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THE MAKING OF SOCIO-TECHNICAL DISASTERS

A Comparative Analysis of the Piper Alpha and Deepwater Horizon Disasters

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Dedicated to my Father Patrick McCormack

‘Shoulders Back, Chest Out’

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List of Abbreviations

STS	Science Technology and Society
LTS	Large Technical Systems
NYT	New York Times
IFRCRCS	International Federation of Red Cross and Red Crescent Societies
PWS	Permit to Work Systems
BP	British Petroleum
4S	Society for Social Studies of Science
EASST	European Association for the Study of Science and Technology
ICT	Information Communication Technology
EPA	Environmental Protection Agency
PLOTS	Public Laboratory for Open Technology and Science
BSE	Bovine Spongiform Encephalopathy
CJD	Creutzfeldt Jacob Disease
HSE	Health and Safety Executive
H&S	Health and Safety

1. Introduction

A cold wind blew from the North, gas flowed, flames leapt, confusion was all around as men scrambled from their beds and the sky glowed red. A banshee like wail echoed as some took their chance and plunged the 100 meters through fire and ice into the darkness, others sat, prayed and awaited their faith. Within 20 minutes 167 men were dead or were on their agonising way. The date was the 20th of July 1988, the night the Piper Alpha oil platform exploded; the night the sea caught fire.

The following morning in Upstate New York Emma went through her normal morning routine. The highlight of which was a rather large coffee, that she sips at whilst having a quick read through the morning edition of the *New York Times (NYT)*. She came across the horrific story of a disaster off the coast of Scotland in which an unknown number of people have being killed, the story focuses on the families of the missing, waiting at the pier for news of their loved ones. For the rest of that week she read with interest the stories of heroism, of suffering and of loss related to the Piper Alpha disaster, noticing that the price of oil will be higher as a result. The following week she's informed that the disaster was caused by a human error and is reassured that it will never happen again, the president of Occidental and his team of experts personally guarantee it. A month on from the disaster information is now but a trickle in the vast ocean of news. What little mention the Piper Alpha disaster now receives only seems to relate to why oil prices are still increasing, why production is down and why Emma's Occidental shares are now only worth half of what they did one year ago. She agrees with the headline which calls for a new platform to be built immediately to replace the ill-fated Piper Alpha.

Bob was on his way to work in London on the 20th of July 1988, it was his turn for the night shift. He was tired and groggy and not looking forward to his twelve hour shift. He was paying little attention to the radio playing in the background. This was to change however, with a breaking news bulletin stating that an explosion had ripped through an offshore platform off the cost of Aberdeen. Many were believed to be dead the newscast reported, rescue services were scrambling to the scene but they were overwhelmed, the military had mobilised helicopters from Inverness, but the heat from the fire was so intense that they had to remain a kilometres away. In the weeks to follow, the events on that night were to be at the forefront of Bob's thoughts. Hourly updates on the rescue mission, list of dead

and the visits of the Queen and Prime Minister to Aberdeen were to fill radio, print and television reporting.

The coverage continued to dominate media headlines even after the last of the bodies had being pulled from the water. Bob preferred the *Guardian* newspaper as it had daily reports on the disaster. The paper focused a lot on the cause of the disaster. Faulty valves; human error, organisational practices and ageing technology were the reasons behind the disaster depending on which source one listened to. Bob wanted to know who was to blame and luckily for him, so did the *Guardian*. The government, the oil industry, the individual who removed the valve and countless others, all in turn were held accountable. After a month or two the media coverage in the UK began to settle around two main themes. The issues were safety and the impact of the disaster on the economy. Safety on the platforms was centre stage with unions, families and survivors being interviewed by the newspapers, it was being linked to wider needs for better safety in British industry. The reliance of Britain on offshore oil and gas was the other issue raised by the media. Owing to the Piper Alpha disaster, and subsequent loss of income, the state would have to raise taxes to make up for the economic shortfall. As a manual labourer in a steel mill Bob could relate to both issues, he read with great interest about the call for strikes in response to the Piper Alpha disaster, it sounded tempting.

Twenty two years later, off the coast of Louisiana disaster struck once more. The crew at first thought it was controllable, even after the blowout and initial explosions, even when the gas began to suffocate them. They could taste it, even feel its crushing pressure upon them, but nobody would give the order to evacuate. Agonising minutes passed before the signal was finally given to abandon the Deepwater Horizon oil platform. All but eleven of the crew made it off alive; some perished in the initial explosion; others while trying to activate the blowout preventer in one last desperate attempt to prevent the disaster. They failed, and after thirty six hours of continuous burning the platform sank on the 22nd of April 2010.

Much has changed for Emma in the subsequent years; she has since retired and moved to the West coast, to take in the sun. One thing remains the same though and that's her morning routine. On the morning of the 21st of April she saw on her tablet the homepage of the *NYT* detailing the destruction in the Gulf of Mexico and the burning remains of the Deepwater Horizon. The following days saw lengthy coverage being dedicated to the disaster covering the deaths of the workers on board, and the impact to the environment of the emerging oil slick. After thinking hard all she could remember about oil platforms was the one back in the '80s, but that had only made the price of oil go up, whilst this one was destroying the environment and it could not be fixed. The wall-to-wall coverage in the months that followed of the environmental damage to the Gulf of Mexico due to the disaster was to spur her into action. What swayed her in the end was the significant amount of scientific sources which were quoted in the *NYT,* stating that the disaster was caused by multiple failures, and that in

fact it was a failure of the technological system, and thus could happen again. Finally, she decided she was going to join the anti drilling protests and vowed to boycott all BP products until they abandoned oil platform technologies.

Not much had changed for Bob in the 22 years; he still worked at the steel mill, drove the same car and read the same newspaper. The day after the Deepwater Horizon disaster Bob saw a small piece in the *Guardian*, only two paragraphs long, about an accident in the Gulf of Mexico, eleven dead the heading read. A week later he had almost forgotten about it when another article caught his eye, this time longer and on the front page about an oil leak in the Gulf of Mexico. He read about possible environmental damage. Failed technological attempts to stop the leak kept the story in the news, with Bob wondering what might be done. He even read a serious article containing expert commentary, which suggested a nuclear bomb might have to be dropped on the well. Bob soon started getting annoyed though, after reading multiple articles where scorn and condemnation was heaped upon the British government, and even the British people, by American citizens and even the American President. Articles in the *Guardian* had quotes from President Obama blaming Britain for the disaster and pictures of American citizens stamping on the British flag. Talk of the environment and technological failings in relation to the Deepwater Horizon disaster were now absent, the paper focused only on the Anglophobia sentiment in the US press, in the US government and with American people in general. Bob became steadily more furious with this state of affairs and eventually cancelled his long anticipated vacation to America. A month after the initial accident there continued to be at least one article a week published by the *Guardian* in relation to the Deepwater Horizon, just enough to keep Bobs blood pressure high.

The above anecdotes introduce to the reader the core subject matter that is of interest to this paper, namely the two socio-technical disasters Piper Alpha and the Deepwater Horizon, and the media's framing of them. The two disasters themselves and the details describing them are as stated, the Piper Alpha disaster happened on the 8th of July 1988 off the coast of Scotland in the North Sea. The Deepwater Horizon disaster happened on the 20th of April 2010 off the coast of Louisiana in the Gulf of Mexico. In addition the media in both the UK and the US framed both disasters in a certain way. In the accounts of Bob and Emma it can be seen that the framings were different due to location and time. In relation to the same event the media outlets focused on different issues, gave different coverage to it and used different sources to construct the framings. The aim of the above anecdotes was to highlight differences in the media's framing of the disasters due to location and time and the possible implications of such differences on the public's perception, understanding and reaction to them. The aim of this paper is to see if (as shown in the opening paragraphs) technologically related disasters are framed differently by different national media sources, and if true, creating the premise that different publics get a different understanding of the same socio-technical disaster due to place

and time. To see if this is the case or not this paper will focus on the comparison of how the media framed the Piper Alpha and Deepwater Horizon disasters.

When one talks about media framing, what does one actually mean and why is it important? As Bauer *et al.* (2006) suggests a frame at its most basic level is just one way in which an issue can be viewed and categorised, other frames are always possible. Goffman (1974) was the instigator behind the concept of framing suggesting that it was a way in which people organise experiences and decipher what is actually happening, what should be focused on and what should be omitted. From this early idea of individual framing of happenings, emerged the concept of the media framing of events. In later chapters, the contrasting and at times overlapping work of scholars on the subject of how the media frames topics such as Tuchman (1976), Gitlin (1980) and Entman (1991) among others will be highlighted. At the core of this theoretical outlook, and which is present in the varying fields of thought is the belief that media outlets include and exclude certain realities and in doing so make the included realities more salient (Entman 1993). In other words journalists and media institutions (in a democracy/free press society) can in effect choose to concentrate on different issues in relation to a controversy, while ignoring or underplaying other issues. According to Scheufele (1999) whose work will be focused on in more detail later, the frame suggests what the controversy is about, what issues are most pertinent to it, what actors are associated with it, what aspects of the controversy are covered and what coverage is given to it. The consequences, the causes, and if pertinent even who is responsible, can also be included in the media's framing of an event.

To use our introductory accounts of Bob and Emma as an illustration, both got a very different understanding of the same disaster due to how the media framed them. Bob for example in 1988 read that the major issue in relation to Piper Alpha was safety, with the survivors being the main actors, that the disaster was caused by a human/technological/organisational error and at different times blame was put on different shoulders. The coverage was intense. Emma on the other hand read that the core issue was economics, mainly the impact on the price of oil and stock prices, the key actor associated with the theme was the oil industry, the cause was put down to just human error, responsibility was never mentioned. The coverage was rather weak. The two examples highlight that just like a picture frame, media framings allows for the inclusion and exclusion of certain content which can result in changing how one views the overall picture.

Media framing therefore is not some abstract occurrence without consequence or impact; on the contrary research by Neuman (1992) which will be returned to later has demonstrated that the public gets its understanding of events usually from a combination of personal experience, interaction with peers and from the mass media. Therefore the media plays an important role in how the public perceives socio-technical disasters; this fact is compounded when one focuses on oil platform disasters, owing to the fact that the public has little personal experience with the technology due to its

remoteness. The number of people that work with the technology is also limited so the main source of information about the technology comes from the media. Research by Entman (1991), Goodman and Goodman (2006), Nisbet (2006) and Antilla (2010), discloses the fact that the media can influence the public's understanding through their framing of an event, especially when the public's level of personal experience with the topic is limited.

However, unlike the dramatised examples in the introduction nobody can say for sure to what degree the media influences public perception. It can therefore be said that media frames do make certain elements of an event more salient, and so can potentially influence the public, but as pointed out by Carter (2013) the level of impact is most definitely debatable. Therefore, in relation to technology dominated events it is important to know how the media frames them, especially when something goes wrong such as at a time of disaster. What the media focuses on can have an impact upon different publics, their understanding and their sentiment. The public's actions in turn can impact back upon the technology through various means.

In order to see if national media sources frame socio-technical disasters differently in different countries and at different moments in time this paper will focus on the two case studies already mentioned; the Piper Alpha and Deepwater Horizon disasters. It will aim to see how they were framed in two newspapers, the *NYT* in the US and the *Guardian* newspaper in the UK. In order to see how they were framed a qualitative and quantitative content analysis of these two newspapers will be conducted. While this paper focuses on how the media frames disasters, it should be noted that they are not the only actor doing so. Media framing is only one aspect in the "making" of disasters Governments, NGOs, industry, experts, community groups, action groups etc. all participate in the making and constructing of disasters. The process of media framing is a constant one of making and remaking an event, it is always in flux, albeit with certain frames prevailing for longer than others.

