these experiments.

The behaviour of individuals within groups can arise not only from inter-group norms but also from the nature of work. Phillip (1993), observed that behaviour within groups was affected by uncertainty when the group members had to deal with risky tasks. He suggests that there is a "group polarisation" phenomenon, i.e. a shift from the average position of the group. He quotes

two theories the Social Comparison Theory (SCT) and the Persuasive Arguments Theory (PAT). According to SCT, group members, in risky situations, shift their thinking in the direction of the socially desirable viewpoint. PAT results in the shift of thinking towards the more dominant of the viewpoints expressed within the group. The word "dominant" also meant as superior, influential and more knowledgeable. For example, an individual considering the sport of abseiling a high risk may, because of peer pressure (PAT or SCT) show that the risk is perceived as being low by agreeing to abseil. The influence of the group can make individual members act towards a risk incongruous with their perception of that risk. There have been some psychological experiments on students which have reasoned that after a group discussed a risky situation, participants of the group were more likely to take on more risk. There were conclusions that groups were more likely to accept more risk than individuals (Brown, 1988).

2.3.2.1. Other Reflections on the Nature of Collective Operations

Groups therefore essentially imply a "*pattern of..... influence*" (Mullins (1996: 180). As noted the traditional systems approach to groups (Hawthorn experiments) indicate that groups are viewed as a socio-technical system "*concerned with the interactions between psychological and social factors as well as structural and technical requirements*" (Mullins, 1996: 182). Since the Hawthorn experiments, many profound studies have been done over the decades. The studies of Mayo (1933), Sayles (1958), Likert (1967) and Schein (1988:145) were responsible for bringing about the shift in approach from systems based approaches to sociological based approaches developing the concepts of culture within group systems. Although collective action at a macro-level may be observed objectively, at a micro-level the complexities of organisation, collective or otherwise, cannot be faced objectively. Individuals forming the organisations hold different sets of beliefs and have different motivational drives, although there is likely to exist at some level a core set of beliefs commonly held (Hedberg and Jonsson, 1977). This core set of beliefs evolves over time and embraces assumptions about the environment in which the collective organisation is operational (Pfeffer (1981), Sheldon (1980). To a greater extent the existence of core set of beliefs brings about some level of cultural and goal convergence legitimised by certain behavioural symbols and rituals (Deal and Kennedy, 1982). Symbols such as training programmes, the use of jargon and clichés and so forth, contribute to a social action and a sense of belonging to a group or collective action. The success or failure of a collective operation

needs to be considered in terms of how it manifests its culture convergence. For example do the core sets of beliefs hold well between the different groups during a crisis? Smelser (1962:49) considered that social action within collective operations devolved from two hierarchies – one among the role components and one within each role component. He identified that there are pre-existing strains or tensions that could affect motivations, norms and situational facilities resulting in a breakdown in the achievement of concrete goals. He contributes this strain to the existence of ambiguities that are not predictable but arise during the interaction.

Blumer (1969; 1976, cited in: Weick 1995: 43) goes a little further in role definition by separating sharing of values from alignment of values. He suggests that "*alignment.....need not involve .... sharing of common values*". *The participants may fit their acts to one another in orderly joint action on the basis of compromise, out of duress, because they may use one another in achieving their respective ends, because it is the sensible thing to do, or out of sheer necessity. In very large measure, society becomes the formation of workable relations*". What is inferred from this observation is that Blumer, in his attempt to separate the values of alignment from that of shared values, attaches a looser set of "sharing of values" to the former. In effect if we are to take the collective operations as under a disaster contingency plan, it is arguable that such an operation is an alliance of different organisations with their own values more so than a group that shares same values. In effect an alliance is more aligned to co-activity than the collective. This distinction becomes critical when attempting to evaluate the rationale for failure within joint operations. Symbolic interaction as a theory is therefore particularly interesting as most theories view collective action as a structural rather than as a behavioural phenomenon. By structural phenomenon, macro-level values such as role structures, status of players (such as those who give orders, those who co-ordinate, the technicians and so forth) and the process of operation are considered. However if a collective operation is viewed as a co-operating or co-existing set of cultural values rather than as a structural system, it becomes critical to view aspects of the make up of the social system. This would include values, norms and drives of individual parties, their experience, perceptions of their role and of others.

Collective operations or co-activity for disaster or emergency management by their very nature seek a convergence of actions. Mead asserts that convergence is achieved through the alignment

of individual actions with each other and with each party perceiving how the roles of others are carried out. The problem however lies in achieving convergence of temporary alliances. The fact that collective operations during emergency events are temporal, the relationships between the groups are suggestively weaker than say collective operations permanently operating within a dominant organisation. Temporal collective operations are vulnerable to higher levels of ambiguities by their very nature of high level of human interaction and "*multiplex relationship*" (Wallman, 1979). Such a relationship in itself has implications on concrete outcomes. However the time span for operation demands convergence towards a shared focus. If taking Blumer's thinking, assuming a loose set of shared values for such an alliance, it becomes questionable as to whether the very nature of alliances is an element of failure. Morse (1976) suggests the existence of sensitivity of one groups to the actions of others and that "*interdependence creates a loss of control..*", highlighting the fact that two or more bodies involved in decision-making can bring about an increase in riskiness and failure. In temporal collectives interdependence may take on a more risky state. The 1987 UK King's Cross fire saw that those who ran the trains (which were run efficiently) were less interested in "peripheral matters such as stations" (Kletz *op. cit.*: 86) (which were found to be a high risk). Interdependence may result in an imbalanced share of attention to areas that are retrospectively seen as critical and this may be more critical where alliances are weak; there could a case where one party may assume responsibility for risk management lying elsewhere. This was seen in the Herald of Free Enterprise incident in the same year. Kletz (*ibid.*) reports ""*sloppiness" occurred at all levels. The office in charge of loading did not check that the assistant bosun was on the job. He was unable to recognise him as the officers and crew worked different shift systems. There was pressure to keep time and the boat was late...the captain was not told everything was ok...he assumed it was. There was no monitoring system. Responsibility for safety was not clear. One director (thought) he was responsible, another said no one was...*".

What is described is a coherent deduction of a situation that developers of joint systems might wish to consider. Yet to assume, without empirical support, that all alliances will fail would be short of credible. Weick (1995:180) observes that the concept of sharing is not easily established. In effect the word "share" as suggested by Cole (1991:18:) could be less about the holding of values but more about division. Sharing assumes convergence of values, while division assumes

some level of parallelism of values. The distinction is fragile in the sense that sharing values assumes a focal point of convergence while division could also assume that there is focal point of convergence but different routes are taken. Collective operations involve both a division of activities by specialisation (parallelism) and an overlap of activities (integration). Without going into the detail on group cohesion theories, one point holds that actions have a direct link to the risk culture of individuals or individual groups (Stoner, 1961:280; Myers and Lamm, 1976: 602-627; Myers, 1990). The antipathetical view is that groups may be so disparate that convergence becomes difficult or that they converge for a period eventually diverging to their original interest.

2.3.3. Conclusion of Section Three

This section concludes that there are four interrelated contexts that affect the vulnerability of the context: the risk culture of the involved organisation, time for response, level of relationships between the parties and the level of preparedness. The relative abstrusity of collective operations and inconclusiveness in studies done make it difficult to distinguish the actual ambiguities arising out of the interactions. Part of the rationale for the participative observations is to compare perceptions in a low risk/high relationship environment and the concrete outcomes with that of the perceptions of a high risk and relationships that existed during a "real live event" of an actual spill. Time and its bearing on behaviour remains mainly unresearched in the context of incident management and there is much complexity in viewing social time (Bergmann, 1981). However, critically, time effects can bring about greater vulnerability. It is no longer possible to view risk as a one-dimensional concept. Risk is viewed in relation to behaviour towards it and this is changeable by reason of the environment in which it operates. The risk becomes greater where the perception of what is risk is underestimated or where it is overestimated.

2.4. SECTION FOUR: FAILURE IN THE CONTEXT OF MARINE OIL SPILLS

The high reliability group distinguishes between the control of specific risk sources and the general effects of management of risk. What emerges is that it becomes easier to focus on the control of physical risk sources, but less so, on human and other uncontrollable risk factors, the control of which has instigated significant debate. Also emerging is that management of risk has less to do with prediction and more to do with development of risk awareness and safety behaviour. However, what we have seen so far is a context that lends itself to man-made risks with man-made controls rather than one that relates to both man-made and natural risks. *Prima facie*, it appears that control systems are all about operational, social and political conditions; however, it is seen in the case of oil spills that there are additional conditions that bring about increased riskiness. Below, we consider conditions in the light of two co-incidental phenomena arising with oil spills, a marine phenomenon and a coastal phenomenon, with three possible options. The failure in controlling the former results in a failure of the latter. The failure of the former does not bring a failure of the latter and the success of the former being sufficient to prevent a disaster. To understand this requires knowledge of characteristics of the marine oil spills and the causes of failure.

2.4.1. BACKDROP TO OIL SPILLS

The 1967 *Torrey Canyon* oil spillage off the UK coast cost about £6.5million. The spillage was significant in both tonnage terms (119,000 metric tonnes) and in terms of its environmental[xix] impact resulting in hundreds of miles of oily beaches and the deaths of thousands of seabirds (Morris and Loughlin, 1994). In 1989 the *Exxon Valdez* spill, which was only one-third of the *Torrey Canyon* spill, cost the Exxon Corporation in excess of £9 billion. Four and eight years later two further major tanker spill events occurred off the UK coast, The *Braer* (1992) spilling about 85,000 metric tonnes of oil and the *Sea Empress (SE)* (1996) spilling 117,000 metric tonnes (TABLE G, APPENDIX A). The financial settlements, although far less than the *Exxon Valdez* spillage, were still substantial respectively about £55m and £22m paid (with claims still contested)[xx]. The cost per metric tonne in 1967 was £55 while in 1996 it had shifted to about ten times this amount. (TABLE H AND TABLE I, APPENDIX A) more. Loughlin (1994: 1-4) observed that there was disparity between costs and spillage rate which

was significant. Spill costs were increasing disproportionately with the rate of inflation while the spillage rate was significantly decreasing[xxi]. The increase in liabilities from 1967 to the nineties is approximately a 700% increase, which is about 7 times more than the cost of living index over that period, making this risk almost unacceptable. The low probability of risk of occurrence of large spills therefore appears to have very little implication for the level of actual economic loss.

2.4.1.1. Tanker and Tonnage Losses

The profile of tanker losses indicates that the ratio of tonnage loss to tanker loss has also been increasing stealthily. It is observed that, although there was an increase of 37.5% in tanker losses in the six year period from 1989 to 1994, the amount of tonnage lost in that period increased by a substantial 196%. It must be noted that all tonnage losses are not necessarily oil tanker spills, however, the increasing loss of tonnage has required special attention to risk managing the transportation of oil. ITOPF[xxii] reported that about 74% of oil spilt; were related to about 3% of incidents. Large spills were, although, infrequent they were more reported than the more frequent small spills. It has also been observed that that the quantity of oil entering the waters by reason of normal tanker operations can be far greater than that caused by accidents (Blanco Bazan (1992). The rate of spillage has been decreasing. In the decade and half from 1980 to1995 average spill numbers were reduced by about 66% from the decade 1970-1979. Yet by reason of high tonnage losses, significant legislation has seen developed to deal with the effects of these high level spills. (TABLE J, APPENDIX C)

2.4.2. CAUSES OF SPILLAGES

There has been much work undertaken to identify the causes that underpin these spills. Beyer and Painter (1977) and Brubaker[xxiii] (1993:4) reported that discharges into the sea have been mainly from ship-based rather than land-based or offshore sources. ITOPF also reported[xxiv] that the majority of spills occur in connection with routine operations such as loading and discharging rather than from accidents, and that these spills are small with some 91% involving quantities of less than 700 tonnes. In examining the range of causes suggested mainly from insurance sources, it quickly becomes clear that the key causes are a mix of physical, human and natural (TABLE K).

Table K: **SPILL CAUSES**

PHYSICAL	HUMAN	NATURAL
Age of tanker	Competence of personnel	Atmospheric conditions
Location of spill	Alertness of personnel	Oceanic conditions
Oil type	Spill response management	
	Level of legislation, nationally and globally	

2.4.2.1. Physical Causes

2.4.2.1.1.Tanker age and riskiness

The 1999 IUMI Marine and Casualty statistics showed that the bulk of the spillages occurred from ageing ships mainly in the tanker group range of 20-24 years followed by the plus 25 years. One reason appears to be the existence of a large number of old tankers in use[xxv]. The younger tankers fare well in the incident rate but after five years afloat, the incident rate increases substantially. Stricter underwriting standards have played a part in reducing casualty rates. ILU stated in their published 1995 statistics that stricter ship surveys[xxvi]have brought about the withdrawal of a number of old tankers.

2.4.2.1.2. Location of spills and riskiness

Loughlin (1994: 11) observed, from the *Exxon Valdez* case, that the effects of oil spills related significantly to location and conditions at the time of spill. However, the US is seen to be a special case because of its highly developed legislative structure and significant punitive legislation. It is therefore ironic that the costs of the spills have been greater in places which have had a developed infrastructure for spill mitigation. Although *Sea Empress* (*SE*) incident had taken it did not turn out to be a significant economic disaster, in social terms it was a catastrophe. The spill had happened in a designated marine environment high risk area (MEHRA[xxvii]). The Milford Haven Port Authority was held accountable and punitive damages were set in the region of £4million (later scaled down). Locations are measurable by assessment of the cost vulnerability of the respective coastline. ITOPF (1987) observed three factors that made a coastline cost vulnerable: firstly the geomorphology of the coast, i.e. the shape and process of landforms, which may or may not be susceptible to penetration and pervasion of spilt oil into the substrata; secondly, the density of the population proximate to the coastline, for the demands for clean-up tended to be higher in high-density areas than in those with lower densities; and thirdly, shorelines that served as recreational beaches or had important cultural or economic importance

were particularly cost vulnerable as in the *Braer* incident where salmon farming business was mainly affected. As observed, the potential affection of public life significantly increases riskiness.

2.4.2.1.3. Oil types and physical weathering process and riskiness

Cowell (1976: 370) identified greater damage resulted from to crude oil spills. Crude oil has numerous chemical components, with toxic elements[xxviii]. Oil, however, is usually toxic at the early stages of the spill (Cowell, *ibid.*). The aromatic constituents are the primary compounds to dissipate, thus making the oil less toxic. The greatest toxicity is found in the upper layers of the water surface (Loughlin, 1994: 17). There are in effect numerous grades of crude. The more weighty the oil the more difficult it is to remove it. Once oil is discharged into the water the combination of water, wind and other elements bring about a chemical change in the oil. When the oil strands on the coast, its impact results in the coating and hardening of the rocks, and accumulation in areas which have little or no contact with the waves. Oil therefore remains embedded and reasonably toxic, as the degradation process is slow. The rate of physical weathering (evaporation and dissolution), chemical weathering (oxidation) and biodegradation all help. This physical weathering manifests into emulsions (mousses), which in effect brings about a detoxification of the oil. Therefore oil reaching the beaches after the spillage generally has a higher level of toxicity than if the oil was allowed to interact with the water for a number of days. The wave action as Cowell puts it (*op. cit.*: 375) has a tendency to make beaches "*physically unstable*" and difficult to sustain a diverse fauna. The more persistent the oil the more difficult it is to remove it. Cowell (*op. cit.*: 370) noted " *The Torrey Canyon oil was almost biologically inert when it was stranded on the Cornish beaches*". The *Braer* crude was light enough to have lost most of its toxicity by the action of waves and much of the oil was dispersed due to the prevailing serious weather conditions. Much of the damage resulting from the *Braer* incident paradoxically was caused by the lack of human foresight such as the use of airborne oil spray, which was carried by storm force winds inland. The actual pollution effects were minimal.

The *Exxon Valdez* scenario was particularly interesting. The oil type was one of medium concentration crude. At the time of the spill, wind conditions were calm and the water cold and the oil spread in less contiguous and stable pools. Also the oil showed no tendency to form

mousse. The rate of physical weathering (evaporation and dissolution), chemical weathering (oxidation) and biodegradation was also slower. Three days later the effects were different. A windstorm arose which formed the slick into bands and streaks spreading over a significantly large area. Evaporation was lighter and about 15% to 20% of the oil evaporated while the toxic fractions of the oil were enhanced. High wave energy increased dissolution. About 15% to 20% of the oil dissolved through storm effects. The remaining slick emulsified with the seawater and created a mousse, which more than tripled the volume of the oil slick.

Although the vessel and oil type, location and sea and weather conditions of oil on its spill are critical deciding factors in what the environmental impacts will be, the human management of the spill is of particular importance. As seen in the *Torrey Canyon* spill, the oil was biologically inert by the time it reached the beaches. The excessive clean-up procedures that took place were unnecessary and caused more damage than good. It was held that such management was by reason of the inexperience of the spill managers. Also mentioned earlier, damage from the *Braer* spill was done more by reason of management errors than by the actual spill itself.

2.4.2.2. Human Causes

Smith (1968: 183) succinctly established that oil spillage is an escape (of oil) through human error or by unavoidable accident. The National Audit Office UK in 1991 statistically determined that the key determinant of tanker spillages was human error. The IUMI reviews also estimated that 80% of shipping losses are caused as a result of human failure. The Hull 1/10/83 Additional Perils clause recognised human error as a risk factor and extended the term of insurance to include loss or damage caused by accident or human error. The awareness of human error has caused a shift from what was academic to being part of risk management strategies. Strategic awareness has arisen mainly out of legislative dictates and insurance requirements. The focus on improving human action and behaviour during incident management has been in the context of development of personnel and management of operations. Recruitment and training of qualified and capable persons have particularly been seen as critical prerequisites for insurance. The International Convention on Standards of Training, Certification and Watch keeping for Seafarers (STCW 78) was one of the early regimes to be developed, with training considered as a

critical function for port authority personnel. Insurers rate the management and capability of the crew as key factors in their pricing.

2.4.2.2.1. Response management

Response in mitigating oil once it reaches the shore requires special management. Clean-up process is more difficult when the oil is dispersed and therefore has implications on costs. In both the 1976 *Urquiola* and 1978 *Amoco Cadiz* spills, about 30% of the oil remained deposited on the beaches and rocky shores. The rest was eradicated naturally by evaporation or by burning the oil (Davies *et al.,* 1997). The *Braer* as noted was a particularly interesting case:; the very adverse weather conditions and high wave energy (Thorpe, 1995) helped disperse the oil very speedily and prevented any significant affect on to flora and fauna. As a result little clean-up was required with little or no add-on costs. Moller, Parker and Nichols (1987) found that clean-up costs for lighter crudes were generally well below average unless there were exceptional circumstances such as heavy oil penetration into the substrata or where natural cleansing process was not happening because of calm weather. They assessed that cleaning up spills varied from $71 to $21,000 per ton ($0.24 - $71.43 per gallon) with an average of about $3.83 per ton ($15.06 per gallon)[xxix] (see FIGURE 4, APPENDIX H), the most important monetary determinant being location. Allen and Ferck (1993) also gauged that 90-99% of cleaning-up and rehabilitation costs were associated with the handling of shoreline response. In many instances disaster recovery (costs of clean-up) has been seen to be more expensive than disaster reduction. It has also been estimated that minor spills cost about $2.83 per gallon of oil spilled. In comparison the *Exxon Valdez* spill clean-up cost up to $2380 per gallon of oil recovered. US, however, is a particular vulnerable factor. Today an *Exxon Valdez* type clean-up cost would amount to about $20,000 per gallon[xxx] with total spill costs in excess of 20 billion dollars an economic catastrophe. A larger spill like the *Sea Empress* within the US jurisdiction might become unendurable for the insurance and compensation funds (SEE TABLE L(I) (MARINE INSURANCE MARKET) AND TABLE L(II) (COMPENSATION STRUCTURES), APPENDIX C).

2.4.3. DEVELOPMENT OF A LEGAL FRAMEWORK

(TABLE J, APPENDIX C)

Since the *Torrey Canyon* incident principles and codes of practice have gradually emerged. Birnie[xxxi](1993: 3) stated that these conventions initially developed "soft laws" rather than binding obligations. This was, as she stated, due to difficulties in accommodating all the interests of the heterogeneous international community. Attention was also given to definitions of "harm" and "pollution" so as to clarify the actual obligations arising from a spill. The OECD developed the "polluter pays" principle, which is still applicable today. The principle provides a strict liability-based compensation mechanism. This mechanism is subject to two principles. Firstly, liability lies solely with the registered tanker owner who is required to carry insurance and secondly, liability is limited to a certain ceiling which may be exceeded only where the owner's "actual fault or privity" is proved (Fontaine, 1992). This means that the tanker owner, if aware of a pre-existing condition of the ship, which has caused the pollution, will not be able to limit liability. However despite the existence of these limitations, oil spills such as the *Exxon Valdez* in the US have demonstrated that whatever the insurance and legislative limits of liabilities might be, public perception of damage can negate these limits in a court of law. The legal developments, although providing a useful safety net against economic pressures post-disaster, are perceived as totally secure. In the 1992 case of *Outboard Marine Corporation v Liberty Mutual Insurance* (Illinois), marine policies which were intended to cover events, including pollution, "sudden and accidental", found under this case that cover was extended to include pollution "unexpected and unintended", i.e. gradual pollution. As Lloyd's underwriter Colton (1993) stated "*The way that oil pollution claims seem to have developed and certainly in view of the Oil Pollution Act (1990) in the US it will now appear that there are virtually no defences to an oil pollution claim. The policy may nominally be a policy of indemnity, but there is no absolute liability and really if it is insurance it is insurance on an open cheque book basis and once there has been an incident we are almost bound to pay up*". Although tanker owners and their insurers fear that they might find themselves in another "*Exxon*" situation, that is, economically responsible for claims that they have intended not to be responsible for, in practice insurance limits together with the international compensation funds seem to have been sufficient for most other claims. Also it is noted that most large spills other than the *Exxon Valdez* spill have been in waters covered by the

international conventions. There is heightening concern that large payouts may arise from spills in the US and other non-convention waters (see TABLES J, L (I) AND L (II), APPENDIX C).

Before the *Torrey Canyon* incident, pollution damage was limited to the intentional discharge of oil and oily mixtures from certain vessels in specified ocean areas and that the emphasis was on the fact that this discharge did not hamper innocent passage of ships[xxxii]. There was no emphasis then on the levels of harm. Concentration was mainly on harm to trade rather than to the marine environment. Since the incident there has been an increased movement towards considering "environmental harm", especially to certain coastal environments which were particularly susceptible to oil spill damage. Consideration was given to heavy graded oils, which were particularly difficult to extricate off the flora and fauna, and there was a direct relation between resultant clean-up costs and the type of oil spilt (Cowell (1976: 370) and Moller *et al.* (1987). Therefore developing conventions sought to provide stricter meanings to oil pollution damage. The International Convention for the Prevention of Oil Pollution of Sea by Oil (OILPOL'54) and later amended in 1962, 1969 and 1971, provided the conventional international standards for the protection of marine environment from oil pollution (Lay, Churchill and Nordquist, 1973). The Convention prohibited, although it did not establish an enforcement system, the "intentional" discharge of oil and oily mixtures from certain vessels in specified ocean areas.

The Civil Liability Convention (CLC) 1969 [xxxiii]defined oil likely to cause harm as "*any persistent oil such as crude oil, fuel oil, heavy diesel oil, lubricating oil and whale oil*". MARPOL73[xxxiv] (Article 2) extended the definition of oil to include crude oil, fuel oil, sludge, oil refuse and refined produce, and also included 45 varieties of asphalt solutions, oils, distillates, gas oil, gasoline blending stocks, gasolines, jet fuels and naphtha (Brubaker (1993): 123). Pollution damage under CLC 1969 (Article 1.6) was defined as follows. "*Loss or damage caused outside the ship carrying oil (oil as defined above) by contamination resulting from the escape or discharge of oil from the ship wherever such escape or discharge may occur, and includes costs of preventative measures and further loss or damage caused by preventative measures*[xxxv]." What was being seen was that pollution damage was now "*proven economic loss actually sustained as a direct result of contamination*" (Brown, 1984). Damage caused by explosion or fire is excluded as not being " contaminating". CLC 69 introduced the concept of

the human condition in the definition of pollution. The words preventative measures implied now a responsibility on controllers and that control was now a contributing factor to incident outcomes, albeit, economic outcomes. Thirteen years later the 1982 United Nations Convention on the Law of the Sea (UNCLOS)[xxxvi] introduced the concept of harm and that of the "marine environment" in its definition of pollution. It was more direct in pinpointing the human-spill relation. Pollution was defined as: "*The introduction by man, directly or indirectly, of substance .... into the marine environment.....which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, the impairment of quality of use of sea water and reduction of amenities*".

The international conventions are only significant for countries that participate in the conventions. As seen with the *Exxon Valdez* experience, despite a legal framework, it is paradoxical that the extent of the risk outcome depends less on the severity of the damage and more on the jurisdiction under which it falls. The more legislated and well-managed countries seem to increase the risk outcomes rather than reduce them. With many countries the oil industry is central to their existence and protectionist policies could overtake environmental concerns, whether or not there are demands made through membership of any one or more of the international conventions. Economics is therefore the "hidden agenda", and although environmental concerns are acknowledged, it is economics and not environment that remains the key criterion for risk management. Regulation, international and national have therefore sought to redress the balance between the economics of an essential trade and the need for environmental guardianship. There are undoubtedly strains in thinking that both need preservation. In general, regulation has worked, until the US OPA 1990, which tipped the balance in favour of environmental issues (Barnes 1994). The problem of regulation-driven environments is that it is unlikely that all will adhere to these demands, as some will find adherence to the law economically detrimental, especially smaller operators in the business. Despite the development of punitive regulations, and increases in risk premium, the oil industry overall has continued to show resilience and has adjusted to regulatory demands. Legislation, insurance and codes of practice provide minimum standards of operation. However this interrelationship is part of a complex and uncertain social process (Mckenzie and Khalidi, 1996:

645). Critical, however is the ability to manage incidents beyond mere adherence to rules and regulations, "*faith* (in which)*.....can sometimes be misplaced*" (Toft and Reynolds, 1994:91).

2.4.4. CONSTRUCTING AN OIL RISK PROFILE

To construct an oil risk profile is, some consideration is given to Litea, Lanning and Rasmussen (1983)'s model of man-made and natural failure. The model is adapted to taken into account the voluntary and involuntary factors that give rise to catastrophic and ordinary failure either immediately or by delayed action.

MODEL C (i) Man-Made failures

	VOLUNTARY		INVOLUNTARY	
	Immediate	***Delayed***	***Immediate***	***Delayed***
Catastrophic	Oil spill by reason of ruptured bunkers	Management of laden tanker in peril	Management failures during incident	(Natural cause) Atmospheric and oceanic conditions and management failures in handling socio/political aspects
Ordinary	Human error (e.g. fire)	Human error (e.g. negligence)	Human error (or war)	Human error (e.g. terrorist activity)

Adapted from Litea, Lanning and Rasmussen (1983).

The problem with such a model lies in the definition of what constitutes a catastrophe. Under catastrophe theory, the systems are subjected to a sudden and discontinuous effect. Turner and Pidgeon (*op. cit.:* 154) consider catastrophe to be more than physical effects and include perception effects. Oil spills appear perception-based catastrophes in the sense that they are a misperceived set of circumstances that accumulate to a disaster. For example, the death of birds may be seen to be catastrophic by the democratic public despite the spill being a technical (ordinary) failure. Therefore we see a situation where catastrophe may be no more than ordinary failure but is perceived as a catastrophe.

MODEL C (ii) Perception failures

VOLUNTARY			INVOLUNTARY	
	Immediate	***Delayed***	***Immediate***	***Delayed***
Technical failure (Ordinary)	Human error (e.g. fire)	Human error (e.g. negligence)	Deliberate human acts outside the control of risk managers (war or terrorist activity)	Deliberate human acts outside the control of risk managers (e.g. .BSE)
⇩	↯	↯	↯	↯
Perceived Catastrophe	Media and interest group influences Death of birds or oil on beaches or in the food chain	Level of lawsuits brought against the polluter post spill		Atmospheric and oceanic conditions – mainly off-coast incidents

We therefore see characteristics that point the finger to human control of conditions in which the risk operates. Despite the existence of a highly legislative framework, the emphasis is on management of the event more so than the management of subject matter of the risk.

MODEL C (iii)

HUMAN CONTROL OF CONDITIONS		
PHYSICAL	**HUMAN**	**NATURAL**
Age of tanker – management failure	Competence of personnel	Atmospheric conditions – human handling of conditions
Location of spill – legislative impacts	Alertness of personnel	Oceanic conditions- human handling of conditions
Oil type – management of marine and shoreline clean-up	Spill response management	
	Level of legislation, nationally and globally	

2.4.4.1. Issues towards the Development of an Oil Risk Profile

The man-made origins of risk therefore extend beyond simple concept of human error towards the more defined understanding of human control of conditions, voluntary and involuntary, in which the risk operates, that can bring about success or failure. These include technical, natural and social conditions. The characteristics of any risk lie in the accumulating causes that make up a disaster or a non-disaster. The threats posed by the existence of these characteristics can be high or low level in terms of what is deemed catastrophic. A large, infrequently arising, tonnage disaster may have less actual serious outcome than those arising from smaller frequently arising

spillages. Deresky's (1997: 60) case study of the Colombian oil industry showed that between 1985 and 1997 the amount of oil spilt was three times more than the *Exxon Valdez* spill. The cause was guerrilla activity and clean–up costs for Ecopetrol were around $750 million, significantly less than the *Exxon* incident and much less publicised. The oil spill profile lends itself to the need for high-level safety operations controlled legislatively (TABLE M, APPENDIX A).

2.4.5. CONCLUSION OF SECTION FOUR

Despite reducing spillage rates, the crude ratio of tonnage spill to monetary outcomes has dramatically increased. Characteristics of the oil, location of spill, weather conditions have implications for spill management. However, human error is seen to be a critical contributor failure. The human error cause is no longer singular to ship's management but also to incident management. Hard laws and insurance have required particular focus on the human condition, such as effective training and adequate health and safety management.

2.4.6. MAKING SENSE OF CONCLUSIONS FROM CHAPTER TWO

The governing question in risk and incident management is; How is a low probability risk, that has both predictable and unpredictable values with a probability of catastrophic outcomes, capable of being managed. The answer lies in the focusing on the human condition, which evokes actions, interactions and reactions that result in success and not failure. Some form of cultural and sociological framework of behaviour becomes definable to the extent that focus is on behaviour conducive to learning and development and not to blind adherence to functional structures. Spills will happen and the macro-level frameworks in managing risk, such as plans and systems are only as good as the proficiency of micro-level framework, such as cultural and sociological systems. The analysis undertaken in this chapter implies the following. Firstly behaviour is that which has direct implications for action and, as a result, behaviour become a risk factor that needs to be risk managed. Secondly, risk management is more than focusing on adequate structures, it requires significant focus on the adequacy of the human condition. Therefore, risk management is all about behaviour and not structures and we are therefore talking about behaviour and not risk management. Thirdly, behaviour management commences from the moment there is obligation or responsibility. This would be where people are dealing with a subject matter that is hazardous, operating systems, involved in plans, actioning and directing tasks, carrying the subject matter and so forth. Fifthly the term risk is equivocal since it

has multiple interpretations conceptually and contextually. However, behaviour is what is manifest and in some way makes sense of something that is not concrete and intangible. Behavioural manifestations are varied, in the sense that they are the action taken whether rightly or wrongly, rationally or irrationally. Failures that have happened demonstrate that all of these arise from some form of action positive or negative taken. For example, the Bhopal disaster highlighted the lack of effective training, the Brent Spar indicated a direct action by Greenpeace. These actions demonstrate the underlying motivations of organisations and as a result culturally of its members that have acted as such. Weick (2001: 27) stipulates that organisations "*generate action, champion accountability, make choices, value good reasons and scrutinise..*". People act in a particular way as they are less involved in the decision-process and more committed to undertaking particular courses of action. The Bhopal incident highlights this where decision to not reveal information to the external world was a strategic decision, and despite the pressures, the local operations felt committed to act on the parent's instructions. However, eventually tensions arose which forced the general manager to open communications externally. Behaviour, therefore, is "long-tailed" in the sense that it arises from culture embedded in organisational values developed over a period of time. This brings us to the sixth premise and that is the time-value of action. Where there is a culture of learning and development, the time-value of action is greater as the value of the learning and development provides an advantage to those dealing with a crisis. However, where there is no investment in training and development results in embedded time-values or sunk-time. The usage of time before the crisis has a direct relationship to the time effectiveness of action during the crisis. The seventh point relates to the cultural dimension, in that the existence of high and low level relationships can mend or strain the connection between groups. A strong team can bring about a convergence of values more easily. In a weaker team where there exist different involvements as in co-active operations with disparate values, the convergence of values becomes difficult and the focus relationships becomes critical as success is dependent on the ability of people to work together. Finally, the need for legislation and public policy demands compliance and adherence to regulations. In other words legislation creates a new culture which can override organisational culture and demand particular sets of behaviour. The next chapter considers how public policy's focus on structures and relationships impact behaviour of those committed to it.

CHAPTER THREE: RISK AND PUBLIC POLICY

INTRODUCTION

This chapter views the aspect of risk in the context of public policy-making. Exploration of the underlying motivations contributing to public policy agenda is undertaken in section one to identify whether these motivations impact both the structural (hard aspects) and the cultural (soft aspects) arising from public policy implementation. In section two, the UK national contingency plan is analysed for its structural implications for riskiness and a phase model is developed, in section three, to surface areas the phases of risk and within these phases areas of failure. The soft aspects are considered in the context of Turner's incubation theory and the cause theories put forward by the high reliability group. Section four considers the phase model in context of the *Braer* case, identify how the soft and hard contexts integrate and identifying areas of failure. The conclusion derived from this is that while there is clearly an essentiality for public policy, the making of policy needs to consider not only a strategy for action but also behavioural factors arising out of the co-active operations.

3.1. SECTION ONE: RISK AND PUBLIC POLICY

National and international public policy is grounded to a greater extent in society's view of risk. As ideologies have changed, so have public policies reflected these changes. The growth in environmental legislation, consumer protection policies, health and safety and human rights among others have developed from society's perception of riskiness and the need for protection from this. For example, Britain's Department of Health and the World Health Organisation have set targets for reductions in mortality risk. Although public sentiments influence policy-making, the public is not key to policy making. Hovden (1987: 161) believed that policy-making involves "*many institutions, professions and disciplines*" and because of this multi-party involvement there arose issues of increased riskiness. He puts it that "*the term "risk" and the conceptual models of risk are used differently (leading) to problems of communication and a lack of trust in one another among politicians, the public and the different groups of experts* [*sic*]". As a result the multi-perceptions of risk become particularly significant as attempt is made to converge individual political, social and economic values into a national policy on what constitutes risk and risk management. Golembiewski's (1985) analysis of public policy yields a set of

observations. Not only must policy–makers specifically take into account the wide public representations and views, but they also develop high cautious and constrained administrative behaviour by reason of the pressures of accountability and legal and political repercussions (e.g. loss of votes). As Golembiewski points out, " *it often becomes all too easy to fall into the habit of generating reasons why actions cannot work, should not be undertaken, will be objected to by certain powers figures, real or alleged and so on and on*" Public policy, he suggests, has limitations as it is generally subjected to bureaucratic structures and budgetary constraints, which he suggests in turn constrain the level of incentive and flexibility that can be provided to encourage risk taking and acceptance of responsibility. The changing face of public policy has involved an increase in legislation. The problem with legislation stipulated by Medawar (1978), however, is that by defining what is unacceptable, it becomes presumed that everything else is acceptable. Codes of practice and laws establish minimum levels of performance rather than bringing about a cultural change. Elliott *et al.* (1999) observed the need for more than legislation, and that was the need to achieve good practice. To change values sense needs to be made of the underlying values that contribute to the development of public policy. Three interpretative values affect the make-up of public policy: political, social and economic.

3.1.1. Political Values and Public Policy -Making

The political notion of public policies involves dealing with the form, organisation, and administration of policy. Smith, D (1992) sees public policy as an instrument that binds crisis and strategic management together. Public policy-making, however, lends itself to constant contesting of viewpoints Weick (1995: 53). Different levels of understanding exist which can thwart policy acceptance. As Starbuck and Milliken (1988) suggest, interpretations are invoked from different perceptions and create political struggles. For example, although all persons are expected to know the law, they do not do so, and interpretation may vary widely between the lay person, an advocate of law and the judiciary. Therefore interpretation has a wider claim than one of form, organisation and administration. However, interpreting policies is very much part of a political system. In effect, interpretations become part of decision-making and they do not only serve a political system but also *"become politics, and by its very structure can serve to co-ordinate and meld differences*"(Huff, 1988: 88). Huff's concept of political interaction sees the need to develop a "*dialectic*" or as Schmidt,K (1991) puts it "*debative co-operation*", in creating

public policy strategies and bringing about political convergence, understanding and acceptance of policy. However co-operation may not bring out the real issues and may be more an outcome of politically expediency (Toft and Reynolds, 1994: 23). The politics of public policy-making can be at a surface level (expediency approach), sub-surface level (organisation approach) and arising out of interactions between organisations (management approach). Shrivastava (*op. cit.*: 19) considers the role of government as the provider of regulatory and monitoring services which may serve to protect its own legitimacy rather than the public interest. For example, non-disclosure of information during the Chernobyl disaster enhanced the crisis creating a significantly more dangerous situation. Alternatively there have been situations where the public policy has been to provide the public with more information, resulting in panic. This is seen in the case of genetically modified food products where the more information provided to validate its use, the more suspicious the public appeared; a clear case of "*..doth protest too much*". Protective attitudes lend themselves to public inquiry and in many a case a "witch-hunt". Public inquiries into disasters aim to appease the public that the cause is sought for, and also provide some level of legitimacy for governmental authorities to validate their actions in the disaster. The sheer authorisation of a public inquiry points to a failure. What is demonstrated is that not enough had been done in the first place to ensure that the disaster would not happen. The Donaldson Report (1994), commissioned after the *Braer* incident, suggested that more attention be given to information and risk control systems than to legislation. The report emphasised the need for dedicated resources and safety management practices. Legislation, however, has overtaken self-regulation. None the less, spills continue to happen with similar causes, as seen with the *Borga* and the *Sea Empress* incidents. There is also the problem of the self-fulfilling prophecy where attempts to regulate can create disaster scenarios. Fire-drills are a good example, whereby too much conditioning can create rigidity in situations that require flexibility. Strict adherence to plan as in the Ohio State penitentiary case can result in disaster.

There is therefore a need to balance these political approaches with the greater socio-economic considerations, keeping in mind that political decisions involve the public and involve costs. On the basis of the idiom that "you cannot make everyone happy all the time, but you can make most people happy some of the time" [*sic*], public policy-making, therefore, must be one that creates a political balance between reducing the risk and what is acceptable by the parties, individually and jointly, in managing the risk.

3.1.2. ECONOMIC VALUES AND PUBLIC POLICY-MAKING

Economic considerations as are like political and social values, critical to the effectiveness and acceptability of public policy management. Increased costs can bring about a rejection of public policy by the business community. Economic models that have emerged throughout the 20th century have increasingly demonstrated the paradox that exists between economic and socio/political values. The shift from Smithsonian free-market economics to Marx and Schumpeter's crisis model indicates social intervention in the control of national economics. Habermas suggested that in this way "*the economy becomes increasingly politicised and no longer the consequence of unchangeable laws of the market*" (Craig Smith: 23) leading towards a compromise model. Keynes favoured a system of state intervention on the basis that free-market economics would not in practice work. Public policy, in effect, seeks to redress the balance between meeting economic expectations of businesses and protecting public interests. Therefore, the critical power-distance in values lies between expectations of businesses and those of the ideological public where social and economic interests vie for priority in the national agenda for policy- making. Thus, in managing risk and safety, corporatist policies have become important.

3.1.3. SOCIAL VALUES AND PUBLIC-POLICY-MAKING

The champions of social values lie in the growing body of interest groups and the media. Although interest groups have come to take on a central role in the national and international political process (Roberts, G.K, 1970:78), there is demarcation between the different influencing groups with different power bases which has a bearing on the political processes. As Craig Smith (1990:100) states that " *pressure groups with open and high political specialisation*" and "*insider status*" have a better influencing position than groups that have limited resources and a weak strategic location, and need to "*rely on public opinion as a primary avenue of pressure*". As a result many of the latter groups force issues through direct action strategies (these include groups such as Greenpeace, an environmental pressure group, who believe in direct action (Ward, 1983). Kimber and Richardson (1974) suggest that jockeying for power and influence between the interest groups can be based more on value judgements such as "might is right" than on objective rationality. Such motivations could bring about a genuine disparity in their roles with one group triumphing out of the disadvantage of another. Olson (1971:144) felt that the roles of interest groups could be "*nothing more than a convenient rhetorical device*". Although

the use of rhetoric may be discredited by many, it remains an important technique in the influencing of political agendas and public policies. It is also interesting to note that the increase in the interest groups has been more in the ideological field than in the economic field (Marsh, 1983). Writers on interest groups have felt it necessary to distinguish between interest groups and pressure groups. Coxall (1981:108-109) and Mackenzie (cited in Craig Smith, 1990: 105) point out that an interest group is a prerequisite to becoming a pressure group, the distinction lying in the methods used to influence. Roberts, G. K. (1970:78) saw the distinction by reason of their power base. Peters (1977) classified four types of interest group levels, which provided more effective definition between pressure groups and special interest groups (TABLE N).

TABLE N– **INTEREST GROUPS** (B. Guy Peters, 1977)

TYPES	INFLUENCE	STYLE OF INTERACTION
Legitimate	Great	Bargaining
Clientela	Moderate	Symbiosis
Parentela	Moderate	Kinship
Illegitimate	None /great	Confrontation

The *legitimate* interest group is legally and officially involved in the decision-making process e.g. the Countryside Council for Wales is formally (by statute) involved in the oil spillage contingency plan for the Pembrokeshire region. Its presence is accepted and seen as influential to the decision-making process and incident management. The *clientela* interest group has a more perceived than formal legitimate relationship. For example, the National Trust has no direct involvement in oil spill contingency but because of the vulnerability of its property to pollution and damage resulting from an oil spill, it is perceived to be in a situation of moderate influence. The *parentela* relationship is one of "kinship" or close fraternal ties between the interest group and the first decision-maker, for example, the relationship between insurers and shipowners. Again, the relationship is perceived to bring about moderate to strong mutual influence. The *illegitimate* interest group is set up for the purpose of influencing the decision-making of the dominant body, that is, being a pressure group rather than an interest group. For example, bird rights activists might put pressure on Parliament to develop effective legislation protecting the rights of birds. Generally the outcome is confrontational. Illegitimate interest-group influences have been known to bring about economic distress for businesses. For example, Greenpeace led a momentum against Shell Corporation during their attempt to dismantle the Brent Spar oil-rig as it believed that significant oil remained in the tanks and did not want the dismantling to be done in the sea. Despite the fact that Greenpeace had perceived

the situation wrongly, this did not stop Shell's financial exposure escalating. Shell put the cost of dismantling the Brent Spar onshore at some £45 million ($71 million) against up to £12 million ($19 million) for deep-sea dumping- excluding the costs of non-usage of Shell products due to consumer boycotts. Overall interest groups take the approach that spillages can be mitigated either by developing standards and regulations of control or by enforcing actions. Such pressure results in a two-way encumbrance for businesses. Businesses are not only required to bear the cost of reducing risk and but also the consequences of actions taken by the interest groups, be it direct action or legislation. This growing societal involvement goes to show that management of the risk is one-part management of the subject matter of risk and one-part management of society. As a result what is being seen is the growth in the public control of risk.

3.1.3.1. Media Influences on Public Perceptions

The involvement of the media in building public perceptions and influencing public policy has been the intrigue and focus of many studies. Beck (1988) felt that the media played a key role in distorting public perceptions. Combs and Slovic (1979) suggest that incidents can be over-reported in news media. Kitzinger and Reilly (1997: 344-345) see the media's role as predominantly retrospective (after the event happens). They also identified a lack of detailed analysis of the media's role. The media's role in the promulgation of information may have significant bearing in heightening the risk (Hovden, 1987:166). The media declared the *Torrey Canyon* incident in 1967 to be a disaster as "*it highlighted with an exceptional clarity the unpleasantness that can arise when materials essential to man's industrialised society escape from the confines of their intended use to foul the environment*" (Smith, J.E 1968:175). The fouling of the environment in this case was hundreds of miles of oily beaches and the deaths of thousands of seabirds. This spill impact caused a public "outrage". Paradoxically, the *Torrey Canyon* damage was greatly caused by inexperienced teams carrying out the cleaning activities (Cowell, 1976: 371) and inappropriate emergency preparations, exacerbating the damage. Attention to death of birds and wildlife during an oil spill stir up emotions, which can belittle the actual outcomes, as seen in the *Apollo Sea* case. The University of Cape Town report (1997)[xxxvii] on the 1994 *Apollo Sea* spillage, off the coast of South Africa, counteracted the press definition of an "*ecological disaster*", stating that the media reporting was without foundation and the ecological impact was overall negligible, with the exception of some impact on penguins.

Interestingly, media perception was influential in downgrading the 1992 *Braer* incident. This downgrading, it was felt, was due to insufficient birds being dead or injured (Griggs, 1995[xxxviii]). The pollution effects of the *Braer* were in effect minimal due to severe weather conditions.

There is, however, little evidence substantiating the influence of the media and it is not clear whether change in events or government action arises because events are in the pipeline and the media seek simply to drive the cause. Whether or not the media is the cause or effect of action, media reports are a form of communication to the public, which is channelled back to the relevant, decision-making, bodies (Hovden, 1987:166). Seymour-Ure (1968:301) described the media as a " *.....channel of communication between the..... political public and the mass public".* In this respect the media sit in a powerful position in influencing the "dialogue" between the two public groups through reporting, interpreting and criticism of actions undertaken. Kitzinger and Reilly (*ibid.*), although acknowledging the importance of media attention in the field of risk theory, identify a lack of detailed analysis of their role. Media pressure could be said to be more assertive for post-event action, for example a witch-hunt or demands for legislation, although it has been argued that the motive might be more economic than socially responsible. This argument, however, remains outside the scope of this study. The media's channelling of communication during a spill incident is based on the perceived value of actions that have been undertaken in managing "acute conditions" rather than the perceived value of actions taken in managing the preparedness. Konings (1997: 118-122) the Civil Protection Officer (Operations), Cape Town, in his assessment of the *Apollo Sea* disaster, noted that when "*disasters occur, the effects on the environment, especially on the plight of wild animals are very often highlighted in the media*". Attempts are being made today to involve the media and key special interest groups in advising them of their risk plans and also by inviting them to participate in their disaster simulation exercises. Most response units have as part of their incident management strategy high profiled dedicated media spokespersons, who liaise with the media, pressure groups and the public. Such strategy aims to dilute the extravagant and intensive publicity (otherwise known as the "hype" effect) and in turn dilutes levels of outrage. Public outrage has a higher political and economic cost as seen in the case of the New York outcry on asbestosis. Public policy, however, is not foolproof. As Johnston (1976) states even the best of laws is imperfect. In the context of oil spills although it is known to be particularly difficult to legislate precisely, there exists one of the most sophisticated laws and regulations in this field

(Gaskill, 1998[xxxix]) (*see* TABLES K AND L, APPENDIX B). In conclusion, public policy is as Johnston's (1976: 590) put it, "*The function of weighing interests on the basis of social values is a... function of law* ". Despite legislative and commercial efforts, political exigencies and provocations by the media and interest groups can create uncertainty in public policy decisions. It therefore becomes difficult to establish what makes the truth, as distortions may appear more true than necessary. Elliot, Frosdick and Smith (*op. cit.*) demonstrate the ineffectiveness of "legislation by crisis" where legislation has arisen from disasters rather than from experiences of "near misses". As a result there is reactive public policy which may not encompass a wide range of risk scenarios but concentrates on those scenarios that were the identified cause of the disasters. This creates failure. Despite misgivings of public policy, there is clearly a significant role for it in preventative risk management but less so in crisis management. State involvement distributes the responsibility and authority between the various sectors, economic and social, of society, including the government. As Hovden states "*legislation provides a documentation of society's commitment to and system for preservation of safety. Legislation is one of society's primal means of handling...risk*" (*ibid.*::165). Public policy clearly has impacts for risk control.