Deepwater Horizon and Piper Alpha were both examples of disasters in the making. Both were offshore oil platforms that pushed the boundaries of man's battle for resources with nature, but unfortunately both ended in tragedy. They could be viewed as being two of the worst socio-technical disasters the world has witnessed due to their considerable negative impact upon both society and the environment. What coverage the media gave to them, the main issues highlighted, the cause given for the disasters and the sources used in constructing the frames will all be examined in this paper. For each disaster one newspaper will give the national reporting of the event while the other an international perspective. The media framing of each disaster will be analysed to see if the public in both the UK and the US received different information. Also the framing from 1988 will be compared against the framing from 2010 to see if the twenty two year gap resulted in any changes in what issues, coverage etc. each newspaper reported on.

At this point it might be constructive to answer two questions which are quite fundamental to this research and its relevance. Firstly, how is it the topic of disasters in a general since interesting from the perspective of Science and Technology Studies (STS)? And secondly, why place oil platform disasters as the focal point, especially given the fact that so many different types of socio-technical disasters take place every year?

Focusing on the former, disasters are an interesting point of study for STS on a number of levels. Of course preventing and minimising disasters and having effective responses when they occur are a very real issue among government agencies and NGOs. However, the "epidemiology" of disasters is also of interest to STS as it directly affects the development of technology and related laws and impacts the natural and social world. This "visual" dimension of disasters and their importance will be expanded on later through the work of Perrow (2007), Lindell (2011), and Olson (2013) who have all researched the prevalence, distribution and management of disasters.

Besides the examination of the manifest traits of disasters, STS is also interested in the more opaque aspects of disasters themselves, and additionally what they open up for study that under normal circumstances would remain hidden from view. How disasters are constructed and classified as either social, natural, technological or a concoction of all three is still somewhat of a contested paradigm. Surprisingly there has even been resurgence of late in disasters being attributed to "Acts of God". A great bulk of research has being completed on what constitutes a disaster by the likes of Britton (1986), Hewitt (1993) Blakikie *et al.* (1994, 2004), Quaantelli (2000), Perry and Quarantelli (2005), and Knowels (2011) whom the paper will return to later when expanding on the notion of socio-technical disasters.

In addition to whether disasters are constructed as either technical problems or human caused, disasters are also appealing to STS for numerous other reasons. As Drabek (2006) puts it disasters are non-routine social events that can enhance the possibility of examining society through new pathways. Fortun and Fickle (2013) expand on this notion arguing that disasters provide an atypical setting in which both science, technology and society can be viewed from a different setting. Disasters mean a loss of control, an inability of social institutions to function normally, a breakup if you will of the tightly coupled system and so they expose as Clark (2006) argues the social structures and incumbent culture in all their glory. As a result a multitude of different topics could be of interest to STS researchers such as the interaction between social groups, institutions and officialdom. The operationalization of expertise and lay knowledge, inclusion and exclusion in the governance of science, the existence of different epistemic cultures, the institualization of risk, the black boxing of practices , and public understanding at times of disaster. This list is in no way exhaustive but it helps to demonstrate the wide ranging challenges and opportunities that disasters pose for STS. While it would be outside of the remit of this paper to analyse all these different aspects in enough detail to do

them justice, it is hoped that interesting questions can be raised throughout this study that could interest further STS research.

To answer the second question of why oil platforms, perhaps the answer lies in the fact that they are somewhat iconic in the fact that they are one of the most recognisable technological artefacts of the post war period. As can be seen in the books of Castaneda *et al.* (1997), Bamberg (2000) and Preis (2007), oil platforms have become symbols of progress, of industrialisation, of capitalism, of globalisation and of human's relationship with nature. Oil platforms have entered some of nature's most inhospitable environments such as the North Sea, the Arctic and the Atlantic and have succeeded through technological innovation and human willpower in extracting oil and gas that fuels our societies and way of life. As a standalone technology they are immense complex human-technical assemblages (Figure 1.1).

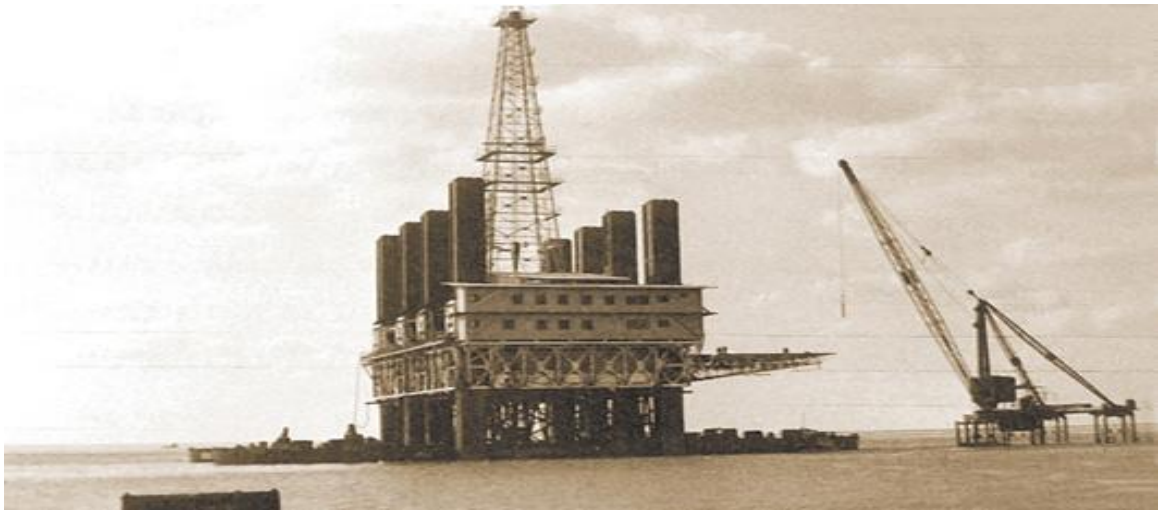

Figure 1.1 Early example of a modern oil platform (ca. 1950s). Source: Castaneda *et al*.1997.

Examples can be seen throughout the world of these enormous technological feats and engineering marvels such as the Petronius platform in the Gulf of Mexico, which is one of the world's tallest structures at over 2000 feet (610 m), and the Troll platform in the North Sea which is the largest construction that has ever been moved to another place. It has over 40 wells working simultaneously and can be even seen from space. For society the importance of oil platforms are quite obvious, they drill and extract oil and gas, they also develop new technology (such as horizontal drilling, pilotless submersible etc), are economic miracles and become beacons of employment. On the other hand, they also come with relatively high levels of risk and danger and so there impact on society and the natural world is quite relevant and so worthy of study.

The importance of studying oil platforms does not end at the boundary of the platform and the sea. Of more interest and importance to society perhaps is the fact that while these platforms have generally been seen as specific isolated technologies or technical artefacts which contain certain technologies and human inputs and sit in the ocean distant from society and the human world, the reality is that oil platforms are not isolated artefacts that operate within their own secluded realm but are in fact components in large technical systems (LTS) known as petroleum supply systems. Oil platforms are for the most part directly linked through a pipe network with compressor stations, refiners, storage depots, factories, power plants, cities, towns and even individual houses and allow other LTS such as the road and electrical systems to function. The concept of LTS as proposed by Hughes (1989) and their importance will be developed more in the following chapter.

Figure 1.2 Oil and gas pipeline infrastructure map of Europe. Source: Penspen 2013

In Figure 1.2 you can see the scale of these large technical systems, which have helped in the process of industrialisation and economic expansion since the 1950s and have helped undoubtedly in shaping and structuring the social world but they have also created many negative large scale accidents and disasters that have resulted in large loss of life, huge economic cost and spoiling of the environment, see later Button (2010).

The 1950s, ‘60s, ‘70s, and ‘80s saw oil platforms in the UK, and the US, develop somewhat in a cocoon, isolated from the watchful eye of the public and the media. As Smith (2002) and Rapier (2012) have shown the late ‘80s and early ‘90s witnessed a drastic change in interest levels of the

public and media in oil platforms due to a number of disasters. Of those disasters Piper Alpha was the most prominent. Oil platforms had finally become a political and social concern (Figure 1.3). Perhaps not surprisingly as the Piper Alpha incident was and still is the worst oil disaster for loss of life in the industry. The Deepwater Horizon disaster occurred some twenty two years later and arguably received the most intense coverage that any socio-technical disaster has received in recent times. It has easily surpassed all other oil platform disasters as the most expensive and environmentally damaging in history.

Figure 1. 3 A drawing depicting the important role oil platforms played in the UK in the 1980s. Source: Hardman 2013.

From an analysis of literature on the media framing of socio-technical disasters and other similar events such as health crises, epidemics and so on it appears that location and moment in time does in fact play a significant role in how the media frames events and the coverage given to them. The importance of location and in the media's coverage of disasters and their framing has previously being researched by Endreny *et al.* (1991), Bauer *et al.* (2006) and Anderson and Marhadour (2007) who all concluded that proximity to a disaster would result in an increase in the media's coverage. As will be demonstrated later through the work of Friedman (2011) and Koerner (2013) different points of time can also result in a different media framing of similar socio-technical disasters. However, other aspects of the framing such as the sources used by the media in their framing should according to the previous research by Wilkins (1987), Nelkin (1995), Albaek (2003), Holloman (2004), Coleman and Dysart (2005), and Groboljsek and Mali (2012) remain constant over time and place. In addition, based on the work of Perrow (1984) it would seem to be the case that the media frames the cause of

disasters as being the result of "abnormal accidents" with individual components being singled out for blame.

With this previous knowledge already established and recognised, a broad hypothesis was conceptualised that would help guide this paper. In relation to the technology related disasters Piper Alpha and Deepwater Horizon it was assumed that the newspaper in the propinquity of each disaster would have much higher levels of coverage, than the newspaper that was apart from the event. In addition it would be thought that both newspapers would frame the disasters differently with the newspaper closest to the event focusing more on individual stories and the impact on the local area, while the paper that was distant from the event would focus on the bigger picture and the global impact. With regards to the sources used by both newspapers in their framing of the disasters it was the postulation that both would focus on the same elite sources as per the extensive previous research. Finally, the hypothesis presumed that both newspapers would frame the cause of the disaster as being the result of individual failures and not as a systems failure or the result of a "normal accident". A much more thorough explanation for the rationale behind the hypothesis is given at a later stage in the paper along with the research questions emanating from it

The organisation of the paper is as follows. Chapter one covers this introduction piece which sets the tone for the rest of the paper. Chapters two deals with conceptual considerations regarding oil platforms. It begins with a quick introduction and overview of terminology. The second section attempts to define or at least describe oil platforms as a standalone technology. Their specific physical characteristics, activities, processes and inherent knowledge are discussed. The impact of oil platforms on society and why they are an interesting artefact to study is also examined. The third section of the chapter looks at oil platforms as components of large technical systems. Again, the importance of oil platforms is highlighted and compared against the role other large scale systems play in society. The final segment in chapter two looks at the historical development of oil platforms and why the paper uses the Piper Alpha and Deepwater Horizon disasters as case studies.

Chapter three examines the concept of disaster; it begins with the different theories on what a disaster actually is and how they are different to other social happenings. The next segment deals with the evolution in the classification of disasters. The classification of disasters is important as it is used in accounting for cause and blame in many instances. The shifting opinion on what disasters are and what causes them be it god, nature, society or technology is discussed. Finally the chapter ends with an examination of why disasters can be seen as an opportunity for STS and other academic fields due the fact that they allow society to be viewed from perspectives that otherwise might not be possible.

Chapter four delves deeper into the two case studies, highlighting the events surrounding them and explaining more details about their importance. Also the reaction from the public and the government is briefly highlighted including the government reports on both disasters.

Chapter five highlights STS research, interest and so literature on disasters. The first section gives a quick overview of STS and its "turn to disaster". The relatively slow uptake of STS of disaster studies is discussed. The second segment breaks down the different STS research on disasters into different areas of interest such as expertise and disasters, responsibility and disasters and so on. The different directions STS research on disasters is taking is examined through the work of both established and contemporary studies.

Chapter six goes into more detail on the approach of this paper to disasters, expanding on the notion of media framing of events. An analysis of the literature on framing is conducted and also on the possible effect on the public understanding as a result. In addition this chapter deals with the paper's hypothesis and research questions. The rationale for both is given through a detailed analysis of literature dealing with geographies of framing, the cause of accidents, the use of elite sources and coverage assigned to disaster by the mass media.

In chapter seven the methodological approach of the paper is explained. It is divided into multiple sections dealing with the selection of newspapers, sampling, data structuring, quantitative analysis of coverage, qualitative analysis of the different frames and a quantitative analysis of the sources.

Chapter eight covers the analysis of the data. It is broken down first by each disaster and then into smaller segments where each research question is applied to the data. Each section is structured as and analysed as follows: first overall coverage, then main frames, followed by how the cause was framed. Finally the sources used are analysed. To assist in the analysis both graphical representations as well as in depth descriptive accounts are used.

In chapter nine the results are compared against each other. The section is arranged similarly to the previous chapter. An in depth comparison of the data is conducted in order to generate data to answer the research questions. The relevance of the results for STS is also discussed. The literature from the state of the art is also reintroduced here in order to see if the results support previous research findings or in fact highlight new possibilities.

A conclusion makes up the bulk of chapter ten. Here the results of the analysis are compared against the original hypothesis of the paper to evaluate whether it holds true. In addition thoughts about the results, limitations of the study and suggestions for possible further research arising out of it are discussed.

2. Oil Platforms

This chapter gives a brief overview of oil platforms and their development in the context of the UK and the USA which are the focus of this paper. This section begins with a quick look at the terminology regarding oil platforms, as there can be some cross over in language and confusion can easily occur. After this is completed the focus will shift to contextualising oil platforms, first as a standalone technology and then as part of a wider technological system. The aim here is to reveal oil platforms role in the world and why they are a topic worth studying. Finally, the chapter will be rounded out with a quick overview of the development of oil platforms, it will not go too deep or technical as there is already extensive literature on the subject, instead the focus is on pointing out two interesting times of technological development and why the paper focuses on the case studies Piper Alpha and Deepwater Horizon.

2.1 Terminology

Terminology relating to oil platforms can be quite confusing with many items having multiple names and references; this becomes more obvious as one gets involved in more technical areas. Even to talk just about oil platforms themselves can be with some difficulty due to the number of names given to the same thing. While conducting the literature research it was seen that suddenly the terminology used could change from oil platform to oil rig to offshore platform and again back to an oil platform within a short space of time. Initially this caused a lot of confusion and that is why it's important to state exactly what it is my research is focusing on.

According to the oxford dictionary an oil platform is: "*A structure designed to stand on the seabed to provide a stable base above water for the drilling and regulation of oil wells*" (2012). The Cambridge dictionary defines an oil platform as a: *"A large structure that carries equipment that is used to get oil from under the sea*" (2013). Whereas an oil rig is defined by the Oxford dictionary as: "*a structure with equipment for drilling an oil well; also known as an oil platform or a large structure with equipment for getting oil from under the ground or the sea*"(2012) while the Cambridge Dictionary refers to an oil rig as "*a large structure with equipment for removing oil from under the ground, especially from under the sea*" (2013).

From the definitions it can be seen that the different terminology relates to the same thing and in literature on the topic this terminology is routinely interchanged with each other and with other titles such as drilling platforms, drilling rigs and offshore platforms. Sometimes oil platforms are referred to by a number of different names in the same article or book. Even the first definition above is a bit outdated as modern platforms do not have to anchor in the seabed but can float on the surface. This paper than when referring to oil platforms and to cover all eventualities of shape and size from here on forth will be using the definition: *"an oil platform is a large structure with equipment that is used to get oil from under the sea"* and will include when examining the data all references to oil rigs and other associated wording. This is a broad enough definition to cover all types of rigs, platforms etc, as there exists numerous types.

What should be taken from this brief section is the fact that there is a lot of jargon in the oil sector (Langenkampf 1994) and reporting on it is messy and so the word oil platform will be used to describe as stated above any large structure that is used to get oil from under the sea.

2.2 Oil Platform as a Technology

"Technology is messy and complex" (2004, p. 1) are the opening words of Thomas Hughes's book on technology and culture, and nowhere is this truer than when one looks at the technological artefact that is an oil platform. STS scholars, historians, and philosophers of technology have for a long time now tried to define or at least describe what it is but with little success, or at least with very little consensus (Ankiewicz and Swardt 2006). In fact many of the biggest users of the term "technology" in STS literature, like Bijker, Hughes and Pinch (1987, p. 4) state that "'technology' is a slippery term, and that concepts such as technological change and technological development often carry a heavy interpretative load" As Hughes states "Defining technology in its complexity is as difficult as grasping the essence of politics (2004, p. 2). Few experienced politicians and political scientists attempt to define politics. Few experienced practitioners, historians, and social scientists try inclusively to define technology" [and so technology is often] "treated as a black box whose contents and behaviours may be assumed to be common knowledge" (Bijker *et al.* 1987, p. 14). In fact "most writings on technology have defined and discussed the term mostly, by presenting and discussing pertinent examples" (Misa 2009, p. 8), and "work from a set of empirical cases that seem intuitively paradigmatic (…) such as bicycles, missiles, ships, power systems, cooking stoves etc" (Bijker *et al.*, p. 4). With this in mind the paper will not try to go in depth on what is or is not a technology but just give some of the ways in which an oil platform can be distinguished from other artefacts, one could describe it as a quick look inside the black box.

According to MacKenzie and Wacjman (1985) technology can be distinguished on three levels, on the physical level or as artefacts, on the level of activates, or processes, and on the level of knowledge in both designing and operating. Leydesdorff lays out a practical description of each."The first definition is one of technology as a product. In this conception, technology is perceived as it is manifested in artefacts: the car, the computer, a software packet, a zip. Secondly, technology can be defined as a (socio-technical) production process: the assembly line, processing machines, blast-furnaces. A third definition focuses on the cognitive aspects of technology: technology as a set of (scientific) knowledge, skills and methods" (Leydesdorff 2013, p.3). There are many other theories and explanations of what technology is from within STS and also from philosophy of science, management studies, economics, and even the UN (Lia-Hua 2009, p.18), however the focus here when describing oil platforms will be on the three tenants mentioned above which oil platforms actually perform at the same time.

An oil platform (and to borrow Hughes words again) is literally a very messy (and quite smelly) affair and one of the most complex mix of machines, computers, pipes, electronics, humans, knowledge, regulations and so on that one could hope to find. However all platforms share basic fundamentals when it comes to physicality or what's contained in them, the activities conducted in them and the knowledge surrounding them and so can be grouped together.

Physical objects or artefacts

There are numerous types of platforms including compliant towers, tension leg platforms and Spar platforms as well as numerous combinations. The interest of this paper happens to relate to two types of platforms which presented themselves during the case studies; although the paper will not be going into too much detail on the technicality of these specific platforms it is good to be aware of them for context.

a) Fixed Platform

A fixed platform as the name suggests is a platform that stays in one place from the drilling phase through production and is dismantled when finished. They are usually fixed to the sea bed by concrete or steel. They are not mobile, are expensive and can be used only in relatively shallow water up to half a kilometre deep. Piper Alpha was an example of such a fixed platform and in fact "was one of the largest and heaviest of its type" (Appleton 2001, p. 197).

b) Semi Submersible

A semi submersible platform can both drill and extract oil and can move from place to place, when the need arises. They are used in harsh environments and in very deep waters of up to 2.5 kilometres. They can be anchored to the seabed with cables or use dynamic positing systems which combine

complex computer software, wave sensors, GPS controls, coil sensors etc. with thrusters to keep the platform in position. The Deepwater Horizon was a semi submersible.

> It was one of the most sophisticated drilling rigs on the planet. Commissioned in 2001, (…) 396 feet from stem to stern, could park in the water, lock onto satellites to measure an exact position and shoot water out of a series of thrusters to maintain that position. Even with waves crashing against the keel, the rig could steady itself for the precision work of sending drill pipes more than six miles down, dead straight, through the ocean floor and deep into the earths crust.
>
> (Gillis and Urbina 2010, p. 2)

All platforms even though they may alter in certain specifications (such as the ability to float, size etc.) contain essentially the same machines, drills, storage facilities, piping systems, technical layout and so on. They are physically the same technology in that they are all designed on their ability to enter the ocean, drill for oil and control its flow. Figure 2.1 below is a good example of an archetypal looking platform.

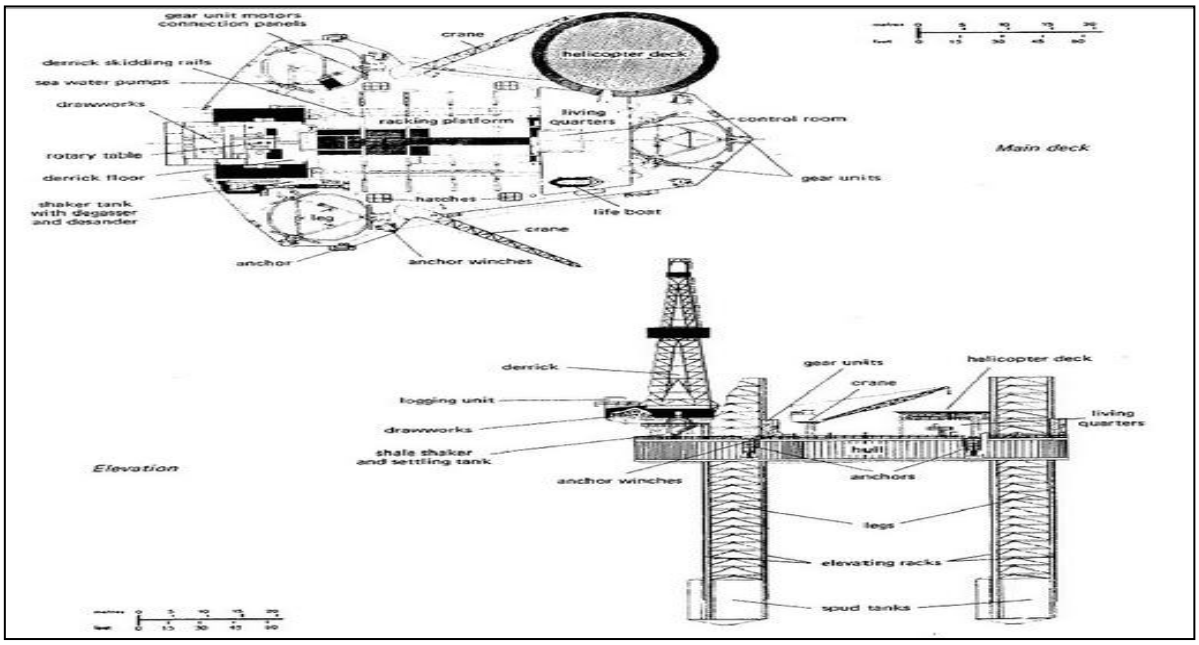

Figure 2. 1 Blue print of typical oil platform. Source: Drilling Contractor 2013.

Activities/Processes

All oil platforms follow the same activity/process. Of course activity surrounding platforms is to drill, extract and control the flow of oil from under the sea bed. There are differences after this is completed to whether the platform stays in place or if the oil can be simply piped. If the oil is piped the platform will move on to the next oil well. Size of the oil well and amount of resources within will determine

what type of platform to use. The processes on board oil platforms, of operations and rules and ways of work are standardised across oil platforms either through company or government edicts.

Knowledge/Know How

Oil platforms involve specific knowledge only related to this technology (perhaps share some with land drilling) in design and in use. In design specific guidelines, producers, engineering skills etc. are related to the development and the construction of oil platforms with individuals with specialised knowledge such as petroleum engineers involved. In the use phase the know how or knowledge of the workers in using the technology is also very specialised with jobs such as Roustabouts, Toolpushers, Drillers, Derrickhands, Motorhands, Leadhands and Ginsels being specific to oil platforms (White 2003). Knowledge also spans a number of academic fields such as engineering, seismology, geology, biology and chemistry. They all bring their specific knowledge together in the operation and development of oil platforms.