3.1.4. CONCLUSION

Public contingency plans seek to improve the effectiveness of risk and response (crisis) management strategically. However, failure could result where public policy fails to take account of changing time-behaviour contexts. However, the scope for failure does not mean that that public policy is to be negated. There is scope for greater failure without it than with it. A lack of a co-ordinated contingency plan bringing in different groups can increase the volubility of public outcry and greater levels of chaos during an event. Public policy has a role in education as in compliance, in that it provides greater knowledge to all likely to be involved in crisis management to understand the risks and to take action and be accountable for the actions. Yet as Shrivastava (*op. cit.*: 118) points out, actions are themselves a cause of crisis as they are not always rational. Weick (2001:225) observes that the enactment perspective has particular bearing on crisis situations. He uses the term "enactment" to describe a concatenation of events, structures being brought into motion both in crisis prevention and crisis management. Enactment "*involves both a process, enactment and product, an enacted environment*". The enacted environment has both a public and private face. In the former it is what is recognisable at the

surface level as to what is visibly a danger and the expectation of output while the latter indicates the internal expectations of what is likely to happen based upon the knowledge and experience. Shrivastava's study of the Bhopal incident provides a learning of what can go seriously wrong from actions undertaken, despite compliance. The critical point of failure or success according to Shrivastava lies in the initial response. However, this is more than action; it goes back to the aspect of Turner's causes that lead to the incubation of failure. Culture, structure, experience and legal compliance requirements converge at the point of crisis. How a person behaves during this period not only lies in what has been learnt but brings about an emergence of values and fears culminating toward a set or sets of behaviour. Apart from the Bhopal case a good example is seen in the *Zeebrugge* incident where despite technical rules, the erroneous assumption of the Chief Officer was the cause of the disaster. The bosun's forgetfulness to shut the door could be seen to be irrelevant. The Chief Officer had not done his job properly. In effect, despite rules and regulations, crisis arises from the human condition. Forgetfulness, recklessness, negligence, boredom, sleep and other conditions can override the best intentions of organisation's codes of practice and public policy. Walley (1999: 46) quotes Dorset Lyme Bay canoeing disaster where safety precautions were unheeded. Attempts to control the human condition have resulted in more legislation with a mixed outcome of reduced failures in some instances and increased failures in other. The increase of cameras to reduce speeding has demonstrated a change, albeit slow, of culture with people driving more carefully. At the same time, the increase in the number of pedestrian crossings has made people take more risks, thus increasing the accident rate.

Public policy for crisis management is subject to risk tradeoff. Tradeoffs are twofold: those undertaken by government and those undertaken by other groups which are required to comply with public policy. Governmental risk tradeoffs can arise from fixation on a particular policy due to public pressure, for example, public policy of reducing cervical cancer risk fail to address other cancer and non-cancer risks with equal or greater danger. The tradeoff arises in the "seen to be doing good "for diseases which have a particular public interest rather than diseases that are less visible (such as heart or blood diseases). It is also seen that environmental public policies have been less integrated. They involve policies focusing on specific areas, such as air, transport, land and water, rather than the implications of one for the other. For example, the clean-up of beaches after an oil spill puts tensions on the environment on land in finding areas to

dump the wastage of oil and sludge removed. Graham and Wiener (*1997.*: 15-16) document the problems of fixation arising from the *Exxon Valdez* spill: "*Spraying hot water to clean oil off the beaches...removed the oil from the beach surface and reduced the risk to the nearby otters and ...birds...but...killed the marine organisms that live on and under the beach*". Government faces the problem of how best to tradeoff the concerns of two or more interest groups Craig Smith (*op. cit.*: 283) documents the case where the UK Ministry of Agriculture was reluctant to release a report on healthy eating as the report had criticised processed foods. Such a report would damage the viability of the processed food industry. However, by way of co-operation with certain pressure groups to promulgate the "healthy foods" message the government was able to prevent compromising the processed foods industry Such tradeoffs can work successfully in crisis prevention and management scenarios. For example, the promulgation of AIDs information through AIDs charities was a more effective way of educating the public than by direct communication systems which might have created a fear situation. Interest groups have a warning role (Craig Smith, *op. cit.*: 273), which can prevent a crisis from emerging. For example, environmental interest groups form part of the dialogue in the setting up the oil spill contingency plan and during the spill event. These co-operations control the level of panic and outrage arising from the manifestation of an incident. The tradeoff for the interest groups is the ability to influence the political agenda in public policy-making (Graham and Wiener, *op.cit.*: 230). Environmental groups such as Greenpeace tradeoff their non-involvement in co-operations by their ability to influence through direct action. Less visible groups may prefer, on the other hand, to participate co-operatively in public policy-making. The intention of public policy is to reach equilibrium "*in the struggle to accommodate conflicts of group interest*" converging towards the pluralistic domain of behaviour (Craig Smith, *op. cit.*: 131). However this is easier said than done as not all interest groups bring into the plural framework an equality of resources, making it difficult to bring about equilibrium of involvement. Tradeoffs between the interest groups can, instead of attempting for equal balance of power, bring about a compromise deal that makes a more acceptable agenda. Business interest groups may tradeoff part of their economic interests to gain social acceptance of their practices. Social groups may tradeoff part of their principles in dealing with economic groups to achieve a higher standing in the political agenda development. Public policy, therefore, creates a compromise model of crisis management.

3.2. SECTION TWO: UK OIL SPILL. NCP AND IMPLICATIONS FOR PUBLIC POLICY-MAKING

An exploration of the framework of the UK national contingency plan (NCP) and the roles that are key to the plan is undertaken. Although much of this chapter is derived from the UK NCP 2000 documentation, it provides an insight into the make-up of the national collective operation and provides a basis for analysis of public policy determination.

3.2.1. SCOPE, PURPOSE AND LEGAL BASIS OF THE UK NCP

Under the requirements of the UNCLOS 1982, to which the UK is a party, there is national obligation to protect and preserve the marine environment. The NCP is stated as one of the many measures undertaken by the UK to meet this obligation. The plan also meets UK's obligation under the International Convention on Oil Pollution Preparedness, Response and Co-operation 1990 (The OPRC Convention). The legal base for this plan is section 293 of the Merchant Shipping Act 1995, (amended by the Merchant Shipping and Maritime Security Act 1997 (the 1995 Act)) and the 1998 Merchant Shipping (Oil Pollution Preparedness, Response and Co-operation) Convention.

The stated purpose of the NCP is to "*ensure that there is a timely, measured and effective response to (oil spill) incident*". It is made clear that the primary aim of the NCP is the protection of the human life, including human health, followed by the protection of marine and terrestrial environment. The plan "*sets out the circumstances in which MCA deploys UK's national assets to respond to a marine pollution incident to protect the overriding public interest*". The NCP specifies pollution by oil of any description (the 1995 Act, s151) or other hazardous substances (the 1995 Act, s138A) as arising from ship's cargoes carried in bulk or in packages, ship's bunkers, and leaks from oil and gas installations and pipelines. The NCP sets out the involvement of a number of national and local agencies to deal with an incident at sea and to respond to the threat of pollution. (*See* TABLES L AND M, APPENDIX B for *key involved parties and their roles and responsibilities*). Furthermore, there is statutory authority on the part of port and harbour authorities to submit local risk assessment and response plans to the Marine and Coast Association (MCA). These local plans underlie the NCP and show arrangements for mutual support during a national incident. Local authorities do not have a statutory duty but are

required to act with respect to emergencies under section 138 of the Local Government Act 1972, the Local Government (Scotland) Act 1973 and the Water Act (Northern Ireland) 1972. Under these powers they, like the port and harbour authorities, are required to prepare response plans for submission to the MCA every five years or earlier where there is substantial change. Dubber (1997) points out that these Local Authority Acts consider the effect mainly on people rather than on environment. However, they form the basis for most local authority planning for oil spill events.

3.2.2. PROCESS OF RESPONSE

The way that the whole plan is devised reflects the stages through which the different groups phase their involvement and each risk plan becomes operational. The NCP response is graduated by way of a three-tiered system of operation. **Tier 1** response is considered to be within the manageability of the immediate resources, for example, ship's facility and port authorities in dealing with an incident at a technical level. **Tier 2** response arises when the local resources are overwhelmed and further support is required. Tier 2 is generally activated for medium scale incidents requiring greater support than that available at the time of the occurrence. Tier 3 response comes into operation mainly for larger shipping incidents requiring co-ordinating response from national and local groups (Johnston, 1998).

In theory there is a dual tier response system. The initial tier is the response capability of the immediate response groups while anything overwhelming these resources requires external support. Splitting into three tiers allows for the creation of the distinction between the use of external support but still within the control facility of the local response group, as opposed to the demand for national support. For example, a medium-sized spill may result in a response by bringing in locally contracted rather than national resources to deal with it. The cascading of information nationally, however, begins either at Tier 1 or 2 depending on the event potential, as national response groups are alerted in the event of the risk developing into a full-blown disaster. Therefore, the risk shift from the manageability of risk to the probability of disaster becomes particularly significant by its direct linkage to the resource facility and establishes the validity of the claim that the movement of the risk is subject to role and response demands. As Smith and Elliot (pg.10) succinctly state " *the typical activities....involve the mobilisation of crisis*

management teams and other resources, the effective communication with stakeholders and liaison with media and other interested parties.".

The NCP is in effect a general response procedure guideline with a directory of roles and responsibilities of the key players (see TABLE O, APPENDIX B). Local issues are identified by the local risk plans submitted to and approved by the MCA. The local risk plans are required to be strategy-orientated (Fischhoff *et al.,* 1993: 48) requiring risk analysis and a strategic plan in handling the risk and ensuring the availability and capability of resources (human, physical and financial). With respect to human capability, most risk plans have training, networking, mainly through partnerships and joint liaisons, and information building as key capability development factors. The measure of effectiveness however lies in the ability of the different risk plans to converge during the response. TABLE P below considers the variables that could arise in individual risk plans making cohesion more difficult to achieve. The procedure for operations may appear foolproof, but the existence of variables can make it less so. Disparate culture, control for resources, time available for preparedness and response, geographical dispersion, inter organisation and external networking ability can all contribute towards failure.

Table P: Variables within the Individual Risk Plans

INDIVIDUAL CULTURE	Compliance of organisational members
SUB-CULTURES	Desired level of compliance
ORGANISATION CULTURE	Organisational risk and safety philosophy and reward and motivation systems
TASK	Role and Task type within the organisation and the NCP
LEVEL OF PREPAREDNESS	Preparedness time for organisation and availability of dedicated resources
TASK COUPLING	Complexity of the role and task coupling at organisational level and during incident management
OPERATING ENVIRONMENT	Environment within which operation conducted and organisations operate (political-economic, social, compliance etc.)
INTERDEPENDENCY and NETWORK ABILITY	Relationship level between the different organisations and sequential interdependence. The less strong the relationships between the groups, the more emphasis on co-ordination and control. Networks between organisations and external and between sub -networks
RESOURCE CONTROL	Control of resources outside the organisation/ collective
CONFLICT FOR RESOURCES	Conflict over control of resources between organisations in the collective
SIZE OF COLLECTIVE	Number of involved organisations in the collective
CULTURE OF COLLECTIVE	Level of convergence of risk and safety cultures of the individual groups
ROLE CONFLICT	Alienated from collective with normative differences in the sharing of power and rituals
OUTCOME PREDICTABILITY	Level of response manoeuvrability and vulnerability of the situation
AGREED PLAN FOR ACTION	Documented rules and code of operation e.g. the three tier scenario
TIME AVAILABLE FOR PREPAREDNESS and RESPONSE	Time dispersion for organisation and collective to respond
GEOGRAPHICAL DISPERSION	Geographic dispersion of the organisations
DOCUMENTING OUPUTS	Control of documentation to support response strategy
PUBLIC VALUES	Conditions conducive to relationships with media, interest groups & govt.

3.2.3. POWER ROLES OF KEY GROUPS

The body responsibility for the UK NCP is the Department of Environment, Transport and the Regions (DETR). DETR's executive agency, the MCA, plays a critical role as a repository for the local risk plans. By reason of this role the MCA is instrumental in its role of "*developing promoting and enforcing standards of maritime safety and pollution prevention from ships*" (NCP 2000). The MCA is also the key lead body for at-sea response. Key response roles are undertaken through two sub-groups formed to deal with special functions: The collective includes representatives of specialist and expert organisations and the specialist sub-groups.

3.2.3.1. Collective Operations

Collective operations are twofold, one for at-sea response and the other for shoreline response:

1. At-sea response: The MCA establishes a Marine Response Centre (MRC), which involves all groups involved in the at-sea response. The MRC is established at the nearest, generally pre-determined, Maritime Response Co-ordinating Centre (MRCC) or Maritime Response Sub-Centre (MRSC). When the spill is outside harbour jurisdiction, overall command is exercised from the Marine Emergency Operations Room (MEOR) in Southampton, UK.
2. Shoreline response: The affected coastal local authority or port (FIGURE 5, APPENDIX H) is in charge of setting up the shoreline response centre (SRC). The SRC includes representatives from the Environment Group, the port authorities, other affected local authorities, the MCA and other organisations contracted to help in the shoreline clean-up. There are three core teams within the MRC and SRC. **The Management Team,** is in effect the strategic team in ensuring the effective management of the MRC and SRC. **The Technical Team,** is responsible for determining the most effective pollution mitigation strategy and the allocation and deployment of resources and the **Procurement Team** operates under the Technical team and is responsible for procuring, marshalling and routing equipment to designated areas. Unlike Perrow's high complexity model (TABLE E) equipment is not tight-spaced and control of resources can extend to over two or more groups. Hence co-ordination of equipment becomes particularly important.
3. It is also responsible for monitoring expenditure and the levels of deployed resources, recovering deployed resources and informing the technical team of resource shortfalls.

3.2.3.2. Specialist Groups:

There are three key specialist groups, which operate separately but interdependently. Each group operates from the context of their specialisation offering advice and support to the other groups carrying out their function. The *Environment Group* derives its core membership from statutory obligations and involves the conservation agencies, fisheries department, environmental regulator, the Joint Nature Conservation Committee (JNCC) (where incidents arise beyond territorial waters) and an MCA representative. The *Salvage Control Unit* (SCU) handles at-sea salvage and involves salvage experts from government (led by the Secretary of State's Representative (SOSREP); the harbour-master (if within harbour jurisdiction), experts from the salvage industry, shipping and insurance and an environmental liaison officer. The *Media Team,* which is the MCA media response team under the chairmanship of a designated press officer linked to the Government's press offices and the press offices of other organisations involved in the incident. The NCP takes on board the Donaldson report in requiring the need for the media to be involved from an early stage. The MCA is required to have a designated press officer. The media team also has the function of dealing with the media present at the incident and also ministerial and VIP visits. The importance for a strong media team emerged from the *Braer* crisis where the emergency response centre had to deal with accommodation, hospitality and transport for both the large media group and the arriving dignitaries.

FIGURE 6a At-sea response – cross-functional teams

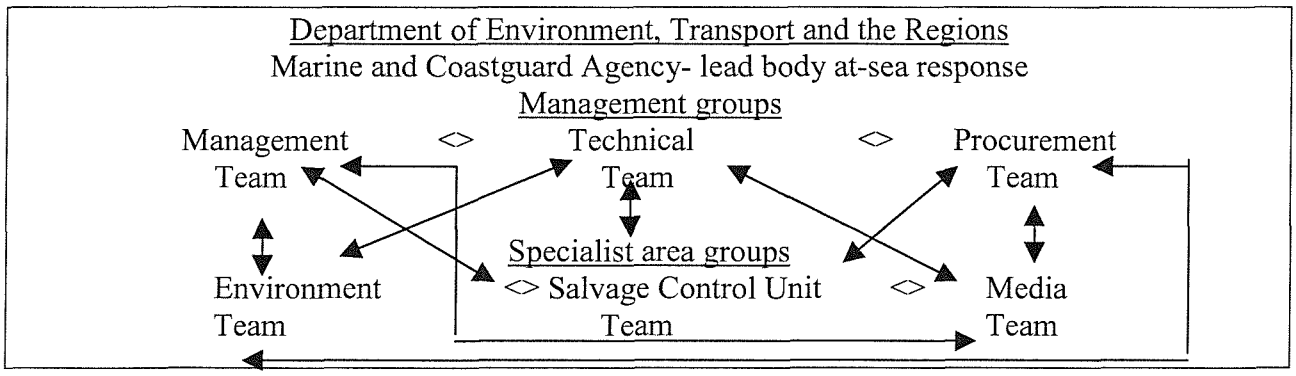
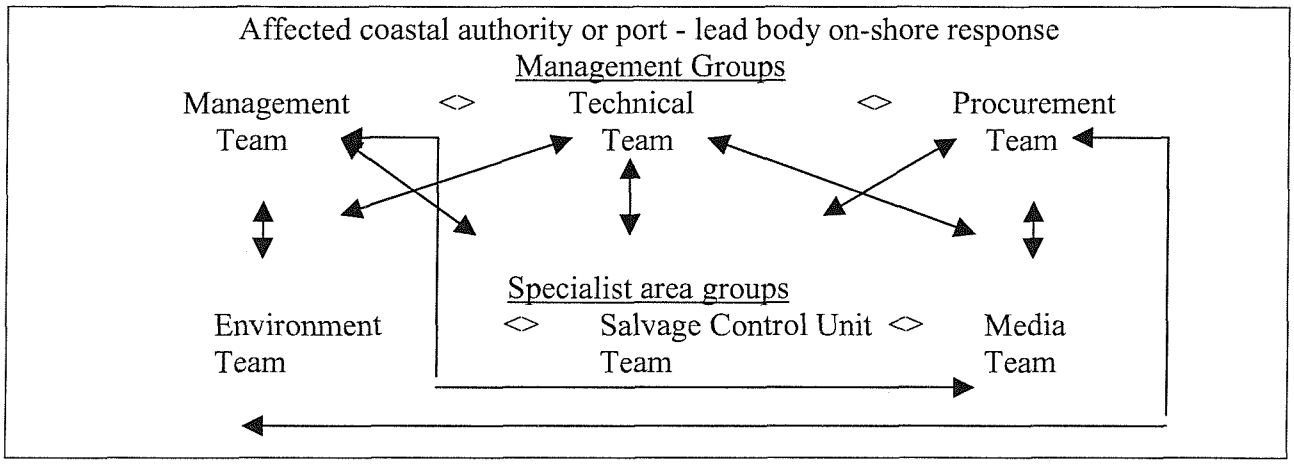


FIGURE 6b On-shore response-cross functional teams



3.2.3.3. Responsibilities of Key Response Officers

The MCA, on behalf of the Secretary of State, DETR, has overall responsibility for the implementation of the NCP under the 1995 Act. The Principal Counter-Pollution and Salvage Officer (PCPSO) of the MCA has authority to trigger a national response, and to deploy MCA equipment to support Tier 1, 2 or 3 operations. The PCPSO has further statutory intervention powers and authority to sanction facilities such as aerial surveillance, ship inspection, use of oil recovery equipment, facilitation of cargo transfer equipment and salvage vessels and moving ship to shelter. The PCPSO is also the liaison person between the MCA and the SOSREP and is the lead person in ensuring MCA control of oil spill operations and taking action to prevent and mitigate marine pollution. The SOSREP role is a new role, to "*provide overall direction for all marine pollution incidents including the salvage of ships*". The SOSREP has direct responsibility for research and rescue, counter-pollution and clean-up operations at sea and for maintaining government stockpiles of equipment. In the event of a significant threat of pollution the SOSREP takes control and decides the setting up a SCU. The SOSREP decides whether the salvor has the capability to carry out the necessary salvage actions, in terms of experience, personnel and materials (NCP 2000). The Director of Marine Operations (DMO) or the Head of Operations (HOO) has control of the Salvage operation until the SOSREP arrives to takes control or until an SCU has been established. Additionally the SOSREP also has authority to establish an on-board Salvage Team, which normally would comprise of the Salvage master and his crew, the SOSREP's own representative and, if the shipowner requires, the shipowner's casualty representative. Also by SOSREP discretion a representative of the hull and cargo insurers might

be included. The Marine Accident Investigation Branch (MAIB) representative is also allowed on to the ship, when safe to do so. As is seen, the overriding responsibility and power lies firmly with the government agency, who has authority to act, make others act and intervene in actions taken, in event of a threat of pollution. The agency is the grand master and the overseer of the sequence of events once there is a national catastrophe and in this respect, there is much need to ensure that role systems created do not collapse. Weick (2001:115) questions, *"When formal structures collapse, what ..is left*?". The answer lies in the efficacy of interaction between the groups which act as test of ability irrespective of formal roles.

3.2.4. REFLECTION

What is witnessed here is a framework that is role-driven and confines actions to functions. Implicit within the plan is the value of relationships with, for example, media, environmental groups and other groups to ensure a convergence of focus. Undoubtedly the final dictate lies with the government who can override any relationship and can force actions where felt necessary to bring about what is expected to be a successful response.

Plans are structured and tier-bound to follow certain sequences and are synchronised and co-ordinated to trigger a particular set of behaviour. In this way they allow for setting priorities and making choices within confined parameters, thus limiting failure by having the chosen routes planned for action. Furthermore the control of decisions is shifted from any one person to the collective acceptors of the plan. To make sense of co-active units is more than observing networks in organisations. Organisations lend themselves to defined practices and some level of routinised roles. However, in managing an incident the only attempt at networking is through preparedness exercises where networks are defined and communication channels set up. These are different from those within organisations. Organisations are basically derived from formal social structures (Scott, 1995: 22) and *"where participants share a common interest in the survival of the system and who engage in collective activities, informally structured to secure this end*" (*op. cit.*: 23). However networking within a collective operation is based on looser role-coupling than is generally required in organisations. It is has less to do with the survival of the system and more to do with achieving mutually acceptable outcomes through shared alliances. At a macro-level there is the overriding power of the MCA to ensure that full mitigation of the incident outcomes is achieved. At a micro-level the network intends to be a dynamic movement

of communication between the management groups and the specialist groups with roles operating co-actively. The level of interaction arises out of functionality. However, when the roles become less than satisfactory, individual interests become paramount. Therefore, both plan formulation and informal networks are systems cut from the same cloth. Plans seek to minimise deviations and deal effectively with new interventions, and the same holds true with network functions. Weick (1995, 2001), Smircich and Stubbart (1985), Schall (1983), Morgan (1997), among others, describe organisations as a communicating activity where shared meanings and interpretations are exchanged and understood. Where communication fails, this results in operational failure. On reflection it is observed that failure happens in spite of process but lies in the management of a collaboration of disparate groups and the development of some level of collective values and behaviour that will work to prevent or mitigate failure

The study now illustrates by way of a phase model how an oil spill incident unfolds, what action is undertaken and how actual roles operate. The phase model demonstrates the implications of failure, at each phase of the management of an oil spill and an analysis of the model is undertaken in context of the work of Turner and the high–reliability group.

3.3. Section three: Oil spill Incident Phase model (Model D)

The phase model is developed from post-event reports of large spills and particularly from the MAIB reports of the *Braer* and the *Sea Empress*. Four key incident management phases, from the tanker's first encounter to the final response, are identified. These are the pre-incident phase where situations lead to the event; the brink of incident phase involving management by experts (active response); the during-event tiers 1-3 " phase (mitigatory response) and the post-event phase (final response) where a wider response situation results in a consolidation of values. Within these four incident phases seven risk phases evolve. A risk phase arises out of the incremental effects of the spill. As oil touches the water, the operational pressures increase and as spill effects escalate so do the societal pressures. The risks during the pre-event (before the event) phase are those risks arising in the normal course of transportation. These would include risk of weather and sea conditions, the routing of the vessels via high risk and low risk locations, the vessel type and age, the crew composition and expertise, cargo risks and so forth. As soon as a problem arises, a new series of actions arises and a shift to the second risk phase result. This second phase is mainly technocentric and at expert level, for example, actions taken between.

MODEL D- Tanker spill – adapted phase model

INCIDENT PHASE	RISK PHASE	FAILURE POINTS	RELIANCE UPON
I (pre-event) **EXPERT LEVEL**	1ST. RISK PHASE economic risk (risk assessed on an insurer's calculation of probable risk of event)	Loading, transporting and unloading	**EXPERTS** Oil industry, tanker owners / charterers Experts in the management of oil transportation and oil spill management
II (brink of incident) **EXPERT LEVEL**	2nd.. RISK PHASE operational risk	Tanker in trouble– e.g. threat of grounding , collision or capsize	**EXPERTS** Ship's crew capabilities (alerting authorities and dealing with crisis)
III (event) **EXPERT LEVEL**		*CRISIS* (tanker disabled)- media alerted to a story	**EXPERTS** Tier I commences
EXPERT LEVEL	3rd. RISK PHASE operational risk and some socio/political risk	Spill begins and Tier 1 resources overwhelmed	**EXPERTS** Control shifts to Tier 2. MCA alerted
EXPERT LEVEL	4th.. RISK PHASE operational risk and widening socio/political risk	Spill reaches the coastline-Tier 2 support overwhelmed. now in world view	**EXPERTS** National response (International support) Tier 3 response commences and MCA activated
CO-ORDINATION LEVEL	5th. RISK PHASE socio/political risk – with economic implications	Heightened public interest with probable pressure from interest group and government	**PARTNERSHIPS AND CONSENSUS BUILDING** Ability of experts to deal with public relations
IV (post-event) **COMMUNITY/ STAKEHOLDER LEVEL**	6th. RISK PHASE socio/political risk	social control of risk – society seeking answers and remedies	**SOCIAL CONTROL OF MANAGEMENT (REPORTING AND DEFENDING ACTIONS)** ♦ Governmental Reviews, ♦ legislative regimes ♦ hardening of insurer practices
COMMUNITY/ STAKEHOLDER LEVEL	7th. RISK PHASE economic risk	Improving relations between inner (corporatist) and outer groups (democratic public)	**ACTIONS TAKEN IN CO-OPERATION AND COMPLIANCE** Increase investment in safety management and "*seen to be doing good*"

pilot and crew and between crew and port authority and/or the coastguard. Much of this action remains within the general roles of the crew and the navigational authorities arising out of the knowledge and structures of the rules supporting ship's safe passage and existence. Tensions can arise when one or more factors arise which are not anticipated resulting in failure. For example, a language problem or over-confidence of the pilot could result in an event. Once there is an event, e.g. grounding or striking a reef or an accident with another vessel, the risk of spillage becomes an imminent problem. This event is the commencement of the crisis stage and the NCP

is activated widening communication networks and sharing knowledge of event conditions. The inner group deals with the event situation first, and if its capability is insufficient, other groups are brought in (FIGURE 7, APPENDIX H). The involvement of wider support creates a risk situation in that control becomes more diluted and the reliance is shifted from management of a small co-operation to the management of a larger co-operation, increasing the public visibility of the incident. The management of the incident now includes the management of affected public. Focus on management capability therefore becomes critical. Failure to defend actions adequately will create the fourth risk situation with control shifting to the media and the interest groups

The Government in representing the democratic public is likely to step in by way of demanding a review of what took place. The risk of involved organisations therefore becomes political and acceptance of actions can be gained by way of consensus building. The final incident phase arises out of the consolidation of interests either through governmental reviews and or legislative measures. Accountability is called for. All parties by way of consensus (legislative or by agreement) seek to breach the disparity between the commercial interest groups, the financial compensation groups, the environmental groups and the democratic public, thus enforcing new standards for improvements in risk management and human capability.

The phase model provides more than a graphical illustration of the journey from incident commencement to completion. It demonstrates that risk is heightened during the process by reason of economic, social and political influences that come to exist during the incident. If for example, the incident at Tier one is well-managed and successful, media interest is likely to be minimal with fewer economic and socio/political outcomes. The escalation of the risk is partly dependent on the escalation of the event and partly on the capability in handling the event.

The principal inquiries resulting out of the phase model are: how such phenomena may be exploited in incident plans; secondly, how loosely or tightly coupled is each activity phase; and how the soft contexts which underpin action is accounted for. To answer the first two, requires an understanding of the third as it provides the backdrop to how failure is generated.

3.3.1. THE SOFT CONTEXT IN RISK AND INCIDENT MANAGEMENT

Three soft contexts are considered: the collective (relationship) context, the risk/response context and the time context. The representation below demonstrates these contexts. Subsumed

within these contexts are the important conceptual theories of risk. These are the social influence theory, the cultural concepts and the learning and communication capability concepts.

Collective – role function and relationships	**Risk/ Response – level of experience** Factors that lend themselves to the incubation of failure	**Time**
Different multi-agencies group and regroup during all the phases. Managing the collective remains critical throughout the phases	Critical at each phase although particularly critical up to phase 4; after tier 3 is activated, phases 5-7 are automatically generated. Emphasis on on-going risk control. The learning phase and cultural development–both pre-event and during event	Attention to embedded time-values important

3.3.1.1. The Collective (Relationship) Context:

Crisis models by Turner, Rasmussen, Shrivastava and others, discussed earlier, mainly consider the context of an incident within one organisation or the wider repercussions of one organisation incident rather than that of a collective risk management organisation with disparate organisational involvement and emphasis on inter-organisational culture. The plural nature of collective operations emphasises a different operational life than that existing within "unitary" organisations. The unitary view pictures organisations overall as an integrated whole (Morgan, 1997: 212), although studies by the high reliability group indicate that failure can arise as a result of looser integration than might be suggestive of a unitary framework. Collective operations are not necessarily more complex than operations within one organisation. For example, it is sometimes easier to manage children in an environment away from their parents than when they are with their respective parents. In schools children come together from different backgrounds, cultures, perceptions and level of parental interest and support, yet schools can be very effective in obtaining successful outcomes for their students. Much of the success rests on the organisation of studies, coupling of tasks, development of relationships and professionalism and expertise of staff. However the inter-organisational nature of collective operations could result in too much interdependency to be managed successfully. Turner and Pidgeon (*op. cit.*: 148) quote the Ronan Point incident, where a wrongly developed group view of the architectural construction led to failure. Unlike in schools, disparate decision-making groups come together and cohesiveness and interaction become particularly critical during incidents as decisions made could lead to disaster. During the King's Cross fire in 1987, failure arose because of inadequate interaction and low level relationships between the decision-making groups. The information provided to the arriving emergency services demonstrated communication difficulties. For

example, the booking clerk was unclear as to the exact location of the fire and the station layout information provided to emergency services was inadequate and confusing. Furthermore lack of adequate co-ordination led to even more failures and eventually to fatalities. The *Zeebrugge* disaster also showed a lack of effective interaction between the bosun responsible for shutting the doors and the chief officer. Co-ordination and interaction therefore become critical issues but, intra-organisation and inter-organisation. If interactive patterns are suitably delineated in incidents it is possible to show that there are different types of interactions having different implications. The types in TABLE Q below indicates that interaction can be manipulated or arise through lack of information or by way of negligence. Disasters stem from both low urgency situations, where the catastrophe is incubating, and high urgency situations, where the disaster begins to evolve.

TABLE Q–**INTERACTION FAILURES**

INCIDENT	INTERACTION FAILURE	INTERACTION TYPE
Bay of Pigs -Cuba 1961	Arrogance in group decision-making ignoring contextual or functional issues	*Low urgency / high importance* Group think
Three mile island – US March 1979	Failure to communicate incident, at another Babcock and Wilson plant, to the industry at large	*Low urgency /high importance* Distribution of information – knowledge based relates predominantly to incident
Pemex oil – Mexico - 84	Government withholding information	*High urgency /very high importance-* Interactions managed by the government covering up the failures
Union Carbide Bhopal - 1984	Organisation withholding information	*High urgency /very high importance* Positive withholding of information. Interactions limited to intra-organisation consequence mitigation
Challenger space Shuttle-US Jan.1986	Communication between engineers and managers of the problem of the defective O-ring closed but not resolved	*High urgency /very high importance* Conclusions unclear The intensity of the decision to "close problem" before it was resolved indicates how simple unclear conclusions can be mistakenly assumed as resolved problem
Chernobyl – USSR April 1986	Government withholding information	*High urgency /very high importance* Positive withholding of information Seriousness of disaster not promulgated quickly resulting in even further catastrophic outcomes.
Herald of Free Enterprise- Zeebrugge 3/1987	Actions based on assumption that the doors were to be closed	*High urgency /very high importance* Mistaken assumptions
UK King's Cross Underground Fire – 11/87	Chain of information inadequate between station officers and emergency groups	*High urgency /very high importance* Operating on information available
Exxon Valdez Oil spill- US	Exxon set up partnership with coast guard and federal and state environmental agencies	*High urgency/high importance* Knowledge not actively used. Exxon Corporation was found reckless in allowing Hazelwood to captain especially as he was known to have drink problem. Joseph Hazelwood was also found to have acted recklessly.

Adapted from Reason (1990)

As discussed in Chapter two, relationships between the disparate decision-making groups play a vital part in the formula for success in risk and incident management. Turner and Pidgeon consider relationships as a key factor in the incubation of failure.

Relationship is an emotional association between two or more persons. The development of relationships can bring about levels of interdependency that can have both positive and negative impacts. According to Weick (1995: 47), positive emotions arise when there is either a removal of an interrupting stimulus, e.g. an irritating colleague, or where an expectation of achievement is accelerated by some action of the other party; for example, the expectation that there might be a problem of obtaining resources and this is resolved quickly. Negative emotions arise when the relationships and expectations of relationships do not work. However, strong relationships between experts in incident management can invoke positive emotions where individuals are able to work together to achieve a more successful outcome. They know each other and know what the other can do and therefore find it easier to manage the interdependency.

3.3.1.2. The Risk/Response Context

Risk is not static as at each stage its increase or decrease depends on a number of variables or phenomena. For example, changing circumstances, the relationship between the individual members of the group in handling the incident, or the entry into the scene of a new deviant can affect response, and the shift to the next stage or phase may be lagged or quickened or it may not even happen. Response, however, involves two critical perspectives: the prevention of failure at the point of incident and mitigating failure on the onset of incident and the response to the wider societal affectation and outrage. It is not always the case that when there is a precipitating event there is onset. Where risk management is successful, disaster may not materialise and there may be no change in the circumstances as indicated in the Turner and Toft and Reynolds models. The situation reverts to its original risk state and the shift to the next phase is avoided. This scenario was seen in the case of the Norwegian registered *Borga* in October 1995. The *Borga*, a double-skinned vessel carrying over112, 000 tonnes of North Sea sweet crude, hit the rocks as it entered the Milford Haven port jurisdiction. No oil leaked and nobody was injured; it was believed that the steering gear failed as the ship manoeuvred and the port authority tugs were too late to stop the vessel hitting the rocks. The incident did not get much publicity and the tanker was quickly restored to its full working capacity. The efficacy of response is based on the level of experience

coupled with the efficacy of the operation. In the case of the *Sea Empress* disaster, arising a few months later, the lack of adequate pilot training and effective management of the incident led to more spillage than might have happened, resulting in social outcry and a public inquiry. However, despite a high level of media interest in an incident, there is generally a delay in public reaction until all response action is in the process of being completed, when a reckoning is done to identify if more needs to be done to protect the social context. As seen in the case of the *Braer,* much of the oil was dispersed because of the prevailing serious weather conditions and significant shoreline response was not required. The *Braer* case (to be considered in detail in 3.4) did go to the Turner's Stage V1 partly due to its potential for serious environmental affectation and not so much for it actual risk outcome. The *Braer* was not a disaster in the true sense but a case study for what could become one in the eyes of society. It was interesting to note that the *Borga* spill brought little and no learning. At that time there were calls for new radar systems, the current system being over ten years old. Tug operators had also complained that there had been 33 near accidents in the last five years in the waterway. Yet the *Sea Empress* had significant socio-economic consequences.

Responding to the wider social context therefore creates a different form of response. To some extent it can be pre-planned by developing structures, which allow for more effective communication. However social issues might emerge during the incident requiring new sets of decision-making. For example, promulgation of health issues during the *Braer* incident required a new set of skill and response strategy. Learning emphasis on responding to crises is critical. Vlek and Cvetkovich (1989) discerned that "*adequate risk management is all about organising and maintaining a sufficient degree of (dynamic) control*". The emphasis is more on the concept of dynamic or "ongoing" risk control more so on what risk evaluators assess as acceptable risk (302-303). In risk control and safety training Turner and Pidgeon consider, development of an organisational risk culture and commitment of senior management as critical to the development of the risk and safety culture (Turner and Pidgeon *op. cit.*: 188), with emphasis on active learning and *reflection upon practice.* Active learning can have negative effects. Exercises such as fire-drills can condition personnel to act in certain ways increasing rigidity instead of flexibility. A point of clarification is that whether there is a distinction between response and risk management. The concepts of "on-going " and "dynamic" control apply to both. However, what appears is the perspective of viewing response management is purely contextual. Responding

involves information assimilation time for action (Brehmer (1991), and good response capability (Max-Ling *et al.* (1988: 147-153); evacuation, rescue and triage (Hodgkinson and Stewart *op. cit.*: 72); and a repertoire (Weick 2001: 230) involving a stock of regularly performed actions and techniques and "*capacity to do something about it*". It is interesting to note that Hodgkinson and Stewart see response as a component of risk control, in effect commencing with preparedness followed by response "on the spot. The need appears to be a movement away from crisis management to risk management as a system of dynamic control and development of an "on going" capability in response management.

One further important point is that it becomes questionable in operating a collective system whether homogeneity of culture and learning is actually achievable. Disparate groups have different learning cultures and organisational safety procedures. This makes it complex to bring about a convergence of learning outcomes in a collective operation. It may be that one organisation is more proactive and time-aware of learning needs while another may be less so. This was seen in the King's Cross incident where underground staff had inadequate fire and emergency training as opposed to disparate training provided by the different "blue light" groups (Reason, 1990: 257). Turner emphasises cultural patterns as the major contributing factor to disaster generation, by reason of erroneous assumptions by management and experts, communication and information hiatuses thus affecting the response capability. Much of this discussion has been developed in Chapter two. In oil spill scenarios cultural manifestations have arisen in one further area, and that is the distinct cultural norms which are known and exist between the social groups and the risk groups. For example the role of media in disaster enhancement has been identified in many oil spill situations even where the incident would not strictly be classified as a disaster. Such failure perhaps arises from the sensitivity of the risk groups towards the consequences of social outcry and in particularly towards scapegoating. Cultural aspects however are less easily manageable than actual physical aspects of the risk. Partnerships and joint exercises play a significant part in reducing "latent causes" of failure. Furthermore, it is worth noting that in global terms systematic learning is predominantly a western notion. In some non- western countries there may be significant learning differences (Phillip, 1993), and cultural convergence in risk/response handling becomes even more complex.

3.3.1.3. The Time Context

Risk planners consider risk mainly in duration terms. To this extent the future is denoted as an extended present (Nowotny, 1985). To consider time in terms greater than that of duration would mean giving consideration to a behavioural process which includes issues such as continuous preparation for uncertainty and increasing empowerment. Turner's model accounts utilising time for development of the risk and safety culture. The time duration of risk, however, is insignificant, as during a crisis is not a question of time but of management of circumstance. This is reflected in the story of a woman going to a watchmaker to have her watch repaired. The watchmaker did the job in two minutes. Delighted, she said, I did not think it would be so simple – it looked like a more than a two hour job". "Yes madam" he replied " It was a 20 years of experience job". The two minutes duration was of no consequence, the space-time-value here being the mix of knowledge. As Wendorff (1980) observes, the present may not have its root in the present but in the time experience of those involved in the process. Thus the investment in the time-value gaining experience brought about a reduction in the time-value of operation. The contingency plan theory does acknowledge the preparedness stage (the building of knowledge, experience and capability), yet there remains a flaw. Structured contingency plans however, view time in a linear monochronic way (Hall and Hall, 1990). The plan and pilot training exercise involves synchronic time-values while the actual activities were seen to be diachronic. There is also an expectation in contingency plans that the ordered sequencing of events assumed in one time dimension is replicated. In reality the probability of conditions being replicated is exceptionally low. For example, in one spill, the degree of spread is accelerated by the wind condition on waves, which may not happen in another. Although the contingency plan kicks in, the roles differ. In the later the contingency plan works and the spill is mitigated. In the former, public reaction to oil affectation to fauna and flora can create disorder. New interactions arise that behave in a way which appears random, and which differs from what is expected and may bring about disorder. The interactions may not actually bring about disorder or chaos in the usual sense of the word; it may appear to be chaotic because it does not support predictions made under the contingency plan. Such a disorder can affect the time perspective. Once a spill happens it sets into motion a planned series of synchronic and linearly dictated set of actions. At the same time it also sets into motion a series of random actions. For example, the contingency plan's assumed human resource capability may be lacking, or information that would be

normally available is not so due to communication system difficulties. These new conditions lead to entropy, causing disorder and collapse of systems. The linearity of a plan is based rather on functional co-ordination than on individual/ group co-ordination. For example, contingency plans require who should be involved and what to do at each stage of the incident. They fail to consider the timing it takes individuals and groups to co-ordinate, synchronise a series of actions. The order of sequencing is replaced by issues such as how long before the next stage comes into operation, how often is information to be cascaded, within what length of the time span do co-ordinations arise, in what order of priority are actions taken or information cascaded and so forth. It becomes critical from what perception risk controllers approach the risk. If they approach the risk from a technical perspective, time-values may take on a different dimension from the time-values arising from an ideological perspective. These different perspectives can disjoint a co-operation. A collective operation may work adequately if the time conditions are favourable, if for example, the build-up of media interest is slow, or that the period of incident recovery is fast. Therefore to gain an understanding of collective operations, there is a need to consider the time conditions in the context of collective behaviour. The framework for collective operations with its tendency towards the analysis of static rather than emerging risk situations, makes it difficult to develop generalisations about behaviour. Situations do not replicate, and what happens in one risk-time -event may not necessarily happen in another risk-time-event. The time-behaviour relationship is important, as it could be time, rather than behaviour, that brings about the uncertainty and therefore increased riskiness. There is, therefore, a need to acknowledge that the reality is the interdependency of people, risk and circumstance.. The capturing of one reality may be insufficient to establish a theory of human behaviour in one time-condition, but it allows the development of elements that provide links to how time can affect behaviour and hence risk and *vice versa*. A relationship is therefore created between the changing context and outcome (Navare, 2000: 1547).

3.3.2. OBSERVATION

The work of Turner and the high reliability group has been central in highlighting the contextual factors that underpin and contribute to failure. It becomes more comprehensible, in making sense of oil spill incidents, that the mix of active and latent factors within one organisation has a direct impact on the culture and behaviour of other organisations and the collective operation.

Although failures within the public collective operations have similar latent and active causes, the interlinking of these factors can compound into failure whereas this may not have been the case within any one organisation. The mere scale of a public incident-operation lends itself to complexity in management as seen in the event of large-scale natural disasters or where the public gets out of control and panic sets in. To this extent public risk and safety policy has a different emphasis than that within organisations. Within individual organisations members can be trained and alerted to risk factors (albeit admittedly not always probable as seen in the Bhopal incident). In the case of an oil spill, although the public is less at risk, the impact on the environment is seen to be an injury to public property and the effect of managing public perceptions responsibly become important. The oil spill risk management phase model involves interlinking behavioural context Therefore going back to the original inquiry, how are the soft contexts taken into consideration in managing structures plans. The case of the *Brear* in 3.4 is now taken to demonstrate how both the hard and soft contexts work.

3.4. SECTION FOUR: BRAER CASE –PHASE MODEL IN ACTION

3.4.1. THE MODEL IN ACTION:

Replicating the model in the *Braer* situation, a snapshot of events is recorded from the MAIB Report to demonstrate how the action range varies. The case study commences from Phase II

Day 1

1. Incident Phase II: (*2nd. Risk phase*) A single–hulled tanker carrying over 89,000 tonnes of North Sea Gullfaks crude oil suffered total machinery failure early on 5th January 1993. The Aberdeen Coastguard (AC) was alerted at five in morning that the *Braer* had broken down but there was no immediate danger of a spill.
2. Phase III: The contingency plan was activated. AC contacted Shetland Coastguard (SC) at 5.15 am. SC contacted the *Braer* and asked their intentions. A tug was requested but stated that the rate of drift was not so fast. There was some confusion on payment terms. Lerwick Port Control (LPC) was advised that a tug might be required. Also a helicopter was alerted. Shetland had accepted co-ordination of incident. At 5.48 the ship began to drift but there was still no agreement regarding towage charges. The US Master of the *Braer* said he would talk to the underwriters but authorised the use of a fishing vessel eight miles away. SC alerted a second helicopter based at RAF Lossiemouth at 6.00 am. Attempt was also made to detect *Braer* on the their radar. At 6.06 am (1hr.40 minutes later) authority was given to hire the tugboat. At 6.32 am the availability of the right tugboat was still a problem. A helicopter was dispatched however the Lerwick Lifeboat was now tasked and ready. At 6.40 am the Director of Marine Emergency Operations (DMEO) in London was advised of the situation. The helicopter had difficulty in evacuating due to the dangerous foredeck. At 6.45 am, the evacuation of crew began and was completed by 8.54 am. At 9.00 am the position of the *Braer* was being attested. But conflicting reports were provided. It was discussed whether to land personnel back on the *Braer* to anchor it. There were difficulties in locating the crew. By 10.30 am attempts were made to fire a rocket line to the *Braer* from the tug but wave action took *the Braer* to the rocks and she broke at 11.19 am. (shift to *3rd. and 4th. Risk phase*). Media groups now on site (shift to *5th and 6th. Risk phase*).

Day 2 (*5th. Risk phase*). Dispersant spraying took place between 10.10 and 15.45. The aircraft had to return to Inverness, as there was no accommodation on the Shetland Isles for the aircrew.

Complaints about dispersant drift over land were received from members of the public. This information led to concerns about human health, crops, food chain, businesses and water supply

Days 3- 8 – bad weather hampered progress

Day 3 – salvage operation preparedness included constructing an access road

Day 8 – salvage progress stopped due to break-up of vessel

Day 9 – Owners served with legal notice to remove all oil from vessel

Day 20 – first diving surveillance undertaken

Phase IV: (*7th Risk phase*) over ten years of claims settlements. Government commissioned the Donaldson Reports with new legislation as the UK Merchant Shipping Act 1995 and The UK Merchant Shipping (Oil Pollution Preparedness and Response Convention) Regulations 1997 and the development of the national contingency plan.

MODEL E (*Braer* response)

Phase	State of affairs	Soft contexts
I	***Preparedness*** – previous international and national spill knowledge and experience of incidents (development of socially responsible risk management plan)	High time (low risk)/ medium levels of activity/ medium relationship There could have been a problem if it was a repeat of a *Torrey Canyon* spill and if weather conditions did not prove to have positive effects
II	***Crisis***: The *Braer* in distress	Low time to respond. High activity/ High risk / medium to high relationship Contingency plan activated. Actions according to plan. • Payment complications for tug suitability, causing delay
III	***Oil spill event:*** Grounding of the *Braer* – oil leakage	High risk / medium to high relationship/medium activity Medium time to respond as bad weather conditions prevailed • Communication between crew and response centre – resulted in delay • Operational errors (aerial spraying) creating some societal distress • Media presence and arrival of VIPs – distension of roles
1II	***Shore-line clean-up***	Process culture – medium time to respond / high relationship required between workers/low activity No significant damage and hence very little shoreline clean-up. Rough weather helped- benefited clean-up operations as most of the oil dispersed naturally
IV	***Review and reassessment***	Response requiring improved relations. Better utilisation of time and preparedness • MAIB report • The Donaldson report stressed deficiencies in response
I	***Preparedness***	Focus on relationship building and convergence of cultures. New measures such as NCP and legislation to be set before next spill which was the *Sea Empress* in 1996

3.4.2. Observation

The procedures were properly in place and well carried-out and well sequenced, yet a number of problems arose which created delays and led to new actions. Firstly, the early mobilisation of a suitable tug would have prevented the reinstatement of the crew onto the ship, which had reached a dangerous state. The ship during the period of delay had begun to drift fortunately to be slowed down by severe onshore gales and a west-going tidal stream. Although it was held that the outcome might not have been different, in spite of an earlier presence of a tug, it does raise the question of adhering to procedures. It is interesting to note a similar situation in the earlier quoted case of the *Amoco Cadiz* in 1978 where, if the captain had asked for assistance earlier, nothing serious might have happened. Five weeks later the *Al Fahid* tanker was saved from an accident in the English Channel through good communications with the British Sea Police. The MAIB report questioned the likelihood of an alternative outcome had communications between the Master and the Coastguard been more immediate and clear. The MAIB report did not consider this case to be one of bad seamanship and the failure to request a tug earlier was considered to be in light of instructions given by the superintendent. In the *Braer* case the level of urgency did not seem apparent until the grounding, despite all emergency units being alerted as required. The environment had shifted from low risk /medium relationship to high risk/medium relationship. Secondly, there was a communication hiatus between the crew on shore before reinstatement, the emergency response centre and the police who were looking after the crew. Difficulties in contacting the crew meant a delay in decision-making on issues such as anchoring and reinstating crew. The environment was high risk/medium relationship when it needed to be high risk/high relationship. Thirdly, there were operational errors. Apart from communication difficulties, there were mistakes such as releasing aerial dispersants on land, causing public concern. These management errors heightened media interest. Fourthly, the presence of a large media group with a lot of time on their hands meant that new issues were sought for reporting, such as health, all of which had to be dealt with by the emergency response group. The need for more effective information flows and communications was wanting.

3.4.3. Reflection

The *Braer* incident model shows that time delays had both positive and negative effects. Activating at-sea dispersing was stalled due to bad weather conditions. However, the conditions

helped to evaporate most of the oil while time-delay in settling for a tug meant delay in setting up ship rescue operations. Although the implications were minor in this incident, the cumulative effect of time-delays could result in a serious incident as in the case of the *Amoco Cadiz.* Embedded time is difficult to observe: however, having the spill means greater need to be prepared: it creates a high risk situation and demands a high relationship environment. The necessity to consider human-time in a process context is critical and merits analysis in its own right. In this study, however, human-time-values remain an integral albeit small part of the total exploration of human behaviour and action in process situations. This brief exploration implicitly identifies that despite the focus on structure it is difficult to ignore the soft contexts and in particular the human aspect, be it in the role related or by reason of their structured relationship.