In summary, it can be said that oil platforms are a technology used to solve the problem of extraction of oil and gas and its control from the sea floor and have particular physical properties, processes and knowledge that are unique to them.

Now that the language around oil platforms has been cleared up and their technical characteristics established the next step is to highlight why oil platforms are an interesting topic of study. While science since the Enlightenment has been widely seen as the march towards progress and scientific findings have been seen as the laws of nature (whether true or not is another discussion), the "case of technology is however more complex then the simple accretion of artefacts that are individually applied for human betterment" (Sarewitz 2009, p. 304).

With a lot of technologies it is hard to see and make connections between individual technological artefacts and either a positive or negative impact on society or nature. This is due to the fact that society is full of technological artefacts that highlighting cause and effect relations is sometimes hard, and can steer into the realm of technological determinism. With that said "technology is frequently considered in terms of its impact on entities outside its essential nature: such as the impact of technology on the environment and society" (Ankiewicz 2006, p. 125). "Today it is obvious to virtually everyone, as it was not as recently as thirty years ago, that there is a "problem of "technology". Arguably no other comparably large theoretical issue impinges so directly on daily life-figures so prominently in newspapers, court cases, and talk shows-as does this problem (Technology) in its various aspects" (Metzer *et al.* 1993, Introduction, para. 2) . Although this quote is from 20 years ago, the relevance of the words are the same today, new and old technologies and their impacts are top agenda setting topics of today with the technology broken down into positive and negatives for society. Examples abound such as how the use of fossil fuelled technology is blamed for destroying

the ozone layer/climate change but also for allowing our industries to function, how cars are blamed for high death rates but that they also create freedom, how guns are seen as the cause of high murder rates but also of personal protection and so the list goes on to eternity with books and articles written about nearly every technology and its impact on society or nature be it good or bad.

The relationship between oil platforms, society and its functioning, and the natural environment can be seen in a number of examples, both positive and negative and so is of interest to STS studies. Of course the effects of nature and society on technology in its shaping and development is of course also understood, and will be disused later in the paper but here the focus is on the importance of the technology and its effects on society and the environment.

The most obvious effect of oil platforms that can be seen in society is the impact on economies where ever they are established. In the two countries that this paper focuses on, since the establishment of oil platforms national economies as well as those areas centred on the coasts where the oil platforms were near (Aberdeen in UK and Gulf Coast in USA) have experienced enormous prosperity. Aberdeen became known as the *Oil Capital of the World* with over 40,000 employed in work related to oil rigs (Arnold 2003), as for the UK on wider level oil platforms have resulted in billions of euro of taxes per year for the British government, 12.4 Billion pounds just in the year 2010 (UK Department of Revenue and Customs 2013). In the US, the state of Louisiana which has around 4000 platforms and support vessels off its costs in relation to oil production makes a profit of 1.4 billion dollars from offshore oil per year while only taking in six million from onshore, while the federal government makes six billion just from oil platforms off shore from Louisiana alone (US Department of Natural Resources State of Louisiana 2012). Other important impacts of the technology on society have been the development of new technologies because of oil platforms needs, and which are now used by wider society such as horizontal drilling, submersible unmanned crafts, 3-D seismic technology, and underwater concrete just to mention a short few. Other positives were the ability to move away from coal (worse for the environment) as the main source of fuel for societies needs, and to create energy security for nations, which became a big issue during the 1970s oil crisis for both the US and the UK.

These technological artefacts are also interesting, as with most technologies there are some negatives for society as well but especially for the environment. Multiple disasters throughout history including the two case studies in this paper highlight the huge damage caused to the environment, with tens of millions of barrels of oil leaking into the ocean. Even President Nixon after a similar disaster blamed oil platforms for the bad state of the environment, commenting that " the deterioration of the environment is in large measure the result of our inability to keep pace with progress; we have become victims of our own technological genius" (National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling 2011, p. 4). Other negatives range from platform failures and design flaws which have led to hundreds of deaths in both nations to the fact that oil platforms and

their ability to produce cheap fuel sources stops alternative, better for the environment, and more sustainable energy sources being developed.

While the above reasons make studying oil platforms interesting and a worthy topic of study (and the list could be continued) in their own right, this basic level of looking at the outcomes of technology as good or bad is not the only one. Just like observing that an airplane alone is interesting to study but as part of a wider large technical system encompassing a glut of interconnected devices, laws, regulations, customers, technological artefacts (airports) and themes such as globalisation, security etc. it takes on a whole new dimension (and higher level of interest), so too does the oil platform as it is also part of a comparable large scale technical system.

2.3 Oil Platforms as Components of Large Technical Systems

"Social science research on technology has long focused on the development, diffusion, and especially the consequences of specific isolated technologies or technical artefacts" (Hughes and Mayntz 1988, Introduction, para. 1) like the oil platform described above. However the oil platform goes beyond just being an isolated artefact and can arguably be more importantly viewed as a component of a large technical system. "Large technical systems (LTS) are spatially extended and functionally integrated socio-technical networks such as electrical, railroad and telephone systems" (Hughes and Mayntz 1988, Introduction, para. 4). LTS can refer to both a way of understanding and "analysing socio-technical change, and to a class of phenomena - large infrastructural and productive systems" (Van Der Vleuten 2009, p. 218) and are sometimes referred to in popular culture as "Big Technology".

Hughes in his book *Networks of power: Electrification in Western Societies 1880-1890* (1983) highlighted the concept of LTS with an examination of electricity development in the USA. Hughes stated LTS are "both socially constructed and society shaping and that they contain messy solving problem components, (…) organisations, laws, regulations, users etc. and to understand the role and importance of technological artefacts one must look at them as part of a whole" (1989, p. 51). Although "there is no consensus on defining words like "large", "technical" and system" Joerges suggest that one should:

> Consider large technical systems as systems of machineries and freestanding structures performing, more or less reliably and predictably, complex standardised operations by virtue of being integrated with other social processes, governed and legitimated by formal, knowledge-intensive, impersonal rationalises (…) and which are materially integrated, or coupled over large spans of space and time, quite irrespective of their particular culture, political, economic and corporate make-up, and support or sustain the functioning of very large numbers of other technical systems, whose organisations they thereby link.

(Joerges 1988, pp. 23 24)

Oil platforms act as a component in the overall petroleum system alongside other components such as refineries, terminals, compressor stations, pipes, regulators, technicians, engineers etc. and non physical social processes such as laws, economics, etc to reach a common goal which in this case is to extract and transport petroleum products from source to user. If the oil platforms were not part of this system or ceased to function then the whole system would stop functioning in its current guise. To emphasise even more why oil platforms are important, and the petroleum supply systems which they are a part of, and the impact they have on society, one can look at figure 2.2 and figure 2.3 below.

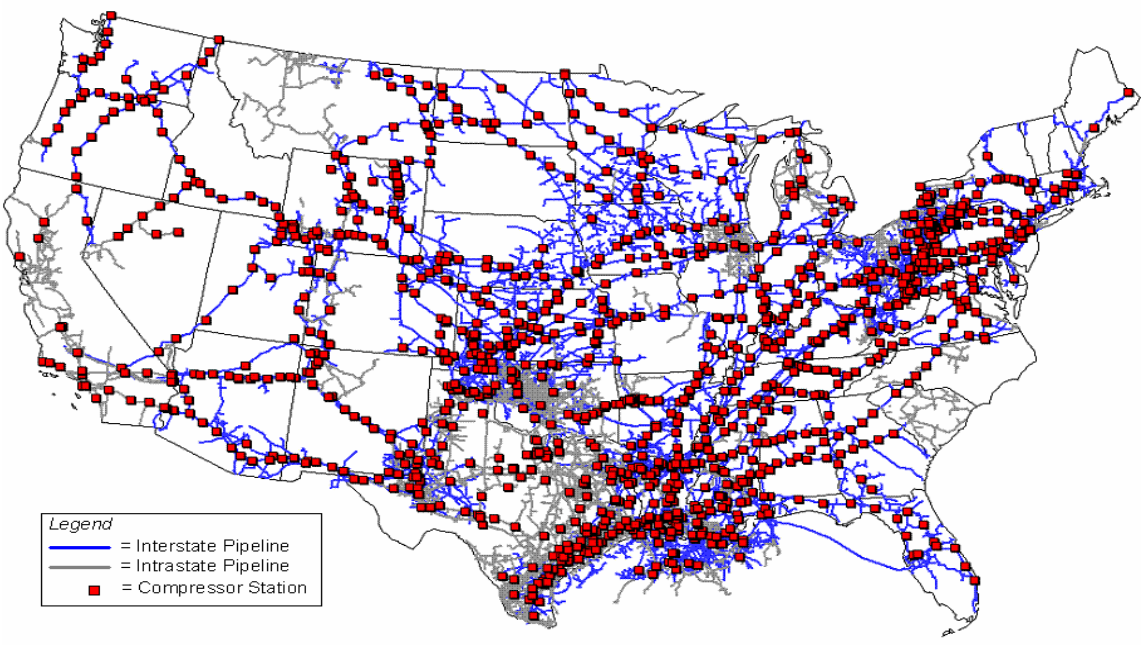

Figure 2. 2 US gas pipeline system (2009). Source: EIA 2009.

In the USA alone (Figure 2.2) there are over 3500 offshore platforms of which they constitute 28% of all US oil and 15% of its gas supply and are a component in a system that stretches out over 2.3 million kilometres. In total there are over 62 million homes in America (54% of all homes) connected to the petroleum supply system plus untold numbers of other connections (Hopkins 2007). When online platforms are joined to the system two thirds of electric production plants are fuelled directly by this system. In figure 2.3 the UK is displayed on the left by electricity transmission (main carrier) lines and on the right by Gas transmission pipelines. What can be seen in these figures is the comparative size of the gas system to the electric system, and in fact the gas system has more international connection lines making the system even bigger. In the UK there are approximately 107

offshore rigs which provide 98% of all oil and gas needs of the UK, off shore alone they are connected through 17,000 Kilometres of pipes.

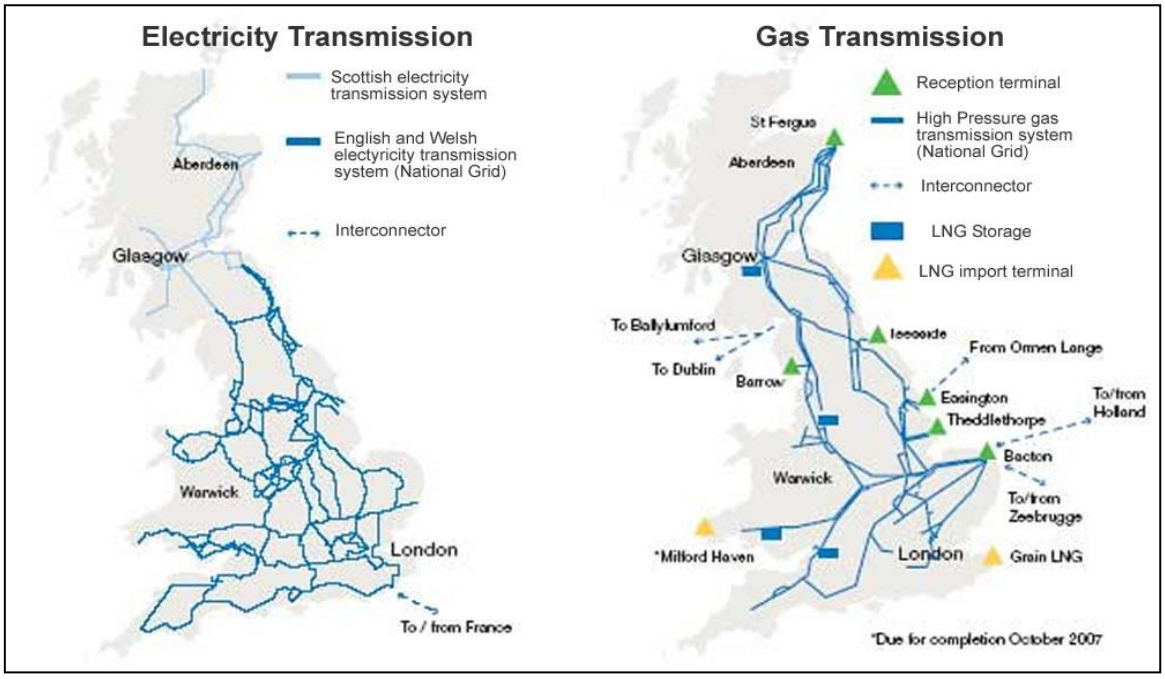

Figure 2. 3 UK electric and gas network comparison (2013). Source: National Grid 2013.

Just over 12 million (46% present of homes) in the UK are directly connected to this system; in addition nearly a third of all of the electricity generated at electrical plants in the UK comes from the petroleum supply system. Even when including only physically connected aspects of the systems, in the UK over 30 million tonnes of oil (1 million truck loads) are moved from source (platform), to consumer through pipelines per year (UK Petroleum Industry Association 2012). When the world is taken as whole the number of platforms could be more then 10,000[1] with roughly 40 million kilometres of petroleum piping connecting them to homes, factories, airports etc. If laid in a single line they would span the earth 1000 times or allow earth to connect to the moon approximately 100 times. These oil platforms in connection with the millions of kilometres of pipe, thousands of terminals, compressor stations, refineries, people etc make one of the largest technical systems in the world that spans borders, time zones and even continents.

The societal implications of LTS are quite large as they are considered as "deep structures shaping individual and social life (…) for instance, electricity supply systems made light and power omnipresent, Swedish or Norwegian hydropower systems secured national energy independence and

[1] Estimated number. Overall numbers not known due to under reporting in some countries and failure of others to report at all (e.g. China)

the Australian interstate power grid should break the state owned utility monopolies that kept prices up-and break coal miners strikes that were organised at the state level" (Van Der Vleuten 2009, p. 22). In addition:

> Societal changes can follow the intrinsic properties of large technical systems and studies around them may have a deterministic character, whether as a natural science cause and effect relation (effects on the natural environment) or as a "force field" favouring some changes above others (in the social world), and they remain too important to be excluded from critical analysis as undesirable "technological determinism.
>
> (Van Der Vleuten 2009, p.22)

Oil platforms as part of the wider petroleum supply system provides the fuel that allows the core systems of society to operate such as road, electricity, and aviation systems so any changes induced by society upon the running, use or operations of platforms can have results that per mutate back throughout all of society.

2.4 Historical Development of Oil Platforms

The historical development of oil platforms in the UK and the USA can be broken down into two major timelines, post war to the 1980s and from the 1980s up to the present. With that said attempts at extracting gas and controlling it from areas of water can be traced back to the ancient Chinese some 1500 hundred years ago, in the form of crude bamboo pipes that would be placed on areas of gas seepage. First attempts at actual drilling in areas of water began in the USA in the 19th century, although restricted to lakes or drills extending from the coast. The 1930s saw the establishment of oil drilling off coasts in the US (Figure 2.4) for the first time although with limited success due to the "limitations inherent in the application of onshore technology to offshore operations" (Castaneda *et al.* 1997, p. 14). It would not be until post World War Two that advancements made in the UK of oil platforms designed solely for offshore use (Thames estuary, for the war effort) would be transposed into the private sector, and so the modern concept of an oil platform would be born.

Figure 2. 4 Early offshore drilling using land based technology, extended by pier (prior to WW2). Source: Castaneda *et al.* 1997

Post War-1980s

The post war period in the USA brought with it the need for oil and gas that had never been seen before; it "witnessed a boom for both the oil and gas industries. Demand sky rocked" (Castaneda *et al.* 1997, p. 17) due to industrialisation and the militaries realisation that oil was the bedrock for sustaining itself, a new emphasis on offshore drilling was born. The military and economic need for oil and gas meant a huge expansion in oil platform construction in the 1950s (and the creation of the first large scale interlinked petroleum supply systems), especially after the "end of the Korean War (…) and the tidelands act in 1953 (which) established a legal framework for leasing" (Castaneda *et al.* 1997, p.15).

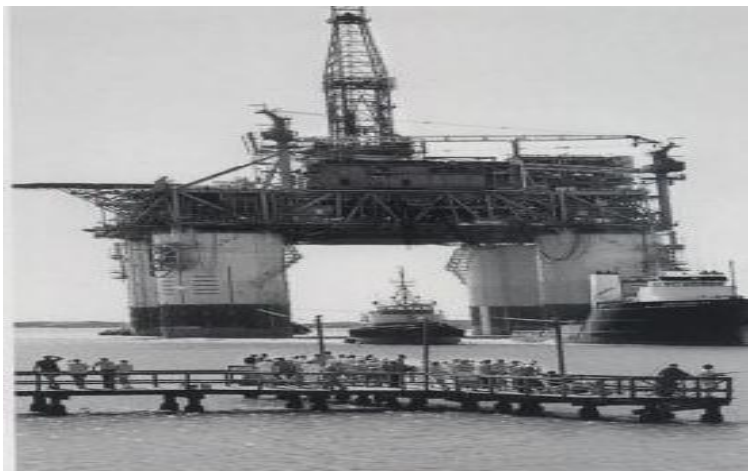

Figure 2. 5 Post World War 2 platform on the way out to sea. Source: Priest 2007.

The development of oil platforms took off in the 1950s and 1960s with them becoming larger and larger and more and more complex and developing their own separate identity to on land oil rigs (Figure 2.5). This was helped by large companies such as shell who were "forced offshore to improve its declining competiveness (…) due to being excluded from onshore prospects" (Pries 2007, p. 30).

From the start, the constructing and development of oil platforms and their operation was very much a two horse affair between that of the government, and industry with emphasis on production and efficiently with lip service paid to the environment and safety. The end of the '50s and the beginning of the '60s saw the main challenges around offshore platforms being the "reduced cost of operating offshore with technological innovations that achieved greater mobility in exploration, speed and capacity in transportation, structural design improvements in platforms, and large scale production aided by submarine pipelines" (Castaneda *et al.* 1997, p. 34). Offshore production yields greatly outshone there on shore competition and so led to its continued growth through the '60s and '70s. This was despite multiple setbacks in the form of disasters and accidents that affected offshore platforms. A good example is the Santa Barbara platform disaster in 1969 which although gaining short term media interest and public protest quickly died away. This was in no small part due to huge industry efforts to sway public opinion. They launched an advertisement blitzkrieg with the American Petroleum Institute alone paying over nine times (nine million dollars at the time) what they had in their history in just two years advertisement on playing down the disaster. They released such notable statements as, "Santa Barbara was a bad accident but no disaster" (Button 2010, p.162).

The US had a big head start in offshore drilling compared to the UK (due to sheltered coasts, shallower water and higher coal supplies in the UK). It wasn't until the end of 1963/beginning of 1964 and the stopping "of tariff protection against imported oil, (…) when Britain entered the European Free trade Association" (Bamberg 2000, p. 196) that Britain started to establish offshore platforms (Figure 2.6).

Figure 2. 6 Diver being prepared for descent to the seabed Lulworth Bay, UK (1963). Source: Bamberg 2000.

Unlike the US which had to wait some 30 years for its first big disaster (Santa Barbara mentioned above) the UK oil platforms struck disaster with their first attempt. The Sea Gem an ill fated converted barge only lasted three months before sinking and killing 13 men. This disaster did not result in public outrage or protests or general widespread interest but the industry "started to make

use of stand-by vessels to help rescue crews in the event of future accidents" (Burke *et al.* 2011, p. 224) and swept over the accident with the information that they were going to use new semi submersibles from the US, with quite a bit of fanfare (Figure 2.7).

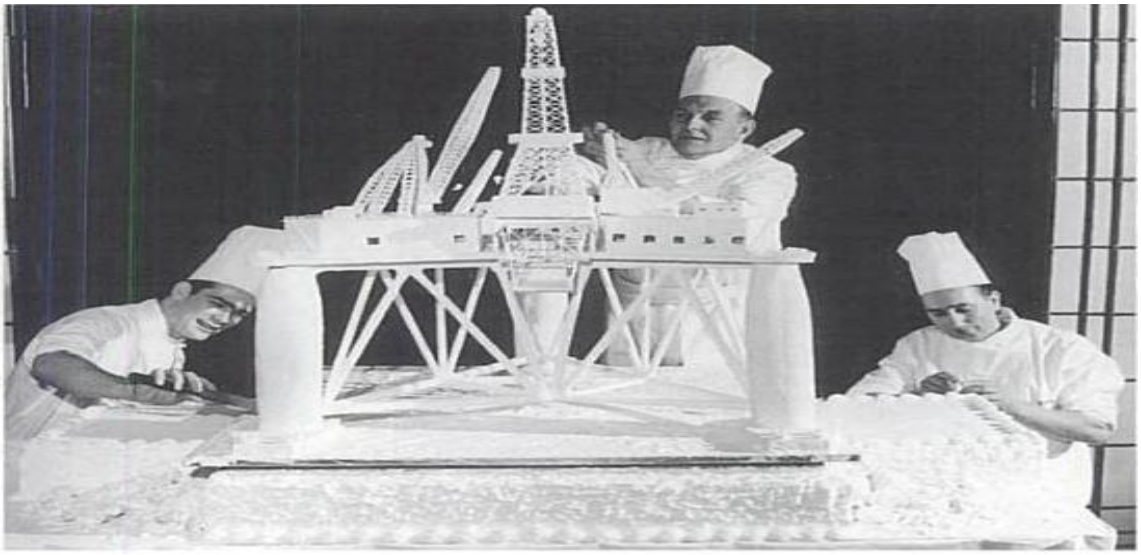

Figure 2.7 An engineering job in pastry, christmas cake- Sea Quest (1966). Source: Bamberg 2000.

Technological levels between the UK and the US were now comparable and going into the '70s they pushed into deeper oceans, developing new advanced technology in order to reach bigger and bigger oil and gas deposits, which resulted in immense profits that made oil companies the richest in the world. The likes of Shell, BP, Exxon, Mobil and Statoil began to dwarf companies from other sectors and industries in terms of turnover and profit. It was not plain sailing however, the resulting tax income for the UK and US government and the need for energy independence during the gulf oil crises led to lax regulations and controls and the 1970s and early 1980s saw the biggest spills of oil into the ocean in US history. In the UK six fatal accidents in less than ten years in relation to oil platforms saw the loss of 79 people while in 1980 just outside the British North Sea, the Norwegian Alexander Kiellend platform collapsed with the loss of 123 lives. What should have been perhaps a forewarning of lax safety and industry standards was put mostly down at the time to "stormy conditions, strong currents and freezing water and the extreme conditions faced by personal employed in the industry in the North Seas" (Burke *et al.* 2011, p. 224).

From the literature it can be seen that this time period was dominated by two actors, the government and the industry, with even disasters only bringing slight interest from other parties which was only temporary. The technological development of platforms of the time was dominated by production,

efficiency, speed and the need to drill deeper and further in the oceans surrounding the UK and the US.