3.4.4. Making Sense Of And Conclusions Arising From Chapter Three

Public contingency plans seek to improve the effectiveness of risk and response (crisis) management. However, failure could result where public policy fails to take account of changing time-behaviour contexts. However, the scope for failure does not mean that that public policy is to be negated. There is scope for greater failure without it than there is with it. A lack of a co-ordinated contingency plan bringing in different groups can increase the volubility of public outcry and greater levels of chaos during an event. Public policy has a role in education as in compliance in that it provides greater knowledge to all likely to be involved in crisis management, to understand the risks, and to take action and be accountable for the actions.

Crisis management, safety policies and error control form an integral part of strategic management. What is called for is the development of a new culture in setting strategies that would minimise the development of crisis and bring about a social control of events. Public policy to an extent parallels the strategies of organisations and seeks to define objectives, put pressure for risk strategy development and education, and demands a dedication of resources to counter crisis situations. The multi-agency system of public policy demands even greater co-action and co-operation, as the disparate parties entering the collective contribute with different agendas. For this reason public policy contingency plans are by no means infallible. They are as much susceptible to failure might be any other collective operation. Yet the need for them indicates that much has yet to be achieved in organisational planning for crisis management.

Turner and Toft (1988:298) suggest that public inquiries have an important role to play in the learning processes, providing information as to the cause of failure. Elliot, Frosdick and Smith (*op. cit.:* 27) however, suggest that there is a need to pay on-going heed to near-miss accounts to establish the causes of potential failures, rather than to base policy on the *post-mortem* of incidents that have happened. Focus on the latter could be significantly skewed, providing less than a holistic picture of the causes that manifest the risk. Besides, as Turner and Pidgeon (*op. cit.:* 167) consider, post incident inquiries may settle for a "whitewash "job. Shrivastava (*op. cit.:* 7) observed that industrial accidents follow a similar pattern, arising out of inadequate industrial infrastructure and occupational health and safety hazards.

To help understand the origins of crisis, the study has so far reviewed the implications internally and that of public policy on preventative and "on the spot" action. The emerging observations indicate a need for a more pro-active approach in creating a planned and human developmental strategy involving a multi-agency co-operative system of operation. The need to pay a wider attention to the social setting is obvious. There is need to get away from stereotypical aspects of engineering action plans but much more in the development of risk plans that provide a cultural/structural setting that allows development of human capability and judgement in actions that might deviate from a planned scenario.

PART TWO - METHODOLOGY AND RESULTS

CHAPTER FOUR: HOW THE IDIOGRAPHIC STUDY WAS MANAGED

4.1. SECTION ONE: METHODOLOGY

The exploration of behaviour management in context is achieved through the use of qualitative tools of inquiry by way of the inductive methods of interviewing and participant observation (idiographs). The analysis of the idiographs takes account of the epistemological assumptions derived in the main from known interpretative approaches predominantly considering Weick's (1995, 2001) concept of "sensemaking". This "sensemaking" approach essentially goes beyond macro-level analysis to micro-level insights such as giving consideration to rationales for perceptions, behaviour and actions taken and, as he terms it, looking at the effects of "*cognition on action*". Tensions are surfaced which raise some critical observations as to underlying motivations, the use of time in learning and training (preparedness), the culture of groups, the level of relationships and the way groups and individuals interact within the pre-determined parameters of operation for risk and incident management. The Chapter also states how data is collected from interviews and from observations of physical oil spill management exercises, so as to enable micro-level analysis. The approach seeks analysis and interpretations from what is observed, bearing in mind the epistemological assumptions made, some sense about the *phenomena* of behaviour in incident management is made and conclusions are derived which support the premise that it is behaviour, and not the process of management, that is the risk.

4.1.1. EPISTEMOLOGICAL ASSUMPTIONS

It is generally assumed that a belief which makes a legitimate claim to knowledge differs from one which is a mere statement of opinion, in that the former can somehow be justified. However, it not always possible to identify what constitutes justification, and how, or whether, it can be attained. Traditionally conflicting theories claim that ultimate justification for our beliefs is to be found in reason, as do the rationalists or in sense-experiences, as do the empiricists. The traditional debate is, however, concerned with the nature of the foundation of knowledge. More recently, however, attention has been focused on the structure of knowledge, that is, on how our true beliefs relate to one another. The assumption made is that a belief is justified to the extent to which it fits in, or coheres with, all our other beliefs. So, for example, it could be argued that the

foundation of the belief that oil spills are a social hazard ties in to the greater belief that animal, birds and other living organisms have as much right to an unpolluted environment as humans. If accepting this argument, identifying the foundation of any belief would require a desquamation of previous beliefs. Not only would this be a time-consuming exercise but also it would not guarantee that the truth behind a belief is obtainable. Therefore a statement of opinion would be seen as justifiable by its link to a series of prevalent beliefs brought about by variables such as experience, function, perceptions, culture, relationships and the vulnerability of the situation. This thought intimates that an opinion valid in one environment may be invalid in another where these variables may take on a different significance. This leads to the second and third assumption that opinions are time-static, in that they are made in the context of a particular time frame and that time that we speak of is not considered in duration terms but as human time (Hegel, 1967) in that it is bound with the human responses to extrinsic and intrinsic stimuli within a time frame (Adam, 1990: 91-103). In effect, the study sees time in terms of its usage-value and the impact of this value on behaviour. The study therefore holds fascination with the context of time, more so than the concept of time. Although not considered in detail as to how time is viewed disparately in different contexts, some aspects of time have been taken to evaluate culture, perceptions, action and motivations during an incident (Chapter two). To this extent an assumption is made that the treatment of human time is central to all behaviour; there is scope outside this study for research to consider the complexities that can arise from time-related impacts on human relations and actions. The functionalist theories of time (Giddens, 1984) view time as an agent bringing about a change in behaviour, but they disregard time as an element of human behaviour. Time has been studied in terms of present and future. Behaviour, however, is stems from time that is past, such as culture-building time, experience time and time used for preparedness.

The fourth assumption is the assumption that observers, by the very nature of their focus of inquiry, influence the outcomes of what is being observed. Experiences, albeit disparate, are mutually implicating and fundamentally interconnected. The very fact that an observer presents and focuses on what is observed as context brings about a convergence of experience. Pure objectivity is therefore not really possible.

4.1.2. CHOICE OF METHODS OF INQUIRY

As Romano (1989: 35-43) puts it, the methodology adopted must reflect the main objective of the research and consideration should be given to the usefulness and relevance of the research. To observe human actions and interactions within a predefined process of incident management requires an approach that would establish in the inquiry some level of legitimacy both in the choice of method and its measure. Early deliberations sought to question the methodologies used in risk, risk management and social studies. The methodologies on risk studies were predominantly positivist in approach. Studies, however, in risk management were two-pronged: financial risk management and physical risk management. Studies on financial risk management (that is, the analysis of possible outcomes of management decisions) were mainly positivist. *Positivism* consider phenomena as they are experienced and that which is observable and measurable. Positivists use deductive reasoning to postulate theory, using tools such as statistical probability techniques and scenario planning (Bernstein, 1996). The positivist approach was also the original research tool used in social studies (Comte[xl]; Strauss and Corbin, 1990; 1994; Banister *et al.*, 1994). Positivist tools aim to find fixed and universal laws that govern behaviour (Buchanan and Huczynski, 1991) and at the same time considering phenomena as they are observed and measured (Easterby–Smith *et al.*, 1990). The approach concerns itself with the search for objectivism, testable hypothesis, causal relationships and quantification of knowledge or analytical truths (Heather, 1976:34; Rose, 1978:26). Positivists believe in empiricism (Checkland, 1981a: 316), a doctrine in the theory of knowledge, which stresses primacy of sense-experience over reason, a standpoint taken by rationalists, in the acquisition and justification of knowledge. The limitation in positivist approaches is that they do not concede to the subjectiveness of observers in the expression of reality (Checkland, *ibid.*; Saunders *et al.*, *ibid.*).

Post-positivist approaches, however, believe all observations are biased by reason of theorists' cultural experience. This thinking upholds a *constructivist's* viewpoint in that the world-view is constructed from the perceptions of it. It is therefore believed that objectivity is not the characteristic of one individual but is a social phenomenon. Therefore, if this thinking is accepted then no methodology can be purely objective. Objectivity in effect is not absolute. To observe the phenomenon of human action during an incident, it becomes essential to establish

what is *really* going on out there (during the incident) and to achieve this requires a subjective perspective, that is, getting inside the collective operation to understand the internal stimuli.

The problem of viewing context from a subjective perspective is that human actions and interactions are by their very nature a subjective phenomenon and hence not directly measurable. By reason of the fact that subjectivity is a multi-dimensional reality with reliance on historical, anthropological and sociological biases, constructs developed are therefore also based on interpretations and viewpoints of the researcher and the persons observed. Therefore, what really underlies the constructs is ultimately the interpretations of ideas or concepts of disparate persons linked by their shared purpose. It is not simple to reproduce or reflect reality from a multi-dimensional context; therefore there is a need to select and shape, and to achieve an illusion of reality, by linking similar interpretations and excluding any extreme depiction of what constitutes reality. The *social constructionist* approach holds that reality is socially constructed through social interaction and negotiation (Checkland, 1981:277), developed through "*shared accumulated experiences*" which give rise to "*assumptions, ideas, values and norms*" (Rosen, 1991: 273).

Presenting facts objectively, that is, uncoloured by feelings, opinions, or personal bias, holds that what is true or false is fixed by how things stand in the world, independently of opinions on the matter. Being purely objective makes it difficult to explaining how reality comes about. It is accepted that objectivity is itself subject to subjective constructs, therefore what is viewed objectively becomes purely illusory (Rosen, 1991:1-24). The ascertaining of real truths becomes questionable. It would, for example, be an over-simplification to represent a reality that states *"oil spill risk management is now a social process more than a economic tool* ". By way of factual evidence, however, it may be accepted that this statement is a truth by reason of the level of punitive damages awarded post–event by the courts and by public relations having become an important issue. It could be asked whether such evidence is sufficient to validate the reality. The reality might be a cultural change where society has sought to change norms on which economic consideration of industries are based, or it might be that industries have changed their social norms to protect their economic norms. The truth is therefore no more generalised than specific for any one organisation or situation and that changing situations can bring about new truths. In effect reality and particularly objective reality can never be captured as Denzin and Lincoln

(1994: 2) observe. Subjective reality, however, also cannot be fully captured; if truths are linked to experiences, as experiences change so do truths. The influences of human action arising in one situation involving a particular set of conditions and experiences may be totally different in another. What is experienced may not be experienced again; and hence reality that exists in one context may not exist in another.

This debate on what constitutes reality goes back to Weber (1949) who pointed out that reality is complex; people live in a world of irrevocable values. However he did believe that some level of objectivity could be generated through the development of a *"value–free* " episteme or by way of some protection against the biases of the individual (Andersen, 1996: 22). It is not the intention of this study to debate subjectivity and objectivity issues as much has already been done on the subject. It accepts that by reason of existing biases, a methodology is required that manages to "tweeze out" the reality as best it can from the contextual variations that contribute to the state of the risk. The study and phenomena of human interaction, the social and cultural processes observable within collective operations may well bring out a different reality. The tweezing out of different perceptions, understanding and interpretation of reality or realities is therefore essential and not necessarily in one environment but within changing environments. Each individual oil spill is unique. Erlbaum (1996[xlii]) upholds that the choice of an idiographic approach is that it recognises the uniqueness of each individual situation and seeks meaningfulness at an individual level. Undertaking an approach which attempts to develop general laws (nomothetic approach) that hold across individual situations may not be realistic and would not produce the "reality" sought for. An approach therefore is needed that is able to "*capture the voices of many and produce a thick description"* (Geertz, 1973) of the reality of individual situations.

Strauss and Corbin (1990) point out than an approach known as "*accurate descriptive*" qualitative research is meant to give a sense of what the observed world is really like. Observing behaviour is an action that requires making sense of a phenomenon as it arises, within its natural settings, requiring special interpretations of individual perceptions (Denzin and Lincoln, *ibid.*). As Cresswell (1998) says, such an approach is like viewing an "*intricate fabric composed of minute threads, many colours, different threads and various blends of material*" and building a

"*complex narrative*" and a "*holistic picture*". Such an approach frees the researcher from a methodology that seeks to simplify or rationalise complexity into components that albeit understandable are unable to provide the true picture.

Phenomenology obviously opens up the domain for questioning complexity without demanding rational explanations. The growth in *phenomenological* approaches has therefore sought to challenge positivism as an adequate methodological tool in social studies. The problem, however, lies in how far complexity can be studied to make it a meaningful exercise. The reality or truth lies in the interpretation of meanings arising through constantly changing narratives (Hoffman, 1990: 3). To capture the full essence of reality makes it necessary to study a number of unique events. There is danger, however, not only that it will be time-consuming in attempting to establish reality but that the existence of a number of parallel realities makes the process more complex. The search for reality therefore becomes meaningless. In fact it becomes questionable whether there exists a reality that can be accepted as a greater reality. The reality of the phenomenon of human action can therefore be observed only in the interpretation of perceptions and by observing behaviour in special contexts. The identifying of some consistencies between the perceived behaviour and actual behaviour allows for some generations of reality.

In determining the choice of method, it was noted that the approaches undertaken on physical risk management, such as safety, incident and operational management, were mainly phenomenological. The approaches were generally eclectic involving use of methods such as interviewing, participant observation, action research, ethnography, naturalist observation (Wittgenstein[xlii]), and grounded research (Pidgeon, 1996:75-85). These methodologies demonstrated that physical risk management was placed firmly into the social science category, involving concepts of sociology, psychology and anthropology rather than being viewed as a natural science. It has been argued that the aim of natural science to predict and control of natural processes, whereas the aim of the social sciences is to understand human behaviour. The choice of method or methods for the study therefore is dependent on the ability to observe some reality in collective operations during an incident. However, there are two existing variables, which makes choosing one method difficult. Firstly, observations of the process of incident management need to be either at an actual incident or at second best a simulation. Secondly, the

involved groups that make up the collective operation operate not as a convergent unitary body but as a pluralistic (Child, 1969: 224) group of divergent organisations. To identify the motivations and tensions of role involvement requires a method that captures individual perceptions, and one that provides a rich insight (Pidgeon, 1996) in the explication of reality. Therefore to capture the relationship between human behaviour, process and environment, a semi-idiographic approach is considered, based on the rationale below.

4.1.3. Rationale for Semi-Idiographic Case Study

As the variables of one oil spill are unlikely to be replicated during another spill, to undertake a nomothetic approach, relying on the collection of group data (Mullins, 1996:105) would not reflect differences. A nomothetic approach tends to view variables as consistent. An idiographic approach (Mullins, 1996; Rogers, 1980; Mead, 1934), however, concerns itself with the uniqueness of the situation; accepting that variables are subject to change in different contexts makes it difficult to achieve full-scale generalisations. The idiographic insights of routine displays, such as pilot exercises or interviews, will not be absolute in obtaining true insights or "reality". Such insights however will bring about some observation of behaviour during incident management. However, to rely on a methodology such as that requires observation of "live incidents" would itself be limiting, as the studies would be dependent upon the happening of an oil spill. The fact that there may be no spill in the next five years would make reliance on a nomothetic approach impracticable.

In anticipation of the criticism, that from the attempt to achieve simplification the study analysis might find itself developing nomothetic conclusions out of idiographic insights, the question is begged whether truths about human-process relationship gained by idiographic methodologies are absolute. Undoubtedly, some assumptions made in the analysis will be based on previous generalisations. However, each new variable analysed will require new interpretations of previous generalisations. For example, generalising that no crisis management would be effective without a designated team fails to take into account variables such as the risk management culture within an organisation and of individual's level of capability. It may be that one organisation has capable personnel but no designated team, but is more successful in handling a crisis than another organisation with a designated team. It is necessary, however,

irrespective of these idiographs, to nomothetise to some extent, not so much to make things appear simple, but to define boundaries within which new thoughts and processes can be put forward for action and further research.

It is accepted that, as more is studied, the pattern of outcomes is likely to grow more complicated. Furthermore, changeable determinants make it impossible to reach any one set of outcomes, and if nomothetisation is sought this will only be partial and possible for one set of circumstances. On the other hand an idiographic approach, although not absolute, is able still to provide a "rich picture" even where some conversion of multiple determinants into generalisations is likely to happen. Part of the methodological rationale is, in characterising human actions and interactions within a chosen context, to allow for both compartmentalisation and fragmentation. To enable capturing truths about cultural, time, motivations and interactions within collective operations the study considers the following inductive approaches.

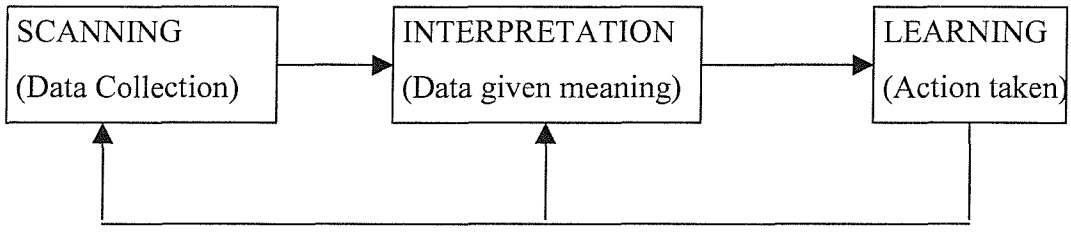
4.1.4. INDUCTIVE METHODS

Inductive methodologies have allowed the development of concepts and techniques for the collection, analysis and interpretation of data and "*.making replicable and valid inferences from data to their context"* Krippendorf (1980). Any inquiry is predicated on the belief that better access to well-grounded information should serve to ensure that it brings about new interpretations and subjects for future research. In undertaking micro-level analysis, in entering the inner world where action and interaction takes place, the approach in interpreting observation, meanings are taken and given to emerging behaviour. The methodology therefore seeks to derive truths by way of interpretative frameworks. The characteristics of interpretivism are in the main threefold: truth is socially constructed, knowledge is concerned with interpretation and meanings are achieved through interpretative frameworks (Usher, 1996). Interpretation, however, needs to be disassociated from reflection. The way information is interpreted is affected by prior assumptions (Billig, 1991). Reflections are not necessarily objective interpretations as there could be biases. To avoid biases and statements describing observations requires constant confirmation and disconfirmation of what is observed. As Weick (2001:242) puts it, "*the critical issues for interpretation systems is to differentiate into highly specialized information receptors that interact with the environment. Information about the*

external world must be obtained, filtered, and processed into a central nervous system of sorts, in which choices are made ....Interpretation is a critical element that distinguishes human organizations from lower level systems". However, reflections allow analysis in the subjective sense and biases and descriptions are useful in identifying trends in thinking and to this extent reflections are considered an important part of observation from which conclusions and interpretations can be drawn.

There are however, some assumptions taken into consideration which enable interpretation and support reflection. The initial assumption is that risk and incident management operations are subject to significant environmental influences and that these influences produce new situations creating complexity in identifying constants in behaviour. Therefore there will be a need to observe how operations develop their communications and information processes to deal with uncertainties. Secondly, assumption is made that there is disparity of cultures and observations focus on how best convergence of values is achieved. The third assumption concerns the relationships and power distancing (Hofstede, 1980) between the disparate groups. In an incident management situation groups operate in various authoritative positions and some by reason of statutory authority. Information generated by groups in charge may have distinct perceptions among those who receive them and those who are expected to use them. Interpretation may vary depending on the roles, functions and vulnerability of the situations. Furthermore, interpretations may change when the incident is over. For example, the acceptance of an overriding dictate during an incident may be less regarded as necessary after an incident, when there may be scenarios of "scapegoating". The fourth assumption is that different organisations have different cultural attributes (see section 2.3.1.4.; Deal and Kennedy (1982) cultural types) which bring about a differentiation in how they interpret situations and information arising from interrelationships. Furthermore the interpretation of information between organisation and member may be of a different experience from one between another organisation and it member. For example, one organisation may operate by collective decision-making while another might provide its member with greater decision control. In dealing with like situations the response of both organisations to each other and to the incident situations may vary significantly, and the interpretation of information therefore may not coincide to provide a mutually acceptable course of action.

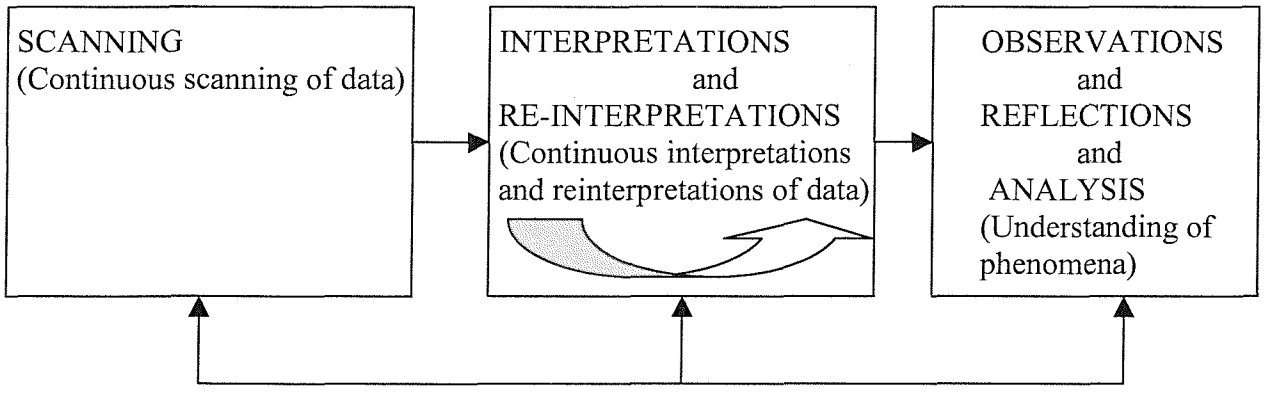
The fifth and final assumption is the time-value of preparedness contributed by each of these groups participating in the collective. Some groups may have invested more time and energy into preparedness and learning than other groups. So low level learning in one organisation may affect the interpretation of events as might by companies who are more prepared. Argyris and Schön (1978) consider that learning involves a new response or action based on interpretation. Weick's (2001:244) observation is that interpretation is analogous to learning. Weick suggests that scanning is the first process-stage where monitoring of the environment and providing environmental data to organisational members is necessary.



Source: Weick (2001:244), Relationships among organizational scanning, interpretation and learning.

The study bases its methodological framework of interpretation of collective organisations based on the premise that continual interpretation and re-interpretation is undertaken of data continuously collected and observations continuously made.

Methodological framework



Special attention needs to be given to how the understanding of phenomena is achieved. Many research studies have put forward various approaches. Naturalistic approaches seek to observe emerging scenarios in their complex and changeable natural environment and provide

explanations and justification of human nature behaviour. Denzin (1989) associates symbolic interactionism as a naturalistic approach. As Denzin points out the researcher must enter the world of interactive human beings to understand them. Blumer (1969) puts it that the purpose of such an exploration is not to construct any rigorously defined theories or to test hypotheses but to " *move towards a clearer understanding ....of one's problem....to develop ideas of what are the significant lines of relation* ...". The approach suggests a need to get close to the subject matter and find the rationales for their actions or, in the words of Blumer, to develop a sensitising rather than a defined concept, i.e. providing direction to the outcome rather then being prescriptive about it. By its very nature, naturalistic approach means that the subject or subjects under observation should be undisturbed by the researcher (Hammersley and Atkinson, 1995). There are viewpoints that the naturalistic approach is positivistic in that both naturalism and positivism represent social phenomena in a literal form (Hammersley and Atkinson, 1995: 11), such as documenting features and explaining their occurrence rather than interpreting the reality of the context. Foucault (1975)[xliii], however, put it that the approach neglects the political interpretation of what constitutes a truth and that in effect what is true and what is false is more than mere observation of context but something which is directly influenced by the dynamics in the exercise of power.

Naturalistic approaches are not best able to capture fully the complexities of social life for they seek to over-simplify complexity (Denzin, 1989). The grounded theory approach is to some extent better able to capture complexity, although, the role and reflexivity of the observer is seen to be disassociated from that of the subject. To alienate the observer limits the experience to an impassive factual account. To experience reality, however, is to some extent the reality from the observer's viewpoint bringing the observer, as Hammersley and Atkinson (1995: 19) state, "*into parallel with that of the people studied...actively making sense of the world, yet without undermining the commitment to research and realism*". It also needs to be recognised that the exploration is made up of a series of constructs with different evidential implications and phenomena. For example, the exploration of insurers' perceptions provide evidence to the fact that they are in a cultural context different from that of the emergency groups. The insurers' focus is more on the performance of the risk in their portfolio, than on the implications to stakeholders and affected public. Yet by reason of the same subject matter constituting the risk

there is a link between the two. It is therefore felt that to observe the social and cultural phenomena of a collective operation, could best be achieved by participating in an observation of either a real spill event or a simulation (as next best) and by interviewing the individual groups in their own contextual settings. To make sense of the inner-outer view requires, therefore, a "culturally attuned" approach whereby data concerning social or cultural groups are gathered by means of some level of personal observation. The uses of ethnographic or semi-naturalist modes of inquiry such as semi-structured interviews and participant observation have been developed to achieve this.

Ethnography is the study of the social organisation and culture of a particular group of people. The term refers to two distinct but interrelated ideas: the conduct by the ethnographer of the fieldwork in a particular place mainly through participant observation, and the putting together of a written description and analysis based on the fieldwork experiences. The emphasis as stated by Hammersly and Atkinson (1983) is a detailed and intimate account of what a particular situation with a view to developing generalisations about what is happening. Ethnographic methodology has its roots in anthropology (Mead, 1935; Malinowski, 1922; and Levi-Strauss, 1978). Ethnography, if following Malinowski's argument, best achieves results by close and prolonged contact with the society being studied, revealing its true character. The concept of prolongedness is vague in the sense that a prolonged period of time could be construed as protraction of an episode or a time-duration, each producing a different form of experience and scenario. Yet in both situations it is possible to capture reality, the inner-outer context or a "feel" of the situation. The problem, however, is that the inner and outer contexts may not easily unite (Mitchell, 1990; Waring and Glendon, 1997:12). The diagnosis of the internal context may follow a different kind of logic from that which might be outside (Weick, 2001:447). For example it might be possible to view the phenomena of a collective by participating in the collective, yet the context that each of the involved groups brings into the interrelationship within the collective may get overridden by focusing on the collective. Thus the internalisation becomes a limited focus of observation. Therefore to capture the phenomena, *emic*[xliv] and *etic*[xlv] perspectives (Harris, 1976: 329-350) need to be considered. However, the observation of disparate groups of individuals operating out of different settings and occasionally grouping, is more complex. This would require the observations within the disparate organisations to understand the culture,

power structures and social interactions. Having done this there is the need to inter-link these observations to that within the collective operation. There are two problems with this method. First, capturing the time-value usage within organisations requires prolonged study and participative observation within each of the organisations. The second is that members change and interactions observed within one time frame may not exist in another time frame where new members have come into the observation. This would be both in the case within organisations and within the collective of organisations. The conclusion therefore is that outcomes generated by way of an ethnographic study would be no more realistic than the extraction of revelations and reflections arising out of personal statements, from observing settings in which interviews are held, or from some level of participant observation of the collective. Anecdotal evidence reflects history and the experience of the narrator, and in this sense provides the observer with insight into culture, power and social interactions. It could be argued that the narrator might not be truthful in his/her revelations. Reliance would therefore lie in the context of questioning and the "tweezing-out" of the deeper thinking. Developing whole-scale generalisations, however, is not possible in the context of an oil spill incident, as findings in one observed setting are not automatically applicable to another setting. Admittedly, despite contextual variations, some generalisation is possible on the assumption that there is similarity in process structures at every spill.

New approaches have gained ground. Streubert and Carpenter (1995) suggested an approach which intends to explore *"the social processes that are present within the human interactions"*. The approach was that of grounded theory, a systematic technique, which relies on the development of theoretically completed explanations. Although this approach is significantly inductive, allowing for the exploration of the data, the data collected lends themselves to deductive validation, especially in seeking explanations of the phenomenon. In effect it seeks to generate theory from data (Holloway, 1997). This approach relies on the ability of the researcher in interpreting data (Strauss and Corbin, *op. cit.:* 274) and to be theoretically sensitive (Strauss and Corbin, *ibid.;* Pigeon, 1996; Cresswell, 1998). This approach requires significant data for coding and comparison. Analysis of data according to Strauss and Corbin is a three-tiered process. First comes open coding "*by which concepts are identified and developed in terms of their properties and dimensions*" (*op. cit..*: 74); secondly, axial coding, the process of reorganising relationships

between categories; third, selective coding, the integration of categories to develop a theory. To achieve effective coding, however would involve more than a one-off observation of contextual variables which is not easily possible in studying oil spills. The approach requires continuous analysis of the data (Saunders *et al., ibid.),* which allows the gaining of new insights or meanings from areas not previously explored or considered and the development and alteration of the direction of thought (Pigeon, 1996; Cresswell, 1998). To this extent it creates a framework of interpretation and reinterpretation of data collected. The need to develop explanations from the data is clear. There is, however, uneasiness in the concept of "emerging theory" as explorations of data reveal more than an emerging theory. They reveal explanations about phenomena and experiences within disparate contexts. However, this approach assumes that context is immutable. The context of oil spill operations is ever-changing and theoretical premises relevant in one context may not be so in another. Pidgeon, Turner and Blockley (1991) admit that although grounded theory helps to enter the complicated maze of reality, it does not provide an easy solution to get out of the maze.

Therefore, explorations of the structural, cultural and behavioural aspects in risk and collective systems is achieved through the combination of description, explanations, reflections, interpretations and re-interpretations. Also in the conclusions of the study the incorporation of some evaluative and suggestive elements are put forward. As Bateson (1972: xvi) puts it, "*an explorer can never know what he is exploring until it has been explored*". Weick (1969) sees reality as a metaphor, in that it " *is simply one way that people try to make sense out of the stream of experience that flows by them*". Whatever method is used and whatever explanations are generated, as worst it lends itself to re-interpretation, at best it brings forward a revelation in the explanations either by its level of rhetoric or by creation of new terminology which helps in creating a base for further challenge to these explanations.

4.2. SECTION TWO: METHODS OF DATA COLLECTION

The research incorporated a three-part approach. First: the gathering and analysis of the data of structural constructs. This was done through the building of contextual constructs and by way of a study of oil spill incident reports (TABLE R, APPENDIX E) and press and public reviews, including those of the *Brear* and the *Sea Empress*, which provided insight to the context of oil spill and the process and tensions that arose (TABLE U, APPENDIX F). A phase model was developed to illustrate the conditions that potentially exist and which could bring failure at each phase. Comparative assessments with other incident phasing models established the distinctions of the oil spill management process.

The second and third parts involved gathering data of perceptions and actions/interactions of the individual groups participating in the collective operations by means of interviews and participation observation. A semi-structured interview was considered to provide a mix of structure and feel and to prise open "*secrets*" Oakley (1986: 231), instead of the formally structured interview method considered insensitive to stimulus observations. To achieve more than formal response to questions, that is, to "get a feel" of the risk and role issues, required "face to face" communications, that is to have an open-ended conversation style interview (Pigeon, 1996). This method would provide a more effective way of obtaining not only the response to set questions but also the added perspective of what was being said within the context of their cultural/structural environment. As Denscombe (1998:113) observed, this method allows the interviewers to "*speak their minds*" on a subject that is intrinsically complex; or as Saunders *et al.* (1997) stated, that such a method would be used " *to reveal no only the "what" and "how" but also place more emphasis on exploring the "why*". However some level of structure is necessary as an open interview can be problematic if it becomes too unstructured. Reinforcing some level of structure, either by keeping within the focus of pre-prepared questions or by loading questions in a logical sequence, would explicate or unfold the latent perceptions of the interviewee while keeping within the confines of the focus of the study (Sellitz *et al.*1959).

The semi-structured interviews provide a crosscheck against the information gathered in part one. To establish the perceptions of parties entering the role, questions were asked about how

they perceived the risk of oil spill to their organisations how they saw their roles and those of the other participating groups, and what tensions arose out of their roles. These three key questions were supported by other questions to establish other unstated tensions. These included questions on the financial tensions experienced; what factors increased or decreased the risk; action taken to decrease the risk; their role in the communications structures, that is, providing information, training, networking and what is required in the future to make it easier. The third part is the actual observing of group behaviour during oil spill simulation exercises.

4.2.1. INTERVIEWS

As this research was after the *SE* incident, the best place to undertake the research was felt to be Pembrokeshire. In each category two organisations were chosen unless it was felt that additional explanations were required, when further organisations were involved. It was anticipated that no further illuminations would arise from undertaking more than two interviews. The specific respondents were chosen by reason of either their involvement in an oil spill or their specialist knowledge. The interviews were undertaken with the following:

1. **Oil companies:** Pembrokeshire and at Poole Harbour and Hamble. The latter is also situated in an environmentally high risk area.
2. **Port authorities**: Milford Haven, Pembrokeshire and Poole
3. **Government Agency**: The key agency is the Marine and Coastguard Agency (MCA). At the time of the interviews they were known as the MPCU.
4. **Local Authority**: Three local authorities were interviewed. LA1 by reason of its involvement in oil spill contingency plan with. LA1 was also used to pilot the interview questions and to establish the "contextual feel". LA2 was chosen for the reason of their dual experience in dealing with the *Rosebay* spill and their involvement in the *SE* incident LA3 by reason of their location and involvement in the *SE* incident.
5. **Environmental groups (EG)**: Four key groups were interviewed. A statutory environmental agency (EG1) instrumental during the *SE* incident. EG2 by reason of their involvement in the *Braer* incident, and in the UK DETR's Marine Pollution Advisory Group. EG3 by reason of having their property affected by the *SE* spill, and EG4 a group supportive of direct action.
6. **Insurers**: Four different insurer experts were interviewed. The initial contacts were made with a London marine reinsurance underwriter. This was followed by an interview with an

international marine reinsurance broker and one UK P&I club director who was recently a visiting professor at Southampton University. Through personal contact, an interview was carried out with the Technical Adviser at the Lloyd's Underwriting Association, who set out the Lloyd's view on marine and oil spill risks. .

7. **Other**: This category included:
   - The tanker owner representative, International Tanker Owners, Pollution Federation (ITOPF) who in effect plays not only an important role not only as the representative of the tanker owners but also by their link to the insurers, and the IOPC.
   - The director of Southampton University's Institute of Maritime Studies, who added to the observation about the legal framework for oil spill incidents.
   - Independent 1: A scientist from a marine biological studies centre who were also national consultees on marine biological issues.
   - Independent 2: An oil spill expert with previous experience in handling oil spills, and involved in post-spill reviews.

4.2.2. MAKING SENSE FROM RESPONSES

After piloting the questionnaire, eleven questions were put to the interviewees (TABLE S, APPENDIX E). When making sense of responses, it became clear that different cultural and experience modes should be considered in order to gain a better understanding and interpretation of the intent of the interviewee in answering a question (See verification of statements in Chapter 5C). For example, it can be assumed that that an interviewee with spill management experience will have a different version of events from an interviewer with no experience of a spill event. Making sense therefore will depend on interpretations of the different types of knowledge and environment in which the interviewees determine their role function. The interviews are, therefore, categorised into six interpretative factors arising from their perception of tensions: the significance of the tensions perceived to the interviewee; experience of the interviewee; the role function of the interviewee and organisation; the culture of (this includes the assumed risk/responsiveness of the organisation), and the risk to, the organisation; and the vulnerability of the situation in which the tension is perceived. Rasmussen (1983: 265) refers explicitly to the importance of qualitative evaluations in assessment, especially in establishing some value of subjective effects.

4.2.2.1. The significance of tensions

Three levels of significance are considered. High significance relates to what is perceived as critical in preventing failure. Medium significance relates to a sense of importance rather than to a sense of what is urgent. In effect what is perceived of medium significance could become high if not properly addressed. Finally, low significance is considered to be some factor that is not fundamental to the success of the management but is instrumental in ensuring a full flow of events that lead to successful management. For example, where training is perceived as a critical prerequisite to successful management, the culture will be devoted to high levels of learning and development. However there may be others who may not, by reason of their level of involvement, consider training for themselves to be of particular significance but may view it essential for others involved in functions that require high level knowledge and skill.

4.2.2.2. The Experience of the interviewee

Experience provides a level of knowledge, which in turn supports decision-making and action taken in an environment where situations change. Persons with little or no experience may find themselves perceiving unfamiliar situations as daunting. Persons who have had experience may well see changing situations in the light of previous knowledge and feel more able to deal with the vagaries of the incident, basing their action on previous knowledge. To ignore the experience factor would be to assume that all those interviewed start at the same perception point in dealing with the risk which in reality is not so.

4.2.2.3. The Function of the interviewee and the organisation

Functional variability can lead to disparate perceptions of risk, task effects and tensions arising. These disparate perceptions may bring about variability in prioritising for action. For example, the salvage operators may give salvage of the tanker and its contents a higher priority than on-water mitigation of oil spilt. As a result tensions perceived by one group may have different levels of significance from that for another group. To test the significance of how each of these groups contributes to actions requires triangulating against the other factors and qualitative sources such as observations of training exercises, public reports and comments. Weick (2001:

446) concludes, "*These various " barometers", each of which presents its own unique problem of measurement, begin to converge on an interpretation*".

4.2.2.4. The Culture of the organisation

In Chapter two, a significant part of the discussion on risk was focused on culture and its contribution to risk and risk management. Culture, firstly, is intrinsically latent and what is manifest is what is perceived by the way organisations are organised and how decision-making is undertaken. Secondly the mix of high and low risk taking cultures can affect response, especially where control is not effectively centralised, as seen in the case of the Three Mile Island incident. Culture that is visible, however, tells a story and that story is one that links to level of knowledge, experience and risk situation.

4.2.2.5. The Risk to organisations

How organisations perceive a risk is how they relate their structural and cultural experiences to their roles. Technical organisations will view risk in operations terms while public bodies are likely to view these in social/political terms. It is felt that these disparate perceptions can manifest behaviour that could bring about divergence of output.

4.2.2.6. The Vulnerability of the situation

The way responses arise is complicated further by the perceived vulnerability of the situation, resulting from cool-headed behaviour to panic. Turner and Pidgeon (1997: 32-34) suggest that where there is predictability, the response is likely to be less extreme. However, knowledge may not be translated into practice during an incident, as unexpected conditions may make people act and react differently from what is expected, especially when vulnerability is high and speed of action is required.

4.2.2.7. Commingling of factors

The interviews attempt to bring together the perceptions of risk, role and tensions explained in light of cultural, relational and knowledge factors that affect perceptions and actions; and from the commingling of these, some sense is made of behavioural reality in incident management. To consider each of these factors separately would only provide one angle of failure. For example,

the culture of an organisation may not be linked to risk responsiveness, however the respondent working for the organisation may, by reason of his/her experience developed a high level of risk responsive attitude and ability. The organisation's cultural ineffectiveness and potential for failure is, therefore, mitigated.

4.2.3. PARTICIPATIVE OBSERVATION

Participation involves either passive observation or "action research". As Rosen (1991: 8) stated, "*to understand social process one must get inside the world of those generating it*". The low frequency of oil spill occurrences means that it is implausible and impossible to undertake participative observation of a live spill. Even then, the call for specialist involvement, speed and sensitivity of process makes it difficult to infiltrate the inner context of the collective operation during acute conditions. Such an approach requires total involvement in activities including being in charge of a project or part of it (Nandhakumar, 1996). Acting as assistant to the exercise director was "next best" to total involvement in a live spill.

4.2.3.1. Observing behaviour during the physical simulation of oil spill management

Typically, physical simulation is an enactment of oil spill management in a short time frame. It enables the observer to evaluate the efficacy of a pre-planned process of incident management and to analyse actions taken by the different groups. In effect it brings the actors on stage and requires them to act out the plot. Deviations from the planned action are occasionally included in the process to enable the actors to adjust the plot in dealing with the deviations. As Weick (2001:188) puts it, " *to enact the environment can "create the appearance of an environment" or "to simulate the environment for the sake of representation*"". He goes on to establish that these enactments or simulations involve a superimposed rather than an underlying order," *based on the assumption that cognition follows the trail of action*". However, such simulations manifest underlying behaviour during action. The behavioural manifestations can be cross correlated with the interview results to provide a more holistic picture, providing some level of generalisation and transferability (to other situations) (Strauss and Corbin, 1990; Schofield, 1993) and confirmability of data (Lincoln and Guba, 1985). Thus, enabling the observation of a complex process, albeit in pre-set conditions, with many interacting elements, all with the aim of optimising performance in some agreed way. Management of the exercise can vary, including

not only in management of the control system, but also that of the collective organisations, the communication systems and the technical decision-making. In an oil spill simulation the key problem is the how the oil spill conditions are to be developed for action, how the interrelationships of roles in dealing with the oil spill are established and how the complete process is tested operationally as if real. The aim for the chief co-ordinator is to ensure that the eventual integration of roles results in success. However the aim of the training is to identify areas of failure that could manifest themselves during a live event. A number of concerns arise in observing simulations. First, the differentiation of the implications of superimposed authority with that of the underlying authorities. Are the roles in a leader/follower structure or a collective action or both? Another observation could be the significance of the role of a superimposed authority on the lead organisation. Secondly, there is the concern that what is seen now may be non-indicative of future action. The exercise could be an organisational failure rather than a failure in the simulation. However, the study takes the premise that whatever the outcomes, these are observations, which at worst may be that "this should not happen again as no learning was gained" or at best " a lot of learning was gained from the problems encountered". To some extent it represents similar observations as might be achieved from a game of charades. Clues are provided and from the observations the whole picture is attempted.

4.3. Conclusion

The methodological tools of semi-structured interviews and participation observation allow the observation of inner-outer context of oil spill collective operations. The tools support analysis, reflection and interpretation of what is observed and described. The epistemological assumptions indicate that although it is difficult to establish absolute truths, the truths surfaced provide some insight as to the behavioural trends. It is assumed that there is some relationship exists between what is told in the interviews and what is observed during the physical simulation exercises. This relationship is analysed from a social contextual point of view, taking into consideration any symbolic interactions, individual motivations and actions taken. From the observations and analysis, emphasis is developed that it is behaviour and not the make-up of the structural framework, or the hazard in consideration that is risk.

CHAPTER FIVE: RESULTS OF THE IDIOGRAPHIC STUDY

SECTION 1: THE INTERVIEWS 1

INTRODUCTION

Each chapter so far has sought to provide an understanding of the conditions that surround an oil spill incident and an examination of the concepts of risk, risk and incident management and human behaviour. The realisation is fourfold. First, the existence of extensive legislation, regulations and insurance demonstrates the perceived seriousness of a tanker oil spill. This has meant, secondly, that the focus on incident management has to be not only on preparedness but also on incident management and thirdly, for this reason, that human behaviour and action during incident management is a critical factor. Finally, as incident management involves the collective operation, human action arises of the interactions of the collective organisation.

The idiographs of action and interaction are undertaken through a two-staged process. The first idiograph is that of the outcome of the interviews. The interviews aim to identify the reasons why failure occurs. They widen the picture by providing an understanding as to how the individual organisations involved in incident management view and deal with risk. The second idiograph is that of the observations drawn from the participative observations of physical oil spill simulation exercises. These exercises demonstrate a level of reality as they bring involved parties together in their attempts to manage a hypothetical spill. The simulations allow for the testing of assumptions about risk and failure made in the phase model and the comments of the interview respondents as to why failure could arise. From this two-staged study, an understanding is derived of the value of human action and interaction on process and roles. Chapter five is subdivided into three parts, partly to enable understanding of the results in digestible chunks. Chapter six considers the participant observations. Chapters seven and eight conclude the study.

IDIOGRAPHS	PROCESS
1	Semi-structured interviews
2	Physical oil spill simulation –incident management exercises

Assumption

As discussed in Chapter four, to establish the "feel" it is essential to filter the truths behind the perceptions. Comments *per se* do not become truth but must be read in the context in which they are made. A comment such as "*We considered this to be an important risk*" is not necessarily indicative that the risk is of high priority. These comments are recognised as a form of required culture in dealing with externals and hence any relevance taken from such comments is to be done in the context of the company positioning, and other statements that intimate a deeper underlying motive to handling such a risk. For example, both the oil companies interviewed stated that they liked to be "seen to be doing good". Reading between the lines indicates that to the company, the public risk of wrongful diagnosis was equal to, if not greater than, the operational risk. In validating the significance of statements from the interviews, factors such as the function, experience and position of groups are considered.

5. 1. RESULTS AND ANALYSIS

The findings from the interviews were twofold: those addressing the intent of the questions and those that were "spin-offs " from general discussion. It is important to note that a number of important identifications came from the latter. The main interviews undertaken were with the five key groups involved in NCP. These groups were 1) Oil companies, 2) Local Authorities (leaders of the SRC), 3) Port Authorities, 4) Environmental Groups, and 5) MCA. Discussions were also held with scientists and insurers. It is noted that a number of respondents have had direct experience to some degree in dealing with an oil spill crisis. The analysis will take each question into consideration. The answers are tabulated in APPENDIX F.

Extent of role and responsibilities

5.1.1. QUESTION 1

What is the extent of your organisation's role pre-spillage, during the event and post-spillage? (TABLE T, APPENDIX F.)

The question sought to investigate the match between how roles were perceived and those determined in the NCP. It also attempts to examine the key role/s of experts within risk and incident management. These role observations provide the basis from which the understanding of duality of process and behaviour is achieved.

Analysis of key comments made.

Early comments showed that the parties perceived their roles and responsibilities as determined either by the national contingency plan or by reason of the strategic risk plans developed by the individual groups. As observed, it became clear that roles were perceived not on how they were positioned but on how they operated when activated. This disparity is demonstrated below. It is clear that that each stakeholder had an individual frame of reference, indicating crucially how each viewed its different frames of reference and dictated how its action should be undertaken.

For the environmental groups the key perceived roles were, "*lobbying*" (or vocalisation of policy issues) or "*raising awareness*", prevention (i.e. of environmental impacts) and providing expert information. Both lobbying and prevention are interrelated and subjected to individual interests: EG3's interest was that of "*national conservation*" while EG2's interest was prevention of pollution damage to national and international environmentally sensitive areas. Status was clearly one of having expertise in their field of conservation. EG1, in its role as a statutory authority, saw its role as "*supporting .... SRC [and] provision of on the spot advice.... to Local Authorities and others*". EG4 saw little value in being involved in post–event evaluations, but reiterated the important role of environmental groups in incident management. *"We don't need to be involved in national incident operation, but it would be useful to the incident operators to consult environmental organisations for their expert advice and knowledge*". Environmental group interest lies in stressing the potentially negative influences of human activities on the physical environment. In behavioural terms this interest is achieved by maintaining the legitimate or clientela position (Peters, 1977), by lobbying and securing information and even at times undertaking the illegitimate position. The responses indicated some level of agenda–setting. Issues such as the use of dispersants were seen to be significant, yet the benefits of the usage of dispersants are hardly mentioned. As EG2 put it, that they were "*happy to leave shores not cleaned as more environmental damage could arise Chemical dispersants are used to make shores pretty and clean too quickly. Since the SE incident chemical dispersants are seen to be the main way of dealing with oil spills. We are concerned that its usage is growing rather than reducing".* Therefore although the roles were accepted as stated, the focus needs to be not on what they can do but the influence of their actions on behaviour, such as Greenpeace's actions against Shell dumping oil at sea, resulting in a global consumer boycott of Shell's products.

Implicit in the NCP is the value of partnerships. The Joint Nature Conservation Committee (JNCC) is seen to one such group. EG1 as part of the JNCC saw itself being " *responsible for monitoring and surveillance during major incidents*" (NCP). Thus, environmental groups maintained different principal interests and saw themselves differently, in their roles. The varying responses lack unanimity with the four environment groups showing different principal aims and preoccupations and therefore, suggesting that the disparate interests indicates different solutions and demanding different aspects to the experts' roles.