1980s- Present

This however was not to remain the case and from the reading of literature on the subject a big change seems to takes place from the late 1980s on. After this period, the language describing oil platforms, their functions and future developments switched focus, from the language mentioned above to language of safety (of both workers and the environment), protection, in depth planning, preventive measures etc. (Button 2010; Burke 2011). This change did not just end with language but also with the technology itself. "Safety was all embracing. The safety culture as the management termed it was built around the seven elements of: sound design, engineering, quality materials and equipment, high standards of construction, fully trained and responsible personal, effective supervision, clear frameworks and rigorous inspection" (Collinson 1999, p.583). New designs to stop spills, protect workers and so on were incorporated into the construction phase and established platforms were refurbished (Cullen 1990; Brumbaugh *et al.* 1996). Protests began to be organised by NGOs against the building of new platforms (Figure 2.8). Hundreds of new laws and regulations were passed and kept, and in 1990 in the US "due to environmental concerns, Bush (SNR) signed an executive moratorium banning offshore oil outside of the western Gulf of Mexico and certain parts of Alaska. The ban impacted the North Atlantic, Pacific Coast, New England, Mid Atlantic, and the eastern Gulf of Mexico" (Rapier 2012, p. 230). Why the sudden change? As smith puts it "Events occur, conditions change, and people respond" (Smith 2002, p.67).

Figure 2.8 Greenpeace activists climb on board an oil rig off the coast of Greenland. Source: The *Guardian* 2011

So what was this event that changed everything, what was this catalyst that would ignite interest in the public that would challenge the world's most powerful industry and the technology it was built on? It would appear in fact that two events in quick succession led to the change; firstly the 1988 platform disaster the Piper Alpha in the British North Sea followed less than a year later by the infamous Exxon Valdez oil spill. Piper Alpha which ranks as the highest loss of life in British industry since 1913, "proved to be a watershed for safety developments in the North Sea, with a raft of technological fixes, for example seabed risers and legislative requirements being implemented in the wake of the disaster, (…) In total 106 recommendations emerged from the inquiry, most of which were

implemented by the industry" (Burke 2011, p. 225). This huge loss of life in conjunction with "one of the great environmental tragedies of North America in the late 20th century" (Brumbaugh *et al.* 1996, p. 197) the Exxon Valdez which leaked around 700,000 barrels of oil around the coast of Alaska and resulted in the Oil pollution Act of 1990, resulted in huge and sustained media coverage on offshore oil drilling, platforms and transportation.

Some would argue that the roots of anti-offshore drilling and environmentalism in general can trace their roots back to the Santa Barbara disaster (Smith 2002, p. 68; Scheffer 1991, p.41). Although this might be the case and it might even go back further, this was the first time where interest did not subside after a time period and everything return back to the status quo. This time public interest was not just reactionary, instead of only opposition coming to drilling after disasters happened; now the public was on the attack calling for bans, opposing new drilling in the Arctic and wildlife areas , linking it to climate change and energy policy issues and so on, the people as Smith would say had responded. And they kept on responding over the following years and the politicians kept responding to them, banning new platforms in certain places and pressuring the industry who incorporated more and more safety techniques.

It wasn't until 2008 that a regression would occur; offshore drilling was intensified in the UK and in the USA Bush (junior) overturned his father's decision to ban drilling due to:

> A mix of social, economic and political factors in the United States (which) motivated deepwater adventures. These included ever increasing societal demands for fuel, the expectation that more exploitation of domestic sources would reverse the trend to higher fuel prices, concerns regarding imports from the Middle Eastern and other troubled foreign sources, and the need for energy independence. In addition lobbying by offshore industry and states bordering the Gulf of Mexico emphasised that deepwater drilling would provide billions in fees and royalties (…) with polls showing 74% supported offshore drilling due to assurances that risks were minimal; for example that drilling within 200 miles of the U.S coast had a 99% safety record, that only 0.01 % of the oil produced had been spilled, and that natural seeping, and runoff from land caused more contamination of the oceans then all oil spill incidents (…) President Obama announced his plan to open up, lease and exploit the closed regions of the GOM, the Atlantic, OCS, and the Chukchi and Beaufort seas off the North Alaska coast.
>
> (Baram 2004, p. 157)

The announcement came just two weeks before the Deepwater Horizon disaster took place (the largest oil industry disaster in history- by cost and effect on the environment). The disaster coming after 20 years of public exposure to oil platforms, open debate and easily accessible information (Sylves 2012) and so it resulted in a tidal wave of outrage, protest, new legislation, promises, bans and technological changes in both the US and the UK (Hamilton *et al.* 2012; Martin 2011). In the wake of the Deepwater Horizon disaster the US government announced that "changes in environmental practices, safety training, drilling technology, containment and clean up technology, preparedness, corporate culture, and management behaviour will be required if deepwater energy operations are to be perused in the Gulf or anywhere" (National Commission on the BP Deepwater Horizon Oil Spill and Offshore

Drilling 2011, p.215). The Deep horizon disaster saw for the first time the idea of production and efficiency taking second place to safety and environmental concerns with all offshore drilling being banned temporally in the US until technological changes were established, a move that would have been unthinkable back in the days of the '60s and '70s.

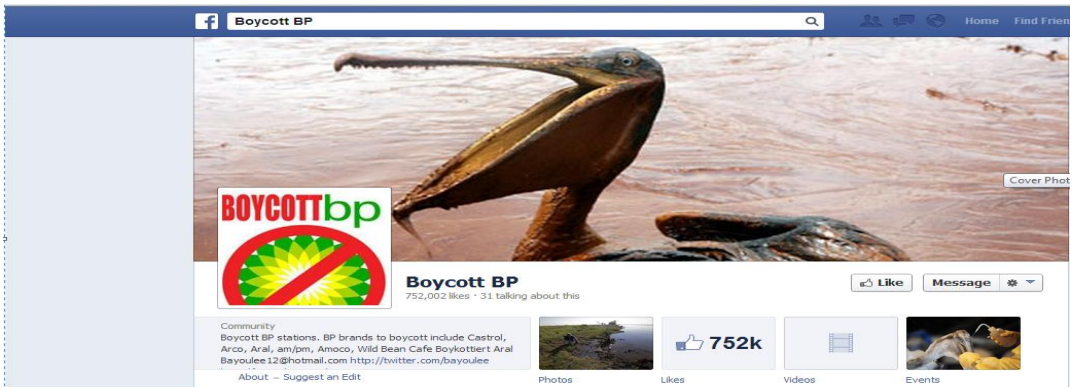

Figure 2. 9 Facebook still of the "Boycott BP until They Stop Drilling" page (over 750 thousand likes). Source: Facebook 2013

The main item to take away from this and what is interesting for this paper is that prior to the Piper Alpha disaster oil platform technology/offshore drilling and surrounding discourses were dominated by industry with lax government oversight, and little public, media or academic interest. The technology was developed with production the number one goal. After the Piper Alpha disaster governments become much stricter in legislation, public interest soared as did the media and academics interest in them. The main language surrounding the development of new oil platforms focused more on safety and risk avoidance. The Deepwater Horizon disaster some 20 years later reinforced all of the above, just as a regression to the days prior to the Piper Alpha disaster was beginning to set in (Figure 2.9; 2.10).

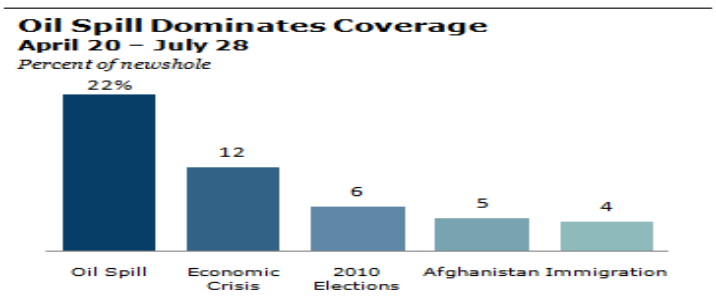

Figure 2. 10 Media coverage in the US at the time of the Deepwater Horizon disaster. Source: Pew Research 2010

3. Disasters

This chapter highlights the different ideas and thoughts about disasters, what they are and why they are interesting to study in a general since and from the perspective of STS. From an examination of the literature two distinct approaches can be seen. Firstly disasters are thought about in a practical way in order to solve practical problems and so are defined in a specific way and result in an explicit response due to their negative impacts. The second approach to disasters is a more theoretical approach that examines societies social systems, epistemology, organisations and so forth and the functioning of society before during and after disasters, not in a negative (or in an attempt to solve or avoid disasters) since, but in what it allows us to see and what new insights can be gleamed about the functioning of society. The chapter will begin with an overview of what a disaster is and is not. Then it will give an overview of the evolution in classification of disasters from initially being seen as an "Acts of God" to current opinions on them. It will highlight some of the major schools of thought on what disasters are, if they are manmade, natural, technological, social or a combination. Once the work on describing and categorising disasters has been concluded, the chapter will then highlight why disasters are important points of departure for study in both an academic since as in what we can learn from them and also in a more worldly way, i.e. their actual physical, social and financial impacts.

3.1 Disasters as a Concept

First off and what is perhaps most critical in understanding disasters, is that traditionally "disasters are seen as matters of opinion and not of simple fact" (Lonergan 2011, pp.3-4), as such disasters are defined by human beings and not by nature. Disasters are characterised as being bad, unpleasant or terrible happenings which are measured not on some universal scale which denotes that some event is or is not as a disaster but in fact disasters are defined as such by just the opinion of certain persons or even individual actors. As Carr highlights "not every windstorm, earth-tremor, or rush of water is a catastrophe" (Carr 1932, p.211). Lonergan (2011) in his paper *Natural disasters and Man-Made Catastrophes* gives some examples of how certain happenings are seen as disasters and how they are based on among other things perspective, location and the belief system of individuals. He gives examples of asteroids striking planets with life and planets devoid of life and how one could be regarded as a major disaster and the other as just a collision of space rocks. The killing off of the dinosaurs 65 million years ago when some space rocks hit the earth Lonergan argues was at the time

considered not to be a disaster, because no local intelligence with the ability to think so abstractly exited. Modern day humans may look back at the event as a huge disaster that nearly wiped out the earth and made the dinosaur go extinct while others see it not as a disaster but as the event that allowed mammals and so us humans to flourish and so should be celebrated. While Lonergan himself admits that this analyse might be abstract he gives more practical everyday examples to show that disasters are mainly a constituent of one's own opinion:

> A tidal wave (tsunami) hits a far off, inhabited coast. Under normal conditions this would be a sad loss of life and destruction of property. If that coast is uninhabited, and home to no beloved animal colony, perhaps nobody much cares. When such an occurrence takes place during time of war, and befalls a feared enemy, it might occasion celebrating in the streets, and even cause religious leaders to give thanks. Everything is determined by one's perspective.
>
> (Lonergan 2011, p.132)

Lonergan also quite rightly points out that disasters happen on an invisible level of scale, a nuclear power plant explodes, an earthquake destroys an entire city or a tsunami engulfs an island are all events that one would could consider a disaster. However, an individual losing his wallet as he walks down the street could be seen as a disaster for that individual, and for him, or her comparable to any of the aforementioned typical typologies of what is seen as a disaster, "everything lies in ones perspective- but we will never be called upon to facilitate research on such small scale-topics" (Lonergan 2011, p.132). Therefore while opinion deems what is a disaster, and what is not, it also involves scale for it to garner wider interest, outside of an individualistic level, and become a societal problem and so deemed worthy of attention and research.

Most writers on disasters are in agreement with Lonergan's perhaps eccentric ways of describing disasters as matters of opinion, location and scale. In addition there are other theories on what a disaster is such as that argued by Carr that disasters are only considered such when it involves human and economic loss, but these views are seen as somewhat antiquated now and more a result of the modernist thinking of his time (1920s and 1930s) (Furedi 2007). However one area that Lonergan lacks in his assessment of how something is seen as a disaster is time, as Kemp nicely shows, what is seen as a disaster has changed over time due to cultural and social changes, "in the middle ages, solar eclipses and comets were seen as catastrophes, because they were interpreted as signs of divine anger against human sins, as were earthquakes and volcanic eruptions" (Furedi 2007, p.483). It wasn't the human suffering or impact but the events as signs of God's displeasure, human loss or suffering was not necessary for the event to be seen as a disaster.

So what is a disaster? It is an occurrence, or event that causes terrible suffering or unwanted experiences, based on scale, location, time, personal beliefs, and usually affects the systems of society's normal operating procedures (economic, political etc.). An interesting aspect that arises

when asking what a disaster is, is how it differs to other crises and problems of community life. Sociologists from the early days differentiated between disasters and other everyday social problems:

> They saw disasters as different from chronic and everyday social problems. Disastrous crises are marked by a since of urgency, a need for prompt reaction, and for quick action to prevent further immediate, often instant, deterioration of the situation. They stand in contrast to more diffuse and continuous social pathologies such as poverty, unemployment, crime, drug use and other similar negatively viewed phenomenon that sociologists treat as part of the social problems of society. (Quarantelli 2000, p.6)

So while disaster is a somewhat abstract term, it is used today in two different approaches for two very different reasons , firstly the practical every day use of the term which can be summed up by the Federation of Red Cross and Red Crescent Societies (IFRCRCS) which defines a disaster as "a situation or event which overwhelms local capacity, necessitating a request to national or international level for external assistance, . . . 10 or more people reported killed,100 people reported affected, a call for international assistance and/or declaration of a state of emergency"(Perry and Quarantelli 2005, p.186). Only one of the criteria in this circumstance needs to be met. This quote actually demonstrates the current thinking on disasters in a daily real world experience based on their negative impact, cause and prevention. Questions from this approach deal mainly with civil protection, emergency management and disaster planning and used by governments, engineers, NGOs etc. in their work.

The second approach to the term disaster is the social science approach developed by disaster researchers and used more so in academic research. It states that "disasters are non routine social problems, non-routine problems distinguishes disasters as unusual and dramatic social happenings from the reservoir of everyday routines and concerns, largely originating within identifiable historical and social conditions" (Drabek 2006, p. 47). Disasters are seen as "acts of society" i.e. of the failure of the social systems to prevent disasters or even of the social systems actually causing them. It must be noted that while considered non-routine events they are normal, in the since that they are expected and occur frequently it's just that societies systems cannot cope with them and so they are not a routine of society's normal operation. This approach examines disasters as components and the results of certain conditions and that the impacts of them should not be seen as simply positive or negative but that they allow society and its systems to be examined from new perspectives. This approach allows new questions to be asked such as, how and why do societies differ in their coping responses to disasters? What social constraints pattern the differential distribution to disasters both temporally and globally? How do disasters highlight the class system and inequalities in societies? What effect had the social systems on the extent of the disaster? And so on.

So in the first instance the term is used to define something, an event and so create a set of reactions or responses by society to dealing with the problem, you can actually put a figure or actually definable or quantifiable description on the happening. While the second approach seeks to understand why

they happen, what social forces are at play and what can we learn about society through them, quantifiable or quantitative descriptions are less important. When it comes to categorising disasters for practical reasons (and so also for appointing blame) along the lines of natural, manmade, social, technological, acts of god etc. the subject of disasters and how they are defined, caused and constructed becomes quite contested.

3.2 The Evolution of Disaster Classification

There has been a long evolution in what the word disaster means, its classification, what it is used to describe, the cause of them and who or what is responsible for them. It is important to understand how disasters are visualised or conceptualised:

> [They are] obviously related to the matter of how to react to such phenomena. For example, certain conceptions, such as that disasters are inflicted by supernatural forces, imply that to prevent or weaken them, steps of a religious nature have to be taken. In contrast, if human actions directly create disastrous occasions, a view frequently taken about technological disasters, prevention of such happenings implies improving the performance of actors involved. One way or another, the visualisation of the ways that can be taken to prevent or to respond to disasters, depends on the perception of the dynamics of the phenomena in the first place"
>
> (Quarantelli 2000, p.2).

From the work done by disasters studies scholars and from various fields the idea of disasters and the dynamics of the phenomena has been historically broken down into different time periods and ways of thought. Initially disasters were seen as the result of God or the supernatural and were outside of the realm of human control. The rise of science with the enlightenment, the breaking away from strict religious rules on how the world worked and the creation of new knowledge resulted in the old disaster paradigm shifting; disasters began to be seen as acts of nature. The industrial revolution and the modernisation of the world brought with it new ideas about disasters and the idea that disasters were only natural in composition was challenged, this challenge to the existing paradigm was enhanced by countless industrial and technological disasters at the time, the result was the forming of the man made or technological disasters that existed in line with natural disasters as two dichotomies to explain disasters (Perry and Quarantelli 2005). This paradigm has lasted to recent times but now the idea of there being any division between natural and technological disasters is being challenged by researchers who propose that there is only one type of disaster. They argue that all disasters are the work of society with some using the term socio-technical disasters to highlight the fact that all disasters are socially constructed (Hewitt 1983; Blaikie *et al.* 1994, 2004).

The term disaster can trace its origins back to the time of the Greeks, disaster when translated to ancient Greek becomes *δυσ-*, (*dus-*) "bad" + *ἀστήρ* (*aster*), "star"(Henry and Scott 2006). Disasters so

initially started out as referring to a bad star which was to do with some negative occurrence relating to an observation by the Greeks of a planet or a star. From here the term went to Latin (disastro) where it continued to be a referral to "astrological or supernatural forces" (Quarantelli 2000, p.2). From there and with the rise of organised religion it took on the meaning to refer to any negative large scale occurrence that could not be explained such as earthquakes, plagues, volcanoes and were categorised as punishments by God. In the medieval times where the word disaster is used again in both English and French it was closely linked to the elements or building blocks that made up the world such as air, fire, water and so on. The idea that the natural elements were the cause of disasters was beginning to take hold, but due to lack of knowledge and religious beliefs this idea of natural disasters was still put down to God's will and the disaster as the act of God due to sin etc. Due to this divine notion of the phenomena of disasters no attempts were made to counter them.

It was not until the enlightenment, the development of secularism and the rise of science that disasters begin to be viewed as natural events i.e.:

> Catastrophic events originating from natural processes. Events such as floods, volcanoes, earthquakes, hurricanes, blizzards, droughts and the like socially defined as disasters within a context of human communities and the natural environment. Although these events are outside the realm of ordinary daily activity, society's experiences suggest these disasters conform to an ordinary course of nature. Thus natural disasters follow a consistent sequence of events that impact a community's social structure at identifiable levels.
>
> (Gill and Picou 1988, p.795)

"Natural disaster involve a lack of control over processes perceived to be uncontrollable" (Aini and Fakhrul- Razi 2010, p.1287) and "can be defined as some rapid, instantaneous or profound impact of the natural environment on the socio-economic system (. . .) In general terms we are not only dealing with phenomena of high magnitude. In fact, we can define an extreme event as any manifestation in a geophysical system (. . .) which differs substantially or significantly from the mean" (Perry and Quarantelli 2005, p.185).

Therefore disasters were seen as separate from human actions and were a one way directional occurrence only impacting on humanity and occurring "out there" in nature. Disasters "could still not be eliminated or prevented, but the greater understanding of what was supposedly involved, encouraged the taking of actions that could weaken the impact of many disasters" (Quarantelli 2000, p.3). This led to a rise in engineering and the applying of scientific knowledge to strengthen structures and vulnerabilities to disasters, even if the disasters themselves could not be directly controlled.

This theory was to remain the standalone approach to understanding the phenomena behind disasters until the industrial revolution when new questions were raised about the origin of disasters. The beginning of the 19th century would be the time when it was finally recognised that the huge damages,

loss of life and interruptions of the workings of society that occurred after natural disasters were now being seen in scenarios where nature alone could not be seen as the sole perpetrator. Pertinent examples could be seen in the expansion of cities especially during the time of urban industrialisation (Knowles 2011). The continued expansion of cities and industry into the 20th century emphasised this phenomena more and more:

> The 20th century has witnessed the emergence of a unique form of disaster that is disasters originating from technological and social agents. Examples include events at Buffalo Creek, United States (1972), Bhopal, India (1986), Chernobyl, Ukraine (1986), Three Mile Island, United States (1979) and Love Canal, Unite States (1979). Compared with natural disasters, these events were unique in that technology, organisations, and human culpability caused disastrous consequences for human communities. Erickson calls such events a "new species of trouble". Others have described them as man-made or technological
>
> (Gill and Picou 1998, p.796)

The idea of manmade disasters was born and while this term does not really do justice to the complexity of the issues it was how they became to be known in the literature. A more favourable description perhaps would be socio-technical disasters in order to highlight the interconnectedness of disasters that were seen as not natural. So "unlike natural disasters man made or socio-technical disasters involve a loss of control over processes perceived to be controllable and they involve identifiable parties to blame and hold accountable" (Aini and Fakhrul- Razi 2010, p.1288). "Socio-technical disasters take place when there is a breakdown in technological and bureaucratic organisation system which leads to a destruction or contamination of the natural and built system" (Gill and Picou 1998, p.796). These types of disasters were distinct from natural disasters in the fact that it was believed they could be prevented. Today the dichotomy of disasters consists of both natural and socio-technical disasters and is the principal paradigm encountered when disasters are talked about in the media, in politics, in science, and in other literature be it academic or not.

There is a change however. Over the last forty years or so researchers of disasters have raised challenges to this dichotomy with some being quite critical such as Perry who states that while classifying disasters as "manmade" versus "natural, begins the process of specifying what a disaster is they are primitive phenotypic typologies—now seen as very naïve. At the most basic level, this distinction was useful in its time, as a means of grouping Human responses differently" (Perry and Quarantelli 2005, p.318).

The premise beyond this new theoretical approach to the phenomena of disasters is that no disaster is natural and that all disasters are due to human actions (or inactions), such as building a city under the sea level, on tectonic plates, near a volcano or changing the course of rivers, climate change and so on. The theory is that man creates all natural disasters by putting itself in the way of normal natural occurrences. However while this idea of going beyond the natural and socio-technical division is

gaining traction today it can actually trace its origins as far as the 1755 Lisbon earthquake which instead of being blamed on an act of God was at the time blamed on building the city on an earthquake zone (Russell 1999), and so the disaster was not purely natural but also the fault of society. In fact "Dynes contends that Rousseau provided the first social scientific insights into disaster" (Lindell 2011, p.1) with his observations at the time. Quarentelli expands even further on this; he argues:

> That disasters result directly and indirectly from the actions, intended or otherwise of human beings. If people are living in unprotected flood plains, in non-earthquake proof buildings in known seismic zones, or next to chemical plant complexes, they are generating the necessary conditions for a hazard to generate a disaster. It is in this sense that many argue that disasters are inherently social phenomena an earthquake for instance is but a physical happening, a hazard, which does not have any social consequences unless society's decisions and actions create built environments that can be impacted. A hazard so at most can only set the stage for an actual disaster; a disaster as a social happening is both created by and manifested by dysfunctional human and group behaviours.
>
> (Quarantelli, 2000, p.4)

When one applies this dysfunctional human and group behaviour to a higher level of analysis of social systems then "disasters can be seen as the manifestations of the social vulnerabilities of society, in other words, their origins are in the structural and cultural dimensions of social systems" (Quarantelli, 2000, p.4). Quarantelli here is borrowing from the terminology developed by Pelenda and Bates who state that:

> In a very real sense, socio cultural systems arise to prevent or control disasters and crises that threaten the survival and well being of human population (. . .) disasters occur when one or more of the socio cultural systems that a population depends on fail to provide an adaptation to the environmental conditions which surround it, or when one of these systems produces, from within its own technological order, an event that threatens the population. The problem of understanding disasters then amounts to understanding the relationships between particular types of human systems and the environmental conditions to which they are related as adaptive devices.
>
> (Quarantelli 2000, p.4)

In order words disasters in all guises are the acts of society and of the failure of social systems (Britton 1986), if the wish is to prevent disasters than changes need to be made to these social systems. This approach also helps to overcome problems when trying to identity if a disaster was manmade or natural which have been shown empirically to be weak divisors. A recent good example is hurricane Katharina where it is hard to decipher whether it was a nature disaster or a technology/manmade disaster. However, the disaster was most definitely an act of society and the failure of social systems as can be seen in Olsen's paper for the national research council for disasters (Olson 2011).