In general, the LAs accepted the voluntary role to be inadequate. All LAs constantly emphasised the anomaly of a role affected by "*lack of statutory duty*" and "*lack of adequate funding structures*". The strong links with environmental and other groups was also emphasised ("*keeping a constant dialogue*"). The development of partnerships was seen to be of major significance. Both LA2 and LA3 demonstrated the importance of the need for dialogue. LA2 put it, "*We have a long-standing arrangement with our own environmentalists in that we meet them very regularly and we get on with them very well....[for] improving of information and communication facility* ...[sic]" LA3 saw the need for good neighbour policies "*setting- up joint partnership with other neighbouring bodies such as WWOPAG*". Despite the writing of plans the concept of risk assessment was seen to have only moderate interest for the LAs. LA2 verbalises this: " *it is not a key role but an important role..... the real thing that comes out of the risk assessment is that you have to be ready all the time.....heck with the risk assessment, that's nothing, you can do the training without a risk assessment,, provided you do the right training*". Yet the role of training seen for oil spill management was linked to budgetary tensions. LA1 stated that a pilot exercise could cost as much as "*£3000 p.a.*". Interestingly, the NCP requested that the LAs were instrumental in writing up their risk plans. There was mixed reaction to leading the shoreline clean-up with some seeing that role to be that of the MPCU under the current non-statutory conditions. Undoubtedly, the LAs' interest lies more with protection of local interests than in open contract with government. The lobbying role (for resources, both physical and financial) was stated early in one interview and put higher on the agenda than being the lead in the shoreline clean-up. The comments, however coherent, show some unease in undertaking their role as leaders of the SRC. Despite wanting statutory duty, LAs clearly see themselves best suited to lead the shoreline clean-up operations. The comment that MPCU

should take charge is taken in the context of government as financiers of the operation. As LA3 commented, "*the MPCU advises the local authority to set up the JRC and that the person in charge for the JRC should be local authority Oil Pollution Officer in charge.....if statutory authority was not granted the lead should be ..... the MPCU backed with experts, and drafting in other parties "at need*"".

The MPCU, therefore, as a government agency, had two frames of references. First, a technical mandate "*Custodian of National Contingency Plan - lead organisation dealing with marine pollution and chemical incidents* [with a] *key role in co-ordinating and integrating response*". The second was a political mandate: "*Overriding authority to respond in whichever jurisdiction - to ensure that oil pollution is combated, defend UK interests irrespective of commercial interests [sic]*". No new role revelations arose to the role set in the NCP. As MPCU is the writer of the NCP, this is to be expected. The respondent however emphasised their role of control and command: "*we are the lead body*". What is interesting is that although dialogue with other parties was accepted as key, this role was emphasised through what MPCU could do rather than in a partnership context, for example, provision of information, training and response expertise. Furthermore, emphasis was more on the duty of others to MPCU (for example writing of plans) rather than on the duty of MPCU to others. This emphasis demonstrated a master/servant relationship rather than that of a partnership with equal contribution. However, with respect to shoreline clean-up, it was made clear that MPCU saw its role as support rather than control. Despite what appears to be a clear and almost military role, the comments betray a discomfort about managing this significant role with limited resources. MPCU is only a small group of experts, and under the MCA the group has been subsumed under a wider control structure with counter-pollution being a small part. As stated, if there were two or more spills, this would significantly question the capability of the counter-pollution unit. Boehmer-Christiansen's (1994) precautionary principle can be invoked in the sense that the role of the technical elites and particular those in a dominant role, as is the government agency, in being precautionary, and in controlling risk decision-making. This duality can cause serious conflict in maintaining the level of neutrality expected by all directly relation to the authority (O'Riordan and Cameron, 1994; Fischer , 1990).

The oil companies as operators of terminals for loading and unloading and oil exploration, however, had multiple frames of reference. The first frame of reference was clearly operational: a high significance role of " *emergency response ...and being part of the overall information team for the efficient handling of oil and oil spills"* (Oil company 1). Oil company 2 reiterated this: *"provision of first level support to the incident (and) setting up of incident response centre"*. To ensure they are able to cope with the vagaries of the incident it was felt that it was of very high significance to be exceptionally prepared and have "*effective safety management*" (Oil company 1) and "*initiating research*" (Oil company 2). The second frame of reference, also clearly one of high significance was the value of their usage of local knowledge and the availability of resources in combating oil spill incidents. As Oil Company 2 put it, they had *"access to existing contracts for services- local knowledge and equipment.... Provision of all reasonable assistance* and resources such as *provision of beachmasters and labour* ..ability to provide *help and advice on health and safety* and facilitating *waste disposal routing"*. The third frame of reference was socio/political: the significance of partnerships and public relations. As Oil Company 1 put it, there was a need for "*developing liaisons....* and a *good level of relationships in advance with other agencies*". Oil Company 2, like the LAs, saw the need for *"setting- up joint partnership with other neighbouring bodies* and developing *good neighbour practices"*. As part of their policy of preparedness high value was given to "*being involved in training programmes* and keeping *up with training and contribute to the development of best practice*"(Oil Company 1) and to maintaining *"Public relations"*. Oil Company 2 admitted that "*political pressure is significant .....ultimate risk is public perception of capability...could even result in the shut down of the plant"*. The fourth frame of reference was political-economic, that of the *"UKPIA* [United Kingdom Petroleum Industry Association*) role*" as representing the national group of oil companies. These multiple frames of reference intimated a need by the companies to maintain a strong socio/political and economic focus to incident management. A strong level of dedicated resources was in place by both companies and a constant level of training was instigated. The oil companies saw their roles as the source of expert information on operations. The emphasis was on "*being seen to be doing good*". The role was seen to be mainly operational and social. Emphasis was on three obvious areas: emergency operational response in tier 1, supporting response in Tiers 2 and 3, and public relations. The public relations role is seen to be critical, intrinsic to the overall management of operations. The existence of an in-house media group and

press office in both the oil companies indicated that the role is considered to be fundamental. Both oil companies stated *"we need to be seen to be doing good"*. As Oil Company 2 stated, the " *....aim is not to have spills – if we do we need to have procedures, people and equipment in place – and how to minimise environmental impact and business reputation*". Business reputation can be seriously affected, as seen in the *Exxon Valdez* Case, when public relations are weak. Oil Company 1 emphasised the importance of this function: "*Oil Company 1 undertakes its own preparation in training people in dealing with public relations.*" They went on to explain: "*You (the media) may get an update statement and you may get bored with that and if you have a deadline on television or newspaper, you are going to soon be looking to go to the front line. And if there is a manager there he is basically going to read that statement isn't he? You are going to try to hit that poor guy there with a shovel, he is going to give you the best story isn't he and you need to know are those guys prepared...so my guy has been at it six hours shovelling, raining, its cold, he's hungry, he's going to give you a wonderful story, especially if you are the lower class publications, so we have to make sure, our guys are prepared that if somebody is going to spring out of the bush suddenly.. they have the facts correct.*".

This explanation unmasks a couple of truths: first, oil companies cannot be seen to be lax when it comes to dealing with the public. The fuel crisis in the UK (2000) showed the necessity to deal with not only the oil depot blockaders but with ensuring supply of oil to emergency cases. Second, there is obvious anxiety that any bad publicity can tip the scales suddenly from being a tiresome inconvenience to an organisation-toppling revolt as seen with Shell's Brent Spar situation. Having in place visible procedures through building of partnerships and training programmes indicates the essentiality of good public relations. After all "*crisis management*" as one respondent stated, was the key issue.

Port authorities saw their role predominantly as operational, especially in safeguarding the safe and efficient use of the port or harbour and *"ensuring operations carried out effectively" (Port Authority 2).* The role involved the "*provision of piloting and technical expertise and support helping the distressed vessel,.....establishment of a control centre and nomination of a senior company representative to take charge of the centre manning the centre at the appropriate level*" (Port Authority 1). The "*roles have been agreed as part of the Standing Conference on Anti-Oil Pollution* (AOPOSC)" (Port Authority 1). The role since 1998 had "*Statutory authority*

to write risk assessment plans" (Port Authority 2). Duties involved "*Support to MCA during Tier 2 and 3.* and *Clean up control of pollution in Harbour waters"* (Port Authority 1, Port Authority 2); "*Nomination of Liaison Officer with oil companies for media enquiries"* (Port Authority 1)*; "Clean-up of shore pollution in co-ordination with the District Council"* (Port Authority 1); and*" Co-ordination of outside agencies involved in the incident*" (Port Authority 1). In light of the impending litigation for mismanaging the piloting of the *SE,* there was little mention of training as a function, although it was later considered in the MAIB report that training and communication had to be high priority. As Chomsky[xlvi] (1957) pointed out, communications are the central part of make-up of the risk culture.

ITOPF's key roles were stipulated as follows: *"provide a service to tanker owners and insurers..."provision of technical support and information to incident management groups.....support to groups in the preparation of claims"*. ITOPF was clear in its role as the direct link between the tanker owners, the insurers and the incident management groups. There was a sense of knowledge of being experts in the field by being represented in spills not only national but international:. *" we have been at the scene of most oil spills*". The biggest problem concerns reasonableness of claims. The issue is by far the most resource-draining bugbear of claimants against the polluter. The issue was a resounding cliché. Brown (1998 *ibid.*) sums up this tension: "*in the first instance if LA can cope with the incident using their own resources,.....Where the incident is too big for the LA to cope.....The LA will continue to meet its expenses of any resources that they make available*". ITOPF, in its dual role as oil spill expert and intermediary for the tanker industry, plays a significantly active role in spill incident management as adviser and key liaison group between those in active incident management and those actually liable for the incident. If value added is looked for, the small resourced organisation of ITOPF is more likely to override the value of the resources put forward by the key operational units during the incident, and for this reason its role in the contingency plan is particularly important.

Insurers saw their role mainly as economic, in the insuring of liability and property risks (See TABLE L(I), APPENDIX C) and being represented in IOPCF in the settlement of claims. In undertaking this role they sought to enforce standards (*"we have strict underwriting")* and to be

involved in networking with tanker owner affiliations such as ITOPF and ITIA and in post-spill reviews (as the Donaldson Review). A secondary role, although highly prevalent within the industry but not significant outside it was the provision of risk information and research information as stipulated: *"research is critical to risk management"*. The insurers saw their role as mainly in the provision of and support on dealing with, the financial aspects of the risk. Their main role before the spillage was in the setting of terms and inspection of vessels. During spillage their role was mainly concerned with salvage operations; post-spillage, with claims assessment, handling and payment. Insurance is all about risk. Losses hurt not only the insurer but also the insurance industry as it affects market capacity to finance the risk. A catastrophic claim has therefore the effect of doubling the riskiness for the insurer. The role of insurers is therefore affected as a shift occurs from the guardian of losses to the generator of additional risk by way of less market capacity and increased pricing. The visual split in the roles between the financial and physical risk groups appears to have created a "them and us" situation. Sharing information appears one way of bringing the two groups, closer.

Finally, the independents were vocal in how they saw the roles of others. Independent 1, who were national consultees on marine biological issues, believed that there was a serious bungling of the *SE* management while Independent 2, who had been part of the post-*SE* evaluation team, was less critical of management but more so of process. The SEEEC report reiterated some of these tensions (5.1.2.1.2.3).

5.1.1.1. Conclusions arising out of Q1

As expected, overall there was not much differentiation between the roles defined in the NCP document and the roles perceived. However the emphasis was clearly distinct. The roles in the NCP document were clearly linked to the management of the incident. They were based on a structural form, with the structure derived from the reporting authorities laid down. Apart from MPCU, the groups' perceived roles were more than was stated in the NCP. Roles were viewed not so much as structurally derived, although groups were mainly aware of the requirements under the NCP, but as cultural. Emphasis was put on the need for strong communications between parties: joint partnerships, lobbying, local knowledge and expertise, provision of advice and information and involvement in joint training exercises. What is observed is the explicit view

of roles as determined within the NCP. Perceptions show that dialogue and good communications are keys to the success of the technical roles; especially in the reality of the consciousness of public involvement. The presence of environmental groups' involvement in before, during and after spillage indicates the growing need to involve and gain acceptance from those who are experts in this field. All respondents accepted the need for a "*sharing of understanding*" (LA3) and the "*sharing of best practice*" (Port Authority 1). There still remains, however, a distancing between insurers and the other groups especially with regard to joint writing-up of plans, training etc. ITOPF, however, plays a proactive role in liaison with the network, advising on the concept of reasonable expenditure. There was no direct contact with insurers, other than with respect to setting up the policy.

Also observed at the time of the event the structural interests become more integrated. (FIGURE 8, APPENDIX H) The interstices indicate the intertwining of roles. The experts and co-ordinators, the internal and external community, are involved at each phase of the operation, although the levels of involvement may vary. The emphasis on communications begins from the moment there is the threat of incident. Tier 1 operations may be successful, resulting in a no-spill situation, yet all structures are activated in different degrees through the existence of networks such as the Emergency Response Centre (ERC), the Environment Group, the Media Group and WWOPAG.

Furthermore, the NCP roles have an operational perspective. Roles viewed are in terms of functions, levels of responsibilities and authorities. Functionality is linked to process and patterns of interaction. Individual roles were dovetailed into the phases of management. Preparedness roles, response roles at each tier of operations, shoreline clean-up roles are roles that are seen to be progressive. As an oil company respondent stated, "*for the first 10-14 days oil spill the response was under our control. The government did a lot when it became a national issue and I moved on to a UKPIA role..... it really was a transition...*". The change in the roles arises out of the shift from one incident phase to another with new roles emerging. Each process requires an ordered functionality, yet undertaking a role was perceived as all about human activity. Lobbying, networking, provision of support and advice, providing information, training exercises, and participation in special groups indicate that process is not merely a function but a series of expected behaviour. Within a process, a series of conforming and deviant behaviour

seemingly arose. One oil company respondent gave an example where the role of the technical team[xlvii] during the *SE* incident had to change to incorporate the role of procurement of resources as function had become critical. The deviation from technocratic to administrative functions, ensured that process continued. Acting and reacting to circumstances rather than to functions is a feature of management.

The Milford Haven AOPOSC Anti-Oil Pollution Plan, 1992, requires control, co-ordination and communication with other involved parties as key role requirements. EG1's work programme 1998-99 requires working closely with other government advisers on wildlife and conservation, local authorities and government departments. Interestingly they do not mention oil companies and port authorities. Oil Company 2, however, reported in aftermath of the *SE* "*local members of the Technical Team and the whole of the Environment Team were known to each other, had exercised together and were well attuned to each other's needs*". The symbolic nature of such interaction is particularly important. It is clear that successful co-ordination is key in achieving procedural successes. The planned involvement of each group does not necessarily mean that they will be involved during an incident, however, they still remain members of the emergency response group. For example, if the food chain is not affected the fisheries department may have a small part to play. They may, however, be called on to take another role, as was seen in the case of a local authority representative who took on the role of "plotter" in recording and displaying information to the ERC. Roles, despite being pre-determined, are expected to vary by circumstance. The concept of the team effort becomes important as all members of the ERC "muck in" when required. Pure adherence to role would therefore fail.

Having made these observations, two issues arise: the dualities in the role of the technical elites within and outside the collective and in this the role of the government, as a neutral agent.

The next inquiry investigated the perceived tensions that arose, out of the roles, during incident management and the perceived significance of each tension by the different groups. Despite cynicism, at times well justified, about their motives and methods, interest groups were seen as indispensable intermediaries in the process of communication between citizens and government.

SECTION TWO: INTERVIEWS 11

5.1.2. QUESTIONS 2 AND 3

What tensions exist, if any in this/ these roles? and What are the tensions, if any, in meeting financial obligations?

Comments, observations and reflections on each tension recorded in TABLE U IN APPENDIX F are dealt in detail below.

Exploring the tensions

5.1.2.1. Tensions arising out of the national contingency plan:

The tensions arising out of the operational national contingency plan were split into two areas:

1. The implications of statutory and non-statutory involvement and
2. The tensions in the roles and responsibilities in co-ordination.

The NCP's aim to bring about a convergence of interests lends itself to a number of tensions. The premise here is that, the tensions are not only linked directly to functions but appear to be linked also to cultures, experience and vulnerability of the end situation.

5.1.2.1.1. Statutory duty to draw up risk plans.

The voluntary commitment to submit risk plans every five years to MPCU was clearly a tension for the local authorities. As LA1 stated *"maintaining of living documents"* and updating physical resources such as response equipment meant pressures on resourcing and funding activity. The submission process of the plans was implicitly prescriptive; however, what was not explicit in the NCP was how, other than the provision of statutory authority to port authorities, the work was to be financed. LA2 claimed that the lack of specific statutory duty for oil spill management made it difficult for this risk to be given a higher priority than other risks. At the time of the interviews the port and harbour authorities were in a position subordinate to the local authorities. They had neither specific statutory duty to draw up risk plans for oil spills nor any compensatory mechanism such as that obtainable by local authorities under the government's Bellwin Schemes[xlviii] for emergencies (APPENDIX D). These omissions in the previous NCP were flagged up by the Donaldson report, thus resulting in the new statutory duty for port and harbour

authorities under the 1998 UK Merchant Shipping Regulations. The implication of this tension is perceived as significant especially in making choices for resources used and developed. As LA3 pointed out, "*there is no particular funding set aside for preparing and for rehearsals of the plans*". Emergency planning authorities also *"acted on their own initiatives"*. One interesting point made by LA3 was "*the role of local authority emergency planners should be to initiate the contingency plan and to gather data but not to run the incident. This way the contingency plan is under constant review"*. Dubber (1997) particularly emphasised this tension. "*If there is to be a meaningful response, there should be model plan with common elements for all local authorities .....but only if this is made a statutory responsibility by Central Government with funding specific for this purpose*". The tension illustrates the tensions between those requiring others to create resources and those actually having to create them. Brock (1991: 409) observes *that "the utilisation of ... resources by humans has meant...fighting between social entities ..over access and distribution*". The line between funding received and incurring of reasonable costs remains a demonstrable tension for local authorities and other involved parties in incident management.

5.1.2 1.2. Roles in co-ordination:

A number of tensions arose with regard to the co-ordination of roles.

5.1.2.1.2.1. COMPLEXITIES ARISING OUT OF MATRIX ROLES.

All respondents were involved in other roles outside that required by the NCP. Other than responsibilities to respective organisations, some respondents had to cope with additional roles. During the *SE* incident the Oil Company 2 representative found himself taking on three roles: NCP; representing own oil company interests; and oil Industry co-ordinator for the UKPIA in determining levels of assistance from all oil companies in the UK. Oil Company 2 explained the issues surrounding these matrix functions. Until MPCU came on the scene, Oil Company 2 used its local knowledge to handle the risk, after which the role was that for UKPIA: " *for the first 10-14 days oil spill response was under OSRL as they were our contractors eventually the government did a lot when it became a national issue and " I moved on to a UKPIA role. – it really was a transition...". "This was a first time scenario of double involvement. UKPIA had negotiated contracting of services to government for which the government indemnifies the oil companies via the UKPIA. This means that the oil companies can release expertise anywhere in*

the UK and know that they will be indemnified for the availability and use of this expert resource".

Furthermore the delay in setting up the JRC meant that Oil Company 2 and the port authorities had to step into the breach and take on roles that were designated to other groups. " *As the spill went on the role changed to dealing with logistics and giving advice to taking advise on technical matters like beach –clean-up techniques ..... (Oil Company 2) found itself spending time on situations such as feeding emergency personnel, contracting for services, provision of waste disposal resources, administrative and communication resources".* These role aspects were clearly the designated functions of any ERC and the local authorities. Local organisations, further, found that they were called upon to provide local expertise " *a lot of people came into the area like government people, MPCU who had no knowledge of the area and no contacts.... We've got those links* ". Local authorities too have dual responsibilities as LA2 explained "*...not only is there a duty of care associated with every county...we have a voluntary undertaking that we will co-ordinate the response*". This statement was a clear acknowledgement of vulnerability existing in light of the lack of statutory duty.

The problem with undertaking two or more roles appeared to concern capacity. Cascading from one role to another became critical as the incident progressed from phase to phase. The tension appeared to be created mainly by logistics and the adequacy of manpower resources in ensuring that the roles were carried out adequately. Oil Company 2 highlights this tension: "*As spill went on the role changed to dealing with logistics and giving advise to taking advice on technical matters like beach clean-up techniques*".

" *we were in a position to mobilise (the resources).... also provision of large amount of protective clothing, feeding about 200 people over a six seven mile radius – 3,000 packed lunches but you can't work 100 people on the beaches without feeding them, organising mobile toilets, shower boxes – but we had the expertise. Therefore it becomes very difficult to work a spill in an area without that type of resource*".

5.1.2.1.2.2. CLARIFICATION OF ROLES AND OF COMMAND AND CONTROL:

Brown's (1998: 19) message to risk managers echoes the sentiments of many of the respondents regarding the lack of clarity of many undertaking their roles: " *To achieve (a) multi-disciplinary response, the management of the organisations must be integrated. Integrated emergency management is a process of co-ordinated preparation that recognises the roles and responsibilities of all participants*" All local authorities echo this point, and that there was a clear need to have roles clarified especially where there was a likely involvement of more than one local authority. The LAs during the *SE* incident were not ready, despite one LA being involved in a rehearsal a few months earlier. Different local authorities had their own way of dealing with preparedness. As LA2 pointed out, it depended on the availability of resources. LA1 showed greater interest in keeping prepared by investing in oil spill mapping systems and being more pro-active in training exercises. As LA3 revealed, local authorities have a key role but are not necessarily experienced to carry out this role. This is a significant tension and the result shifts a "*co-ordinated process*" to a response based on "*co-ordinated capability*" as seen during the *Sea Empress* incident. Local authority reorganisation and the lack of available capable personnel meant that command roles changed. The port authority undertook the chair for the JRC (SRC) whereas NCP indicates this to be a county council role.

5.1.2 1 2.3. SEEEC REPORT ISSUES:

The post-*SE* 1997 SEEEC Report stated that people were not clear who was in charge of the operations. It was revealed that some saw the Port Authority in charge while others saw the oil company in charge. The NCP specifically defines responsibility for at-sea counter-pollution as lying with the MCA and the on-shore role with the local authorities or the port authorities if spill arises within the harbour. The distinctive disparities in the perception of roles meant that communications and reporting was affected. There were also command and control tensions between the port authorities and the MCA as to who should determine control of the operations. The SEEEC report made a recommendation to have the role of the MPCU Overall Commander at the scene of an incident clarified. The report suggested that the intervenient powers of the Secretary of State should relate more to assistance than to interference. The 2000 NCP takes this point into consideration. It specifies that the harbour-master is in control of the incident response when a spill happens inside the harbour authority's jurisdiction, although the SOSREP has

power to override this authority. There is of course some danger that port authorities may tow an injured ship out of their jurisdiction or prevent a ship entering their jurisdiction in the event of a spill, so as not take responsibility. It is further noted that the NCP sees the role of the oil company in the SRC to be a supporting rather than a leading role. The culture of strict preparedness of oil companies as opposed to the looser preparedness culture of local authorities demonstrates that convergence of cultures is difficult.

5.1.2.1.2.4. SHORELINE CLEAN-UP ROLE TENSIONS:

As discussed, coastal local authorities lead the shoreline cleanup and deal with wastage disposal at both county and district level without in effect having statutory duty for this role. The perception of roles varied between the LAs. LA3 felt that MPCU (MCA) advised the local authority to set up the SRC and that the person in charge for the SRC should be the local authority Oil Pollution Officer in charge. LA2 was emphatic in their role definition: *"we are the people who are going to lead on the day ... in fact we are the common thread running right through and we lead the initiative"*. There was also a feeling that if statutory authority was not granted, the lead should be by an external body such as the MPCU drafting in other parties "at need". The 2000 NCP however makes its clear that the local authority is the lead body in setting up the SRC. Both Oil Company 2 and LA3 emphasised the need to have not only clarification of roles but also the creation of special roles. The financial and procurement role was seen important enough to dedicate special resources for it. Oil Company 2 stated the "*Absence of a procurement team (*during the *SE* incident*) meant that the technical team found itself being more involved in this activity than it should have*". As the technical team's responsibilities increased this meant that the time-value of the technical role decreased.

Another important tension arose from different groups issuing press statements disparately. This point is discussed in **5.1.2. 4.3.**

5.1.2.2. Tensions in resource availability:

5.1.2.2 1. Conflict of interests:

Conflict in the prioritising of high and low frequency risks: A number of respondents felt that tension existed between the need to meet commercial demands and that of meeting their social stakeholder responsibilities. The adjusting tool was their strategy for prioritising funds for both

high and low frequency risks. Predictably the degree of resource tension for each responding group varied. The oil companies and port authorities recognised the need for significant investment in preparedness. Funding preparedness and prioritising for oil spill risk was clearly more of a critical problem for local authorities than for other bodies, although all were aware the funding function had to be managed effectively. All respondents felt that although probability studies were important they had little value when it came to preparedness. The low frequency of an oil spill risk did not affect their levels and strategies for preparedness. LA2 showed some scepticism for the need to risk assess: *"the real thing that comes out of risk assessment is that you have to be ready all the time".*

Oil companies were particularly conscious that the high possibility of spillage during loading and unloading demanded high levels of readiness for dealing with both the technical and the social risks that could arise. Port Authorities too made the point for the need for effective prioritisation of funding strategy. *"Prioritisation is essential to make best use of resources- the choice is between reducing economic damage and environmental damage".* However, for the Local Authorities the low probability of the risk has meant added pressures in prioritising for more immediate and needy causes. The pressure faced by the coastal local authorities to prioritise against the needs for, say, hospital and fire services which have a high probability of incident occurrence and also higher immediate visibility was a significant tension. As one local authority respondent stated off the record *"ironically we need more spills to give this risk a higher priority"* All local authorities, however, had a person dedicated, although not full-time, as an oil spill officer whose functions were wider than just oil spills and related to other emergencies.

The disparate strategies saw their impact in the *SE* incident when because of the local authority difficulties the slow emergence of dedicated oil spill personnel meant that new roles had to be taken by other involved parties. Resourcing was also an issue for environmental organisations. EG2 stated *"funding....subject to priorities when received...also - might not dedicate resources to shipping as other more important priorities". "It's more likely that we would engage a fisheries person than a full-time shipping person".* Non-governmental organisations of course could prioritise according to strategies that would strengthen their influences. For statutory environmental organisations, oil spill plans were a must.

5.1.2.2.2. Human resources:

- *5.1.2.2.2.1. DEDICATED RESOURCE*: All the responding organisations were seen to have dedicated resources for oil spill management, albeit at different levels. Those with statutory authority were well equipped, although as seen above not so with local authorities. The MPCU felt that it was "*not geared to take on two major oil spills (*occurring simultaneously*) - although low probability of happening"*. The environmental groups attempted to clarify their role in the training helpers. EG2 stated "*We do use volunteer groups for direct involvement but we recognise that they are fully trained beforehand via other groups such as RSPB"*. Local authorities raised concerns about the management and use of volunteers. As LA3 put it, "*volunteers should have been stood down sooner as ....some .....were in their 60s and 70s. Clambering over oil beaches or sitting in their cars for long periods of time in sometimes cold inclement weather was not a good idea*". This comment was stated in the context of local government reorganisation which "*–caused....problems in the provision of (*a dedicated administrative*) support"* (LA3). Oil Company 2 summed up the criticality of this tension "*Technical continuity of personnel was a problem during the SE incident due to local government reorganisations, the MPCU and UKPIA had to provide transitional continuity of the Technical team ....(Oil Company 2) found itself spending on situations such as feeding emergency personnel, contracting for services, provision of waste disposal resources, administrative and communication resources*".

5.1.2.2.3. Physical resources:

The demand for physical resources and the availability of these during an incident can be quite separate issues. The tensions were in four key areas.

- **Availability of adequate tugs**: LA2 stipulated that in 1996 it sent a resolution to the Secretary of State for Transport. The resolution urged that Government give serious consideration to ensuring that a tug of suitable capacity be permanently on station for the south-west shipping lanes, to provide early assistance to tankers and other large vessels in distress. The suitability of tugs was critical. However difficulties in getting the right tug during the *Brear* and *SE* incidents continued The post-*Braer* MAIB report did flag the need to request a tug earlier. In the *SE* incident it took a day for shipowners to enter into a salvage contract under the insurance Lloyd's Open Forum and for larger tugs to be brought in.

- **Mobilisation of resources**: Oil Company 2 was the most vocal on the need to mobilise resources quickly where spill occurred outside the oil company's jurisdiction (clearly they felt they had full capability within their own jurisdiction). It was, however, accepted by most respondents that there was a robust level of resources available and a team trained in handling supplies, other than the comment that there was a need for an effective procurement team. Port authorities too showed concern for a quick mobilisation of resources, particularly tugs. The NCP 2000 now requires each response centre to include a procurement team responsible for the acquisition and movement of equipment and supplies.
- **Waste disposal**: Dealing with oily waste was acknowledged as a big problem. Local authorities saw cost, availability of landfill sites and the logistics of achieving waste disposal (which could become significantly weightier than the actual oil spilt) as critical. LA2 expressed the logistical concerns *"how are you going to get rid of oil waste, how are you going to stack it"*. As LA3 put it, *"During the beach clean-up of the Sea Empress 3000 tonnes of liquid had to be handled off the beaches - problems can arise in shifting such volumes*". Oil Company 2 too felt that if the company had not been nearby this could have been a serious problem during the SE incident: *"If it was not for Oil Company 2's large sludge lagoons and the provision of a large oil storage tank for the separation of oil from water the rate of liquid recoverability could been substantially inhibited. 22,000 tonnes of liquid waste (95% through Oil Company 2) was handled during the SE incident* ".
- **Use of dispersants:** The environmental groups expressed particular concern over the use of chemical dispersants. EG2 stated" *We have great concerns about the chemical dispersants and have raised these publicly. Chemical dispersants are seen to be the main way of dealing with oil spills-[*we are*] concerned that its usage is growing rather than reducing*". EG2, however, also felt that for shoreline clean-up it was strategy more than speed that was required. They were *"happy to leave shores not cleaned as more environmental damage could arise. Chemical dispersants are used to make shores pretty and clean too quickly*". The FSC echoed this sentiment: *"use of chemical dispersants on emulsions...should be small and carefully used"*. The SEEEC report summary suggested the efficacy of offshore dispersal: *". Oil remaining on the sea surface generally formed an emulsion (a stable mixture of about 70% water and 30% oil) which impeded the natural dispersion process, though monitoring*

from boats in the area where the dispersant was being sprayed confirmed the effectiveness of the chemical dispersants even on emulsion".

Observation

Adequate and efficient physical resources are critical for successful outcomes. In an incident it is not always viable, even if prepared for most eventualities, that all resources will be effectively available and adequately administered. Negotiation and expert knowledge enables the effective and efficient dealing with resources available. For example, a doctor trapped in a mine with a miner who has his feet locked under a broken steel shaft may not have the medical equipment to undertake effective surgery to free him but will use his/her skill to free the miner by whatever means is left to him. There is clearly a need for people to group together in a crisis to enable more resources and expertise. It is interesting that people tend to group more effectively where lives are in danger, yet when property is danger, there are tensions in converging values.

5.1.2.2.3. Financial Resources:

Apart from the implications of the lack of statutory duty for the LAs, the other main financial tension was reimbursement for money spent during the incident. Oil companies through UKPIA forced an indemnity agreement with the government during the *SE* incident for equipment deployed on request by the government agency. Local authorities saw that there was an anomaly in getting reimbursement if the polluter was not identified. This was possible in Tier 1 and 2 cases where clean-up and disposal costs *"remain in the cost domain of the local authorities"* (Brown, 1998). The impact of financial constraints in the main affected the decision outputs. For example, the decision about the choice of tug and other resources has implications for action and its consequences. The responsibility not only for action but also for its consequences remains a prime motive for cautiousness. Consequences are publicly visible, with growing emphasis on accountability, which means that actions become part of a negotiated arrangement rather than one person or organisation shouldering the onus of responsibility. As punitive damages for wrongful action have become the norm, this has meant that behaviour has adjusted to conform to what is expected by the holders of the purse strings or that action is share-based on a compromise deal where more than one group shares in the decision process. This in itself is failure, as working in the shadow of being made accountable creates constraints in behaviour, which in turn can result in unsuccessful outcomes, as seen with the *Amoco Cadiz* case.

5.1.2.3. Tensions in management:

Responses mainly dealt with aspects of communication and decision-making in operational management, and reflected the beliefs and expectations of management. The problem of the one local authority reorganisation during the *SE* incident was clearly expressed by Oil Company 2: "*Technical continuity of personnel was a problem during the SE incident due to local government reorganisations, the MPCU and UKPIA had to provide transitional continuity of the Technical team*". As accountability was significantly in the MCA court, there was the obvious concern that they would be "*subject to suits if wrong decisions deemed to be made*". A throwaway comment that the MPCU function was "*often a thankless task*" merits some comment. As discussed earlier the role of MPCU (MCA) is both technical and political. The former is key in incident management but the latter, by nature of its parent's power structure, is seen to be a political role. The watchdog and command role of the present MCA body is clearly seen in terms of a parent/child situation with MCA in the parent role. Regulatory pressures for trained crew and safety measures have meant that risk management has become significantly strategic. Oil companies write their own risk plans based upon the "*degree of manageability versus the probability of risks*" (Oil Company 1). The port authorities emphasised communication tensions, for example, language difficulties between a ship's crew and on-shore command. Although normally language difficulties are a minimal frustration, it can engender conflict and even in the narrowest sense such conflict in turn could engender responses resulting in a spill. This conflict is seen in the case of the *De Yue* tug case during the *Sea Empress* incident. There were also tensions in managing "*foreign fishing vessels*" (Port Authority 1) where communications were a more significant problem than communication with tanker crews. The key emphasis, for the environment groups, was in their ability to influence the national contingency plan. EG1 stresses the need for *"continuously lobbying the government"*. The groups go on to explain succinctly the link between riskiness and their involvement. "*Risk has been reduced by awareness and development and our policy in lobbying the government to change their policy and to develop their policy on risk* (EG2) *"Risk managed through the lobbying role....work through agencies like the environmental agency"* (EG2); "*formal representation at JRC level*" (EG1). EG4 showed its aim to be more "*making things happen rather than waiting to make it happen*". It did not see the "*need to be involved in national*

incident operation, but it would be useful to the incident operators to consult environmental organisations for their expert advice and knowledge".

5.1.2.4. Communications, distribution of information and public relation tensions:

5.1.2.4 1. Logistics and Communication:

Comments regarding communication tensions highlight the tensions that existed with communications and distribution of information. Oil Company 2 explained " *The Marine Team, not officially part of the JRC organisation is usually located in nearest Coastguard Centre. Conveniently at Milford, this was adjacent to the Port Authority offices where the JRC was based- Even with being this close liaison was not always as good as it should have been*". The company further stated that there was need for "....*effective communication systems. During the Sea Empress they commenced without a switchboard, which resulted in a help line established for the public outside which took over 3000 calls.....needs a large amount of phone resources... dedicated line resources. Furthermore coastline proved difficult for radio and phone communications*". The main concern for the port authorities was "*the quick assurances from the distressed ship's pilot for .. quick mobilisation of resources..*". The *Amoco Cadiz* case, referenced to earlier, demonstrates the problems that can arise if there were procrastination in the response. The local authorities believed that the critical tension lay in managing communications between the shoreline workers. LA2 emphasised that *"improving ...information and communication facility*" was vital. LA3, however, observed that difficulties existed; for example, "*making contact with Beach Masters by mobile was very difficult*" and hence amateur radio stations such as RAYNET were used. Because of inadequate recording it was not possible to get reliable information. LA3 observed that *"formal recording of events was haphazard"* and could not be relied as a source of accurate information. In some cases because of poor communications there was confusion in caring for workers: "*..workers missed on feeding ... or...made their own feeding arrangements".*

Oil Company 1 saw a significant benefit in sharing information: "*development of standards – much aligned to everywhere else as you share information*". Environmental groups emphasised the importance of working closely together and sharing expert knowledge. Comments such as the need for "*partnerships and joint initiatives*; *supplying libraries with information and providing them with access to any study contracted"* (EG2*);* provision of "*greater and accurate*

information" (EG3, EG4) and *"publicising problem*" (EG4) emphasise expected behaviour within and outside the norms of the structural framework. Insurers homed in on the need for the *"provision of technical advice and risk management services to insured*"(Insurer 1). Their link to organisations other than the insured was not seen to be important, although non-insurance organisations saw a role for insurers in improving communications. The role of insurers in providing risk information was raised in the Donaldson Report (1994). The absence, until asked, of the mention of insurers indicated that their role in the planning and response stage was perceived to be minimal. LA2 was most emphatic about the need for their involvement. *No link - they step back clearly from us.....One of the biggest problems we have is what to do with shingle beaches - there is no adequate discussion between ITOPF, insurers and county councils to the effects of washing off oil on shingles*". From these tensions it appears that management is predominantly about communication and relationship behaviour.

5.1.2.4.2. Information provision:

There was, however, general consensus that the level of information provided was adequate. ITOPF's guidelines to reimbursement have gone some way to breaching the gap between emergency group needs and insurer needs. Devon County Council (1996)[xlix] highlighted some areas also put forward by Port/Harbour authorities for more information on the following.

- "*Suitable and adequate flow of information between tankers and Ports/ Harbour related to known risks and other shipping movements when tankers are entering and leaving*".
- "*The establishment in the relevant port/harbours of databases to predict tanker handling characteristics in risk areas in varying tide and weather conditions to indicate precautions or remedial action needed*".

Overall, all respondents agreed that risk and management information was sufficient. With the web, information provision was made easier. Most respondents were involved in sharing information. Oil Company 1 reported that it undertook "*monthly meetings with the Harbour-master and EA to share information and practices*". The problem lay in two areas, making the public more aware of issues and converting information into practical use. LA3 felt that there was also a *"problem of cascading information from national offices (governmental) to local offices*" and that "*consultation with local offices is insufficient*". Information is therefore critical for action and for the consequences. However as Weick (1995: 87) wrote, information load *"is a*

complex mixture of quantity, ambiguity and variety of information" forced into circulation. The translation from information to usefulness is critical. It is more than the "*suitable and adequate flow*" mentioned by Devon CC above. It is therefore essential to filter information by way of sharing communication, such as briefing meetings with effective documentation of information.

5.1.2.4.3. Media Tensions:

Media relations were clearly felt to be important for effective incident management. LA2 reflected this tension: "*our involvement with the Sea Empress was a purely media battle for a week and a half. You can get away from that if you deal with the media and get everyone on your side and you have a cunning plan, for example, the first press release*". The oil companies considered important the aspect of "*to be seeing to be doing something*". Demonstrable steps were taken to improve the links with the democratic public. All respondents declared that they involved media and environmental organisations either directly or through the collective operation, either advising them of their contingency plans and/or inviting them to participate in their disaster simulation exercises. Most response units have high profiled media spokespersons who liaise with the media and the public in providing assurances in the handling of a crisis. There was, however the problem with the promulgation of joint statements to the press during the event. The simulation exercises manifest this issue (see Chapter 6).

OBSERVATION: The existence of a collective control group for incident management is likened to the bond between a parent (the experts) and child (public). The child demands answers, casts blame and seeks assurances and support. The pressure to support the calls of the public puts a totally different dimension on the role of the collective process. It develops from a planned exercise to one involving a wider political framework. If this shift is recognised there is no longer the risk of oil spill damage but the risk of failure in meeting social expectations. Although the success or failure in the former can be linked to the success and failure of the latter, this link need not influence the outcomes. For example, preparedness and strong collective action may avert an oil spill from a troubled tanker. Yet tanker owners, port authorities and governments may come under scrutiny for contributing to the manifestation of the risk. The risk therefore is the consequences of the failure of duty to society. As LA2 stated, "*public are looking for reassurance, early constructive responses are important*". ITOPF felt that there " *should be a*

greater awareness of different types of media and their different approaches. Stories of misfortune and mismanagement can be damaging even if there is no truth in the matter".

5.1.2.5. Legislative Tensions:

These are predominantly tensions that lend themselves to legislative determination, such as, the provision of statutory authority. Since the interviews port authorities have been given statutory authority under the Merchant Shipping Act 1995. However, this issue remains the key bugbear for local authorities. Other minor issues were raised, for example, effective governance for waste disposal:" *a dedicated wasteland for disposal of oil"* (LA2*);* "*landfill has affected the waste handling issues (i.e. making it more difficult now to dispose of waste*" (LA1). EG1 too expressed *"a need for a regulated policy for the use of dispersants and waste disposal*[lh]". Some environmental groups were concerned with there being "*no formal role in the national contingency plan SRC*" (EG3). Oil companies felt that there was a need to have some legislation on indemnity for resources supplied and used by the government agency. MPCU saw the need to clarify the overlap between the authority of the EA[li] and that of the MPCU in dealing with spills within the three nautical miles of the sea baseline. The responses indicate a level of "he who shouts the loudest (hopefully) gets heard" setting the agenda for future oil spill legislation.

5.1.2.6. Conclusions from Questions 2/3

The responses demonstrate that tensions are evoked in the attempt to bring about convergence of interests. Also apparent was the difference in perceptions and expectation from those groups which appeared to be prepared and had the capability, and groups who demonstrated less capability during the event. The oil companies displayed their position of strength: " *we have local, expert knowledge* [*sic*]" and "*we have resources* " (Oil company 2). LA3 admitted weakness during the *SE* incident resulting from local authority reorganisation and accepted criticism received. Dubber (*op. cit.*) stated that the plan," *had been tested in a "Green River " exercise 3/5 months earlier but actions not implemented – personnel were not in place*". To identify tensions, however, may not be sufficient. The key lies in whether the identification of tensions can bring about change in behaviour. These tensions contribute to the total experience gained, which should, in theory, be taken into training sessions for testing that tensions have minimal impact during an incident.

SECTION THREE: INTERVIEWS III

5.1.3. QUESTIONS 4 AND 5

What is the risk to your group? What factors contributed to increasing or decreasing this risk? *(*TABLES V AND W, APPENDIX F*)*

The answers to Question 4 from the respondents have been categorised into three broad headings: Financial, Operational and Socio/political. The bottom line risk, not unexpectedly, for all groups was financial, as financial viability is the prerequisite of any business operation. Financial considerations were foremost in the replies (TABLE V). Local authorities put emphasis on funding risk arising out of a lack of statutory authority; oil companies and port authorities were conscious of the balance between commercial viability and socio/political requirements. The environmental groups showed that tensions in prioritising were based on the availability of funds; as EG2 stated there was a "*stress on resources and workload*". Even to the scientific organisation (Independent 1) the risk was financial arising though "*loss of site*". MPCU advised that it cost about £13m to fund the *Sea Empress* incident. Insurer risk was, by the nature of the business, financial. It is clear that although financial consideration is of prime importance the degree of financial risk depends on both operational capability and the overall perception of the event. The EGs also reflected on this tension. EG4 let on that "*Maintaining membership support is important*", although EG2 did not feel that membership funding was a risk issue: "*unlikely that membership funding would be affected*".

The port and oil terminal authorities as operating units emphasised the operational risk: the "*operational manageability at jetties and of loading and unloading operations*"*{sic}*. MCA showed concern about responsibility in operational decision-making in their role of leading the marine pollution response. Similarly local authorities also stressed the need for sound management of the shoreline response. All respondents made strong assertions about public perception of their conduct of business. Oil Company 1 stated "*It is important that we are seen to be doing good*", MPCU stresses the problems that would arise in "*making wrong decisions*", and as LA2 and LA3 put it, "*this could result in a loss of votes*" or "*loss of public confidence in the council*". ITOPF felt that "*research on media* [was] *a different story*". None of the insurers

raised the issues of social concerns except in terms of the implications on liabilities. As one insurer mentioned "*society more litigious- the impact on level of liabilities can be a problem*". The link between public perception and commercial disaster has been explored in Chapter one and there is awareness that management of operations has today to be seen to be socially responsible, while continuing to achieve financial viability. Although balancing these two objectives is in no way a new situation or new risk awareness, there is a change in attitude. Operations are no longer geared towards the commercial risk but towards the social risk (see results from participative observations in Chapter 6). In the current pursuit of environment management, all organisations seemed to be practising public relations, not so much in how to deal with the democratic public but fundamentally, in reviewing their processes and techniques. The shift towards preparedness demonstrates that there is focus on developing and conducting socially responsible operations and that it would therefore not be economically or commercially desirable for organisations to ignore the strength of the social ideology. The choice supportive of what would be good for the business or operation has now become a choice based on what would be good for all directly involved or affected by the business or operation. "*We need to be seen to be doing good*" indicates that organisation decisions are to a greater extent guided by social rather than by organisational values (Fischhoff *et al.* (1989): 44-45) creating a shift in behaviour.

5.1.3.1. Question 5:

To get an understanding of management actions, inquiry was made as to the factors likely to increase or decrease the risk. What came out was both surprising and unsurprising: unsurprising because both global and national legislation require certain actions that would bring about a reduction in the risk of spillage occurrence, and damage, for example, handling the loading and unloading of oil, improved tanker specifications and incident management plans and procedures. All relate directly to operational procedures and are indicative that collective operation is a significant condition in the reduction of risk. The responses from the interviews, however, showed surprisingly that the key factors lay not only in operations but also in behaviour. TABLE X, (APPENDIX F) demonstrates that the key factors fall into six headings: factors relating to co-ordination, resourcing, operational management, communications, legislations and research and information development. Resourcing is split between financial and human. Physical resources are subsumed within operational management.

5.1.3.1.1. Co-ordination

Two aspects appeared to impact on management, and hence risk: the strength of relationship between the involved parties during incident and the clarity of in the roles undertaken. LA2 saw the need for *"keeping up a constant dialogue with involved groups such as....dialogue on beach cleaning.....dialogue on where we are to have the storage facilities [sic]"* as important. Most respondents stressed the importance of networking and developing partnerships as critical to effective risk management. Role ambiguities during the *SE* incident created delays in management decisions and as FSC put it, *"what could have been a 2,000 tonne spill resulted into a 72,000 tonne spill"*. Both these areas were seen to be of high significance.

5.1.3.1.2. Adequate Financial Resources

As seen in question four the availability of financial resources was stated as key for all responding organisations, in ensuring effective financing of risk management and funding of research.

5.1.3.1.3. Human Resources

The issues on human resources were split between the availability of human resource and the development of human resource. All respondents saw both areas to be very significant. The funding of dedicated personnel was felt to be key by all although local authorities did not see the need to fund a full-time oil spill expert. The emergency-planning officer dealt with all emergencies. High significance was also put on training and development of personnel, partly through the experiences gained from the *Sea Empress* incident. Most respondents other than insurers were involved in joint training programmes and oil spill simulations.

5.1.3.1.4. Operational Management

The management aspects were considered important: the management of marine response, safety management, shoreline clean-up management. The availability, access and good maintenance of physical resources was stressed.

5.1.3.1.5. Communications

The communication structures during an incident were seen to be a critical risk factor. Oil Company 2 stressed the difficulties in communications: *"During the Sea Empress they commenced without a switchboard, which resulted in a help line established for the public outside, which took over 3000 calls. Also procurement needs a large amount of phone resources – need for dedicated line resources. Furthermore coastline proved difficult for radio and phone*

communications". LA3 also echoed this point: "*Setting up communications, feeding using radio network, providing first aid all directly relate to the effective management of an oil spill*".
As discussed earlier, access to local knowledge and expertise and the handling of the public were throughout seen to be very significant.

5.1.3. 1.6. Legislation

The high significance for statutory authority has been emphasised throughout the interviews with local authorities. Other legislative requirements reducing the risk were issues such as having a national booming policy, special legislation for the use of dispersants and waste disposal.

OBSERVATION

To legislate for every risk factor would be cumbersome, involving effort and costing the taxpayer probably more than the actual risk of error or event occurrence. New techniques and procedures and agreements are being constantly developed which could be incorporated into the planned process without the need for legislation, for example, setting up a memorandum of agreement between the oil companies and government to pay for equipment used.

5.1.3. 1.7. Research and information development

All respondents saw the need for continuing research and development, albeit dependent on funding. EG2 commissioned *"a research to undertake a pilot assessment case of the coastline. The work will be published and through this we will encourage the government to take a more in-depth look at the risk*". MPCU also had commissioned "*scientific research on countering oil pollution* (which) *cost about 800k*".

5.1.4. QUESTION 6

How have the roles played by other involved parties contributed to increasing or decreasing the risk?

The answers lay predominantly in two areas, developing good liaisons (and within this contributing to the development of best practice) and a clear understanding of their roles. The stress on networking emphasises convergence of interests and behaviour. As respondents from LA3 pointed out, liaisons need to be strong and effective at the point of incident.

5.1.5. QUESTION 7

What action has your organisation taken to reduce the risk?

This question seeks to identify how each organisation views preparedness. The predominant emphasis was again on convergent behaviour - networking, joint training exercises, sharing information. When respondents were questioned about individual preparedness, issues such as developing strategies and policies, training of human resources, lobbying for policies and research were mentioned. Some cultural manifestations also arose. The local authority comment "*ironically we need more spills*" highlighted the tension in local councils between the emergency planning team and the strategic team. There was an apparent struggle to keep oil spill high on the agenda. An oil company respondent stressed his personal capability in the position and demonstrated a superiority in preparedness: "*I have a good knowledge of beaches, tides .....and a good knowledge of where the spill might end up*" . An environmental group showed that by reason of its position as experts, it was now in an influencing position: *"We sit on the DETR's marine advisory board– we didn't even have to fight for this place. At a national level we do have a lot of influence*". These manifestations of weak and strong influences point towards a cultural domain of the organisations. The respondent groups that make up the collective operation operate not as a convergent unitary body but as a group of culturally divergent organisations. The factors affecting the risk are, although similar in the generic categories established above, distinctive for each respondent. For local authorities the emphasis was the lack of statutory authority and the implications arising from leading the shoreline clean-up. For MCA, the oil companies and port authorities the marine response was particularly critical, each in respect of their jurisdictional operations. The environmental groups were concerned with the risk to their interest, be it water, wildlife, food chain or flora and fauna.

OBSERVATION

Being prepared was seen to be the key remedy. The emphasis was on dialogue and preparedness. The tensions demonstrate the problems of ineffective preparedness, though, what is also seen in the tensions is the capability of managing uncertainty. There was a distinct separation of the concept of preparedness from the context of risk. Preparedness indicates a forced convergence of perceptions on what constitutes risk. To have in place a contingency plan denies the existence of variable situations of uncertainty. One respondent stated "*We can only do our best*", and another, "*It is not possible to do away with total uncertainty*". Managing uncertainty was seen to be

critical; " *I had the knowledge"; "The Emergency Planning Officers involved, acted very much on their own initiative, in support of the JRC management and the functional groups*"; "*I threw out four people from the JRC. They were environmentalists I asked them what they were doing and they said nothing so I threw them out*". These comments show that despite preparedness, the critical behaviour is that which is put to the test during the incident.

The sharing of information

5.1.6. QUESTIONS 8, 9 AND 10

What methods are used by your organisation in acquiring and giving relevant information? How significant is the role of the other involved parties in the provision of relevant information? What are the limitations in achieving adequate information?

These questions reiterated behaviour in preparedness. Training, newsletters, liaisons, raising awareness and information provision were considered key. Overall it was felt that there was sufficient information available. LA2 considered others, particularly insurers, to undertake a more proactive role in training and provision of information: "*The payers of the claim are never represented in the JRC". "Insurers are not proactive enough... we would love them to participate in the preparedness with the CC and also to tell them if their beach cleaning exercise was reasonable"; "Training mainly - OSRL and MPCU- the oil companies come and participate in local authority exercises but not ITOPF - but then they are very short staffed - but that's their fault. They have been asked*".

5.1.7. QUESTION 11

What is required in the future to make it easier for your organisation to manage the risk?

The question intends to identify the existence of a divergence of interests. The environmental groups sought to maintain their influencing role with government and the emergency units. EG3 suggested a " *formal role in JRC*" while EG2 saw its role as negotiable and to "*debate whether (EG2) should be consultative party to IOPC. So far they tend to choose organisations that have a practical role in response"*. EG1 considered its role as critically one of "*continued liaison with sister agencies such as EA and with JNCC*".

The oil industry's needs were more financial, with respect to the use and maintenance of their equipment. Both companies felt that their level of internal training and knowledge was greater

than the standards put forward by the government. Oil Company 1 spoke of "*running training programmes especially large programmes* [which] *can be expensive, but we do this and more*". The port authorities also considered investment in training as key. However, the training issue was taken in light of the impending legislation and the lack of statutory duty at that time. Subsequently the port authorities in their internal documentation continued to suggest the importance of training, public relations and continued liaisons. The local authorities without exception put statutory duty as the foremost benefit. Having statutory authority as LA3 suggests, would allow "*for the employment of trained and capable staff*". Other issues included continued liaison, special legislations for waste disposal, a national boom policy and the need for a dedicated resource. MPCU raised a jurisdictional issue with the EA. Reorganisation has not necessarily addressed this issue but has subsumed the role of MPCU into the MCA with greater powers for marine response and salvage.

5.2. CONCLUSION OF INTERVIEWS

The macro-analysis focuses on disparate groups' "sensemaking". The interviews show two key areas of behaviour. First comes the need to converge interests by way of partnerships, joint training programmes, rehearsals and sharing of information; secondly comes the need for management capability during the incident, that is having people with special knowledge, experience and capability of handling the situations of uncertainty that arise. This demonstrates the need for a mix of conforming and adaptable behaviour. The interviews have also shown the ability of the respondents to reflect on-going situations from knowledge or experience. It becomes clear that the incidents (predominantly the *Sea Empress* in this case) are treated as interpretation systems where knowledge gained from previous experiences is reflected in the analysis of tensions and the ability to change. At a micro-level there are hints of collective thinking where respondents have voiced similar tensions, role and risk considerations to other groups. This is partly due to the fact that many of the respondents have worked together in the same incident or in similar incidents. The linguistic terminology, although not the same, was similar, (for example, "be seen to be doing good") when discussing lobbying, influencing, partnerships, sharing and so forth. Also identifiable are the distinctions in behavioural norms, from an overall relaxed attitude in some local authorities, to the tense and serious attitudes of oil companies to the risk. There are of course, different motives to which different organisations

subscribe which fuel the behaviour toward the risk. Local authorities see their role in emergency as much wider than oil spills despite the seriousness of consequences from oil spill. True "sensemaking", therefore, does not necessarily mean that one organisation needs to follow the behaviour of others to achieve a successful outcome. What is observed is that when it comes to failure, the rationale for the behaviour becomes questionable. During the *Sea Empress* the local authority's seeming ineptness was put down to reorganisation problems, not because they had not prepared. In fact there had been early preparation in the Green River exercise. However, Dubber (1997) and Brown (1998) both identified critical underlying failures in local authorities such as decisions in prioritising emergencies, training effectiveness, financial constraints and internal communication systems. What is seen is not what we learn; we learn from what is being said and from what others with internal knowledge say. Chapter five considers the responses in the context in which respondents' perceptions arise and whether from these perceptions a general lesson that can be drawn. Chapter six considers whether there are clues to collective "sensemaking" that arise from how the respondents act and enact their perceptions. If lessons are to be drawn from perception, there is a need to ensure a level of credibility of enactment in practice.

SECTION FOUR: VERIFICATION OF STATEMENTS

5.3. CONFIDENCE IN OUTCOME

There is always the problem that anecdotal evidence can result in an illusion of truthfulness rather than actual truth. Although it is not always possible to validate statements that are in the main opinions and perceptions, there is need to try to achieve some level of confidence in the substance of these statements. It is clear that the statements made have some significance where they are supported by statements made in reviews, risk plans and legislation. It also becomes possible to develop some level of truth arising from similarity of opinions and beliefs testified where it begins to be obvious that there is some convergence in thought. There is, however, awareness that statements made are contextually driven. Discussion in Chapter two considered the implications of organisational culture, preparedness-time including experience, level of relationship and vulnerability of the situation as key factors that drive behaviour. A model has been, therefore, developed to consider these factors to enable some level of observation to be made that provides some confidence, even minimal, of the significance values of the responses. The responses that are taken into the test are the categories of tensions which are seen potential failure points that impact incident management. In attempting to validate the statements the intention is not to take away the meaning of the individual statements but to articulate the relationship between different points made, so becoming able to compare the possible motivations behind the statements.

5.3.1. VERIFYING SIGNIFICANCE OF STATED TENSIONS

Observations are made by considering how significant a particular tension is perceived; the level of experience of the respondent in oil spill management (whether they have had previous experience or not); the role or function of the respondent rated by the direct level of involvement they are likely to have in a "live" spill; the risk to response culture; and the vulnerability of environment in which the statements are made. The maximum mode value is 4. The tensions and risk are seen to be critical for organisations that have tensions with significance over 3.

1. The Significance of the tension to organisation. The significance levels are derived from TABLE U.

Area	Significance	Code
Significance of statement	Very significant	4
	Significant	3
	Medium significance	2
	Low significance	1
	No significance	0

2. The Experience of the respondent: This accounts for the respondent's level of spill experience. The tension is seen to become more meaningful and hence significant where perceptions relate directly to experience.

Area	Significance	Code
Experience	Experience of operating during "acute conditions"	3
	Some experience in oil spill management	2
	No experience in oil spill management	1

3. The Function that the organisation is carrying out as expert. The four functions are categorised as follows:
   a) PHYSICAL RISK MANAGEMENT GROUP: This group has been given the maximum value of 4 because of its direct involvement in the incident;
   b) PHYSICAL / FINANCIAL RISK CONTROLLERS: This group has been given the value of 3 because of some direct involvement in the incident and a financial interest in how the incident is managed. This category applies particularly to ITOPF;
   c) OTHER ENVIRONMENTAL GROUP NOT INVOLVED IN THE CONTINGENCY PLAN: This group has been given the value of 2 as there is some involvement or indirect influence on incident management. This category would apply to organisations such as Greenpeace;
   d) FINANCIAL GROUP: This group has a purely financial interest in the outcomes of the incident. This category is predominantly the insurer group.

Area	Significance	Code
Function as expert	Physical Group	4
	Physical / financial risk controllers	3
	Other Environmental groups not involved in the contingency plan	2
	Financial groups	1

4. The Culture of the organisation: The ability to respond indicates a relationship between culture, function, risk and time to respond. If the function is one that a significant role in spill management the culture is likely to be (using Deal and Kennedy's (1982) cultural typologies), *tough-guy* or *work hard/play hard.* There is a need to respond with some speed. Where response required is not immediate, the culture is likely to be *bet–your–company* culture or *process* culture. Interpolation is undertaken where the cultures are mixed, for example, a mix of *work hard/play hard* and *process* cultures would be taken as a 2.

Area	Significance	Code
Culture (Risk /Response relationship)	Tough-guy macho	4
	Work hard/play hard	3
	Bet-your company culture	2
	Process	1

5. Risk to organisation: The risk is categorised according to TABLE V. The risk codes have direct links to the physical operation. Organisations subject to operational/financial and social risk are categorised as 4, as they are seen to be the key players and losers by their involvement in managing the spill. The environmental groups are coded according to their direct or indirect roles in incident management. The financial groups are coded as 1 as their risk is mainly portfolio and manageable by factors other than the incident.

Area	Significance	Code
Risk	Operational/Financial / Social	4
	Financial./ Social/ Operational	3
	Environmental /Financial	2
	Environmental	1
	Financial	1

6. Vulnerability Statements are considered in the context of four spill vulnerability levels. Response ability and time become critical factors at higher vulnerability levels but less so at lower levels.

Area	Significance	Code
Vulnerability (level of spill)	Heavy spill – has affected the coastline or very likely to affect the coastline. Heavy wildlife mortality and significant embeddedness of oil into the shore substrata	4
	Medium spill – oil in water with greater levels of evaporation with some shorelines` and wildlife affected	3
	Low spill – mostly contained at sea or dispersed with little or no impact to shoreline	2
	Incident but no spill	1

5.3.1.1.Tests:

1. NCP – Tensions (Clarification of roles and responsibilities in co-ordination)

	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
LA1	4	2 (personal experience in shipping)	4	2 -work / play hard & process	3	4	4
LA2	4	3-*Rosebay*	4	2	3	4	4
LA3	4	3 (*Sea Empress*)	4	2	3	4	4
Significance Mode -high							4
Significance Mode-medium	4	3	4	2	3	3	3
Significance Mode-low	4	3	4	2	3	2	*** 2-3-4
Significance Mode- none	4	3	4	2	3	1	** 3-4

*** recorded as 3 ** recorded as 3

	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
Oil Company 1	3	2 (Tiers 1 and 2)	3	3	4	4	3
Oil Company 2	3	3 (Tier 3)	3	3	4	4	3
Significance Mode -high							3
Significance Mode-medium	3	2-3	3	3	4	3	3
Significance Mode-low	3	2-3	3	3	4	2	3
Significance Mode- none	3	2-3	3	3	4	1	3

	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
EG1	3	3	4	2 work/ play hard and process	2	4	3
EG2	3	3	4	2	2	4	3
EG3	1	2	2	2	2	4	2
EG4	3	3	2	4	2	1	** 2-3
Significance Mode -high							3
Significance Mode-medium	3	3	2	2	2	3	* *2-3
Significance Mode-low	3	3	2	2	2	2	2
Significance Mode- none	3	3	2	2	2	1	2

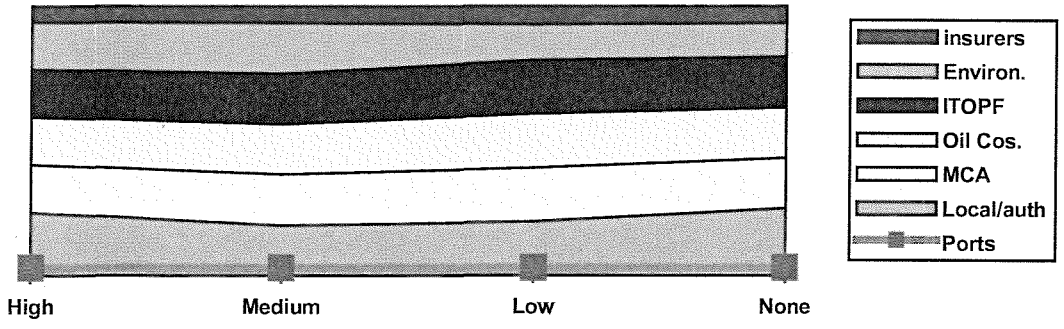
** recorded as 2

	Significance	Experience	Function	Culture	Risk	Vulnerability H M L N	Mode
ITOPF	2	3	3	3-a mix of work/ play hard and process	1	4, 3, 2, 1	3,3, 3, 3
MCA (then MPCU)	3	3	3	4	4	4, 3, 2, 1	3, 3, 3, 3
Port authorities	4	3	3	3	4	4, 3, 2, 1	3, 3, 3, 3
insurers	2	2	1	1	1	4, 3, 2, 1	1, 1, 1,1

Relation to vulnerability

	Vulnerability H M L N
MCA	4, 3, 3, 4
Oil companies	3, 3, 3, 3
Local authorities	3, 3, 3, 3
Port authorities	3, 3, 3, 3
ITOPF	3, 3, 3, 3
Environmental groups	3, 3, 2, 2
Insurers	1, 1, 1, 1

Clarification of roles and responsibilities



All groups particularly demonstrated their concern for need for effective clarification of roles and responsibilities. The local authorities were top of the list. This was partly by reason of the discrepancy about statutory duty and reorganisation whereby the degree to which a local authority is locally representative and responsible varies in different counties. Oil companies too saw this tension as medium to high despite confidence in their ability and role to handle the situation. Most of the key players in the management of the incident all considered this tension to be fairly significant (3). All respondents saw the government's role in the operation of the NCP

as significant; however, there were calls for role clarification when the roles of non-governmental experts were operational and in seeming conflict with that of governmental expert groups. The groups not directly linked to the incident were not in a position to comment on this tension beyond that it was obvious, for successful outcomes, that roles should be clarified.

Resource Tensions – human and financial

	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
LA1	4	2 (personal experience in Merchant Navy)	4	2 (a mix of work/ play hard & process	3	4	4
LA2	4	3 (Rosebay incident)	4	2	3	4	4,
LA3	4	3 *Sea. Empress*	4	2	3	4	4,
Significance Mode - High							4
Significance Mode-Medium	4	3	4	2	3	3	3
Significance Mode – Low	4	3	4	2	3	2	3
Significance Mode – None	4	3	4	2	3	1	3-4 (3)

	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
Oil Company 1	2	2 (Tier 1,2)	3	3	4	4 3 2 1	3
Oil Company 2	2	3 (Tier 3)	3	3.5	4	4 3 2 1	3
Significance Mode-High							3
Significance Mode-Medium	2	3	3	3	4	3	3
Significance Mode – Low	2	3	3	3	4	2	3
Significance Mode – None	2	3	3	3	4	1	3

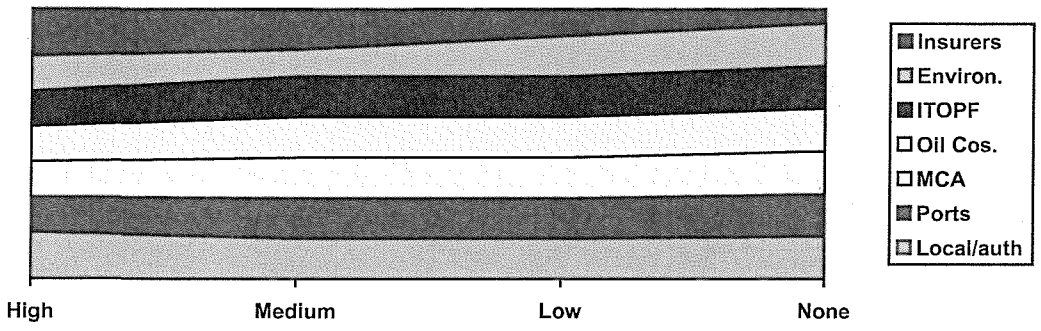
	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
EG1	2	3	4	2	2	4	2
EG2	2	3	4	2	2	4	2
EG3	2	2	2	2	2	4	2
EG4	3	3	2	4	2	4	3
Significance Mode-High							2
Significance Mode-Medium	2	3	3	2	2	3	2
Significance Mode – Low	2	3	3	2	2	2	2
Significance Mode – None	2	3	3	2	2	1	2

	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
ITOPF	2	3	3	3	1	4 3 2 1	3 x 4
MCA	3	3	3	4	4	4 3 2 1	3 x4
Port authorities	3	3	3	3	4	4 3 2 1	3 x 4
Insurers	1	3	2	1	4	4 3 2 1	4, 3, 2, 1

Relation to vulnerability

	Vulnerability H M L N
MCA	4, 3, 3, 3
Oil companies	3, 3, 3, 3
Local authorities	3, 3, 3, 3
Port authorities	3, 3, 2, 2
ITOPF	3, 3, 3, 3
Environmental groups	2, 2, 2, 2
Insurers	4, 3, 2, 1

Resources



Local authority call for a statutory duty demonstrated that resources were a key tension especially as the authorities played a significant part in shoreline clean-up. Port authorities at the time of the interviews were also demanding a statutory authority and the significance of this tension, although high, will be lower now that statutory authority has been granted. For insurers the resource (mainly financial) issue bore particular significance when during and after the spill, i.e., when vulnerability was high. For ports, oil companies and environmental groups the tension significance was level, irrespective of vulnerability. This is partly due to their need to have high level preparedness irrespective of vulnerability.

Resource Tension continued: Conflict of interests

	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
LA1	2	2	4	2	3	4	2
LA2	2	3	4	2	3	4	3
LA3	2	3	4	2	3	4	3
Significance Mode - High							3
Significance Mode-Medium	2	3	4	2	3	3	3
Significance Mode – Low	2	3	4	2	3	2	2
Significance Mode – None	4	3	4	2	3	1	3

	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
Oil Company 1	3	2 (Tiers 1 and 2)	3	3	4	4	3
Oil Company 2	3	3(Tier 3)	3	3.5	4	4	3
Significance Mode -High							3
Significance Mode-Medium	2	3	3	3	4	3	3
Significance Mode – Low	2	3	3	3	4	2	3
Significance Mode – None	2	3	3	3	4	1	3

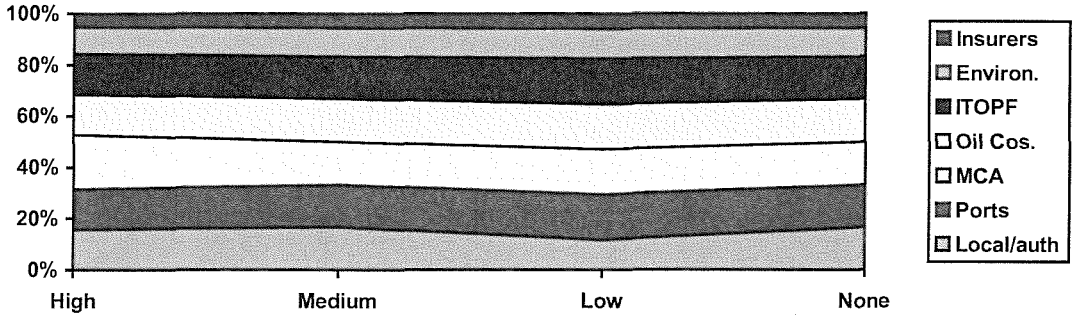
	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
EG1	2	3	4	2	2	4	2
EG2	2	3	4	2	2	4	2
EG3	2	2	2	2	2	4	2
EG4	3	3	2	4	2	4	3
Significance Mode-High							2
Significance Mode-Medium	2	3	3	2	2	3	2
Significance Mode – Low	2	3	3	2	2	2	2
Significance Mode – None	2	3	3	2	2	1	2

	Significance	Experience	Function	Culture	Risk	Vulnerability H M L N	Mode
ITOPF	2	3	3	3	1	4 3 2 1	3 x 4
MCA	3	3	3	4	4	4 3 2 1	4, 3, 3, 3
Port authorities	3	3	3	3	4	4 3 2 1	3 x 4
Insurers	1	3	2	1	4	4 3 2 1	1 x 4

Relation to vulnerability

	Vulnerability H M L N
MCA	4, 3, 3, 3
Oil companies	3, 3, 3, 3
Local authorities	3, 3, 3, 3
Port authorities	3, 3, 3, 3
ITOPF	3, 3, 2, 3
Environmental groups	2, 2, 2, 2
Insurers	1, 1, 1, 1

Resources (Conflict of interest)



The oil companies were particularly sensitive of the need to be prepared and the availability of resources was seen as high priority. This high priority demonstrated not only a strategic but also a cultural value. This effort was more than that demanded by legislation. Throughout the interviews this priority was constantly emphasised. It became apparent that oil companies were keen to demonstrate good practice. Procedures were shown as being developed to a fine art and any reality established during the interviews brought out truths that were self-evident rather than the truth of the " way that the things really are". Local authorities saw a conflict in resourcing arising from the lack of statutory duty. This was seen as highly significant and not relative to vulnerability. Insurers did not see a conflict of interest in their role. Basically they knew their business and saw their key role in insurance more than in risk management.

Tensions in management

	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
LA1	4	2	4	3	3	4	4
LA2	4	3	4	3	3	4	4
LA3	4	3	4	3	3	4	4
Significance Mode - High							4
Significance Mode- Medium	4	3	4	3	3	3	3
Significance Mode – Low	4	3	4	3	3	2	3
Significance Mode – None	4	3	4	3	3	1	3

	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
Oil Company 1	4	2-3	4	3	4	4	4
Oil Company 2	4	3	4	3	4	4	4
Significance Mode -High							4
Significance Mode –Medium	4	2-3	4	3	4	3	4
Significance Mode – Low	4	2-3	3	3	4	2	3
Significance Mode – None	4	2-3	3	3	4	1	3

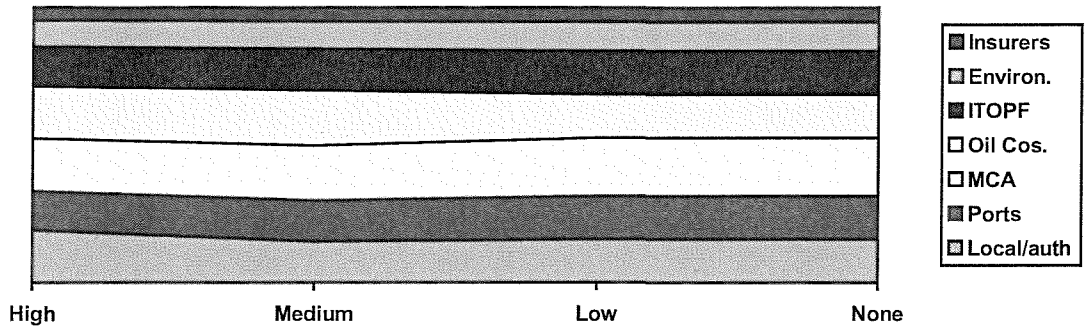
	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
EG1	4	3	4	2	2	4	4
EG2	2	3	4	2	2	4	2
EG3	2	2	2	2	2	4	2
EG4	2	3	3	4	1	4	3
Significance Mode-High							2
Significance Mode –Medium	2	3	4	2	2	3	2
Significance Mode – Low	2	3	3	2	2	2	2
Significance Mode – None	2	3	3	2	2	1	2

	Significance	Experience	Function	Culture	Risk	Vulnerability H M L N	Mode
ITOPF	2	3	3	3	1	4 3 2 1	3 x 4
MCA	4	3	4	4	4	4 3 2 1	4 x 4
Port authorities	4	3	3	3	4	4 3 2 1	3 x 4
Insurers	1	3	2	1	4	4 3 2 1	1 x 4

Relation to vulnerability

	Vulnerability H M L N
MCA	4, 4, 4, 4
Oil companies	4, 4, 3, 3
Local authorities	4, 3, 3, 3
Port authorities	3, 3, 3, 3
ITOPF	3, 3, 3, 3
Environmental groups	2, 2, 2, 2
Insurers	1, 1, 1, 1

Tensions in management



As was seen the port authorities with respect to command and control; local authorities in leading shoreline clean-up operations; and MCA in leading marine response operations all highlighted the significance of tensions in managing the operation on-shore and off-shore, during an incident. Oil companies demonstrated a confidence in their management ability and saw their capability and resources as significant to the operations. They considered their role as "*maintenance of strong operational management practices*". The statements suggest a need to be prepared at all times.

Distribution of information

	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
LA1	2	2	4	3	3	4	3-4
LA2	1	3	4	3	3	4	3
LA3	1	3	4	3	3	4	3
Significance Mode - High							3
Significance Mode-Medium	1	3	4	3	3	3	3
Significance Mode – Low	1	3	4	3	3	2	3
Significance Mode – None	1	3	4	3	3	1	3

	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
Oil Company 1	1	2-3	4	3	4	4	4
Oil Company 2	1	3	4	3	4	4	4
Significance Mode -High							4
Significance Mode-Medium	1	2-3	4	3	4	3	3
Significance Mode – Low	1	2-3	3	3	4	2	3
Significance Mode – None	1	2-3	3	3	4	1	3

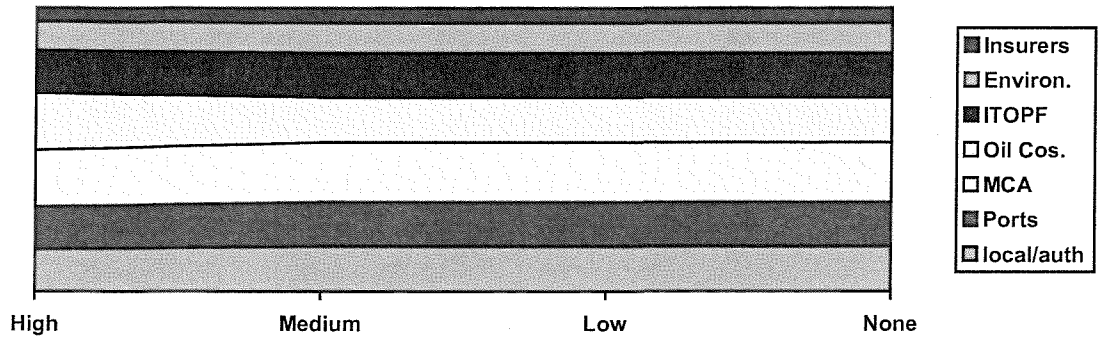
	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
EG1	2	3	4	2	2	4	2
EG2	1	3	2	2	2	4	2
EG3	1	2	2	2	2	4	2
EG4	3	2	2	4	2	4	2
Significance Mode-High							2
Significance Mode-Medium	1	2-3	2	2	2	3	2
Significance Mode – Low	1	2-3	2	2	2	2	2
Significance Mode – None	1	2-3	2	2	2	1	2

	Significance	Experience	Function	Culture	Risk	Vulnerability H M L N	Mode
ITOPF	1	3	3	3	1	4 3 2 1	3 x 4
MCA	1	3	4	4	4	4 3 2 1	4 x 4
Port authorities	2	3	3	3	4	4 3 2 1	3 x 4
Insurers	2	3	1	1	1	4 3 2 1	1 x 4

Relation to vulnerability

	Vulnerability H M L N
MCA	4, 4, 4, 4
Oil companies	4, 3, 3, 3
Local authorities	3, 3, 3, 3
Port authorities	3, 3, 3, 3
ITOPF	3, 3, 3, 3
Environmental groups	2, 2, 2, 2
Insurers	1, 1, 1, 1

Information



Despite the low significance of this tension stated by all groups, the information provision is seen as important in the development of knowledge and culture. Where there was direct involvement in spill management, the tension was seen as crucial more than where involvement was indirect and groups operated in low-risk conditions. Most groups stated that they had sufficient information and were well up on their knowledge base on oil spill management with a high level of expertise existing in their respective fields. The significance varied in relation to the need, availability and use of information during an event.

Media Tensions

	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
LA1	3	2	4	3	3	4	3
LA2	4	3	4	3	3	4	3
LA3	4	3	4	3	3	4	3-4
Significance Mode - High							3
Significance Mode-Medium	4	3	4	3	3	3	3
Significance Mode – Low	4	3	4	3	3	2	3
Significance Mode – None	4	3	4	3	3	1	3

	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
Oil Company 1	4	2-3	4	3	4	4	4
Oil Company 2	4	3	4	3	4	4	4
Significance Mode -High							4
Significance Mode-Medium	4	2-3	4	3	4	3	4
Significance Mode – Low	4	2-3	3	3	4	2	3
Significance Mode – None	4	2-3	3	3	4	1	3

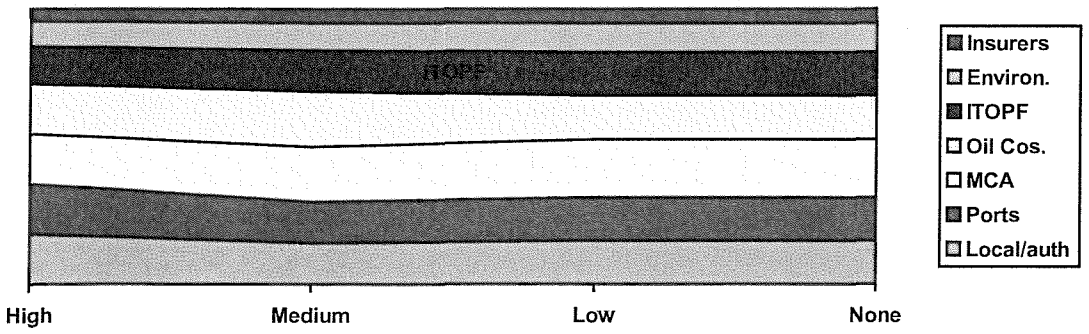
	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
EG1	3	3	4	2	2	4	2 – 4
EG2	3	3	2	2	2	4	2
EG3	3	2	2	2	2	4	2
EG4	3	2	2	4	2	4	2
Significance Mode-high							2
Significance Mode-Medium	3	2-3	2	2	2	3	2
Significance Mode – Low	3	2-3	2	2	2	2	2
Significance Mode – None	3	2-3	2	2	2	1	2

	Significance	Experience	Function	Culture	Risk	Vulnerability H M L N	Mode
ITOPF	4	3	3	3	1	4 3 2 1	3 x 4
MCA	4	3	4	4	4	4 3 2 1	4 x 4
Port authorities	4	3	3	3	4	4 3 2 1	3 x 4
Insurers	2	3	1	1	1	4 3 2 1	1 x 4

Relation to vulnerability

	Vulnerability H M L N
MCA	4, 4, 4, 4
Oil companies	4, 4, 3, 3
Local authorities	4, 3, 3, 3
Port authorities	4, 3, 3, 3
ITOPF	3, 3, 3, 3
Environmental groups	2, 2, 2, 2
Insurers	1, 1, 1, 1

Media



Media concerns appear high for all involved in the incident. Even ITOPF felt that media influences were worthy of new research. The tests show again that the outcomes are based predominantly on the functions, culture and risk base of the respondent organisation. For

example, the oil companies more than other groups were particularly sensitive of public relations.

Legislative tensions

	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
LA1	4	2	4	3	3	4	4
LA2	4	3	4	3	3	4	3 -4
LA3	4	3	4	3	3	4	3-4
Significance Mode - High							3-4
Significance Mode-Medium	4	3	4	3	3	3	3
Significance Mode – Low	4	3	4	3	3	2	3
Significance Mode – None	4	3	4	3	3	1	3

	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
Oil Company 1	1	2-3	4	3	4	4	4
Oil Company 2	1	3	4	3	4	4	4
Significance Mode -High							4
Significance Mode-Medium	1	3	4	3	4	3	3
Significance Mode – Low	1	3	3	3	4	2	3
Significance Mode – None	1	3	3	3	4	1	3

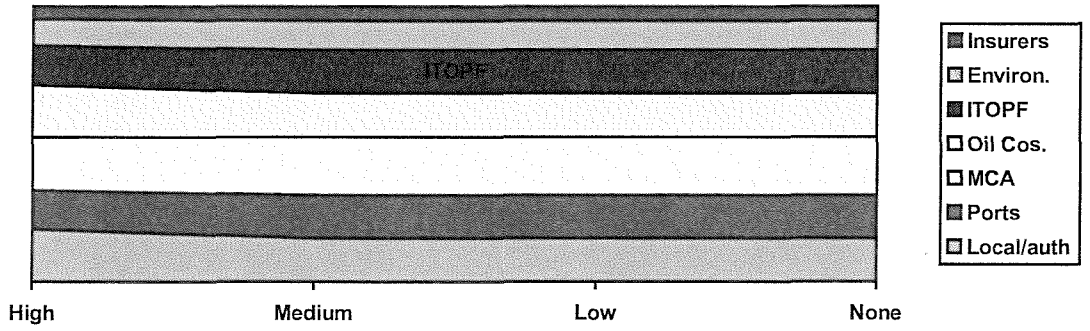
	Significance	Experience	Function	Culture	Risk	Vulnerability	Mode
EG1	3	3	4	2	2	4	2-4
EG2	3	3	2	2	2	4	2
EG3	2	2	2	2	2	4	2
EG4	4	2	2	4	1	4	2
Significance Mode -High							2
Significance Mode-Medium	3	2-3	2	2	2	3	2
Significance Mode – Low	3	2-3	2	2	2	2	2
Significance Mode – None	3	2-3	2	2	2	1	2

	Significance	Experience	Function	Culture	Risk	Vulnerability H M L N	Mode
ITOPF	2	3	3	3	1	4 3 2 1	3 x 4
MCA	4	3	4	4	4	4 3 2 1	4 x 4
Port authorities	4	3	3	3	4	4 3 2 1	3 x 4
Insurers	2	3	1	1	1	4 3 2 1	1 x 4

Relation to vulnerability

	Vulnerability H M L N
MCA	4, 4, 4, 4
Local authorities	4, 3, 3, 3
Oil companies	4, 3, 3, 3
Port authorities	3, 3, 3, 3
ITOPF	3, 3, 3, 3
Environmental groups	2, 2, 2, 2
Insurers	1, 1, 1, 1

Legislative tensions



The significance of legislative measures for LAs was more critical than for any of the other groups. Statutory authority was stated as high significance. Despite this, the tension is seen to be less significant than in respect of statutory authority for the MCA whose whole basis of existence is statutory. The oil companies were, however, seen to support local authorities in their demands for statutory authority. All respondents voiced comments for the need for legislation on waste disposal, role authorities and clarification of financial responsibilities. The environmental groups, already participating within the inner circle of risk controllers, called for developing standards. Greenpeace, interestingly, put legislative dictates as very significant. Lobbying for better environmental standards, however, is their key motive for existence.

REFLECTION OF OBSERVATIONS

The tests reveal the following observations

1. All tensions are directly related to the level of experience, function, culture, risk to the organisation and vulnerability. In effect the significance of a tension may be recorded as low but the value of the tension to the category may be high. This indicates that the tension needs to be addressed irrespective of the level of perceived significance.
2. The higher the degree of involvement or potential involvement, the higher the significance of the tension.

   Therefore the value of tension (vT) has a direct link to the level of involvement:

   (vT) = v(E+F+C+R+V).

   where v =value and vT is the value of tension to a category. E is experience, F is the level of direct involvement, C represents the assumed cultural profile of the organisation, R is the perceived risk to the organisation (financial, operational, social or a combination of these) and V is the level of vulnerability. The equation in itself is an identity, since the left-hand side represents the total value of the tension, irrespective of vulnerability, and the right-hand side represents the total value of involvement. It is assumed that E, F, C and R are assumed constant, so that vT is determinable by V. The equation indicates that an increase in vulnerability is likely to have some impact on the value of the tension for the category and thus increasing vulnerability even more.
3. It is however difficult adequately to monitor the cultural shifts and the level of experience as new people with different capabilities enter the scene.
4. Also vT has no direct link to the level of preparedness. The equation assumes a high level of preparedness. As considered in Chapter 2 (2.3.1), if preparedness (P) is low, this increases the vulnerability of the situation. Therefore P is inverse to V. However high preparedness does not necessarily lower the vulnerability. If there is high external vulnerability with low time to respond, and capability despite preparedness is weak, then the risk can be high.
5. The perceptions reflected the need to be prepared for any eventuality.
6. Therefore vT has a direct link with the level of management capability.
7. The equation does not consider the impact of behaviour undertaken or new actions (TABLE X, APPENDIX F).

5.4. CONCLUSIONS AND "SENSEMAKING" FROM THE INTERVIEW STAGE

A number of conclusions arise from the interviews. First the tensions appeared in three key areas: the availability of resources (human and financial); co-ordination (involving role definitions, management and communications within the collective operation); and dealing with the media and the democratic public. On the face of it the tensions reflected the expressed financial, operational and socio/political risks of the involved parties; however, the surfacing tensions appeared behavioural, demonstrated by comments such as the need "to exercise together", "for partnerships" and "good relationships". The management of stakeholders becomes prime issue in the management of a publicly visible incident. This relates back to the precautionary principle (Boehmer-Christiansen, 1994; O'Riordan and Cameron, 1994; and Fischer, 1990).

Secondly, the significance of the tensions varied for each of the groups. This disparity itself created a tension in making full sense of patterns of behaviour. A Weick (1993: 636) put it, "*it is hard to make common sense when each ... sees something different or nothing at all..*". The tensions indicated different motivations. For example, local authorities by reason of their obligations to the local people and industries and as required by the government to deal with emergencies, were unlikely to walk away from their roles, whatever tension lay in creating a balance out of these conflicting expectations. The expectation under the contingency plan is for LAs to lead the shoreline clean-up, which has built up from expectation that statutory authority is essential for such responsibility. The resultant behaviour, though, while unlikely to affect the experts in their roles, affects the motivations of the local authority in the preparation for expertise and competence, such as providing a dedicated resource/s and funding rehearsals and training.

Thirdly, the tensions indicate that not only is there a potential for disorder, but also that if they are not addressed early, there could develop the situation that more concentration is given to sorting tensions than dealing with the actual incident. In effect the focal point of operations is constantly shifting. Graham and Weiner's (*op.cit.*15-16) observations of "fixation" provides some validity to a claim that incident management ought to be a series of omnidirectional roles than operating on fixed aspects of operation, mainly for the reason that incidents involve onmidirectional factors.

Fourthly, the tensions reveal the underlying unease in dealing with public relations. There was manifest awareness that incident management could become inclined towards the management of political situations (stakeholder management) rather than a balanced management of both the technical operation and political situations.

Finally, it must be acknowledged that the perceived tensions evolved from both respondents' previous experience and current practice. The tensions perceived from current practice were those arising from a low vulnerability position with time for readjustment and a low risk stage. Tensions arising during a spill incident demanded action in high vulnerability conditions. As Dubber (*ibid.*) put it, "*The real test of any* (contingency) *plan is,* (is that it works for*) for real*". Marwell and Schmidt (1975:75), in their experimental studies on co-operation showed that under high (or large) risk conditions co-operation was more difficult to maintain than in small risk conditions because of interpersonal risk. Where risk (as in simulations) is removed the outcome is total co-operation. It is borne in mind that the notions of reality explained here are "narrative–dependent". It is also seen that motivations affecting behaviour arise predominantly in reflection of the process outlined within the NCP. The context made up of spill management experiences, knowledge of practical difficulties, the level of relationship with others and the preparedness culture of the organisation to which they belong is seen to influence perceptions and behavioural expectations. Behavioural expectations, although on one hand, seemingly derived from prescribed expectations showing convergence in values, the narratives, on the other hand, are more than the manifest behaviour, they reflect to some extent the existence of disparate values.

5.4.1. LEARNING FROM SCENARIOS

Turner (1978) saw culture and communications as key in the convergence of values and in the prevention of failure. However, the focus in many organisations is more on operational efficacy than on the soft contexts of behaviour management. In a collective, accumulation of the disparate organisational philosophies can distend to a point that the collective relationship relies purely on compliance to legislation than on a more integrated behavioural system. This makes the frequent "getting together", whether in terms of training exercises (Sagan, 1993; Turner, 1978 and other propounding the high reliability concept), building partnerships or coalitions (the corporatism angle) and even in the constant sharing of information (Richie and Marshall, 1993, Turner, 1994), critical in the prevention of failure.

CHAPTER SIX: PARTICIPATIVE OBSERVATION

INTRODUCTION

Two oil spill physical management simulation exercises were attended, one at an oil company terminal in Hampshire and the other at a Harbour Commissioners in Dorset. The oil company simulation provided the initial understanding of the nature of emergency operations. The Harbour simulation was attended with advanced knowledge and hence observations were more directed towards studying behaviour. Furthermore, in the first simulation participation was as an observer, whereas in the latter, participation was active, having a pre-determined role. The motive behind these observations is to search for a common ground on behavioural trends. The context is engineered and in this respect creates a situation of theatre: stage-managed, actors playing their part, props checked and worked. But as in a theatre, the drama ends at the end of the play and the players and the audience revert to their original functions. Actions taken are in a controlled situation which is low risk; as a result, actions are more manufactured than natural. To identify behavioural trends becomes important. How people communicate, the way structures work, the impact of interruptions and other such observations reveal a tendency toward sets of behaviour and natural action. As Barley (1986: 83) implies in his study of institutional realism, "*scripts link institutional realism to the realism of action*", and so it is anticipated that some real truths are drawn from planned exercises.

6.1. SIMULATION EXERCISE 1- HAMBLE

The incident was a tanker in jeopardy of tilting over. The key aim of the exercise was to establish how well involved parties understood and handled (in a mock scenario) the oil spill response arrangements. Groups invited to participate were a British port authority with a local base, an oil company and its exploration unit based about 60 miles away, a borough council, an environmental group, a charterer, the local river authority, the local county council, ITOPF and oil spill management contractors to the oil company (OSRL). The exercise took into consideration that the terminal operated on a minimum manning principle and relied on quick response from external operators. Early observations noted that none of the local authority representatives was present and furthermore, that the Terminal PR adviser was officially on leave and reliance was on the oil company's exploration unit's PR support.

6.1.1. KEY TENSIONS THAT COULD PRODUCE FAILURE

Roles and responsibility tension: Not every party was clear about the roles. For example, there was some ambiguity in the role of parties in alerting groups for action. The ERC took to contacting the different environment groups separately. It was felt that this role belonged to the lead conservation agency in the spill plan. There was some discussion as to who should document information and write up the narrative board. The role had to be created. In a staged play, if there is role ambiguity, there could be disaster. However, an oil spill has wider and far-reaching management considerations, and roles are likely to be dynamic rather than fixed. Where expertise is associated with a role, then less ambiguity exists. Therefore, a salvage expert will clearly be involved in salvage, but is unlikely to be much use in shoreline activities. Some role ambiguity will exist and much of crisis control is sorting out the uncertainty.

Resource Tensions: There was delay in effective resourcing mainly as resources were off-site. The technical personnel took up to three hours to arrive on the scene. The Terminal has no effective response capability other than manning the oil recovery craft. Speed is of the essence especially if a Tier 2 or 3 spill were to occur. In this case, however, the MCA was locally situated and it is likely that resources from MCA would be deployed perhaps faster than those of the oil company. This bears point to the issue that a spill elsewhere may not have the luxury of MCA resources close by. How equipment is transported also is critical. The use of river, road and even air transportation needs to be considered, although speed of transportation could have implications for costs. However, for the south coast in summer with heavy traffic jams, river transportation, despite being more expensive, would be more effective.

Management (managing communications and relationships): There was seemingly medium relationship between the controller of operations and the nominated communications officer. Overall, there was noticeable incongruity in the culture between the ERC and the on-water team. The risk relationship in the ERC was medium, despite activity being high and the risk situation low (section 2.3.1.3.3 and 3.4.2.), and decision-making was slower. On the other hand the on-water response team demonstrated a strong interrelationship, and despite the risk being low (no real oil spill), and activity high the actual process of booming and skimming was more quickly achieved than the dictates received from the ERC. The boom team was often isolated. There seemed to be a lot of waiting for instructions before booming commenced. It is accepted that in reality waiting for the right water conditions would occur for booming and use of skimming equipment. The on-

water team had a high relationship situation, acting in unison, and did more to ensure the efficacy of the booming. The symbolic reality of sub-groups and sub-group culture mirrors behaviour within organisations where activities, although linked formally, are informally driven through the existence of sub-groups or teams. The contingency plan is an organisation, with similar forms of interactions, where communications between co-ordinated and less co-ordinated teams can result into failure, as seen in the King's Cross incident. Apart from behavioural tensions, there were logistic tensions which in turn affected behaviour. Two rooms were designated as emergency response rooms. The terminal control room (TCR) was set up for dealing with shipping issues (navigation, docking, loading and unloading work) and the other as the critical response centre (ERC). The latter was too small for a response centre to house a bulk of participants during a real live situation. To bring people together demonstrates relationships within a structural framework for operation. Creating two rooms forces a break-up of relationships and raises a "what if " question. What if the two groups (ERC and TCR) were merged into one room? Relationships facilitate both communication and decision-making. There is visibility of skills and there is lesser time lag in communicating information between the groups. Arguably, time embeddedness is reduced, allowing for a more effective use of resources.

Distribution of Information: Overall the problems were minor. There was some overlap of authorities in providing information. For example, the exercise director and the controller of operations gave conflicting aerial survey instructions and the outcome was seemingly futile for the exercise as well as expensive. It is, however, unlikely in reality that aerial instructions would be taken lightly. There are three problems in the distribution of information: transference of information, transference of coherent and understandable information and acceptance of information. Where the information is misinterpreted, this results, according to Perrow (*op. cit.*: 84), in redundancy of information. Misunderstandings can result create or exacerbate disaster conditions: for example during the Hurricane Mitch disaster in Honduras, aid helicopter personnel were wrongly transporting diapers instead of food and medicines to a community that was in desperately need for nourishment and medical care (*Seattle Times* Nov. 1998).

Public Relations (PR) and Media: The conditions during the exercise were ideal, with minimal press or public hecklers during the operations. Furthermore, there were no regular announcements of position, although information was made available on demand. There was delay in the release of press statements because of a lack of a PR person on-site. The first

interview by the press officer, on his arrival, was three hours after the incident. Although this was predominantly an administrative problem, much of it was to do with the ability and responsibility of managing the public relations effectively during the period of delay in official PR support. Aspects such as communicating, intermingling and "pooling together", without the need for slavishly following the script, appeared linked more to attitudes than to administration.

Failure points	**Behaviour causing failure**	**learning**	**Behaviour**
• Role ambiguity • Resource management • Management of operations • Information dissemination tension • PR/Media tensions	Weakness in understanding of roles and communications	• Role clarification: part of effective co-ordination strategy • Ability to balance function and behaviour	NEED FOR CONSTANT COMMUNICATION AND INTERACTION WITH ALL PARTIES "POOLING IN"

REFLECTION: The non-presence of local authority representatives questions their dedication to oil spill management. The *Sea Empress* incident flagged tensions that arose by reason of lack of knowledge and deficient expertise of local authorities in leading a shoreline response and even participating in the ERC. Taking the helicopter view of the participating groups, the players seemingly acted in a concertina fashion, going in towards the nucleus (the controller of operations) for instructions and then retiring to their groups inside or outside the ERC or the TCR. There was very little milling together except during the "wash-up" exercise (post-mortem). At times the on-scene commander was alone with one or two persons in the ERC. As Granovetter (1985: 485) considers "*Actors (participants) do not behave or decide as atoms outside their social (or organisational) context nor do they adhere slavishly to a script written for them .....Their attempts at purposive action are instead embedded in concrete, on-going systems of social relations*". More pro-activity and high-level relationship might have increased the effectiveness of decisions. The handling at the ERC was, seemingly, efficient. There were clear tensions in the timing of getting human and equipment resources to the spill location. In reality an hour in crisis management can be extremely significant in shifting the position from successful operation to failure. In fact the media were present almost two hours before the oil company PR officer arrived. It is accepted that logistical constraints can hamper proceeding and create delays. It, therefore, becomes particularly important for the on-scene commander and other personnel to have the capacity and competence to deal with both technical matters and public relations.

6.2. SIMULATION EXERCISE 2

The prime aim of this exercise was to test the control and co-ordination structures in event of a spill in the harbour. Involved parties were the harbour personnel (including the chief executive and the harbour-master), MCA personnel (SOSREP, PCPSO); Maritime Volunteer Service (MVS), representatives from EA and MAFF, two environmental groups, HMCG; police and fire services, charterers, four LAs (one council, two unitaries and one district), neighbouring oil company personnel, OSRL and local media.

6.2.1. OBSERVATIONS

One room was designated as emergency response centre (ERC). The room was split with desks for each involved group. The tables in the middle distanced psychologically the north part of the room from the southern part (FIGURE 9, APPENDIX H). As in the first simulation the environment was one of medium relationship (Chapter 2) in the ERC with high relationship between field groups. The observations consider the physical simulation and the student agitation exercise.

6.2.1.1. Key tensions with a potential for failure

Roles and responsibilities: As in the first simulation, some role ambiguity existed. Four local authorities were involved but none was quite sure what its roles were. The police felt that they had no specified actions and responsibilities within the plan. Also one environment group noted that they had not been contacted about the incident as expected under the plan and only found out about their involvement through another body. There was also confusion as to the perception of the role of the EA and the role of representing local authorities on waste disposal. EA felt it was there to give advice rather than to arrange the disposal, as they would for land-based spills. Furthermore, role overload arose especially with the ERC, who on top of leading the operation was involved in taking phone messages. An assistant was felt necessary to take over the administration of phone calls. This was predominantly an administrative failure. However, assertions for support could have been made. There were a number of people milling around, with little to do, who could have been called in to deal with telephones, albeit as a temporary measure. The context of "pooling in" would have produced more successful outcomes.

Reflection: The level of functional structures must to an extent coincide with social structures if they are to work effectively. Social structures suggest behaviour that relates to "interacting with

others to achieve outcomes" rather than behaviour that relates to "doing the job to achieve the outcomes". Crisis management alters both the functional roles and the social structures and what is a "standard plot" no longer remains as such as improvisations are required. Management is the invoking of social structures to achieve functional outputs. As Mangham (1979) puts its, "*Behaviour ... is marked by an ongoing process of negotiation, one in which working agreements are created, consolidated or overturned as members interact*". Roles are intended to be not concrete, but dynamic in the sense that they are constantly capable of being restructured to suit the requirements of the crisis situation.

Resource Tensions: The use of the electronic oil spill model was found to be less effective in tracking the oil spilt within the harbour because of complicated harbour hydrodynamics. The success here was the swift change to calculating statistics manually; as a result, a robust level of information was developed for decision-making. Handling resources created some tension. The LAs, for example, saw it not their role to train beach masters while the role for co-ordinating coast walkers remained unclear. This could result in a real situation of zealous untrained volunteers risking their safety to provide information. There were also significant time-value tensions such as the delay in setting up surveillance and the agitators distracting the harbour-master from undertaking the operational functions.

Reflection: The existence of resource tensions does not in any way indicate outright failure. Resource tensions exist during any incident. This is part of the milieu of an incident process. However, what becomes critical is the extent to which the environment is congenial to obtaining their goals (Turner and Pidgeon *op. cit.*: 109). Irrespective of these shortcomings, if the environment is resourceful then despite constraints, goals can be achievable. This is seen in the case of the 2001 New York disaster; despite the seeming US failure to prevent an incident, this can be considered a major success story in that the environment nationally and internationally was behaviourally congenial to developing rescue and moral solidarity.

Conflict of interests: This was critically a local authority issue. The LAs emphatically asserted the need for statutory authority. The issue was raised not once but several times during the event and the "wash-up". There were some minor conflicts of interest such as log-books being kept disparately by the different groups. The Police perceived that there could be potential for legal implications in converging log-books as their remit for recording was based on police activity and not as a part of the contingency plan requirement. There was also some worry about

breaching licensing laws in dealing with disposal of waste, where the conflict was between the immediate need to disposal large quantities of waste and the legality of disposal.

Reflection: Conflicts of interest demonstrate a strained consensus, but not a breakdown of functionality, They do indicate that choices become strained because of the existence of these conflicts creating functional uncertainty. LAs., for example, did not deviate from or diminish the value of their roles simply because they did not have statutory authority, but it created a tension in respect of choices in dedicating resources for the event.. Prioritising resources was clearly critically based on the level of financial resources available in handling the risk.

Management: There were some critical tensions in communication systems, for example, an overload of extension lines, lack of a dedicated phone line and incorrect numbers. There was some feeling that disparate lines might result in the groups "*doing their own thing*". Interestingly enough, personal mobile systems were used by a number of groups. Administration issues, although minor, can become important. Many of the groups forgot to bring their spill plan of the Harbour and none was made available during the exercise. In the event of a real life situation, this could become problematic, where parties are called to respond whilst not familiar with the plan; hence they may feel that they are acting "in the dark". Some form of support structure is called for, or something to lean against even if it is not foolproof. Weick (1995:54) recounts how a small Hungarian detachment lost its way in the Alps. Coming across a map got them back to base even where the map was that of the Pyrenees and not the Alps. The basis that some support is better than none, irrespective of its value, is, however, more applicable to "last resort" scenarios. Accuracy is less critical where survival is critical; however, where accountability becomes an issue, factual accuracy has particular relevance. How things are recorded becomes critical in post-incident investigations. The exercise flagged up some disparity between the hand written narrative board and published outcomes (APPENDIX G). Recording information, however, is a documentation of the actual. If recorded differently by different narrators, it questions the need for documentation. Hall (1878 cited in Weick 1995: 59) suggested judgements of accuracy lay in the path of action. In other words, how a particular thing or aspect is perceived lies not in general perception of what it ought to be but on the basis of how instrumental it is. A paper clip may be depicted as clipper of paper, but for the burglar or anyone locked out of their houses, it is instrument for a breaking a lock. The usage of the narrative board therefore has its function to explain its instrumentality, so that it is understood. What is recorded or not recorded affects

perception. One is reminded of a story, where a tea-lady in the headquarters of a global concern mistakenly believed that the removal of pins, depicting areas of operations in various countries, from a world map, meant that the company was selling off its operations. This perception when passed round the office accelerated to a labour-management conflict. The instrumentality of removing the pins was to clean the map, yet the meaning of the act was read differently. Narrative boards reflect the perception, culture and language of the notekeeper, which may vary in various degrees from the perception, culture and language of others. For example, simply stating " OSRL personnel mobilised" can be misconstrued. However, the addition of "coming by boat" provides more specific information as to the probable timing of arrival of personnel and equipment.

As in the case of the first simulation, the field groups appeared disconnected from the centre. A shift from medium to high relationship was required. Communication structures highlighted a weakness. There was a reasonably easy breach of security by the agitators infiltrating the ERC and demanding the attention of the Harbour-master. Also, somewhat interestingly, an observation was made of the impact of a fleeting statement. Speaking to the police in general about the agitators, it was mentioned in passing that one (student) agitator had previous affiliation with the Greenpeace movement. This comment caused a stir, as the realisation was brought home, that not only was there a potential security breach of having agitators infiltrate the emergency operations but also that members of the direct action groups might be involved intentionally or inadvertently in the security breach. This exercise highlighted a behavioural issue. The concern was on the failure of procedures and checks. However if the actions were based on maximum transparency of operations, a security breach would be meaningless as observable behaviour within the collective organisations would show not a nervousness of action but a capability in undertaking actions.

Another management problem was the holding of meetings. Briefing meetings were informal, which meant that not all persons were available at the time of all briefings. The validity of a formal meeting has its downside, as seen in the *Sea Empress* incident where salvors found that they had to "down tools" to attend a briefing meeting. As Schwartzman (1989: 86) put it, the meeting " *is the form that generates and maintains* (the group) *as an entity*". It brings about the dissemination of values and perceptions and creates a forum that propels the convergence of values. Schwartzman (*op. cit.*: 11) suggested that meetings provide individuals with the

opportunity to make sense of their activities, and their relationship with others in undertaking their activities. Furthermore, as she puts it, meetings are objectified in minutes, reports, notes and memories and they formulate policy, enabling "*constructing, enacting, interpreting and reinterpreting ...events*"(Schwartzman *op. cit.*: 313). This however, assumes equal power structures of each party. There could be a case where the stronger may interpret situations in a way that may impose values but not bring about convergence. Alternatively it could result in groupthink (Janis, *ibid.*). Meeting brings people face to face and making sense of the situation is more easily possible; however, power and politics can change the situation. Huff (1988: 88) believes, however, that the meeting is politics itself and by its very structure serves to bring about a co-ordination and blending of differences. The outcomes are based on consensus of sorts, where people may agree on action even though they may not subscribe totally to the rationale. To this extent there becomes a shared accountability of actions taken.

Distribution of information: There were some weaknesses and "*some mix up in communications" (PSPO).* It was felt that some parties, such as the coastguard and the SOSREP needed to be involved earlier than they had been. The police were notified through the local station enquiry office rather than the police emergency control room. In practice the timing of messages is critical to allow for the early deployment of resources. The Police felt that they needed*" to be kept informed especially with information received from the public"* (in this case the agitators). Furthermore calls linked to one number, caused some level of stress during the exercise, and likely in a real incident to cause significant stress. Union Carbide's failure was predominantly with respect to their communications systems. Messages and reports were not communicated effectively and those that were did not record well of the management of the organisations (Shrivastava, *op. cit.*: 84).

Public Relations (PR)/Media Tensions:

There was a clear need for a co-ordinated effort (EA, HMCG and Charterers). The content of press releases was not made clear to parties in the emergency room. There were groups such as the charterers and HMCG making up their individual press releases in the ERC. The need for an agreed co-ordinated response was obvious. The press statements required wider circulation both internally and externally. A media person could have been available to draft statements. This was BEHAVIOURAL FAILURE, as teams did not interact but remained within the domains of their own roles. It was also an ADMINISTRATIVE FAILURE, with press statements and consultations not

integrated into the process. The media representation advised that good policy was to get ahead of the press or "*if behind them, they are likely to be on your back*" (Media). The press had access in the ERC. This could, if not clearly managed, cause information distortion. A risk of photographing the telephone numbers off the narrative board was highlighted. There was no press protection for field workers who could get badgered by the press and public *(OSRL)*. The importance of this was flagged up in the interview with one oil company. Table Y teases out the learning and behavioural considerations that appear to arise from the perceived failure.

TABLE Y : LEARNING AND BEHAVIOURAL CONSIDERATIONS

Failure point	**Behaviour causing failure**	**Learning**	**Behaviour**
Internal communications	• There was an acceptance of procedures as they stood • Role assumptions- people behaved towards others, as they perceived their roles. There was little ascertaining of facts	• Administrative shortfalls exist and will continue to do so ♦ Roles capability may be more than assumed	NEED FOR CONSTANT COMMUNICATION AND INTERACTION WITH ALL PARTIES "POOLING IN"
Public Relations	• No integration of activity • Individual groups developed individual press statements • Intra ERC-communication weak	• Non-convergence on PR can bring about conflicting news • Continuous integration	NEED TO COMMUNICATE CLEARLY AND OPENLY "POOLING IN"
Technical	Change of method of operation	Ability to transfer skills	QUICK RESPONSE TO TECHNICAL PROBLEM
Time usage	Allowed to be distracted away from focus	Prioritising urgent and important issues and delegating what is important but not urgent	THE ABILITY TO DEAL WITH DISTRATIONS EFFECTIVELY.

6.2.2. STUDENT AGITATORS – EXERCISE

Students were given a remit to act as agitators and to try to access the chief executive and the harbour-master. Three types of disturbances were scheduled: 1) to make phone calls to Harbour headquarters as affected parties. 2) to breach security and gain entry to the ERC and 3) to request a call to the chief executive of the charterer organisation for a statement.

1. Phone calls to Harbour and outcomes

Students calling as	Calling to	Comments
Chairman of the Baltic Exchange + Chief Liaison Officer of Lloyd's of London	Harbour Personnel at main headquarters	"Initially reasonable, didn't know where I was coming from - said what they wanted to say and then ended conversation"
Greenpeace Regional Area Controller	Harbour Press Officer	"Good handling of questions"
Sunseeker representative	Switchboard operator and then to CEO	"Good handling of inquiry and linking to chief executive. Chief Executive was excellent"
Greenpeace agitator	Harbour-master	"Was very helpful and informative and spent more time than expected"

2. **Breach of Security**

   Students were able to breach security easily. They were allowed into the ERC without full checks. The police representative at the emergency centre was suspicious of their entry and sought to clarify their involvement. When it was explained that this was an agitation, the students were referred to the harbour-master. The harbour-master was sidelined away from his technical role by one of the agitators for more than twenty minutes. **OBSERVATION**: The harbour-master was seen to be in charge of control, command, administration and messaging. Such an overload in the role can have important implications for behaviour.

3. **Media harassment for statement**

   A phone call was made to the mobile phone of the chief executive (CEO) of the tanker charterer organisation. In attempting to obtain a statement about the reported spill caused by the charterer's tanker, the student discovered that the CEO was at that time in the middle of purchasing sandwiches in a shop. With this knowledge and the claim made by the CEO that he had no knowledge of any spill, the student commenced heckling. It was over ten minutes of hard heckling before the compromise was reached: that the situation would be looked at on his return to his office and a statement issued within a short period thereafter.

6.2.2.1. Observations from the Agitation exercise.

Apart from the breach of security, the agitators were successful in distracting key personnel from undertaking their role. The confrontation, albeit amiable, with the harbour-master meant that the time-value of the role diminished as focus was put on dealing with agitators rather than on the emergency at hand. The harbour-master spent about twenty minutes answering questions when the agitator, interestingly an attractive female, could have been referred to the press office. The exercise brings home the need for prioritisation in dealing with public and media inquiry.

6.2.3. OBSERVATIONS FROM WASH-UPS

The views expressed demonstrated mainly what could be done better, rather than what went well. Personal agendas were emphasised by the local authorities, the charterers, the EA and the police, all to a varying extent sensitive and not clear about the organisation's role. The concertina effect was more obvious in the second simulation as pre-arranged corners and desks meant that

players tended to be more secluded. Also the table in the middle psychologically exaggerated the distancing between groups. Groups remained reactive to demands for support rather than being proactive. In retrospect it was seen that special knowledge existed with some groups, which was not made known. This could have arisen by reason of the non-reality of the situation, though this, begs the question whether co-operation includes not only provision of specialist expertise but having to be adept at cross – functional expertise, i.e. being able " to muck in" at all stages.

Where decision is made to actively or passively being involved, automatically creates a boundary, the inner circle and the outer circle and the closeness between the two may be reflected in behaviour, such as not revealing information or sub-grouping. Where there are sub-groups role ambiguity can increase (Schachter, 1959) or results in some level of confusion (Weick, 2001:51). Managing the collective could result in a power struggle for resources and knowledge, if not handled effectively. The need for inter-relating among the groups is obvious. The exercise director highlighted the need to interrelate more closely with the manager of operations. In terms of Weick (2001:272), this is heedful interaction more than heedless interaction where "*interrelating breaks down, individuals represent others in the system in less detail.... Attention is focused on the local situation rather then the joint situation.*". In conclusion, the outcomes of the wash-up sessions appear grounded in behaviour of the individual groups which is treated as actions that create a pattern of activity that manifests itself into collectiveness or sub-groups. In a sense, what is seen is the existence of small mindsets where decisions are made not in a collective fashion, but in little groups feeding the core group in the centre of the operation at specific intervals but mainly remaining within the domains of their special groupings. The interrelationship being more co-joined than collective. However, if complexity is to arise it does so from interactive failures more so than by reason of the concertina effect. The level of routine interaction provides the observer with the signal that things are either going well or not so well, and what can appear routine interactions can result in non-routine consequences (Perrow, 1984: 10) and failure.

6.3. CONCLUSIONS FROM THE PARTICIPATIVE OBSERVATIONS

The observations demonstrated that individual agendas operated within the collective structures. Different groups had different frames of reference. Also clearly demonstrated was the nervousness felt by many of the participants of media presence, "off the cuff" interviews and

agitators. Despite clear outcomes from the "wash-up", what was also missing was an action review. Each party made important points but no future construction was derived from these points made. Learning was effected during the simulation but whether future simulations would show new constructs in the learning process is not clear. Communication tensions were particularly an issue especially with regard the dissemination and integration of information. It does raise the issue as to whether practice would make this perfect. It has to be said that the value of these simulations is great for each participative member, although there is a need to reflect on how to activate the learning gained so that there is a marked significance in outcomes during the next simulation. The incorporation of agitators and an assumed "on camera" environment demonstrated some level of vulnerability, and unease. Oil spill management demands expert and capable persons ready to tackle the vulnerability of the situation. Ability to manage vulnerability therefore is critical and needs to be developed early on into the programmes. The low/medium level relationships in the ERC mirrored some of the tensions that arose, such as increasing the workload of the harbour-master, duplication of press statements, not being aware that groups had both the knowledge and the capability to deal with incidents. Some groups, such as EA, could have been more effectively involved with their knowledge of oily waste disposal issues, . The networking was greater amongst the affinity groups. People congregated more in affinity relationships than by cross (interdisciplinary) affinities. In fact, there was very little crossing over between the LA personnel and the coastguard and police service or MAFF. In fact MAFF seemed significantly isolated. The harbour-master and the LAs were more in communication by reason of the oil spill mapping process under the control of the local authorities. It is also clear that importance is put on the co-ordination of behaviour and actions. As Weick and Roberts (1993) point out, that there exist a number of important issues surrounding the interaction between experts and the use of technology, as well relating to other members of the team. Disparate agendas and risk views can create disparate behaviour, making it more difficult to control the operations. Although it is unlikely that a totally unified behavioural system will be created, an attempt must be made to come close to such a scenario as much as possible and this can only be done through progressive leaning rather than learning in extant. The failure of learning within the context of *"frozen realities"* will make training meaningless when it comes to convert learning to the reality of a spill.

6.4. "SENSEMAKING" FROM BOTH INTERVIEWS AND PARTICIPANT OBSERVATION

So far the study has argued that "sensemaking" in risk and incident (crisis) management is about issues such as observing behaviour within processes, analysing areas of failure, analysing perceptions with behaviour during exercises and identifying patterns of behaviour. However it is "sensemaking" only in a specific context, limiting interpretation to what is observed within a defined framework of study. However, a limited context does not necessarily diminish the value outputs of observation and by no way prevents their applicability to the wider context. Outcomes such as safety and risk culture of organisations, relationships between groups, the existence of vulnerability exist in all incident situations. If comparisons are to be made with high complexity systems, then in the strictest sense it might be difficult to adjust to the definition of a high complex system put forward by the high reliability group where activities are seen to be tightly coupled with little slack and there being many control parameters, understanding of all system processes not possible and limited awareness of interdependencies due to personnel specification (TABLE E). Collective operations also demonstrate similar tendencies with expert involvement creating interdependency tensions as the perceptions have denoted, and although activities may not be so tightly coupled, there appears significant complexity arising less so from a system of operation but more so from the interlinking of behaviour.

The interviews and the "wash-up" demonstrate a pattern of perceptions that declare the conflict between what is expected and what actually happens in reality. Comments such *as "lobbying", "raising awareness", "sharing of understanding*" and being *"attuned to each other's needs*" indicate patterns of thought. The comments demonstrate functions as a political process where relationships are perceived as critical to successful outcome. Yet behaviour is not necessarily related to what ought to be done with people doing their own thing or having their own agenda to protect or promote their organisation as a valued source. This makes it difficult to pinpoint the exact nature of outcome. It can only be assumed by the way people talk, the repetition of phrases, and through metaphors that there is a constant form of behaviour that exists and is expected in such situations. For example, the concertina metaphor provides a sense of there being ebbs and flows of co-action. This reflects forms of behaviour, that is, relationships, expectations, co-activity and action. Brunsson (1982) suggests that people are more likely to act on what they feel than according to how they are required to act. Functional structures, therefore,

appear to have less value where they do not reflect the behaviour of the involved parties on which they are imposed. Full convergence of behaviour is unlikely to happen but some convergence is possible where the disparate organisations develop like-minded values and cultures intra-organisationally. The combination of intra-organisation cultures and inter-organisation expectations contributes to the construction of a social group where there becomes less focus on accuracy of process (getting things right together) and more focus on doing the right things together. Behaviour is, therefore, the microcosm in the convergence of functional structures and expected outcomes in risk and incident management. If Sagan's (1993) high reliability theory is to be considered, then high reliability of a collective operations needs to have as its linking pin the "culture of reliability" and adding to this a "culture of risk responsiveness and responsibility".

PART THREE: CONCLUSIONS AND RECOMMENDATIONS

CHAPTER SEVEN: REVIEW OF FUNDAMENTAL ISSUES

The summary covers all investigations undertaken: idiographs from the interviews, participation observations and review of studies undertaken, which underpin this exploration. Firstly, a summary of the critical issues discussed in the previous chapters is provided. The summary in a sense develops nomothetic outcomes from the investigations. Secondly, attempt is made to link the nomothetic outcomes with the idiographic outputs. Thirdly, a review is undertaken of the critical findings followed by conclusions to the study. The conclusions foster "sensemaking", albeit in simple terms, as much is based on common sense interpretations of the critical issues derived.

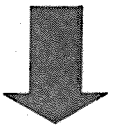
7.1. Section One: Critical Issues Derived From The Study

- Marine oil spill, today, is more a socio/political risk than a pure economic risk.
- Incident management is, therefore, more about the management of socio/political issues than operational management.
- The low-level probability of a disastrous spill is of little importance in the global preparedness for marine oil spills from tankers. The spill has a high-vulnerability factor (propensity to cause danger to society's property) hence the need for high-level preparedness.
- Preparedness for oil spill means the ability to convert low-vulnerability preparedness to high-vulnerability operations and being able to utilise effectively the embedded time-values.
- The very nature of oil spill management means the involvement of numerous groups, with disparate interests, managing the incident collectively. Therefore the efficacy of collective operations is critical if failure is to be prevented. The key factors in collective operations are the ability to communicate, act and take responsibility for decisions made "on the spot".
- This in turn demands a high level of human resource capability during and after the incident.
- In conclusion: Risk management is a qualitative process, subject to judgements coloured by experience, culture, perceptions, economics, social values and politics. The source of risk is human behaviour and action more than process. Effective human action and interaction is the key to successful incident and crisis management.

7.2. Section Two: Matching Idiographic Insights To Nomothetic Conclusions.

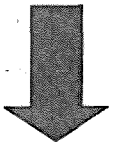
The constructs explored in Part I showed that an oil spill (TABLE M) profile has a potential for public outrage (Groth, 1990) Being a man-made disaster (Turner, 1978, Turner and Pidgeon, 1997) means that the observation is on human action in handling not only the subject matter of the risk but also the incident. (Section 2.1).

Human action is risk and central to risk management



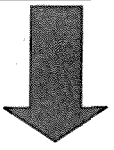
Oil spill incidents have shown that their consequences are more than the pure economic risk: a spill can cause outrage and therefore involve a social and political risk. (Section 2.1) It involves human, organisational and procedural (technological or communications systems) issues (high reliability group).

Management of an oil spill incident is economic, social and political



The oil spill profile makes this risk unique by reason of a number of factors: a) a low occurrence risk with a high outrage factor b) therefore risk management is subjected to a high level of preparedness and highly complex and sophisticated risk compensation systems and insurance arrangements. Compensation regimes and insurance have had to make allowances for liabilities that are greater than the pure economic loss. Pooling financing arrangements and setting up funding mechanisms make provision for the availability of wider financial capacity than might be provided by one insurer or tanker owner. (section 2.1).

Oil spill incidents therefore have the most sophisticated international regimes, policy and insurance facility



The necessity for national contingency plans for marine oil spills has meant an emphasis on preparedness and the development of resource capability, both human and physical, with special emphasis on the development of a culture of risk/responsiveness (High reliability group) (s2.2).

Emphasis on safe systems and procedures, preparedness and incident management

The conversion of preparedness to managing "live conditions" is more than issues of process; it also involves cultural and behavioural adjustment. The degree of time and the level of relationship between the groups have a direct influence on the degree of adaptability and response to adjustments and to the riskiness of the situation. (Section 2.3 and Chapter 3)

Degree of time and the level of relationship between the groups have a direct influence on the riskiness of the situation and the ability to adjust from preparedness to managing "live conditions."

The interviews further demonstrated that perceived tensions were related not only to the risk culture and the vulnerability of the situation, but also by reason of experience, function and role. The more the experience of "live" situations, the more the significance of a tension. "Live" situations also include experience in writing plans and budgeting. (Chapter 5)

Experience and Role also influence the degree of adaptability

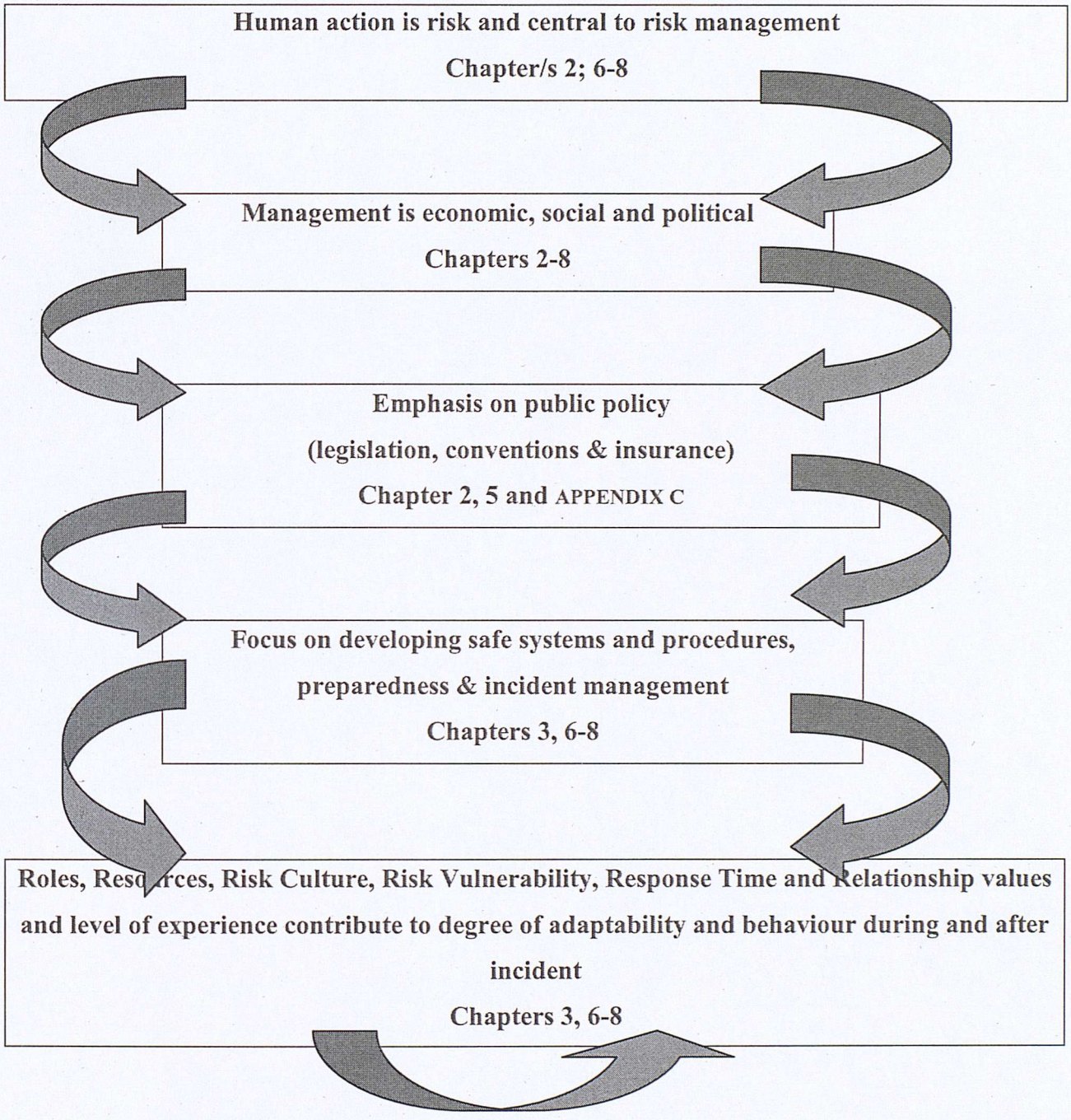
It was also seen that public relations (particularly when dealing with the media) and communication tensions were perceived as highly significant tensions arising out of operations.(Section 2.1, Chapters 5 and 6)

The perceived significance of public relations and communication tensions demonstrates the incident management is as much the management of the social risk as it is the management of the economic risk

The participative observation sustains the revelation in the interviews that risk and incident management has to do with managing behaviour within a predetermined process structure. The key tensions lay in behavioural aspects such as communication hiatuses, degree of relationship or networking, i.e. not talking adequately with each other, responding more to camera than to operations, allowing distraction from agitators. Process issues are directly linked to communications and actions. Proactivity is a behavioural factor. It is the taking of initiative in being involved in the process. Distraction disassociates involvement in the process. Networking connects separate processes so that information can be exchanged and actions taken accordingly. Networks also allow for cultural interfacing where two or more different cultural types can work in complementary processes, e.g., specialists taking on their specific roles whilst gaining an understanding of the roles of others. (Chapter 6).

Risk lies in the management of the crisis emanating from an incident. It is behaviour that manifests itself in action and interaction that becomes a critical factor in the failure prevention.

Central to the philosophy of risk, incident and crisis management, lies the principle of behaviour: how we act, how we relate to one another, how we negotiate with individuals, organisations and governments, how we defend our actions, how we reflect behaviour that is perceived as supportive, helpful rather than confrontational or negative, and how we support the actions of others.. This fuels the difference between perceived success and failure. Management is, therefore, managing perceptions, and behaviour is the all-encompassing tool that enables control in a context where the environment is uncontrollable or unfriendly (Rasmussen, 1987b: 296).



7.2.1. SUMMARY AND PROPERTIES OF "SENSEMAKING"

Risk management is a behavioural process and subject to perceptions, experience, culture, function, vulnerability and level of relationship between the players.

"Sensemaking" in the study is considered in terms, partly supported by Weick's (2001:461-462) properties of "sensemaking" and partly from the key aspects of the study. The two properties

mentioned below, are interrelated from the study has developed its themes that lead to the premise that behaviour is the key risk factor.

Human behaviour context: "Sensemaking" of human behaviour was derived from the perceptions and narratives of all the interviewees. These reflected what was observed in the past and what was observable at the time of the interviews and during the training exercises. They specifically reflected individual preferences, based on experience, knowledge and actions taken demonstrating their individual perceptions as to what behaviour and action were essential during incident management. These explications further demonstrate not only learning gained from their knowledge and experience (hindsight), but the ability to think of issues beyond what was visible (foresight and insight). For example, the stated tensions reflect what is visible, it is also seen that there is the insight the individual organisational cultures can create constraints to effective incident management. It was interesting to note that, despite little importance given to own organisational cultures, the interviewees were aware, on the whole, of cultural shortcomings or attributes of other groups. These personal narratives reflect knowledge of a greater context than what is simply voiced. It provides the observer with a sense of "where people are coming from". Furthermore, as patterns of thinking emerge, sense is made of individual organisational culture, individual motivations and from this how behaviour is generated.

Collective context: Central to incident operations is the social structure of the collective organisation, that reflects both the formal and informal interactions, and which underpins emerging behaviour and action. Sense is derived from the observations of the interactions that took place during the training exercises. These drew together the strands of individual behaviour within the interrelating framework of collective management. To observe human behaviour without a social base provides a viewpoint that is only partially relevant to the whole picture. For example, it may be perceived that the ability to communicate is key to effective management, however, in the context of an incident, constraints, not anticipated, may arise that make it difficult to consolidate communications. For example, language, culture, logistics and relationship difficulties can hamper communications. Therefore, the test of perceptions lies in their relevance in the collective context which, in itself, germinates new and distinct behaviour.

7.3. Section Three: Review Of Key Critical Findings

7.3.1. Can behaviour be managed?

Failures in management result in public inquiries. Public inquiries are called to identify flaws in behaviour, such as human error, lack of training, risk management as a low organisation priority or where there appears to be some sort of "cover up". Legislation, to a greater extent, is developed to demand norms of behaviour and standards for action. There has been no easy solution to the ongoing debate between the economic cost to the commercial enterprise and the social demands for more responsible behaviour. To achieve socially responsible behaviour or "to be seen to be doing good" requires investment in procedures and controls.

While all those interviewed believe that they are managing their own capability well, their perceptions of management in other organisations manifests the reality in that there are tensions not only in the internal management of organisations but more so in the collective organisations. The predominant sentiment was to see a bettering of communication (not information) systems between the involved groups. The simulations demonstrated that the bulk of the tensions lay in co-ordinating communications so as to be heard externally as a convergent and singular voice. Yet the behaviour of each group demonstrated that there was some tendency to act in unison as a reactive rather than as a proactive group. Although such behaviour did not affect the efficacy of the group, it highlighted the fact that it affected the communications within the group and it becomes important to consider the link between communication structure and behaviour. This reflects the thinking of Turner and the high reliability group. It also reflects the importance of Heinrich's (1959) focus on human action, albeit, keeping the balance the physical requirements.

7.3.2. Public awareness – responsibility for one's own actions

The simple carrying of a camcorder in the ERC made people more alert than if there had been no camera. During both the interviews and the participative observations, it became clear that there was nervousness in the dealings with public and "being on camera". Public demands for inquiry are becoming the most prominent political form of accountability (Gephart, 1992; Toft and Reynolds, 1994). Whatever the levels of right or wrong these demands may be, their impact has had more than economic repercussions: they have been significantly political with governments and legal activists demanding accountability. The Shell Brent Spar incident, the *Exxon Valdez,* the food chain issues, such as genetically modified foods and pollution of aquatic foods, all of

these and more, have caused social outrage. Preparedness for incident management is more than a technical training effort, it is also a public relations exercise. The nervousness experienced by the members in ERC at the appearance of agitators indicated nervousness at public reaction, despite the fact that most if not all were competent in handling public inquiries. As Levitt and March (1988) observed, conflict existed between formal responsibility, accountability and (eventually) liability. Global compensation regimes and a widening of insurance capacity have controlled levels of economic loss. Such measures however, do not necessarily reduce social outrage. Ad discussed earlier, social outrage has a price. Legislation dictates and penalties which together with industry-based penalties such as higher insurance premiums and stricter standards all exacerbate the already existing tension between needing to achieve commercial viability whilst ensuring a socially responsible attitude.

REFLECTION

The idiographs have shown that the limitation in the behaviour of experts in the collective organisation is the congruence of culture between that of the individual organisation and that of the collective operation or the ability culturally to readjust. The groups were united in their understanding of the process of management of the spill but were separated as to how they related this understanding to individual actions. The interactions and interdependency are temporally related to ensure minimum outcry. When communication is weak accountability becomes an acute issue and solutions are found not unnaturally in "scapegoating" or "fighting from one's corner" rather than as a collective operation. Comments made in the wash-up sessions, although constructive, showed a tendency to demand rather than to praise. Incident reviews also concentrate more on identifying the operational cause of incident rather than on the linkages in behaviour. This means that even though measures are developed or reinforced, incident management could be subjected to social outrage where these linkages remain weak.

The study of media influence merits detailed analysis. In this study they form a small part in the wide exploration of the different influences on collective operations. Perspectives arising out of this study suggest that it is impossible to establish risk without adequate consideration to the behavioural linkages internal within organisations and within the collective operation.

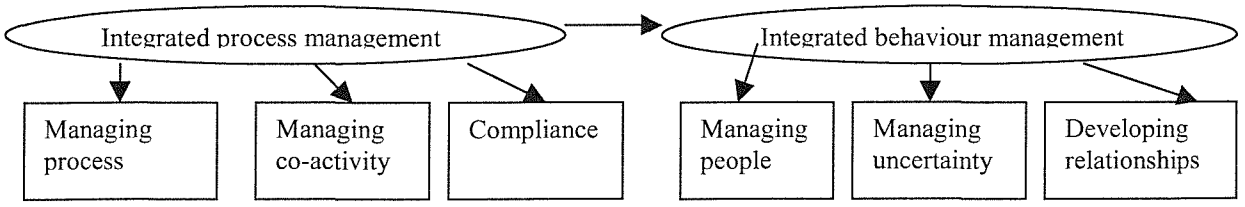
7.3.3. DEVELOPMENT OF RISK CULTURE

Collective operations mean a culture that accepts parallelism and integration. All respondents saw training exercises, sharing information and partnerships as an ongoing process of organisational and collective cultural development. Undoubtedly, where expertise is developed, and the testing of human capability in the collective operation is carried out by way of constant reviews of roles and behaviour, this is likely to minimise failure as the concentration is on development and not on procedure alone. Evidence has shown that although rehearsals are carried out there is little in the way of action planning for more development. If a collective culture is to be developed there is a need for constant reinforcement of values. On the basis that there can never be two similar spill scenarios, the development of behaviour therefore becomes more critical than pure concentration on procedure. Behavioural adaptation is achieved more easily to changing contexts than in adherence to procedures. The relationship with the democratic public calls for a single collective stance and the ensuring of sound inter-organisation and inter-collective communication. However, it is recognised that despite the merit of a collective stance, this may work, as seen during the exercises as many groups were preoccupied with their own agendas and risk base. The purpose, therefore, for constant action reviews, almost similar to a fire-drill, is necessary to develop a behavioural culture sensitive to operating in crisis conditions. This, however, means a cost to the organisations as risk plans schedule in training, rehearsals and development as part of their cultural-reinforcement attitude. As an oil spill can become a national crisis, the government as part of its involvement holds an important role in providing training, technical information and advice, the focus being on reinforcement.

7.4. SECTION FOUR: SUMMARY OF KEY ISSUES AND CONCLUSION OF THIS STUDY

It is seen that despite 30 years of technical and operational progress, oil spills continue to happen and provoke distressing outcomes. The study has identified that the final outcome is sensitive not only to initial risk conditions but also to intermediate risk conditions and particularly as a result of actions undertaken during the management of the spill. The study submits that despite the preparedness system being exceptionally organised and co-ordinated, it betrays an underlying strained system of roles operating jointly and severally. This underlying system could move along the continuum of minimal strain in co-ordination with significant disorder. The patterns of risk situation are never the same for any two spills. The success, therefore, of the co-ordinated

exercise is not entirely dependent on levels of process preparedness but also on operation of the collective operation during the incident. The degree of relationship within the collective operation, the time element to respond, the vulnerability of the situations, together with other factors such as the underlying risk base of each group and the resource capability at the exact moment of happening all affect the motivations underpinning the actions taken. The interviews highlighted that also communication inter-organisation and inter-collective operation was crucial to the success of oil spill management. The interviews revealed two phenomena. First, the economic/political imperatives that existed for each involved party contributed to controls being "internally focused" rather than focused on collaborations, as seen with the promulgation of different press releases. The phenomenon that occurs when handling the incident is that actions are collectively reinforced during the process such as organising voluntary help, procurement of equipment, shoreline clean-up but cancel out at points where tensions exists such as unclear command and control role, media pressures and financial concerns. The second phenomenon was the reverse of the above in that collective operations were more focused on handling public relations than were their organisations. This was observed in the case of the Port Authority 2 simulation where student agitators were dealt with reasonably effectively by the ERC although the handling of the agitators by the Port Authority 2 headquarters staff had room for improvement. Role behaviour therefore has to be interpreted in terms of the environment in which risk determination is sought. It becomes essential to focus on not only the scenario in which the risk exists but also on how actions and influences affect the risk-state. Role behaviour analysis seeks to establish that not only do risks emerge during and from decision-making but that these new emergent influences are in fact risks that change the whole perceptive profile of the risk, thus making a low probability risk significantly high risk and *vice versa*. The approach to incident management in dynamic risk conditions intimates the need to seek different solutions and structures in handling the risk. The study sees a clear need for a shift from integrative process management to integration of behaviour management.



There are some significant learning concepts that can be derived from the work of the high reliability group, yet the main learning is the need to develop a "culture of reliability" manifesting a behaviour that is reliable, responsive and responsible. The importance of understanding how behaviour is determinable by understanding not only actions taken and outcome feedback but also understanding the context of the actions. The contextual framework for oil spill management below shows that despite groups appear camerated, the function of the collective operation requires concatenation, integration and equal membership to ensure success for each group, the public, and the collective. To achieve this requires a cultural and a behavioural metamorphosis from individual to aggregate.

RELIABLE---------->RESPONSIVE---------->RESPONSIBLE BEHAVIOUR

Public policy on risk management in its attempt to create an aggregate sees itsef suffer from a couple of problems. First, by reason that public policy is superimposed authority (Weick, 1995), could create tensions in achieving full convergence of values from the adhering authorities and might develop conflicts in command and control role between experts and lead organisation. Secondly, different levels of understanding exist which can thwart policy acceptance and hence co-operation becomes paramount (Weick, 1995; Schmidt, 1991). However the value of public policy lies in the tradeoff of accountability on one party for collective accountability. Furthermore an environment is created that promotes partnerships, knowledge sharing and learning, which, lends itself to a risk culture that is geared to crisis preparedness. As, Smith, D., (1992) puts it, public policy seeks to bind crisis and strategic management together. However, it is beyond public policy that behaviour has to be developed so as to cope with the wider socio/political issues emanating from an incident.

Therefore, despite high reliability of systems and spacing of activities (coupling) is critical to ensure failure is preventable, what becomes clear is that the concentration on preventative behaviour, albeit important, must not disassociate itself from the fact that incident will happen and crisis will arise where the behaviour in the aftermath become particularly important. In other words why it happened becomes less important than how we are going to manage what has happened. It is not intended that the we forget the cause of incident (risk incubation factors) as these need to be accounted for and restructured to improve failure rates, however, it is intended that we remember that accidents will happen, irrespective of cause, and the responsibility of the management of outcome can turn what is apparent failure to perceived success.

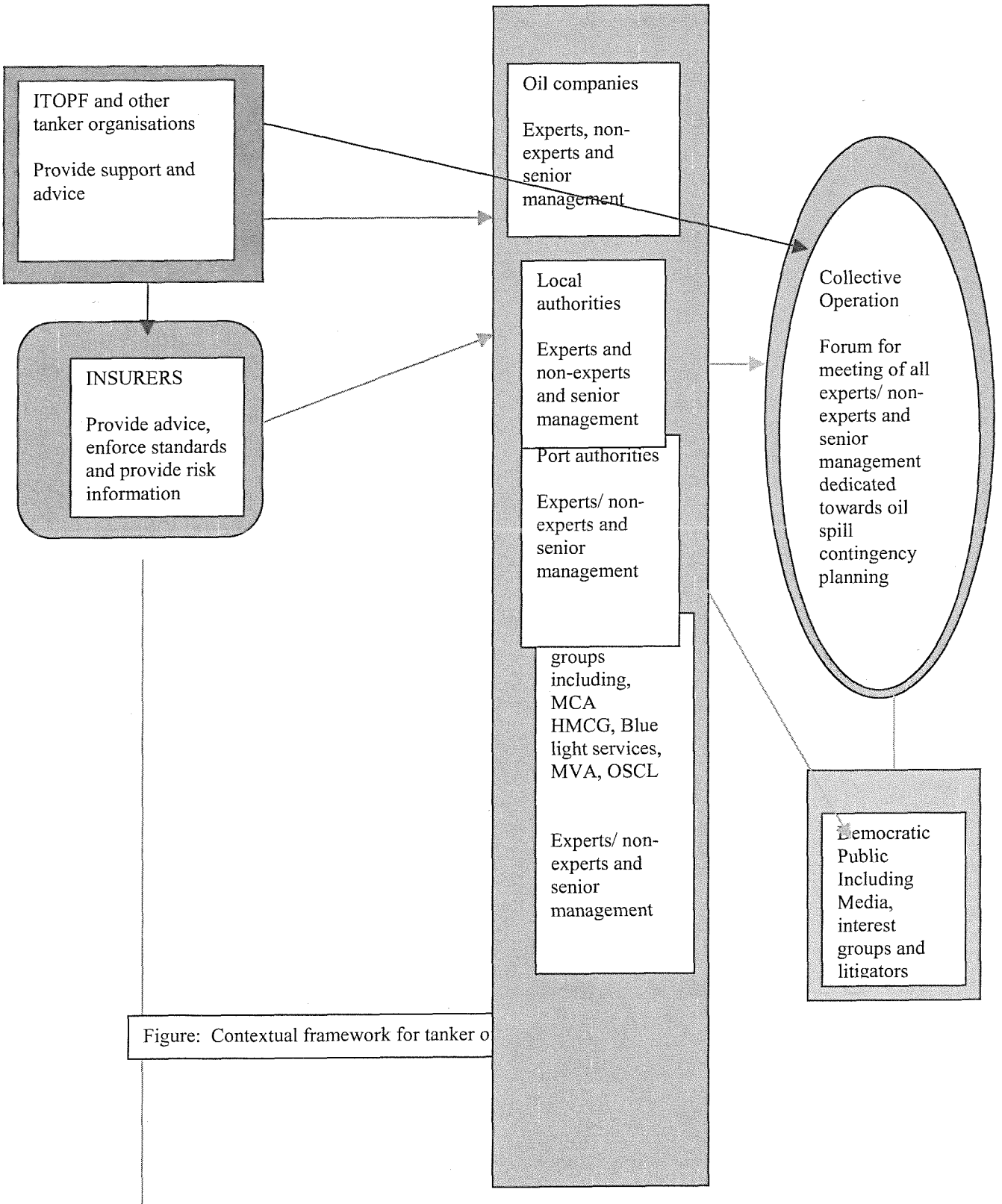


Figure: Contextual framework for tanker o

CHAPTER EIGHT: RECOMMENDATIONS AND FUTURE RESEARCH

8.1. SECTION ONE: RECOMMENDATIONS

These recommendations are made in the context of developing capability and behaviour. There is no special order of priority as different groups might be subjected to different developmental strategies. However, what emerges from the study is that some organisation is required that will bring about a collective behaviour. This collective behaviour is more difficult to achieve partially, because of the disparate motivations of the disparate organisations, in the collective, towards development of their human resource. The model that has been developed considers the collective more than organisational but considers that the starting point is that there are different motivations and for this reason, there is a shift in the responsibility of development from organisation to the collective. The collective responsibility is not necessarily to ensure a convergence of values, but to develop a bank of experience and knowledge, from which participants through their networks develop skills and behaviour in dealing with crisis.

The model summarises the key issues in a minimalist form as many of the points are interpretable through common sense and personal experience of what is achievable. It is also understood that the model is there to develop debate on the possibilities that go beyond what has been stated.

8.1.1. DEVELOPING MANAGEMENT CAPABILITY AND BEHAVIOUR

Taking the premise that developing capability and behaviour is vital in management, the question is how this is best achieved. There are apparent limitations creating development programmes. Apart from the need for an adequate budget, training programmes can become circumscribed if exercised within one time-frame and in pre-set conditions. To ensure that continuous learning and competence development are achieved, the training and development exercises not only need to take into account potentially emerging dynamic conditions but also be a programme which will support continuous learning. MODEL F has been outlined explicitly to incorporate both these aspects, involving four areas of consideration: consideration of all possible elements; consideration of all sources of risk/uncertainty; consideration of all the potential outcomes; and consideration as to how realistic the continuous development programme can be?

MODEL F

Developing capability for incident management – Key considerations	
1. **Consider all possible elements.** • Make it realistic • Instigate dynamic conditions • Involve the affected public, businesses and media • Involve support services such as fire brigade, police, medical team • Safety management	2. **Consider all sources of risk/uncertainty.** • Culture and behaviour of involved individuals • Conditions of vulnerability such as weather, and tide • Location and logistics • Danger to humans- availability of support services • Lack of adequate personnel • Communication systems
3. **Consider the potential outcomes.** • Level of economic loss • Potential for social outcry • External group influences - Media influences - VIP visits - Direct action groups	4. **Consider how realistic the programme can be.** • Cost/ benefit implications • Action plans and reviews • Ways of continuing learning - using "live" situations as training programmes • Monitoring information and having clear guidelines as to how to deal with the risk.

8.1.1.1. Considering all possible elements

A development programme should attempt to replicate a "live" situation as best as it can within the allocated resources to ensure that the behaviour tested mirrors the behaviour that will arise during the "live" incident. To build in dynamic conditions requires a programme that creates a culture shift in management from a risk extant approach to a dynamic risk approach (TABLE Z). The extant approach assumes one set of conditions in one- time environment, assuming that these conditions will recur. In reality there would be different conditions which would require a different set of actions and behaviour.

Table Z- **Shift in management approach** (from risk extant to dynamic risk)

Risk Extant approach	Dynamic Risk approach
Scientific assessment of risk	Concentration on human action and behaviour
Predicted outcomes	Difficult to generalise
General assessment variable valid for every event	Unique variables exist for each and every event
Response management – focus on contingency plan and procedures	Response Management – focus on players, participation and performance
Outcomes seen in financial terms	Outcomes assessed in terms of risk cost including socio/political consequences
Structure of network – vertically integrated and differentiated	Structure of network – horizontally integrated
Solution in terms of standardised methods	solution in terms of continuous socio/ structure management

The dynamic risk approach sees a more network form of operations, where there is greater sharing of knowledge and working together with focus on the three Ps (players, participation and performance). Concern is given to building relationships, learning from experience and

developing knowledge surrounding the dynamic conditions. Development exercises there need to take into account that development is carried out in almost "live", if not "live", situations and that as much as possible participants should be exposed to new deviants that might affect the linear management of incident.

a. ***Making it realistic***: This would require having the main players in a live incident involved, including ITOPF, tanker owners/ charterers and their insurers. As insurers and tanker owners may be outside the geographical domain of a training simulation, nationally based organisations could be approached to take part. It is in the interests of tanker owners /charterers to undertake simulations where a tanker is in trouble. It also requires the setting up of an ERC (or MRC, MRCC, MRSC, MEOR,) and premises for an SRC and an SCU. The premises should be well designed, capable not only of housing representatives of player organisations while making allowance for incidental traffic of people walking in and out of the room (going to coffee machines, rest rooms and so forth). Furthermore, to make it realistic, notice of the spill exercise should be kept as secret as possible, except from the organising few. This would determine how prepared organisations are to deal with a spill. If, for political and economic reasons, this level of secrecy cannot be achieved the next best thing would be not to provide the time scheduled for the exercise. Part of the exercise would be to see how long it takes for the players to become mobilised and make it to the ERC.
b. ***Instigate dynamic conditions***: The training programme should include some unplanned deviations. Some examples in dynamising training could be by introducing agitators, visiting dignitaries, press pressures or equipment failure, or the absence of key personnel.
c. ***Involving the affected public***: Local businesses and the media need to participate in the exercise, even if this only means being kept informed rather than actually involved. Media involvement should be planned into the exercise and the media advised accordingly of their role in the exercise. In this way there is strengthening of the relationship between local news groups and the collective organisation. It is accepted that the involvement of national news groups may not be effectively achievable. Training exercises, however, will prepare players to deal with media issues.
d. ***Involve support services such as fire brigade, police and medical teams.*** Although in most tanker accidents there is generally less threat to human life, simulation exercises require involvement of support services to identify how their role would be affected in such a crisis.

The most effective simulation would be ensuring an element of surprise that spurs the support services into action. It is accepted that limitation of resources would prohibit a full surprise element to be incorporated into the simulation plan. However, advising the groups of a "drill" situation without giving the actual date might allow for the release and use of resources, at the same time providing a surprise element on the day of the exercise. Furthermore, physical simulation exercises could be as much part of the internal training programme of the individual organisations as for the collective operation.

e. ***Safety management:*** Safety, as discussed, is a concept that can be differently perceived. There is, therefore, a need to have a convergence of values of what constitutes safety and the precautions necessary in battling with crisis. The development of a safety culture is important to the collective and in particularly in building foresight (Sagan, 1993; Turner, 1978, Reason, 1990). Perrow (1984) believed that failure was inevitable unless attention was given to failure incubation factors and this includes behaviour. Training exercises need to reinforce the points of failure, and draw attention to potential areas where failure lies in latent factors such as where boredom, stress, conflict arise. There is a need to constant pool resources and work in teams (La Porte and Consolini, 1988) so as to share knowledge and provide support.

8.1.1.2. Consider all sources of risk

a. ***Behaviour of individuals involved in risk and incident management:*** values, norms, beliefs, attitudes and capability need attention. In training personnel, attention should be given to developing culture, decision-making and capability in action. Training schemes may be experimental in that there are built-in scenarios, where structures are removed, where people are required to act as if there was a crisis. De Keyser (1987) suggests that there is a need for individuals to experience and deal with difficulties which arise and furthermore there is a need for managing these experiences. Learning can be enhanced by introducing novel experiences *"which require thought patterns beyond the current stage of cognitive development."* so as to develop effective cognitive control structures which reduce the risk of failure by reason of incompetence or non-capability. The management of behaviour is, however, more than having a dedicated training programme, it involves developing a culture where learning is gained and knowledge shared about the environment and of experiences learned and gained with the aim to improving of capability (Argyris and Schôn, 1996).

b. ***Conditions of vulnerability:*** Simulations, whether computer-based or physical, should test the best and worst possible scenarios by instigating conditions of vulnerability. A tier one to three should be practised. Different venues need to be experimented with. Although this may not be possible in the case of live simulations, a modelling scenario should be considered.

c. ***Location and logistics:*** An oil spill can happen anywhere along the tanker route and preparedness needs to take into account that time for response and resources available, wherever the spill might happen, might be limited. As Oil Company 2 pointed out the logistics of the *Sea Empress* incident were favourable in that the oil company was able to provide transportation and waste disposal carriers. These problems should be effectively addressed by the risk plans. Again the development of a computer-based model to support these conditions could be useful in identifying how the players manage to deal with the incident in areas where resources are not easily available. A physical simulation exercise could develop discussion and debate on how this management might be best achieved.

d. ***Human beings in danger:*** Rescue services are operationally aligned primarily with fire departments or ambulance services and coastguard services. The primary focus of rescue services at this time is the extrication of humans from water-related accidents.The management of getting crew off board is critical and difficult to simulate. Rescue events are "*loose and separate, ..conjoined but not connected*" (Hume, 1748; cited in Weick: 2001:199). This calls for repeated enactments, in studied conditions, to reduce the level of errors and to increase the level of flow between the emergency groups. The training plan should involve timed action and observations made of inter-group behaviour arising out of the connected activity.

e. ***Lack of adequate personnel and or physical resources:*** The reality in any event is that trained persons may not be available at the time of the incident. Furthermore persons who participate in training exercises are already dedicated and knowledgeable about the incident. Organisations need to have "back-up" personnel ready, and good practice would be to involve more than one member in the exercises. It is also good practice for organisations to promulgate outcomes from the training to their individual response teams, media department, training department and senior management. Any key learning can then be incorporated within the organisation's own training programmes, for example how to deal with the media, new communication strategies, intervening variables and negotiations.

f. ***Communication problems:*** Significant communication problems during the *Sea Empress* incident caused delays in developing response. Weick (2001:137) suggests that lateral communications structures are critical to detecting and diagnosis crisis. Replicating, in training exercises, lateral communication structures such as with groups who sport special communication facilities like radio hams, will reduce reliance on a linear communication systems, with knowledge that there can be devolved authority at local level e.g., managing the beach volunteers. Furthermore, a database of volunteers and amateur radio or network hams could be pre-determined and be ready at hand so central and local operations can have the choice of which resources to make use of.

8.1.1.3. Consider the potential outcomes

Oil spills as seen have the potential to impact upon environment and social structures. All legitimate societal concerns need to be addressed Training exercises need to draw out areas where liabilities may have been less if management had been adequate. A list of potential areas for liability could be drawn up which allows the value of the exercise to be tested and benchmarked. Training exercise could in effect have a back to front testing mechanism, where outcomes are first established, then threaded back to the actions taken. Questions should be asked on issues which have a direct link to social outrage, such as whether the use of dispersants helped or worsened the situation. Has the credibility of any organisation diminished and what does this mean? Would better communications have helped to reduce concerns? The review needs to establish whether things might have been better managed. There is a need to consider the influences of the external group, both from a safety management point of view and the potential of their influences, e.g. the promulgation of scare stories, demonstrations and so forth.

8.1.1.4. How realistic can the programme be?

a) ***Cost/ benefit implications:*** In considering economic outlay, the costing of the simulation is also a major consideration. Apart from statutory funding, another way of funding could be through an oil spill simulation pool, which should be funded by all players directly involved (as a portion of the individual organisation's training budget). Funding could also be invited from equipment manufacturers and research organisations wishing to test the use of special equipment or processes in a simulation. The pool concept allows for the dedicated

management of a simulation. A cost benefit analysis of simulations can be achieved by measuring the development of personnel in money terms and comparing this to the cost of investment. Development cost and benefit may be extremely difficult to quantify. Techniques employed to assess these costs could include, for instance, some level of accreditation for competence gained in handling risk situations.

b) ***Action plans and reviews:*** The learning gained should be more than an intensive one-day interactive and information-building exercise. Action plans should be instituted and carried out within pre-determined time frames. Admittedly, it is unlikely to be cost-effective to have regular oil spill exercises. However, the existence of networks and partnerships should keep this agenda high on the priority list.

c) ***Ways of continuing learning:*** Continuous knowledge is a sustainable advantage but it requires the commitment of senior management with the player organisations. It also requires the development of a learning culture with focus on developing intellectual property. Although many companies say they encourage autonomy among their personnel, many are too often guilty of stifling learning. Outlined below are some suggestions as to how continuous learning is achievable:

   i) **Interacting with involved parties and parties likely to be potentially affected..** This provides an awareness of how things are managed.

   ii) **Unlearn old habits..** Hedberg (1981) observed that organisations unlearn slowly, resulting in slow development of new learning, developing a culture of continuous learning and knowledge is important for behavioural management.

   iii) **Arrange for seminars with people outside the industry...** Too much time is spent with others in the same industry. Learning can come from new settings where there can be a free exchange of ideas arising from the sharing of experiences with people from diverse businesses but with a similar agenda. This includes involving academics as well as practitioners.

   iv) **Continuous research...** Performing a function efficiently is one thing, but to be able to test the effectiveness of a function is another. Forums, training sessions, and other arenas should be used to develop ideas for research.

   v) **Using "live" situations as training programmes..** There is no better learning than actual experience. An incident should be used as a learning session followed

by a post-spill or post-incident forum to identify what took place, irrespective of the size of the incident or whether there is a post-event review. By this way knowledge gained can be turned to skill-based control (Rasmussen 1987: 55).

8.1.1.5. Summary of recommendations

The recommendations suggest that preparedness is more than a series of training exercises, it involves a change of both organisational and individual culture focusing on the development of capability and behaviour rather than being predominantly process oriented.. There is need not only to become more informed and responsible but to be involved in best practice.

8.2. Section Two: Future Research

The constant theme of the earlier chapters has been that focus on the process of incident management itself is insufficient. Some attempt has been made to consider behaviour as a factor of influence. Yet there are still areas where there is call for further research within this sphere:

1. **Research on the time aspects in incident management:** Chapter two has considered some implications of time as a factor of behaviour. This analysis could be extended to observation of effects of embedded time-values on relationships and within different incident types.
2. **Evaluate the role of insurers in a wider contextual framework:** The views of insurers on their policies and administration of oil spill liabilities could provide insight to the strategy of insuring against this risk as opposed to other similar large liability risks. The extent to which legislation has made insurance of high outrage risks more uninsurable could be considered.
3. **Survey public attitudes about oil spills:** The study has been focused primarily from a technocentric point of view. To make sense of the effects of outrage, public opinions need to be elicited. In doing so, comparisons of different versions of oil spills need to be investigated. Questions such as " To what extent organisations forego their values for social values?"; "Do the public view the standards set by the NCP to be adequate?" could be considered. As Davies (1999: 296) states as what has been echoed by many, public participation is crucial to planning and successful outcome.
4. **An investigation of the link between organisational culture and culture during incident management:** The study has considered culture in attempting to draw out behavioural conditions in incident management. To this extent assumptions to culture have been taken by

relating function to culture. The aspect has been outer/ inner. What could be interesting is to observe organisation in action for an inner/outer viewpoint. This would mean participating in the functions of one or more of the player organisations.

5. **Modelling of oil spills:** The systems and the behaviour of risk managers in real situations are observed and modelled. Where social simulation models are devised to support plans, they need to bring in the distinctions between qualitative judgements and quantitative relationships drawn from either statistical data or physical theory. The models need to investigate the relationship between direct communication among the players, the decision-making capability and the efficiency with which their common task is carried out.
6. **Failure management:** Error management has been particularly a source of inquiry in considering complex systems. On the premise that collective operations lend themselves to levels of complexity, there arise issues about managing failure. Such issues would have applicability for the development of cultural systems and quality procedures in areas which are not driven by complex engineering systems but where complexity exists by the very existence of interrelating task structures. Critical questions remain to be further explored such as: who dictates that there is failure?; To what extent is failure detectable in non-engineering type scenarios?; At what point is failure allowable as it might be more expensive to manage?; and to what extent do effective cultural systems and technology support failure management?

8.2.1. SUMMARY OF FUTURE RESEARCH

For the disproportionate level of public concern of a low occurrence risk, the research seems overall limited, especially with regard to behavioural implications. In reality what is practised is only as good as the person or persons capable of putting it into practice. Developing capability is one thing but having capability at the time of an incident is another. However it needs more than research to gain understanding, it needs a proactive stance on the part of organisations to consider risk management as part of their corporate strategy and social policy.

8.3 Section Three: Making Sense Out Of The Study

What is seen is that the study of risk and risk management is extremely diverse and that it becomes easy constantly to change focus from one area to another. When sources of information are considered, there is a tendency to triangulate, while meeting people and discovering what they think bring a more earthy sense of what it (risk management) could be all about. Revelations bring into perspective that what the risk is, is not the issue, and that the uppermost part of people's thinking is that about behaviour: how we talk and how we act and react. The process of listening to people's views and observing how they acted, albeit in non-live risk circumstances, provided a sense that what happened in the past and what is likely to happen in the future was of little relevance. It was the "now" that mattered and the "now" was the past and the expectations all rolled up to being the present where concern lay in what to do about management and behaviour now. In a way, the route to looking at tensions was limiting in the sense they were statements of the past and within distinctive social contexts. However, on the positive side, these experiences provided some idea of what aspects were bothering the respondents sufficiently to have flowed into present and perhaps providing some sense of the likelihood that some of these concerns would continue to exist at the next risk event and in other social contexts.

The key implication that comes out of my analysis is that attention is to be focused on the development of behaviour today. Organisational culture takes on particular relevance, as culture today will act as the backdrop to behaviour tomorrow. Culture, as a concept, is more easy to articulate on paper than it is in achievable in organisational terms. In effect, organisational culture represents more than training exercises, it represents a behaviour that provides for senior management commitment to risk responsiveness, an organisation of resources that underpins the strategy of the company and provide the equilibrium between performance and managing the human resource. Therefore, it may have been richer to study failure in organisational terms as much as in terms of collective operations. This exercise, however, would be no mean task and it would be certainly difficult to observe cultural development within organisations where organisations are constantly in a change mode. Achieving a rounded sense of what is behaviour is therefore difficult except that it then means having to rely on research undertaken on like-minded organisations and making comparisons to the context of inquiry. The study analysis has

left several questions not fully answered. For example, is the concept of risk really necessary to understand risk management? Instead should behaviour be understood better, to develop concepts of behaviour management? Such questions become more difficult to answer especially where attitudes and terminology are embedded in a culture that is fixed on a "cliché". Risk management texts, risk management qualifications consider predominantly technical aspects. However, if a study commences with the premise that there is no such thing as risk management, then contexts become irrelevant and therefore the central point for discussion becomes human behaviour and in particular a social context, in organisations and other collective contexts. Whatever level of uncertainty present itself, it is behaviour that gets an organisation, collective or individual into a mess or out of it. Therefore, it becomes questionable as to whether the starting point of making sense of actions lies apart from the initial concept of risk and the technical management of a risk. To this extent the study analysis, in its attempt to merge the disparate aspects of risk, highlights the fact that risk by reason of its usage and abusage as a term provides little or no understanding to what it is and what is that which can be managed. However what is seen is that every time risk is considered there is a link to some human act whether it is decision-making, incident management or safety management. From this inelegant making of sense of risk and risk management, stems a glare lurking behind the scenes of that very important concept of behaviour and behaviour management. There also emerges a fleeting sensation and hope that even in capturing a simple thought that it is behaviour and not risk that we need to be focusing upon liberates a thought process in the wider debate on the link between human action and failure (in whatever context).

APPENDICES

APPENDIX A - OIL SPILL RISK CONTEXT

Table B **OIL SPILL OUTRAGE FACTORS (PAGE 29)**

Low Outrage	High Outrage
Natural Origin	Man-made Origin
Controllable	Uncontrollable or difficult to control
Well Understood Risk	Highly Uncertain Risk
Commonplace	Memorableness of event
Availability and usage of accurate information	Lack of or usage of accurate information
Voluntarily encountered	Outside the control of the public
Involvement of the democratic public	More Institutionalised

Adapted from "Communicating with Consumers on Food Safety and Risk Issues," Edward Groth III, PhD., presented to the Institute of Food Technologists annual meeting, June 18, 1990.

Table G– **OIL SPILLS IN METRIC TONNES (1967-1999) (PAGE 84)**

	metric tonnes	area
1967 *Torrey Canyon*	119,000	UK
1976 *Urquiola*	108,000	Spain
1978 *Amoco Cadiz*	233,000	France
1979 *Atlantic Express*	280,000	Tobago
1983 *Castillo De Bellver*	257,000	South Africa
1988 *Odyssey*	132,000	off sea Canada
1991 *ABT Sumner*	260,000	off sea Angola
1991 *Haven*	140,000	Italy
1989 *Exxon Valdez*	38,000	US
1992 *Aegean Sea*	73,500	Spain
1992 *Braer*	84,700	UK
1996 *Sea Empress*	72,360	UK
1999 *Erika*	14,000	France

Table H– **CHANGING CHARACTERISTICS OF THE OIL SPILL RISK FROM 1967 TO 1996 (PAGE 84)**

Torrey Canyon **1967– low regulatory framework**	*Sea Empress* **1996- high regulatory framework**
Tanker accidents 410,000	Tanker accidents 110,000
No planned response	National contingency plan
Undeveloped compensation structures	Highly developed compensation structures – also IOPCF Fund limits more defined and increased
Liability was proven fault or negligence	Strict liability on polluter
Shipowners under 1969 CLC Fund requirements not able to limit liability if proved actual fault or privity	Widened liability to include recklessness (i.e. although did not intend to create harm but aware that harm was likely to arise by the actions taken)
Insurers were not directly liable (they stood behind the insured)	Insurers directly liable
Risk to the environment was " harm to trade"	Risk to environment significantly extended to include "reasonable" clean-up costs and costs of preventative measures (even when no spill - as long as there was threat of pollution)
Cost value per metric ton spilt = £55	Cost value per metric ton spilt = £554
Tanker design and safety management for bulk oil carriers only	Widening of regulation to include spills from vessels constructed or adapted to carry oil

Table I –**MEASURE OF LIABILITIES OF LARGE UK SPILLS FROM 1967- TO DATE (PAGE 84)**

Measure of Liabilities (some examples of spills in the UK)		
spillage	**oil spilled metric tonne**	**Liability per metric tonne**
1967 *Torrey Canyon* - Cornwall	119,000	£65
1989 *Phillips Oklahoma* – Humber	800	£228
1990 *Rosebay*- Devon	1,100	£749
1993 *Braer* -Shetlands	84,700	£590 approx.
1996 *Sea Empress* -Pembrokeshire	72,360	£236 approx.
Compare with		
1989 *Exxon Valdez* (US)	38,000	£21,000 approx.

Table ML–**OIL RISK PROFILE**

ORIGINS OF DANGER
- Human control of conditions of risk (technical, natural and social)

CHARACTERISTICS OF THE RISK
- Transportation of oil a necessary activity
- Low risk in its intrinsic and confined state. High risk to coastal and oceanic flora and fauna if spilt
- High risk in highly developed legislative environments (e.g. USA)
- Low density oil has higher pollution effects- Risk can increase if seepage is allowed to continue its pollution
- Can be catastrophic if oil affects coastal areas (high intensity of affectation to coastal businesses)
- Has an international rather than a national orientation

THREATS
- High level (in tonnage terms) spillage occurrences infrequent and low level spillages more frequent

CONSEQUENCES
- Could be perceived as major for coastal environment and marine ecology. Once spilt the damage may not be irreversible (although damage to flora and fauna is known to regenerate naturally)
- Generally minor impact on humans (unless capsize or breaking up or fire and explosion)

HUMAN INTERVENTION
- Preparedness might bring about substantive risk avoidance and mitigation, although dependent on culture, time and relationship conditions during spill
- Reliance on external support and collective structures for incident management
- For shore-line clean-up – situation might even get better if less or nothing is done

REACTIONS
- Public concern for flora, fauna and wildlife. Concern by coastal businesses for consequential loss
- Public reaction to damage to personal property and to health and safety issues
- Generally medium to high concern, with little or no panic. High media profile

SAFETY SYSTEMS
- High reliability of human operations – associated precautionary norms exist. Incubation takes into account cultural factors. High reliability of operational plans
- Response is by way of co-activity. Developing simulation models of spill conditions and physical training

LEGISLATIVE IMPLICATIONS
- Highly complex national legislation and international regulations, demanding a high level of preparedness
- Serious consequences for polluter (potential for punitive damages if breach of US OPA 90)

INSURABILITY IMPLICATIONS
- A low loss spread over a large portfolio (compulsory insurance for shipowners). Insurance only for established negligence of the shipowner. Liability on a "polluter pay" basis

APPENDIX B - COLLECTIVE OPERATIONS

Table O

OPERATIONAL RESPONSIBILITIES OF LEAD BODIES IN THE EVENT OF A SPILL

BODIES	ROLES
MPCU	• response to oil spill and assessment of the response (before action) • activate MEOR[lii] and mobilisation of response activity • establish Marine Response Centre and with local authorities - a shoreline response centre - disperse oil at sea • can issues directions to ship's owner or master, to a pilot or salvor or harbour master, harbour authority [liii] • can order a ship to be sunk or destroyed or can take control of the ship[liv] • can request marine surveyors to board a casualty in harbour or at sea to carry out port state control inspections and offer advice on vessel seaworthiness • advises the DTI on the adequacy of plans for dealing with marine oil spill • overriding authority to respond irrespective of jurisdiction • provide training courses on oil spill response, contingency planning and use of cleaning an oil reduction equipment
HMCG[lv]	• responsible for co-ordinating maritime search and rescue • undertakes a 24 hour radio watch and reports pollution to MPCU • has delegated powers to control air space and creates a temporary exclusion zone around the casualty
ROW[lvi]	• deals with wreck and salvage[lvii] • All property found in or on the shores of the sea, or any tidal water must be reported to ROW to establish ownership • responsible for the disposal of stranded dead Royal fish[lviii]on UK shores • Also informs the National History Museum in London before arranging disposal of carcass
Marine Surveyors(part of MCA)	• responsible for regulating[lix]marine activities in UK waters and on board UK registered ships (wherever they are) • collect evidence and interview suspects and witnesses in preparation of a prosecution in the event of pollution offence
DTI	• licensing of offshore gas and oil exploration and production facilities and the control of discharges from offshore operations • gives approval of oil spill response plans for the offshore industry[lx] • Receives reports of any oil spill at the DTI Oil and Gas office[lxi]
Port and Harbour Authorities	• respond to incidents of marine pollution within their area of jurisdiction and which can be contained by using port and harbour facilities or by way of their partnership agreements • statutory duty to report all spills to HMCG • From February 1998 - a statutory duty to prepare and submit oil spill response plans to MPCU for approval[lxii]
Local authorities	• no statutory duty to clean-up the shoreline (but do so voluntarily) • power to incur expenditure to alleviate the effects of the oil incident • have a duty of care to ensure safety of local authority employees involved in clean-up activities • duty to carry out risk assessments under the Management of Health and Safety at Work Regulations 1992 and the Control of Substances Hazardous to Health Regulations(COSHHR) • recover their clean-up costs from ITOPF where the source of pollution is an oil tanker

ROLE OF KEY SUPPORT ORGANISATIONS

BODIES	ROLES
DETR	• co-ordinating role in marine pollution
Maritime and Coast Guard Agency(ex Marine Safety Agency)	• regulating maritime activities in UK waters and onboard UK registered ships with particular reference to ship safety , safety of navigation, prevention of pollution and carriage of oil and other hazardous substances
Shipping Policy Directorate - DETR	• policy oversight role of the MCA as well as policy responsibility for marine pollution from shipping -in effect it assess the effectiveness of MPCU's overall approach to incidents within the framework of the Agency's objectives
Environmental Protection Group - DETR	• has overall responsibility for the government's policy or environmental protection and in particular counter-pollution activities
Fisheries Dept.- MAFF and SOAED; WOAD and DAN	• responsibilities for safety of aquatic food chain including the safety of consumers of fish and shellfish • under FEPA, they have the power to close Fisheries where there is a risk to the consumer arising from a spill • statutory responsibility as Licensing Authorities[lxiii] to deposit dispersants and other chemicals
Territorial Environments Dept.[lxiv]	• delegated (from Central Govt.) responsibility to support local authority finances and especially for dealing with oil pollution • have a memorandum of understanding with MPCU
Ministry of Defence	• responsible for dealing with pollution caused by naval or other MOD vessels wherever they may be within naval waters • may provide assistance on a cost reimbursement basis to the MPCU especially on salvage, equipment use, vessels to provide on scene command facilities, reconnaissance, spraying vessels, and oil recovery equipment. • also provide on a cost reimbursement basis - equipment to local authorities for shoreline clean-up
Health and Safety Executive	• responsible for regulating Health and Safety offshore
Foreign and Commonwealth Office	• responsible for advising on or, dealing with any international relationship matters which might arise from proposed counter- pollution co-operations undertaken by the MPCU[lxv] • will be kept informed of any spill that happens in the UK waters or where counter pollution measures are taken that could affect the bilateral agreements between states • may warn neighbouring states of pollution threats that could affect them
Home Office	• responsibilities for the Channel Islands and IOM. Home Office must be informed of any incident or counter measures that affect these islands
The Environment Agencies	• have wide ranging powers relating to pollution control " for the purpose of preventing, minimising, remedying or mitigating the effects of pollution of the environment" • mainly for land based pollution - although a MOU has been established with MPCU in dealing with oil spills in coastal waters
Nature Conservation Agencies[lxvi]	• advise [lxvii] government, on nature conservation within the 12 mile limit • together with oil industry and MPCU have provided detailed maps of conservation areas that could be affected or sensitive to oil pollution[lxviii]
Health Authorities	• have to oversee potential hazards to public health
Oil Companies	• major companies have resources for oil recovery and other counter pollution operations • provide technical information on tanker and tanker operations • contingency plans dealing with spillages in oil terminals operated by them

UKPIA	• through ROSC provides advice to MPCU and local authorities during a spill and acts as a liaison point for access to oil industry expertise and information on capability
UKOOA	• allows access to MPCU to the industry's dispersant stockpile during a major incident
Voluntary Agreement with the Oil Industry	• new negotiation for voluntary agreement whereby MPCU would be able to request support and assistance from involved oil companies during a major spill (response within 24 hours)
Meteorological Office	• at MPCU's request, will provide weather forecasts to ascertain wind drifts so direction of spilled oil can be calculated
P&I Clubs	• insurance for third party liabilities including pollution, of shipowners
Hull and Cargo Underwriters	• insurers of ship's property
IOPC	• provides compensation for pollution damage caused by persistent oil carried by tankers over and above the CLC limits (i.e. compensation payable by the shipowners)
ITOPF	• provide a service to both tanker owners and the P&I Clubs • advises the IOPC Fund of technical aspects of response operations and on the reasonableness of claims for compensation • provide views on the counter measures used to combat pollution
OPOL[lxix]	• manages the Offshore Pollution Liability Agreement which binds operating oil companies to accept strict liability for pollution damage and remedial measures up to a maximum amount per incident [lxx]
BOSCA	• trade association and membership by subscription • it membership includes equipment manufacturing companies, service contractors and consultants, and covers every aspect of oil pollution prevention, control and clean-up at sea, along coastlines and inland • has a service contract with MPCU which include maintenance of national equipment register for use in spill incidents • also supports ports and harbour authorities, operators of oil terminals, pipelines, oil handling facilities and offshore oil installations, and local authorities • also provides round the clock spill response services for small and medium enterprises and the general public

Source: "Oil Spill Response - The National Contingency Plan" conference papers March 1998. The Institute of Petroleum.

APPENDIX C - INTERNATIONAL CONVENTIONS AND INSURANCE

Table J[lxxi] **DEVELOPMENT OF INTERNATIONAL CONVENTION REGIMES (PAGE 89)**

DATE	REGIME	OUTCOME
1910	International Convention for the Unification of Certain Rules of Law Relating to Assistance and Salvage at Sea	dealt with salvaging wrecked ships, saving life and property and rewarding those who salvage. This did not cover marine pollution problems involved with salvage operations
1924	Hague Rules	provided a uniform code for the carriage of cargo shipped under bills of lading
1926	International convention relating to oil pollution	failed to be ratified by any nation
1949	ILO Convention No. 92	crew accommodation on board ship
1954	OILPOL' 54 - The International Convention for the Prevention of Oil Pollution of Sea by Oil - came into force in 1958- later amended in 1962, 69 71 (now superseded by MARPOL73/78)	provides the conventional international standards for the protection of marine environment from oil pollution (Lay *et al.*1973:557-9) - it prohibited the intentional discharge of oil and oily mixtures from certain vessels in specified ocean areas did not establish any enforcement system other than by flag states
1958	Territorial Sea Convention	did not deal specifically with marine pollution and shipping but gave specific rules concerning a Coastal State's rights governing marine pollution in their sea area - i.e. allowing them to legislate anti-pollution and navigation measures under Article17 however under Art 15(1) and 18(2) States by legislating may not hamper innocent[lxxii] passage through its territorial[lxxiii] sea or discriminate. Art. 19 allowed a coastal State to enforce violations of its pollution legislation committed in its territorial waters
	Geneva Convention on the High Seas	required every coastal state to draw up regulations to prevent pollution at sea[lxxiv]. Also required Flag States to regulate their ships. Art. 6 provides exclusive jurisdiction on the Flag State over its ship on the high seas
	Geneva Convention on the Continental Shelf - Art. 5(7) and (1)	required coastal state to undertake appropriate anti-pollution measures within the " safety zone" extending 500 metres around offshore installations[lxxv]
	IMCO formed (inter- Governmental Maritime Consultative Organisation). This was a specialised agency of the UN	
	ILO Convention No. 109	Wages, hours of work on board ship and manning
1965	SOLAS1960 - came into force IMO Convention on Facilitation of International Maritime Traffic	

1966	IMO International Maritime Dangerous Goods Code	
1967	*Torrey Canyon* disaster	
1968	Hague-Visby Rules	applied in 1987
1969	IMCO generated CLC Convention. (The International Convention on Civil Liability for Oil[lxxvi] Pollution Damage[lxxvii lxxviii]	shifted liability from one of proven fault or negligence to strict liability. An insurance certificate is required where 2000 tons of oil and over are being carried - a certificate must be issued by the flag state verifying this financial security
	CLC applies where pollution damage is caused to the territory, including the territorial waters of the CLC state	also introduced a system of certification, making pollution damage insurance basically compulsory and giving right of direct action against the insurer if the shipowner did not pay action against the shipowner must be brought within three years from the date of the damage but not later than six years from the date of the incident also post spill preventative measures taken outside the Contracting state's territory or Territorial Sea is covered (see endnote lxxiii) shipowner and insurers liability limited to 133 SDR per ton of ships total tonnage within upper limit of 14m. SDRs[lxxx]
	International Convention relating to intervention on the High Seas in Cases of Oil Pollution Casualties (Intervention Convention)[lxxix]	convention allowed coastal states to take early action on the high seas against vessel which pose a threat to their coastlines (in effect they are given a right of action outside their own area of maritime jurisdictions
	Amendments to the Convention for the Prevention of Pollution of the Sea by Oil (1954)	regions such as Med. Sea, Baltic Sea and the Black Sea designated, as " special areas" where no oil discharge was permissible
	TOVALOP (Tanker Owners' Voluntary Agreement concerning Liability for Oil Pollution)	designed to encourage tanker owners to clean-up spills regardless of fault with the assurance of recovering their costs from the P&I Club. The scheme also contained funds to compensate governments for their own clean-up costs. upper limit of pollution damage = $14 million. It provided additional cover to that provided by the CLC e.g. covering of "pure threat situations" e.g. preventative measures taken if no oil is actually spilled. Also TOVALOP applies to spills from tankers in ballast
	IMO International Convention on Tonnage Measurement on Ships	

1971	IMCO- The International Convention on the Establishment of an International Fund For Oil Pollution Damage (The Fund Convention)	extend CLC limits particularly for significant shipping disasters " balanced the responsibility between the shipping industry and the oil cargo interests" oil was persistent oil in cargo or bunker amount of liability = $54m. (can be increase to $72m.) combined with compensation from the CLC. Shipowners are reimbursed under the CLC liability greater than" $120 per ton or $10m. whichever is less or $160 per ton or $16.8m whichever is less[lxxxi] allows for the provision of compensation in cases which come under the exception under CLC e.g. no shipowner's liability or where there are problems with shipowners finances funds come from a levy on imports greater than 150,000 tons per year of oil by Oil Companies on a pro rata basis in the State Parties also compensates shipowners for part of their liability under the CLC(Ganten 1981)[lxxxii]
	CRISTAL (Contract Regarding an Interim Supplement to Tanker Liability for Oil Pollution)	created for speed extended the liability limits. offence of strict liability to discharge any oil or oily mixture into UK territorial waters
	Prevention of Oil Pollution Act UK	the Act brought into effect for ships registered in the UK the terms of the International Convention for the Prevention of Pollution of the Sea by Oil 1954 (amended 62 And 69)- allows the Secretary of State to take action
	Merchant Shipping (Oil Pollution) Act- UK	owners of tankers must pay for the damage following the discharge of oil
1972	Convention on the International Regulations for Preventing Collision at Sea 1972 as amended by 1981 and 1987 (Collision conventions)	emphasises ship safety in navigation
	United Nations Conference in Stockholm (Lister (1996:22)	first articulated the " polluter pay" principle

1973	IMCO adopted the International Convention for the Prevention of Pollution from Ships (MARPOL) (aim to " eliminate intentional oil pollution of the marine environment and to minimised accidental discharges of oil"	Article 2 provided definitions; Article 5 - required all ships to hold a certificate of compliance with MARPOL standards, both technical and operational Regulated the • design, construction and equipment of tankers • discharge of oil from cargo tanks of oil tankers also required • a detailed oil record book

1974	The International Convention for the Safety of Life at Sea The Protocol of 1978 (SOLAS 74 ; came into force 5/80)	IMCO adopted proposals in 1978, which required new tankers of more than 20,000 tonnes and existing tankers of more than 40,000 tonnes to be fitted with segregated ballast tanks together with COW equipment and inert gas system. Also radar and duplicated steering gears requirements were instituted for all tankers greater than 10,000 tonnes (Amin, 1986 :13)
	Marine Environment of the Baltic Sea(Helsinki)	
	Merchant Shipping Act UK	
	UK Control of Pollution Act	made new provisions in the rules of the Court in respect of service in actions where compensation may be payable by the International Oil Pollution Compensation Funds being informed of certain judgements of the court
1975	OILPOL (Offshore Pollution Liability Agreement 1976 included 34 parties operating mainly on the British Continental Shelf)	if discharge of oil occurs from an offshore facility operated by an operator who is party to OPOL then the operator must reimburse for any remedial clean- up measures taken by the public authorities or itself and pay compensation for pollution damage[lxxxiii]
1976	ILO Convention No. 147	Minimum crewing standards in Merchant Ships
	ILO Convention No. 145	Continuity of Employment of Seafarers
	Liability Convention[lxxxiv]	extends OPOL to increase liability to $400m. and the operator also has unlimited liability. Insurance was also not less than SDR 35m. Joint and several liability also exists
	Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona)	
	Action Programme on the Environment - EC	noted that marine pollution was one of the most dangerous forms of pollution affecting the whole (European) Community. It identified four major sources of pollution: a) discharge of effluents from land b) deliberate dumping of waste at sea c) exploitation of marine and sub- marine resources; d) sea transport and navigation

1978	1978 MARPOL Protocol *Amoco Cadiz* disaster The STCW Convention (International Convention on the Standards of Training, Certification and Watchkeeping for Seafarers) Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona)(1976) Hague Memorandum of Understanding	re-examining the ancient law of salvage designed to raise standards of training for seafarers and to the general increase in navigational safety. came in force North Sea States agree to maintain a general surveillance on seagoing cargo and passenger ships within their territorial waters; also provided jurisdictional rights to inspect ships of all nationalities calling at their ports
1979	UK Merchant Shipping Act	S20 (1) provides that UK may by Order in Council give effect to any international treaties ratified by UK, which relate to the prevention, reduction or control of pollution of the sea or other waters by matter from ships. Provisions contained in such Orders may, *inter alia*, provide for anti-pollution measures, surveys and inspections, imposing penalties, detaining any ships and repealing previous enactments or instructions
1980	SOLAS 74 which supercedes SOLAS 60- 73 came into force Draft Convention on the Law of the Sea adopted by UNCLOS 111in August	contracting states agree to ensure that the vessel is fit for the purpose for which it is intended convention dealt with the responsibility and liability of States on environmental matters
1981	The 147th Convention of International Labour Organisation came into force The Shipping Committee of the UN Conference on Trade and Development (Geneva)	enables port authorities to inspect a ship or prevent a ship sailing, take remedial maintenance to improve safety and health, if suspected of being sub-standard even if it is flying the flag of a State not amongst those countries having ratified the Convention voted to seek " a gradual and progressive transformation" of flags of convenience fleets into normal registration

1982	UNCLOS 111(1979) created the UN Convention on the Law of the Sea	special attention to "marine environment" + guidelines for the measures which coastal states, flag and port states might take to prevent and alleviate ship-generated marine pollution. also defined the outer limit of the EEZ[lxxxv] as 200 nautical miles from the baseline of the territorial sea(Amin,1986 : 13) also incorporated(in December) the ICNT/ REV1[lxxxvi] which provided for a prompt and adequate compensation or other relief in respect of damage caused by pollution of marine environment - included issues such as responsibility and liability for the assessment of , and compensation, for, damage and settlement of related disputes inc. the need for compulsory insurance and compensation funds Article 208-211 - provided that states shall adopt laws and regulations to prevent, reduce and control pollution of the marine environment arising from a) or in connection with seabed activities subject to their jurisdiction ; b) dumping; c) vessels and d) activities in the seabed and ocean floor and subsoil and thereof beyond the limits of national jurisdiction (Amin, *op.cit.*:14) Art 217 States shall ensure compliance with International rules and standards by vessels flying their flag or of their registry Art. 194 - " states shall take all measures necessary to ensure that activities under their jurisdiction or control are so conducted as not to cause damage by pollution to other States and their environment and that pollution arising from the incidents or activities under their jurisdiction or control do not spread beyond the areas where they exercise sovereign rights in accordance to this Convention"
	IMCO became IMO	
	The Memorandum of Understanding on Port State Control	undertakes to maintain effective port state control that the ships in its ports comply with the main IMO safety conventions

1983	ANNEX 1 of MARPOL comes into force (Prevention of pollution by oil)	• the maximum quantity of oil permitted to be discharged on a ballast voyage of new oil tankers has been reduced from 1/15,000 of cargo capacity to 1/30,000 of the amount of cargo carried. Criteria apply to both persistent (black) and non- persistent (white) oils • also all ships capable of operating methods of retaining oily wastes on board through the " load on top" system or for discharge to shore reception facilities. This involves the fitting of appropriate equipment • new oil tankers (i.e. those built after 31/12/75) of 70,000 dwt + must be fitted with segregated ballast tanks large enough to provide adequate draught without the need to carry ballast water in cargo oil tanks (later amended by the Protocol of 1978 for tankers of 20,000 dwt + • also new oil tankers are required to meet certain subdivisions and damage stability requirements so that in any loading condition, they can survive after damage by collision or stranding
1984	IMO Diplomatic Conference Protocols	raised the CLC and the Fund limits also increased the geographical limits up to 200 miles from coast
	Civil liability Protocols	came about to alleviate some of CLC's deficiencies. The limit of liability was raised to 3m UOAs[lxxxvii] for ships under 5000 tons and 420 UOAs per each additional ton for ships[lxxxviii] above 5000 tons. The upper limit was increased to 59.7 m UOAs pollution damage covered is in the zone and 200 nautical miles from baseline as is the cost of preventative measures[lxxxix] more parties included in the protection: servants or agents of owner, crew members, pilots, charterer, manager or operator, person salvaging, person taking preventative measures, as well as servants and agents of those mentioned. Because of unlimited liability, the onus of proof is on the claimant to show that the owners or others acted recklessly or intentionally. deposit is to be made now whether or not a claim has been made
	Fund Protocols	extended compensation limits by $140m. to $208m. if combined quantity of oil imported in three contracting states = 600m tons

1985	Oil sector of the shipping industry- PLATO (Pollution Liability Agreement among Tanker Owners). Died due to lack of support	designed to provide an interim solution for the pollution liability pending the entering into force of the 1984 CLC and Fund Protocols. It was reflection of the oil industry's disapproval of the 1984 Protocols which not only raised the limits but also attempted to balance ship/cargo responsibility
1987	Hague - Visby rules adopted The Comité Maritime International - introduced a set of rules on the assessment of damage in event of a collision	• due diligence requirements of carriers • carriers rights and immunities[xc] • carriers right of limitation The development of the Lisbon Rules
1988	IMO Convention for the Suppression of Unlawful Acts against Safety of Maritime Navigation	upper limit of pollution damage = $400 million
1990	International Convention on Oil Pollution Preparedness, Response and Co-operation enforceable from 5/95 US Oil Pollution Act	• provides a global framework for international co-operation in combating major incidents or threats of marine pollution. Parties to the convention are required to establish measures for dealing with pollution incidents, either nationally or in co-operation with other countries. Ships are required to carry a shipboard oil pollution emergency plan = are required to report incidents of pollution to coastal authorities. • also calls for the establishment of stockpiles of oil spill combating equipment, the holding of oil spill combating exercise and development of detailed plans for dealing with pollution incidents see Chapter 4
1992	MARPOL Amendments (to be in force from 3/96) New Protocols amending the CLC and Fund Conventions. The amended conventions are known as the 1992 Civil Liability Convention and the 1992 Fund Convention	• all new tankers of 5,000 dwt + must be fitted with double hulls separated by a space of up to 2 metres (on tankers less than 5,000 dwt. the space is 0.76m). As an alternative, tankers may incorporate the "mid- deck" concept under which the pressure within the cargo tank does not exceed the external hydrostatic water pressure. Tankers therefore have double sides rather than a double bottom. Alternative design methods are allowed by approval provided that such methods ensure the same level of protection against oil pollution in the event of collision or standing and are approved in principle by the MEPC[xci] based on guidelines developed by the organisation • tankers over 5 years of age have an enhanced programme of inspections Protocols were adopted amending the "old regime", which became enforceable in 1996. The International oil pollution fund (1992 Fund) was set up under the 1992 Fund Convention

1993	IMO *Braer* disaster	reacted favourably to UK proposal for the adoption of Formal Safety Assessment (FSA), an approach which is goal-oriented, facilitates the introduction of performance based requirements and embodies the philosophy and principles of the safety case regime. FSA has five stages: the identification of hazards; the assessment of the risks associated with those hazards; ways of managing the risks identified; cost benefit assessment of the options identified; and decisions on which options to select. UK proposed that FSA should be adopted as a tool in the IMO's regulatory process to help ensure that the framework for international shipping regulation is both risk based and consistent, and thus avoid the emergence of differing approaches. The implementation of FSA, it was felt would enable risks to be anticipated and properly managed throughout the international shipping industry
1994	SOLAS amendments (MSC?)	Reg. 15-1requires all tankers of 20,000 dwt and above built after 1/1/96 to be fitted with an emergency towing arrangement to be fitted at both ends of the ship. Existing tankers must be fitted with a similar arrangement by no later than 1/1/99
1996	International convention on Liability and Compensation for Damage in connection with the Carriage of Hazardous and Noxious Substances by Sea (HNS) *Sea Empress* Disaster	
1997	The Merchant Shipping (Oil Pollution Preparedness and Response Convention) Regulations 1997 Merchant Shipping and Maritime Security Act	came into force 1/2/98 • statutory duty on Ports - those with over £1m turnover - to prepare a contingency plan and undertake an assessment of the risk and to report **all** oil spills [xcii] • included an enabling power which could allow local authorities to be given statutory duty for their role in oil pollution contingency planning

DEVELOPMENT OF UK MARINE POLLUTION LAWS

Table L

1964	Continental Shelf Act	there is no mention under this Act of the nature of the rights exercisable by the UK over the Continental Shelf
1971	Prevention of Oil Pollution Act[xciii] consolidated previous legislations between 1955- 1971	it is an offence of strict liability[xciv] if oil or oily mixture is discharged into any part of the sea from a pipeline, or from seabed workings in any area designated under the Continental Shelf Act 1964 for marine areas beyond UK territorial waters, the Act brought into effect, for ships registered in the UK, the terms of the Prevention of Pollution of the Sea by Oil in 1954 (amended 62 and 69) this in effect is where there is an accident in UK or outside UK territorial waters of any British ship, the SS (Secretary of State) may give directions or take action himself
	Oil and Navigable Waters (Shipping Casualties) Order 1971	the SS can take actions when there is an accident outside UK territorial waters involving a foreign ship, only when he is satisfied that there is a need to protect the coast or UK waters
1974	Dumping at Sea Act Control of Pollution Act Merchant Shipping Act 1974	restricts the dumping into the sea of substances unless licensed to do so. The only defence allowable is where the safety of the ship or crew is in question.

1976	Convention on the Limitation of Liability for Maritime Claims	• defined the terms " shipowners" as owner, charterer, manager or operator of a seagoing ship
		• Salvor is meant any person rendering services in direct connections with salvage operations
		• both shipowner and salvor allowed to limit their liability
		• insurer also allowed to benefit
		• the act of invoking the limitation of liability itself does not constitute an admission of liability
		• claims subject to limitation:
		  • loss of life, personal injury, damage to property and consequential loss
		  • loss resulting from the delay in the carriage by sea of cargo, passengers or their luggage
		  • loss in respect of infringement of rights other than contractual rights
		  • claims in respect of the raising, removal, destruction or the rendering harmless of a ship which is sunk, wrecked, stranded or abandoned, including anything that is or has been on board or the cargo of the ship (not the case for claims under contract)
		  • claims of a person other than the person liable in respect of measures taken in order to avert or minimise loss for which a person liable may limit his liability with this Convention and further loss caused by this measure (not the case for claims under contract)
		• Claims excepted from liability:
		  • salvage or contribution in general average
		  • claims for oil pollution damage as under the 1969 CLC
		  • claims by servants of shipowner or salvor whose duties are connected with the ship or the salvage operations, including claims of their heirs, dependants, or other persons entitled to make such claims

1979	Merchant Shipping Act	
1984	The Prevention of Pollution (Reception Facilities) Order	Art 3- Harbour authorities have been given powers to provide reception facilities either on their own, in co-operation with others or having others arrange to provide the facilities Art. 4- The SS may investigate allegations that a harbour or terminal does not have facilities sufficient to meet the requirements of MARPOL73/74. Fine for summary conviction is £100 Art. 5- requires the owner of the ship to pay charges for the facilities

1995	Merchant Shipping Act	S.151- Marine pollution = pollution by oil (as oil of any description and includes spirit produced from oil of any description, and also includes coal tar) or other hazardous substances (substances referred to in S.138A of the 1995 Act) : substances prescribed by the Secretary of State by order for the purpose of this section, or although not so prescribed, are liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea S.225 and S.249 -MPCU can issues directions to ship's owner or master, to a pilot or salvor or harbour master, or to a harbour authority
1997	The Merchant Shipping (Oil Pollution Preparedness and Response Convention) Regulations 1997	came into force 1/2/98 • Statutory duty on Ports - those with over £1m turnover - to prepare a contingency plan and undertake an assessment of the risk and to report **all** oil spills (any size)

Table L **THE MARINE INSURANCE MARKET - LAYERS OF FINANCIAL COVER**

PRIMARY		**TANKER OWNERS**		
SECONDARY	**hull underwriters (traditional (open) insurance market)**	**protecting and indemnity clubs (tanker owner mutuals)**	**cargo underwriters (traditional (open) insurance market)**	**self insurance**
Cover	Loss of or damage to vessel and machinery	Liability: physical damage; risk of loss or damage to ship's hull and machinery; oil pollution; death or injury to crew or passengers; collision with another ship; a pipeline jetty or a harbour crane Other: cargo if negligence of shipowner or crew contributed to its loss or damage	Total or partial loss suffered by cargo owner during the course of the voyage	Up to level of retention or excess of insurance or reinsurance
INTERMEDIARY		**REINSURANCE BROKER**		
THIRD LAYER		**REINSURANCE COMPANIES**		

Table L (Ii)– Guide To International Compensation Structures

Level	Convention	Payer	Source of Funds
1	Civil liability convention	Tanker Owner	Insurers (P&I Clubs and the reinsurers)
2	IOPC FUND	Oil receiving countries	Collected Fund from member states

APPENDIX D - SUPPORTING INFORMATION

Supplementary Information 1

From Local Government Review Expenditure Division

BELLWIN SCHEME OF EMERGENCY FINANCIAL ASSISTANCE TO LOCAL AUTHORITIES: *1999/2000 GUIDANCE NOTES AND THRESHOLDS 1999/2000*

Bellwin schemes are discretionary; local authorities have statutory powers to deal with emergencies and are expected to plan accordingly. There is no automatic entitlement to special assistance.

- Any incident for which assistance is sought must involve conditions, which are clearly exceptional by local standards and the damage to local authority infrastructure, or communities must be exceptional in relation to normal experience.
- Any application for assistance must demonstrate that an undue financial burden would otherwise fall on the authority.
- The purpose of a Bellwin scheme is to provide emergency relief, not to put right all the ill effects of an incident.

Arrangements for activation of a scheme – Claiming procedure:

- Department should be contacted within one month of the incident.
- Details of expenditure incurred by the authority, as a direct result of the incident should be provided. Also to be provided is any supporting information about the action taken by the authority and the scale of the incident (e.g., local press reports and Meteorological Office or Environment Agency reports relating to weather conditions and flooding). Loss of income is not eligible for compensation under a Bellwin scheme.
- If Ministers decide that a Bellwin scheme should be activated, that decision would normally be announced in Parliament. The relevant authority and the local Member(s) of Parliament will be notified at the same time.
- Detailed guidance notes on the specific terms of the scheme, together with grant claim forms, will be sent to the authority as soon as possible thereafter.
- In exceptional cases, Ministers may consider that the nature and scale of an emergency warrant announcing the activation of a scheme shortly after the incident. In such cases the relevant authority will be notified within two weeks of the event.

Thresholds for 1999/2000

Expenditure thresholds have been applied to Bellwin schemes from their inception on the assumption that prudent authorities will budget to cover a proportion of the costs of emergencies from their own resources. Ministers have taken the view that it is reasonable to expect authorities to make provision for contingencies of about 0.2% of their budget requirements.

Hitherto, the method of calculating thresholds has begun with an aggregate figure updated from one calculated in 1987, under the previous local government finance regime but one. Following representations by the local authority associations, Ministers have agreed that this part of the calculation should in future be made in a way that reflects the current local government finance system. The total of thresholds for 1999-2000 has therefore been calculated as 0.2% of total local authority budget requirements for 1998-99, uprated by the SSA increase between 1998-99 and 1999-2000. As in previous years, this total has been distributed among authorities broadly pro-rata to SSAs.

In the event of a scheme being activated, the affected authority or authorities would be expected to meet all emergency expenditure up to the level of their threshold(s) and grant would normally be paid at a rate of 85% on eligible expenditure above this level. I should emphasise that, even if an authority exceeds its threshold, there is no automatic entitlement to financial assistance; Ministers decide whether or not to activate a scheme after considering the circumstances of each individual case.

APPENDIX E - METHODOLOGICAL ISSUES

Table R-KEY TITLES SEARCHED

TITLE	Date
MAIB: REPORT OF THE CHIEF INSPECTOR OF MARINE ACCIDENTS INTO ENGINE FAILURE AND SUBSEQUENT GROUNDING OF THE MOTOR TANKER *BRAER*	January 1993
SAFER SHIPS, CLEANER SEAS- REPORT OF LORD DONALDSON'S INQUIRY INTO THE POLLUTION FROM MERCHNT SHIPPING	May 1994
ITOPF OIL SPILL DATABASE	March 1996
SEA EMPRESS ENVIRONMENTAL EVALUATION COMMITTEE – INDEPENDENT ASSESSMENT OF CLEAN-UP OPERATIONS	July 1997
INTERNATIONAL OIL POLLUTION COMPENSATION FUND ANNUAL REPORTS	1993- 1999
OIL SPILL RESPONSE CONFERENCE NOTES	March 1998
INSTITUTE OF LONDON UNDERWRITERS – HULL CASUALTY STATISTICS	1999
MAFF FOOD RESEARCH REQUIREMENTS DOCUMENT	1999-2000

TABLE S- QUESTIONS RATIONALE

QUESTION	RATIONALE
1. What is the extent of organisation's role pre-spillage, during spillage and post spillage?	Identification of entry point a) The pre-determined role and the acceptance of this role b) Rationale for the significance of roles taken establishing influences of legislation, codes of practice and mission
2. What tension exist, if any, in this role/s?	Identification of organisation and collective operational culture. Establishing signs of process disintegration
3. What are the tensions, if any, in meeting financial obligations?	Provides a cross-check between how responding organisation contains the threat of economic repercussions and the extent such containment affects the significance of the roles
4. What is the risk of tanker oil spillage to your organisation?	The extent the perception is linked to role. Sets out the possible behavioural entry point
5. What factors contribute to increasing and decreasing the risk?	Identification of perceived actions to be taken to reduce the risk
6. How have the roles played by other involved parties contributed to increasing or decreasing the risk?	Provides insight into how the responder perceives other roles and the tensions arising from these roles
7. What action has your organisation taken to reduce the risk?	Determines inter-organisational mechanisms of behaviour development such as training etc.
8. What methods are used by your organisation in acquiring and giving relevant information? 9. How significant is the role of the involved parties providing information 10. What are the limitations of achieving adequate information?	The extent of information development; provision is a critical source of risk management behaviour
11. What is required in the future to make it easier for you to mitigate the risk ?	Demonstration of risk management strategy

APPENDIX F - INTERVIEW RESULTS

TABLES CONSTRUCTED FROM THE INTERVIEWS

Table T

Question 1 - ROLES IN INCIDENT MANAGEMENT – SUMMARY OF INTERVIEW RESULTS

PRE-SPILLAGE ROLES

	significant role	**A secondary /supporting role**	**Have no role**
writing up of plans	MCA; local authorities[xcv], Port, Harbour and Terminal authorities; Statutory Environmental Groups	NGOs, ITOPF, Scientific and research organisations	insurers
Risk assessment	MCA ; local authorities, Port Harbour and Terminal authorities; Statutory Environmental Groups	NGOs	
Preparedness Includes health and safety procedures	All	NGOs	
Involved in joint partnerships and network	All		
Lobbying	Environmental groups. Local authorities		
Enforcing standards[xcvi]	Government[xcvii], MCA[xcviii]; Port, Harbour and Terminal Authorities[xcix]; insurers[c]	Media and Public Environmental groups only through lobbying	Local Authorities
Providers of training	MCA, Oil companies, Port and Harbour Authorities, Local Authorities		
Providers of risk (intelligence) information	MCA, Oil Companies, Port and Harbour authorities; Local Authorities; ITOPF; Environmental groups both statutory and NGOs	Insurers	
Initiating Research	MCA, Oil Companies, Port and Harbour authorities; Local Authorities; ITOPF; Environmental groups, Insurers		
Formal Safety Assessment of Tankers	Terminal, Port and Harbour Authorities; Insurers	Environmental Groups, ITOPF – also lobby for this	
Environmental Assessment	MCA, Oil companies, Port and Harbour Authorities; Local Authorities	Environmental groups[ci]	

DURING SPILLAGE ROLES – PRE-CONDITIONS TO RISK MITIGATION

	Play a significant role	**Play a secondary/ supporting role**	**Have no role**
Tier 1 Response	Local authorities, oil companies, Terminal, Port and Harbour facilities respectively	MCA, Regional support groups	Insurers
Tier 2 Response	Local authorities, Oil Co. terminals, Port and Harbour facilities in co-ordinated and integrated effort with regional support and or MCA	MCA	Insurers
Tier 3 Response (Johnston 1998)[cii]	MCA – lead role in co-ordinating and integrating response of all involved bodies (+salvors)	insurers[ciii]	
surveillance and tracking	MCA		Local Authorities
shoreline clean-up	local authorities, MCA	Oil terminal authorities, Environmental Groups	
waste handling	local authorities,	Oil terminal authorities, Port and Harbour authorities	MCA
dealing with media and communication affairs post spillage	MCA lead for informed opinion – all others actively involved in the physical response		
acting as consultees	Environmental groups, scientific organisations, ITOPF	insurers	

POST-SPILLAGE ROLES – PRE-CONDITIONS TO RISK MITIGATION

shoreline clean-up and waste handling	local authorities, MCA	Oil terminal authorities, Environmental Groups	
claims assessment	all bodies making claims e.g. local authorities, Port authorities etc. ; ITOPF, Insurers, IOPC	Environmental Groups	
claims management	MCA, ITOPF, Insurers,		
responsibility for liabilities incurred	Insurers and IOPC Others[civ]		

TABLE U Q 2 AND Q3– TENSIONS

TENSIONS	Local authorities	MCA– previously MPCU	Oil company	Port Authority	Environment Groups
NCP TENSIONS ▪ Statutory Duty	**V. S.** major role in writing- up plans – yet no statutory duty; " have a voluntary undertaking.(to the people). to co-ordinate"	**S.** supported statutory duty for local authorities	**S.** The frequency of updating plans	**V. S.** Statutory- need to write- up plan (now given statutory duty)	**N. S.** Not applicable
▪ Roles in co-ordination	**V. S.** clarification of role and remit during shoreline clean-up "Keeping up constant dialogue is very important"	**V. S.** clarification of role and remit with Environment Agency within the three mile off coast jurisdiction	**V. S.** dual role of representing UKPIA and oil company **M. S.** "There were times that salvage experts could not get on with their work due to the constant scheduling of meetings"	**V. S.** re: command on spillage MCA or port authorities Problems with speedy mobilisation of people and equipment	**V. S.** perceived significant tensions in response centre roles
RESOURCE TENSIONS conflict of interests	**S.** Prioritising between low probability risks (oil spills) and high probability risks (fire and accidents) **L. S.** Risk assessment "it is absolutely meaningless". "the real thing that comes out of the risk assessment is that you have to be ready all the time"	**V. S.**. Balance of commercial and environmental interests	**V. S.** Commercial investment and stakeholder demands vs. environmental risk	**V. S.** Environ'tal versus economic	**S.** Some conflict

RESOURCE TENSIONS CONT. Human resources	**H. S.** Problems in reorganisation of LA3 - tensions in the availability of key personnel	**V. S.** Problem dealing with two simultaneous spills	**V. S.**	**V. S.** Effective com/cations with tanker personnel	**M. S.** Availability and training of helpers
Physical and financial resources	**V. S** – concept of "reasonable" use of shoreline clean-up resources not totally clear	**V. S** Continued Government support	**V. S.** tensions in the mobilisation of resources outside local area **V. S.** costs incurred even in no spill-preventative measures **S.** continued availability of financial resources	**V. S** Speed of mobilisation of resources e.g. availability of adequate tugs at the time of incident	**S.** Concern for membership
MANAGEMENT TENSIONS	**V.S.** Availability of dedicated human resources / investment in human resources	**V. S.** Are subject to suits if wrong decisions deemed to be made Often a thankless task	**V. S.** Strategic pressures, e.g. on effective crew. Technicians on ships	**V. S.** Training and Comm/ation, for example Language difficulties between ship crew and on-shore command; also greater problems with foreign fishing vessel accidents than tanker accidents	**S.** Lobbying for more effective decision structures in risk and response management

COMMUN/TION/ DISTRIBUTION OF INFORMATION TENSIONS and PUBLIC RELATIONS	**V. S.** the availability of effective radio facilities. During the SE the use of RAYNET was made. **L. S.** would like more knowledge - e.g. from insurers	**L. S.** generally happy with information received	**L. S.** **	**L. S.** generally happy with information received	None – generally happy with information received
media tension	**V. S.** "..involvement with the *Sea Empress* was a media battle for a week and a half"	**V. S.**	**V. S.**	**V. S.**	**V. S.** Also significant was the lack of accurate information given out
LEGISLATIVE TENSIONS	**V. S** No lack of statutory duty **S.** No national boom policy **S.** Need for dedicated waste land usage for disposal of oil spill waste	**S.** Support statutory duty for local authorities **S.** EU directives can have a disruptive influence – e.g. disposal and waste management	**S.** inadequate compensation for acting as agent of the government in the response *	**V. S.** No statutory authority (now achieved)	**V. S.** on environm/tal issues; use of chemicals, waste disposal etc. required

*Since this interview A MOU has been agreed between the UKPIA and the government for the funding of resources
** Effective communication systems. During the *Sea Empress* (SE) they commenced without a switchboard, which resulted in a help line established for the public outside which took over 3000 calls. Also procurement needs a large amount of phone resources – need for dedicated line resources. Furthermore coastline proved difficult for radio and phone communications

Table V ***Question 4–OIL SPILLAGE AND ORGANISATIONAL RISK***

Organisation	Generic Risk	Actual risk
OIL COMPANIES	FINANCIAL	▪ costs of resources deployed during emergency response ▪ loss and damage to property and to cargo and jetty (pure risk) ▪ closure of plant due to adverse publicity ▪ training exercise more expensive to run large exercises ▪ financial exposure – financing operation, loss of production, business reputation, Oil companies also have crisis management teams which looks at the potential of loss to reputation ▪ monetary risk of loss and damage ▪ loss in shareholder confidence
	OPERATIONAL	▪ degree of manageability vs. probability of risks ▪ risk of pollution of loading and unloading oil ▪ ship management: vessel loins rendered, drifting, parting company with the cargo arms, mechanical failure (well maintained equipment) damage to facility –delaying berthing – ship loses propulsion and collides with a ship on a jetty
	SOCIO/ POLITICAL	▪ closure of plant due to adverse publicity ▪ public perception of capability
LOCAL AUTHORITIES	FINANCIAL	▪ costs of resources deployed during emergency response and not covered by the polluter " ▪ costs of reasonable measures taken to combat oil at sea, to defend sensitive resources, to clean shorelines and coastal installations and to dispose of any recovered oil debris and ▪ consequential loss or damage e.g. clean-up operations causing damage to roads, pier or embankment, the cost of work carried out to repair the damage and ▪ cost of personnel, hire of equipment and materials, cost of cleaning and repairing clean-up equipment and of replacing materials consumed during an operation is also covered [cv]. Delay in reimbursement of liabilities incurred The implications of the shoreline damage on businesses ▪ financial- unable to recover clean-up and disposal costs for tier 1 and 2 where polluter is not identifiable ▪ implications on financial resources ▪ local authorities should only bear their staffing costs as this is absorbed but the cost of purchase of equipment *et al* should not be shouldered by the LA as they cant afford to bear this amount while central government can do so ▪ statutory authority may not necessarily alleviate this funding problem as they might say here is the level of funding you still have to bear any of the excess costs. LA should continue to press central government to assist them in the overall funding mechanism in bearing the costs ▪ but in the Rosebay incident where more than 150.000 to 200,000 spent - almost 100% got back ▪ the key problem is waiting to get the money back. ▪ the risk has actually increased because of the problem with claims • prioritising risks can be a problem. Fire risk is more immediate than oil spill risk • claims assessment "How much of the money we spend we get back" is critical

LOCAL AUTHORITIES	OPERATIONAL	▪ manageability of shoreline response • plans not effectively rehearsed. Exercises and rehearsals allow for a plan to be tested and modified part by part so that it satisfies public expectations • lack of capable manpower • ineffective communications • high volume of waste – problems can arise in shifting such volumes • problems in maintenance and recovery of equipment
	SOCIO/ POLITICAL	• risk could be chronic rather than acute – had psychological and political implications • risk to small business (esp. tourism and leisure – as happened with Tenby) – again political spin-offs • risk of world attention –(political risk) ▪ loss of power ▪ keeping up constant dialogue is far more important ▪ "we have to say to people this (shore) will be cleared much more quickly than you expect" ▪ pre- spillage: six monthly meetings with media ▪ during spillage – constant dealings with the media - *involvement a purely media battle*
ENVIRONMENT GROUPS	FINANCIAL	▪ costs of resources deployed during emergency response and not covered by the polluter ▪ delay in reimbursement of liabilities incurred ▪ loss of membership (low significance) ▪ reliant on statutory funding ▪ economic concerns vs. environmental concerns ▪ *Sea Empress* cost about £100,000 ▪ Financial loss – full value not always recoverable ▪ lack of adequate funding and subject to priorities when received although financial resources available - might not dedicate resources to shipping as other more important priorities ▪ financial resources is a critical tension: Quarter of a million spent on external spend – this excludes core activities – see above
	OPERATIONAL	▪ N/A
	SOCIO/ POLITICAL	▪ loss of membership – low significance • loss of influence – WWF "At a national level we do have a lot of influence" ▪ risk of exaggerated stories
MCA	FINANCIAL	▪ cost of resources (not claimable) ▪ financial risk - *Sea Empress* response cost £13m.
	OPERATIONAL	▪ making wrong decisions
	SOCIO/ POLITICAL	▪ making wrong decisions ▪ reputation
PORT AUTHORITIES	FINANCIAL	▪ financial risk – high risk cost arising from a non- statutory duty – although recently given statutory duty ▪ loss of trade
	OPERATIONAL	▪ ineffective operations was key risk for all port trades
	SOCIO/ POLITICAL	▪ financial risk – high risk cost arising from a non- statutory duty – although recently given statutory duty ▪ reputation

INSURERS	FINANCIAL	• key risks high claim settlements "not an insurance risk but a financial risk" – LUA availability of insurance capacity
	OPERATIONAL	• underwriting capability – bad risks can impact portfolio
	SOCIO/ POLITICAL	• society becoming more litigious – has implications to the level and size of claim
ITOPF	FINANCIAL	• polluter responsibility- costs maybe more than covered by insurers and the Compensation Funds
	OPERATIONAL	• risk of spillage with financial and political implications
	SOCIO/ POLITICAL	• media risk

Table W. ***FACTORS AFFECTING THE RISK***

Q 5. What factors contribute to increasing and decreasing the risk for each group?

FACTOR	Local authorities	MCA	Oil companies (include ITOPF)	Port Authority	Environment Groups	Insurers
Co-ordination Main areas	:					
Liaisons with other involved parties weak	V.S.	V. S.	V. S.	V. S.	V. S.	V. S.
Clarity of roles and responsibilities	V. S.	V. S.	V. S.	V. S.	S.	S.
Financial Resource main areas						
Statutory authority	V. S.	S.	S.	S.	L. S.	N. S.
Funding from other sources	V. S.	V. S.	S.	S.	S.	N. S.
Human Resource main areas						
Resourcing	V. S.	V. S. A small body of expertise – clearly a problem if two or more large spills arise	V. S.	V. S.	V. S. for collective operation but medium significance to environmental groups	V. S. Ship's crew capability important
Training	V. S. NCP rehearsal	V. S.	V. S.	S.	S.	V. S.
Management capability	V. S.	V. S. re: operational/ management	V. S.	V. S.	V. S.	V. S.

Operational Management Main areas						
Risk assessment	**S.**	**V. S.**	**V. S.**	**V. S.**	**S.**	**V. S.**
Preparedness	**V. S.**	**V. S.** strong response strategy in place including NCP +Review of OSC Plans submitted	**V. S.**	**V. S.**	**V. S.**	**S.**
Management of Marine response	**V. S.**	**V. S.**	**V. S.**	**V. S.**	**V. S.**	**V. S.**
safety management	**V. S.** Especially health and safety	**V. S.**	**V. S.**	**V. S.**	**V. S.**	**V. S.**
Management of Shoreline clean - up - including waste management	**V. S.**	**S.** (supporting role)	**V. S.**	**V. S.** (within jurisdiction)	**V. S.**	**V. S.**
Availability of physical resources and maintenance of the equipment	**V. S.**	**V. S.**	**V. S.**	**V. S.** + adequate no. and type of tugs	**V. S.** + use of chemical dispersants- this increases the risk to the environment and not to the organisation – in fact having a cause keeps the organisation in funds, therefore reduces the risk	**S.**

Comm/cations main areas liaison	**V. S.**	**V. S.**	**V. S.**	**V. S.**	**V. S.**	**V. S.**
Communication system and network	**V. S.**	**V. S.**	**V. S.**	**V. S.**	**V. S.**	**S.**
Access to local knowledge	**V. S.**	**V. S.**	**V. S.**	**V. S.**	**V. S.**	**S.**
public relations	**V. S.**	**V. S.**	**V. S.**	**V. S.**	**V. S.**	**V. S.**
Legislation/ Regulation Main areas Statutory authority	**V. S.** - key	**V. S.**	**S.**	**V. S.** – was key	significance dependent on role	**N. S.**
Operational policies	**V. S.** lack of national co-ordination policies e.g. national boom policy or dedicated waste land	**V. S.**	**V. S.** inadequate policing, which could result in breaches of legislation	**V. S.**	**V. S.** not enough legislation more on environmental protection + greater role in advising	**S.**
Research and information development	**S.** dependant on funds	**V. S.** constant review of procedures	**V. S.**	**S.** need to update information " *living documents*"	**V. S.** greater awareness-dependant on funds	**V. S.**

Table X - **Linking tensions to behaviour**

Pre-event

Tension	Significance	Driver/s	Behaviour
NCP Control and command	Medium	Financial Co-ordination	• government seen as control body • empowerment accepted but there is an uneasy relationship between the risk control groups and government. Nature of NCP is prescriptive rather than a code of conduct
Preparedness	High	Financial and Social	• shift to observable behaviour such as "be seen to be doing good". Oil companies seen to be developing more of a risk awareness culture than done so by port authorities and local authorities • writing of risk plans
Resources-Human and Physical	Medium/High	Financial	• depends on stakeholder requirements of high or low priority risk. For oil companies this risk of an oil spill was high priority while for local authorities this was medium priority

During event

NCP in operation Control and Co-ordination	High	Technical need	• taking over control and new roles ▪ calling for relief assistance ▪ use of voluntary organisations ▪ scapegoating post-event
Public relations	High	Political	• taking over new roles • making individual statements • calling for back-up assistance • scapegoating

Post-event

NCP review	Medium	Financial	• review of NCP • clarification of roles and responsibilities • greater powers to MCA • negotiations for the usage of equipment (government or oil industry) • "them and us" situations • legislation • training and personnel development • research and more studies undertaken • review of strategic plans • re-prioritisation of funds
Claims	Medium/High	Financial	• manifestation of "them and us" situations-especially in making claims of "reasonable use of resources"

APPENDIX G - NARRATIVE BOARDS

SIMULATION EXERCISE ONE-NARRATIVE BOARD

9.00	Arrived at Centre, easy to access
By 10.05	in Emergency Response Centre (ERC) – introduced by Exercise Director to Centre Manager of operations and leader designate of simulation
10.10	Simulation commences - Oil Leak on vessel reported
	Narrative Board
10.25 to 10.47	Harbour master, HMCG,EA, MAFF, EN, Southern Sea Fisheries, Eastleigh Borough Council informed
10.47	Aerial survey undertaken
10.45	BBC reporters breach perimeter fence – they are ejected
10.55	Personnel deployed on foreshore to divert public
11.14	Call from Police requiring warning signs on beach
11.15	OSRL personnel mobilised -coming by boat
11.20	Hampshire County Council representative on standby
11.28	Complaint – oil on beach
11.29	Photographer requested on-site
11.33	BBC requiring live interview – referred to terminal
11.50	Booming commencing – joined boom vessel with OSRL team – short boom in place
12.00	Complaint re: oiled dog on Beach – referred to vet/RSPCA. First OSRL contingent on site
12.35	Wytch Farm representatives arrive
12.45	Telephone Call to one participant – (spouse) gone into labour – (this was not clear)
13.55	Men made available + beachmaster for shoreline checks
14.00	KHS responded
14.25	Booming exercise completed
14.30	Return to base, instruction for waste management and shoreline clean-up
14.45	Wash-up

SIMULATION EXERCISE 2 NARRATIVE BOARD

SOURCE	TIME	Post-spill printed narrative board *	ACTION
Observation	Left 9.35 a.m.		took some time to find Emergency Response Centre (no signs)
Observation	By 10.05 a.m.		in Emergency Response Centre – introduced by Exercise Director to Harbour Master
Narrative Board**	10.10 a.m.		Simulation begins Board: Oil Leak on vessel MV Slipshop reported – permission to continue berthing at RORO by Harbour Master
Narrative Board	10.16 a.m.	10.15	Board: Berth Change
Narrative Board	10.18 a.m.	10.25	Board: Damage Report: need approx. 6feet fracture at Weld on frame 93. Starboard Shell plating in way of no.1 starboard, Cargo tank: 2 metres below water. If 180 product, 1897.34 metric tonnes. No.1 hold(s?) 200 metric tonnes of IFO (Intermediate Fuel oil) (approx. 3 tonnes missing)
Internal Announcement	10.33 a.m.	10.31	Centre alerted for boom preparation and LA asked to give a prediction of oil spill movements. Tidal check

Narrative Board	10.50 a.m.	Ballast tanks flooded	Board: Vessel commences filling ...(unable to read).....
Narrative Board	10.55 a.m.		Board: Vessel all fast starboard side to new quay. FEW Yokohama. Deployed FWD of No. 1 STED ships crew in readiness to assist with boom deployment
Narrative Board	10.55 a.m.	Not recorded	Board: police marine section at scene
Narrative Board	11.05 a.m.	11.07	Board: Vessel alongside NQN Booming of vessels no underway
Press Release	11.05 a.m.		Vessel berthed Reported weld fracture Divers engaged 3 tonnes leaked Plan to unload 170 tonnes of oil into road tankers Booms to be deployed to contain oil around tanker ERC set up
Internal Announcement	11.11 a.m.	Not recorded	Vessel secure. Leak was secured in harbour. OSRL alerted to deploy Tier 2 equipment. MCA stockpile put on standby and coastguard units mobilises and units for walking the shores. Diving team to commence inspection of hull at 12p.m. The use of road tankers to offload oil but no road tankers were not easily available Tide was ebbing
Internal Announcement	11.17 a.m.	Not reported	LA reports that spill modelling was not effective for inter harbour assessment. "Back to using common-sense and slide rules"
Narrative Board	11.50 a.m.	Not recorded	Booming completed and skimming begun?
Narrative Board	12.15 p.m.	12.16	Diving team from Dean and Dyball has placed a magnetic plate over the fracture. This together with the action of deepening the draft has slowed down the progress of oil considerably
Press Release	12.00 and 12.15 p.m.	12.30	Pollution report Yacht clubs advised Road tankers not easily obtainable Charterer's tanker is being deployed to pump oil alongside for 15.00
Internal Announcement + Observation	12.36 p.m.	Not recorded	Booming complete , Yachts asked to move Agitators inside ERC
Observation	13.00 p.m.	Not recorded	Public agitation (although most of this commenced around 11.30 am) Harbour Master distracted
Press Release	14.30 p.m.	Not recorded	HMCG helicopters deployed for visual surveillance Estimated that 13 tonnes was releases Spread contained Shoreline clean-up commenced – manual operation
Observation	15.00 p.m.		Wash-up – concluding simulation

*This information was provided in printed format post –spill

** This is a hand written narrative board

APPENDIX H - FIGURES

FIGURE 3

TIME –BEHAVIOUR CONTINUUM

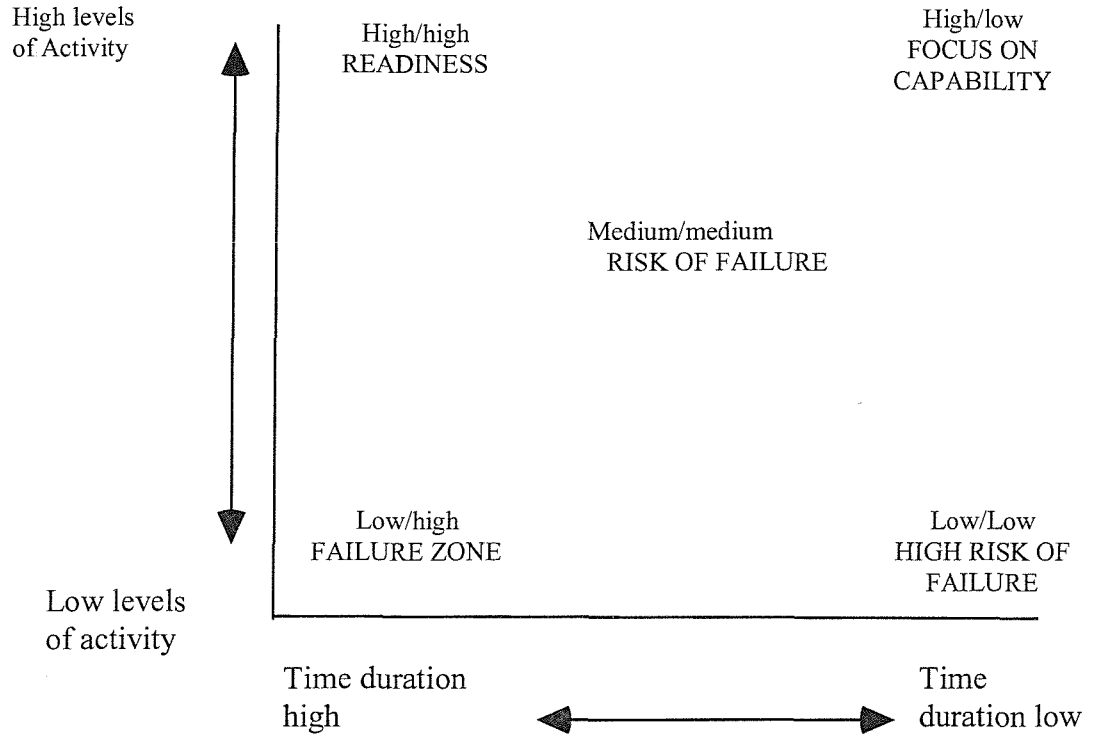


FIGURE 4 AVERAGE PER UNIT CLEAN-UP COSTS

Average per unit clean-up costs are:

World-wide = $12.99 per gallon
N. Europe = $15.52 per gallon
N. America = $17.26 per gallon
Far East = $06.99 per gallon

FIGURE 5 DIVISION OF RESPONSIBILITY FOR CLEAN-UP WITHIN HARBOUR JURISDICTION

Location of pollution	Responsibility for clean-up
On the water	Harbour authority
Jetties/wharves/structures	Harbour authority
Beach/shoreline owned by the harbour authority	Harbour authority
Shoreline(including land exposed by falling tide	Local authority or EHS (Northern Ireland)

Source: National Contingency Plan for Marine Pollution from Shipping and Offshore Installations. January 2000 (booklet) pg. 17

FIGURE 7

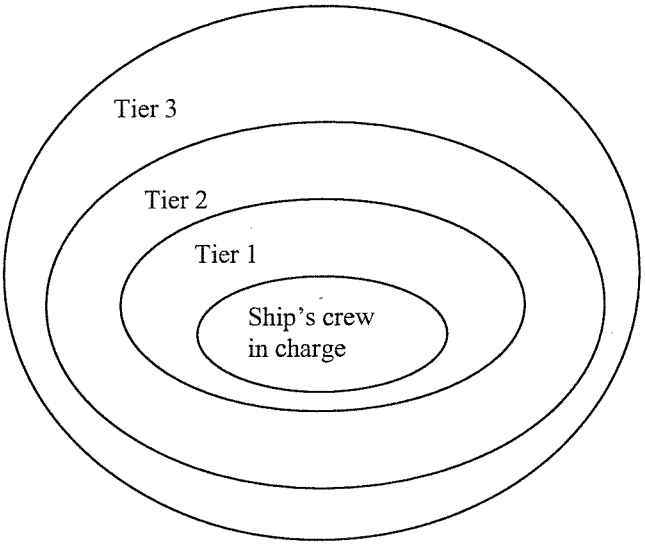
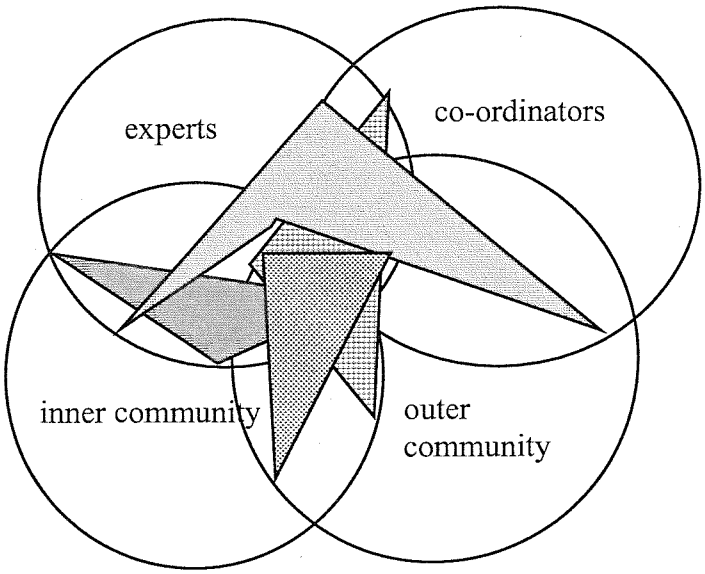


Figure 8 –
Integrated roles



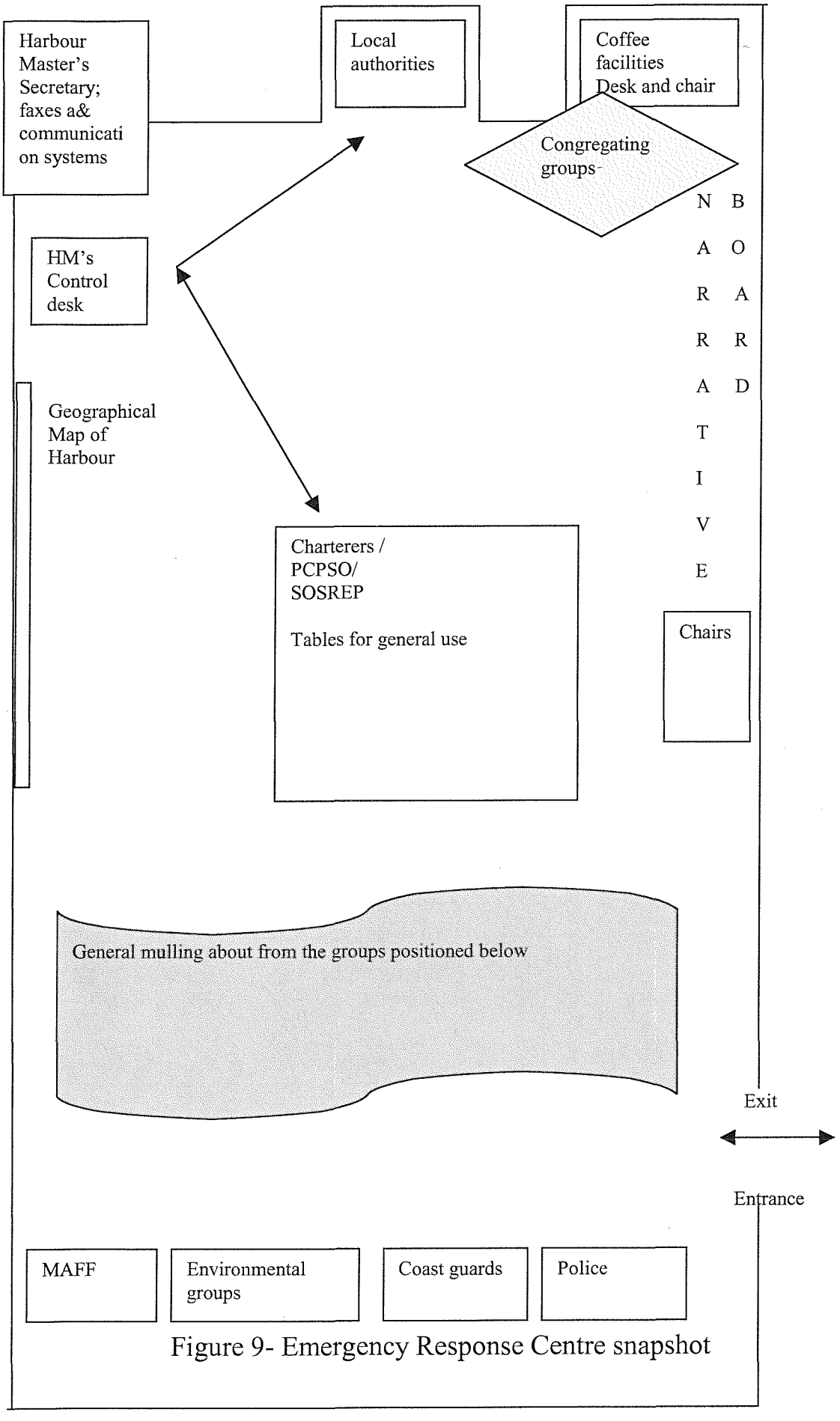


Figure 9- Emergency Response Centre snapshot

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ENDNOTES

i The National Contingency Plan for Marine Pollution from Shipping and Offshore Installations Jan 2000, Marine and Coastguard Agency of the Department of Trade and Industry.

ii Bernoulli family, of Belgian origin, settled in Switzerland, produced many prominent mathematicians within three generations. Jacob, or Jacques, Bernoulli (1654-1705) was a founder of probability theory and the calculus of variations, while his brother Johannes, or Jean, Bernoulli (1667-1748) developed many applications of the calculus to physics. Daniel Bernoulli (1700-82) made important contributions to hydrodynamics and propounded a version of the kinetic theory of gases.

iii 189 people died when water rushed through the open bow doors of the *Herald of Free Enterprise* causing the British Ferry to capsize off the Belgian port of Zeebrugge.

iv *Goffman, E.* (1922-82), US sociologist, particularly concerned with symbolic interactionism. He maintained that social life could be understood using a dramatic analogy, where life is a stage, human beings are players, and expectations of front stage and back stage behaviour diverge. In a restaurant, the diners may sit in elegant comfort, while 'behind the green baize door' staff labour in pandemonium. Such divergences are to be found in most organisations and social groups.

v The *ABT Sumner* spill of 260,000 mt. in 1991 off-coast Angola and the 132,000 mt. *Odyssey* spill in 1988 off-coast Nova Scotia.

vi Professor Wilson at Harvard University.

vii Bovine Spongiform Encephalopathy (BSE), a degenerative and ultimately fatal brain disease of cattle, popularly known as 'mad cow disease', characterized by a staggering gait and behavioural changes. The first outbreaks of the disease were recorded in Britain in the mid-1980s; it is thought to have been transmitted in cattle feed containing brain tissue of sheep infected with scrapie and from infected cows to their calves.

viii BSE, scrapie, and Creutzfeldt-Jakob disease (CJD), all degenerative brain diseases that affects humans, appear to be caused by the same type of highly resistant infective agent, and the outbreaks of a form of CJD affecting mainly young people in Britain in the 1990s have been linked with the consumption of meat and meat products from BSE-infected cattle.

ix Marx, Karl Heinrich (1818-83). German social philosopher and an important figure in the history of socialism. Marx's involvement with radical groups in Germany and France during the 1840s led him to formulate a far-reaching critique of capitalism, a system that he condemned as the major source of human alienation. Marx's theories were developed at length in *Das Kapital* (1867; ed. by Engels, 1885-94) which inspired the communist movements of the 20th century.

x Schumpeter (1883-1950). Austrian economist and social philosopher. A prominent member of the Austrian School of economics. He was interested less in technical questions of economics than in long-term patterns of economic change. In *Capitalism, Socialism and Democracy* (1942), he predicted that capitalism's very success would lead to its demise.

xi Habermas (1929-) German philosopher and social theorist. Habermas attempted to identify an alternative form of rationality by looking at what people must assume about one another if they are going to communicate.

xii later reproduced in Turner B and Pidgeon N (1997) " Man–Made disasters " second edition Butterworth Heinemann pp 68-84

xiii Ramani, S and Finlay, H. F. (1991) They considered severity of risk in terms of monetary value of property destroyed and damaged

xiv In December 1984, uncontrolled emission of lethal gas from the Union Carbide pesticide plant killed over 3000 people and injured over 200,000.

xv Carr distinguishes between instantaneous onset, in which the time duration between the precipitating event and the physical consequences is short. In the case of progressive onset of crisis, it could be either a precipitating event with many repercussions or progressive disaster resulting from a series of precipitating events occurring in close succession.

xvi *Goffman,* as in (iv) above.

xvii First posited by the Swiss psychiatrist Jung 1875-1961

xviii The Hawthorn Experiments were made in the Western Electric Company plant in Hawthorn outside Chicago by a group of researchers led by Elton Mayo from Harvard University between 1920 and 1930

xix The term environment is that used in the report by the Ecological Steering Group on the oil spill in Shetland 1994. Environment is the combination of i) physical surroundings and conditions especially those that affect people's lives and ii) external conditions affecting the (biological) growth of plants and animals

xx IOPCF Annual Report 1998

xxi The number of spills over 700 tonnes had dropped to 8.3 spills a year between 1980-95. Compared to the number of spills per year between 1970-79 which was 24.4 spills a year.

xxii International Tanker Owners' Oil Pollution Federation

xxiii Number of Reported Discharges and Related Sources 1980-1986 sourced as Tab 1. SFT Akutt s5 pg. 43

xxiv ITOPF Oil spill Database March 1996

xxv Hull casualty statistics - IUMI Conference Berlin 1999 - Chart 18.

xxvi Lloyd's and ILU recently put forward a new " structural condition warranty" for older vessels. the warranty calls for a thorough examination by surveyors acting on behalf of the underwriters and is designed to help identify structural deficiencies.

xxvii As determined by the Donaldson Report 1994

xxviii The most toxic of which is " hydrocarbons" and in particular the polycyclic aromatic hydrocarbons (PAHs) which are potentially carcinogenic. There are also monoaromatic compounds such as benzene, toluene, xylene and naphthalene, which although being toxic are water-soluble. These toxic compounds however, in their favour have a fast evaporation rate

xxix figures are based on the normalised values for 1985

xxx Seaward R (1996)- Institute of Marine Underwriters meeting - March 1996

xxxi Director, IMO International Maritime Law Institute. in her paper at the seminar held in Genoa under the auspices of the Comite Maritime International (CMI).

xxxii Art. 15(1) and 18(2) of Territorial Sea Convention Act 1958

xxxiii General cargo ships , bulk carriers other than oil carriers and tankers on ballast voyages are excluded from coverage.

xxxiv MARPOL 1973/78 Annex 1 changed by the 1978 protocol

xxxv Marine Insurance Report April 1994 Iss. 124 " Frankona Re examines Braer pollution claims"

xxxvi Part 1 Article 1(4) in: Donaldson (Lord) 1994 Safer Ships, Cleaner Seas. Report of Lord Donaldson into the prevention of Pollution from Merchant Shipping. HMSO pp 2

xxxvii Investigation conducted by the Centre for Marine Studies at the university of Cape Town 1997

xxxviii Griggs: Senior Partner Ince and Co

xxxix Gaskill, N – Professor of Maritime Studies Southampton University – interview

xl Comte, A (1798-1857) Comte saw sociology as a 'positive' science founded on the analysis of directly observable phenomena and dubbed his system positivism. His major work was *Cours de Philosophie Positive* (1830-42).

xli The nomothetic approach seeks general laws that hold across individual situations, the idiographic approach recognises the uniqueness of each individual situation and seeks meaningfulness at an individual level.

xlii Wittgenstein, Ludwig (Josef Johann) (1889-1951), Austrian-born philosopher. His work, exemplified in the posthumous *Philosophical Investigations* (1953), and involves detailed examination of areas of language, such as those concerned with experience, intentions, and knowledge, which give rise to a lack of clarity in our thought.

xliii Foucault a French historian and social philosopher. In *Discipline and Punish* (1975) he considered that it was possible to struggle against the domination of existing patterns of thought and behaviour, but not to totally escape from power relations.

xliv describing the structure of a particular culture in terms of its internal elements and their functioning, rather than in terms of any existing external scheme

xlv designating a non-structural approach to the description of a particular culture or behaviour

xlvi A US linguistic philosopher and intellectual, professor at the Massachusetts Institute of Technology. Since the publication of *Syntactic Structures* in 1957, his work has revolutionized linguistics.

xlvii The technical team is responsible for the pollution mitigation strategy and the allocation of resources

xlviii The Bellwin schemes provide for emergency financial relief but not for "all the ill effects of an incident". There is, however, a need to demonstrate that the incident in the first place caused exceptional (as opposed to that considered a local standard) damage to the local authority, infrastructure or communities and that there is demonstrable undue financial burden. There has been some attempt to establish what constitutes demonstrable financial burden. The expectation at central level is that local authorities make available a

percentage of their budgets to deal with emergencies e.g. the 1998-2000 figure was 0.2%. Up to 85% of the claim above this figure budgeted would be met by the government – although this is not an automatic figure. The rule is not strict to whether any of it will be payable.

xlix Letter dated 10th September 1996 from Chief Executive and County Solicitor's Department Exeter to the Secretary of Association of County Council London

l The Waste Management Licensing Regulations 1994 regulate that all waste disposal sites require a licence and to do so planning permission is necessary. The feeling is that temporary sites should be allowable without the need for licensing of temporary waste storage pits.

li EA has territorial responsibility for that area and MCA has territorial responsibility for all marine spills

lii Marine Emergency Operations Room in Southampton

liii Under S137 of the Merchant Shipping Act 1995

liv Under the Secretary of State's power of intervention

lv uniformed branch of the MCA

lvi Receiver of Wreck - situated within the operations branch of the HMCG

lvii As set down by the S225 and 249 Merchant Shipping Act 1995

lviii whales, dolphins, sturgeon and porpoise

lix particular responsibility to ship safety, safety of navigation, prevention of pollution and the carriage of oil and other hazardous substances.

lx As required under the OPRC convention

lxi also copied to the HMCG in accordance with the guidance contained in PON1

lxii Merchant Shipping Oil Pollution Preparedness, Response and Co-operation Regulations 1997 (effective from Feb 1998)

lxiii Licensing Authority – England and Scotland Fisheries Dept.; Wales – MAFF; NI - DOE

lxiv DETR, The Scottish Office, The Welsh Office and DOE (NI)

lxv For example use of intervention powers using a non- UK ship

lxvi Joint Nature Conservation Committee (JNCC); English Nature (EN), Scottish Nature (SNH) and the CCW, Environmental and Heritage Service (NI)

lxvii implications of pollution of any proposed clean-up actions on wildlife and habitats to relevant authorities e.g. MPCU. MAFF, SOAEFD, Local authorities

lxviii such as within the jointly prepared wildlife contingency plan

lxix The Offshore Pollution Liability Association Ltd.

lxx July 1996 (US$120m. per incident with a maximum deductible of US$1m per incident)- reviewed periodically to take into account changes arising out of risk inflation

lxxi Up to 1988 taken from Handbook from P&I Insurance by Sjur Brœkhus and Alex Rein 1988 published by Assurance Foreningen Gard- based on lecture by Professor Edgar Gold " the International Regime of Marine Pollution- Prevention and Liability Compensation.

lxxii Innocent passage has been described in Art.14 as navigation which is not prejudiced to the peace, good order or security of the Coastal State and in conformity with the Convention and other rules of International Law in: Brubaker , D (1993) - Marine Pollution and International Law - Principles and Practice ; Bellhaven Press, London and Florida pp 119 -120

lxxiii Art. 1 - Territorial Sea is the belt of sea adjacent to the State's coast over which the sovereignty of the State extends beyond its land territory and its internal waters

lxxiv 1963 UK Treaty Series5,Cmnd 1929

lxxv 1963 UK Treaty Series39,Cmnd 2422

lxxvi Oil means " any persistent oil such as crude oil, fuel oil, heavy diesel oil, lubricating oil and whale oil"

lxxvii General cargo ships , bulk carriers other than oil carriers and tankers on ballast voyages are excluded from coverage

lxxviii " loss or damage caused outside the ship carrying oil by contamination resulting from escape or discharge from oil from ship.....and includes the costs of preventive measures". Damage caused by explosion or fire is excluded as not being " contaminating".

lxxix This Convention was viewed as an attempt by the major maritime powers to limit rights of coastal States to act outside their jurisdictional zones for the purpose of enforcing anti-pollution measures

lxxx The polluter must deposit with a Court or other competent authority of any Contracting State in which the legal action is bought an amount equalling the liability limit determined by CLC.

lxxxi It was noted that in the first 6 years of operation the Fund paid out $42m. for 16 claims. *Lay et al* pg 26

lxxxii suggests that shipowner is relieved of liability under the CLC by 25% to 40%.

lxxxiii This strict liability is subject to exceptions e.g. Act of God, by governmental negligence etc. The compensation is limited to $12.5 m., OPOL parties have to secure insurance up to $25m.

lxxxiv Convention for Civil Liability for Oil Pollution resulting from Exploration for and Exploitation of Seabed Mineral Resources.

lxxxv Economic Environmental Zone

lxxxvi Revised Informal Composite Negotiating Text introduced in April 1979 by the UN

lxxxvii Unit of Account = $ 4.06m. and $568 per ton

lxxxviii Definition of ship has been widened to include ships "constructed and adapted" for carrying oil as bulk cargo and ships carrying oily ballast.

lxxxix definition could include a) measures taken in a geographical area seaward of the outer limit of the territorial sea and b) preventative and precautionary measures taken prior to an oil spill which does subsequently occur or prior to a threatened oil spill which does not subsequently materialise. Definition provided by Prof. Butler see: Brubaker (ibid.) pg 173.

xc No liability for Act, neglect or default of the master, mariner, pilot or servants in the navigation and management of the ship; fire; perils, danger and accidents of the sea,; Act of God; Act of war; Act of public enemies; Arrest or restraint of princes, rulers or people , or seizure under legal process; Quarantine restrictions; Strikes or lockouts; riots and civil commotion; inherent defect; insufficiency of packing or marks; latent defects; etc..

xci Marine Environment Protection Committee

xcii Ports would like to see the *De Minimis* rule - whereby HMCG and MPCU would also be responsible for spills not reported.

xciii UK Oil Pollution Act 1971 -HMSO

xciv if the owner or master of a ship is found guilty of an offence, he shall be liable for a summary conviction of a fine not exceeding £50,000, and on indictment by an unlimited fine. Supportive case law - Federal Steam Navigation Co. v. DTI (1974); Esso Petroleum Co. v Southport Corp. (1956).

xcv voluntary rather than statutory agreement

xcvi Includes the undertaking of audits

xcvii By legislation

xcviii By integration and co-ordination

xcix By a series of audits

c Through their rating structures

ci To some extent

cii large spill size irrespective of local, in the vicinity or remote- Requiring national resource : in Oil Spill Response- The National Contingency Plan The Institute of Petroleum conference notes Mar. 1998 - by Gordon Johnston Exec, Director - UK Major Ports Group Ltd.- " Ports Responsibilities"

ciii By link with the salvors

civ Local Authorities and other claimants may find themselves responsibility for compensation or incurring of costs if they are not recoverable from the polluter's insurers or the IOPC Fund

cv Brown. D. 1998 -Lancashire County Council - Institute of Petroleum- Oil Spill Response Conference 10-11 March 1998.