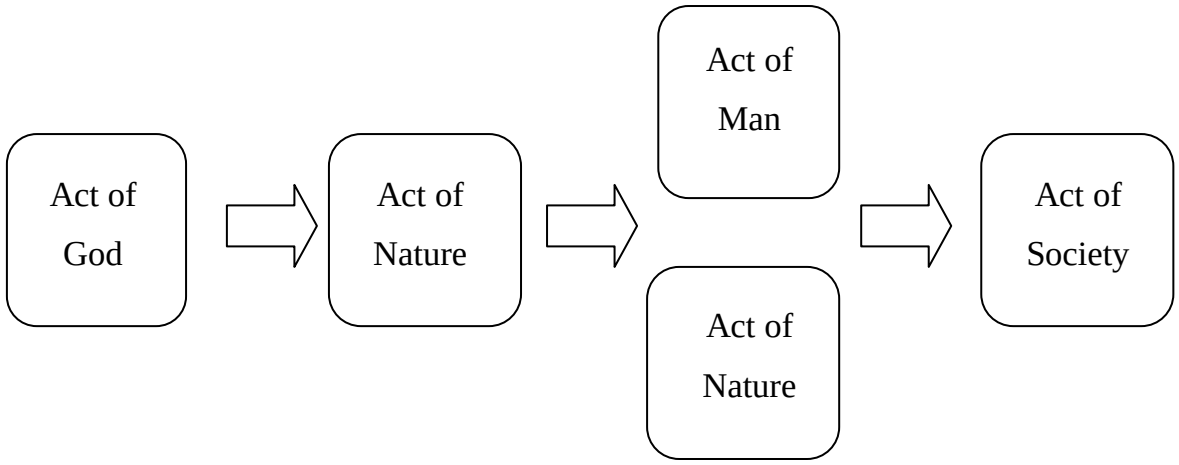

Figure 3.1 Classification paradigm shifts over time.

Not all of society goes along with this new way of thinking by social scientists and the evolution of what phenomena's lead to disasters and so their classification (Figure 3.1), "studies show that all four conceptions of disasters are held in varying proportions and sometimes together by different segments of the population. In fact, a Gallup poll in 1993 found that 18 percent of those surveyed agreed "that recent floods in the Midwest are an indication of God's judgement on the people of the United States for their sinful ways" (Quarantelli 2000, p.6). Also some scientific papers, perhaps surprisingly, still refer to disasters as "acts of god", for example, "an earthquake occurring in a remote, primitive area is an act of god" (Beigel *et al.* 1980, p. 104).

With that being said a lot of people now have moved on to view all disasters as acts of society with no differentiation being made between natural or manmade and that societies systems are the root cause of all disasters (or a component in these systems)," in the aftermath of a disaster today, the finger of blame invariably points towards another human being. Government officials, big business or careless operatives are held responsible for disasters" (Furedi 2007, p.483). However from a general examination of literature outside of specialist focuses such as disasters studies the natural/ socio-technical disaster dichotomy is still the most relevant and used method for discussing and describing happenings that are deemed disasters. Although many scholars say that classifying disasters into either box A or box B is past its sell by date, it is still inherently done across academic disciplines. In order to understand something, usually the first analytical process completed by humans is to classify it. Professing that all disasters are the result of society seems at the moment to be too abstract a classification for those involved in academic research or indeed for those involved in preventing or responding to disasters.

3.3 Importance of Studying Disasters

Disasters be they classified as natural, technological, social or any combination of the three are appealing to study and are in fact studied on two distinct levels. First is the practical level, which focuses on the fact that disasters are increasing at a massive rate or at the very least the impact of disasters upon the human and natural worlds is accelerating at an alarming rate. The financial, social and environmental costs are skyrocketing and so to examine disasters, how they come about, their impact, their cost etc. is a very practical real world need. On the other level is the academic interest in disasters, disasters are epistemic events that involve the making and breaking of technological and organisational paradigms and allow for hard and soft scientific research on the cause and effects of disasters. The impact of disasters upon the interactions of groups, organisations, the rise and fall of experts, paradigms and the development of new ways of thinking, scientific knowledge and technology are all of interest to researcher's and different academic fields. They also allow for new and interesting points of departure in academic research that otherwise might not be available (Fortun and Fickle 2013).

Focusing on the prevention, aftermath and the reduction of disasters has become "big business" for government, industrial and academic actors due to the fact that "disasters from natural sources, from industrial and technological sources, and from deliberate sources such as terrorism have all increased in the United States in recent decades, and no diminution is in sight" (Perrow 2007, p.1). They happen more than one might think, "disasters mistakenly might be considered rare events but in fact happen rather regularly (Perrow 2007, pp 1-2.)[2]. It is not just in certain locations where disasters are increasing, according to the National research council, a think tank on disasters, "the year 2010 saw 950 natural catastrophes around the world-the second highest annual total ever with overall losses estimated at $130 billion "(Olson 2011, p.1), this did not even include so called technological disasters such as the Deepwater Horizon disaster etc. which would have increased the figure drastically. Blame is assigned to increased populations, complex technological systems, terrorism etc. by the centre for research on the epidemiology of disasters who have found an ever increasing number of disasters worldwide. In fact a drastic increase in disasters is reported. "During the decade 1970-1979, 1230 disasters were registered; in the 1980s, this figure was 2,856, and, in the 1990s, 4,790 disasters were listed. For 2000-2003(only), more than 3,000 disasters were reported" (Dirkzwager *et al.* 2005, p. 107). The interest in this aspect of disasters interests a wide range of disciplines and

[2] The evidence for the increase in industrial disasters comes from the Swiss reinsurance firm, the world's largest, Swiss Re. The worldwide figures can be found in its sigma reports. "Man-made disasters" include road and shipping accidents, major fires, and aerospace incidents, and the threshold for qualifying is 20 deaths, or 50 injured, or 2000 homeless, or $70 billion in losses, or insurances losses ranging from $143 million for shipping, $28 billion for aerospace to $35 billion for the rest. Similar criteria are applied to natural disasters. For manmade disasters in the United States, the period from 1970 to 1992 averaged 7.7, from 1993 to 2001 it was 12.8, a 60% rise. Natural disasters rose steadily in this period, well below the man-made ones in the 1970s but rising to almost thirty a year for the period 1993 to 2001.

professions such as emergency managers, fire and law enforcement, public health, law, planning and the like and can result in new technologies, laws etc. being developed or enacted to combat disasters (Lindell 2011, pp2-5). Also social science research has focused on disasters and the effect on communities and the efforts to reduce risk. Areas of research here lie around the physical impacts of disasters such as casualties, damage (losses of structures, animals and crops), social impacts such as psychological responses to disasters, demographic impacts, economic impacts, and political impacts. Also the study of emergency management interventions such as hazard mitigation, emergency preparedness, community and organisational preparedness, household disaster preparedness, emergency responses, disaster recovery and so on are all areas of interest for the practical fixation on disasters (Lindell 2011; Petucci 2013).

Besides the practical significance of hoping to solve the problems associated with disasters there is also the wider social science approach, and interest to, and in disasters with various theoretical perspectives and aims. As disasters are seen as non- routine social problems (although normal events) they can "highlight the multidirectional pathways that exist in society, which can enhance the flows of research findings and theoretical frameworks" (Drabek 2007, 92). Besides the physical cost upon society or the environment because of disasters there is another way of viewing them as Clark put forth. He rightly states that "disasters expose our social structures and culture more sharply than other important events" (Clark cited in Perrow 2007, p.3). One can see the operation of society (and the lack of operation) and what it viewed as important and what not at a distinct time, without certain institutional and social boundaries that might otherwise exist. Not only can the negatives of disasters be viewed or should be, but also the positives of disasters according to Quarantelli should be looked at from a "social change approach which…would force us to consider more aspects of disasters (all but impossible to consider in a social problem context that focuses on the negative)" (Drabek 2007, p.46).

So from a sociological perspective and view of disasters the interest goes beyond just the impact or need to prevent disasters and the associated negativity, "the sudden and large scale changes that disasters trigger in ecosystems societies and knowledge practices offer scholars unique opportunities to study social dynamics of techno-science under highly atypical situations" (Forun and Fickle 2013, p.4). The focus consequently is on a number of themes/fields of thought that use disasters as perhaps a tool or at least as a window into social occurrences that would otherwise not be visible or accessible. Social science research on disasters comes from (but most definitely not restricted to) scientific fields such as disaster studies, organisation studies, STS, development studies, environmental studies, media studies and cultural studies. Mentioned below are some of the varying topics of interest for academic research in relation to disasters (while the list could be quite long I will just mention some of the main areas of research to give a since of the scale that is possible). First, disasters and knowledge production and disasters and technological change, disasters result in an abundance of new scientific and technological research and knowledge production, development, and innovation along with new

practices, ways of working and possible institutions and the networks that connect them all (Suikar 2013). In addition the interaction between government, industry and academia at times of uncertainty makes for interesting research.

Second, disasters and experts, during disasters and social uncertainly the interaction between lay and expert knowledge is also vital as is its dissemination. Who creates the knowledge, who is included, who is exclude, how it differs from normal social conditions and so forth. Third, disasters and the operation of organisations, "social system failures such as technological and organisational failures are at the heart of many disasters, and their normal operating procedures which can remain somewhat obscure in normal societal conditions are opened up for scrutiny and so analysis as a result of disasters" (O'Leary and Pidgeon 2000, p 1).

Fourth, disasters and the functioning of society, the negatives associated with disasters such as damage to the environment or impact on people can also open up new ways of examining how society interacts. Interesting sociological questions such as fairness in society, racism, how different groups respond to disasters etc can be viewed in a new light (Fothergill 1999). Another interesting research topic and the final one that I will highlight is how disasters are represented, that is how they are constructed by different segments of society such as by the legal and media worlds, and what this can mean for concepts like what constitutes a disaster, responsibility for disasters, the public understanding of disasters and so on (Klinenberg 2002; Fortun 2002).

4. Piper Alpha and Deepwater Horizon

In the first chapter the important role oil platforms play in the functioning of modern societies was highlighted; they fuel both our cities and our economies and are essential to our first world standard of living. With no viable alternatives yet in sight and no reduction in the number of new platforms being commissioned, it seems they will play a vital role in our economic and social systems for some time to come (Wethe 2013). The negative impact of disasters upon the functioning of society was shown in chapter two. The number of disasters is increasing at a rapid rate with increased loss of life, economic cost, and destruction to the environment. Oil platforms are one of the leading causes of these negative impacts upon society, and the environment. It is a grand paradox so that one of the technologies society relies on most heavily to function is also one of the most damaging to both it, and the wider environment.

From an examination of the history of oil platforms, two important case studies were highlighted which will be the focus of this paper; they are the Piper Alpha and the Deepwater Horizon oil platforms. The events surrounding both oil platforms caused terrible suffering and unwanted experiences, affected society's normal operating procedures and required urgent, prompt reactions from society in order to prevent a further deterioration of the situation and so they can rightfully be deemed disasters. The following two segments will expand on these two disasters, what they consisted of and the reaction to them.

4.1 Piper Alpha

On the 6th of July 1988, just after 22.00, the Piper Alpha oil platform (Figure 4.1) situated off the coast of Scotland in the North Sea exploded. It had stood for only 12 years before it became the world's worst oil related disaster, consisting of massive loss of life, an enormous oil spill and the largest insurance claim for a man made construction(1.5 $ billion) as of that time.

Figure 4.1 Piper Alpha before and after explosion. Source: BBC 2011.

To this day it still accounts for the single largest lost of live in an oil related accident and the largest industrial disaster in the UK since the Pretoria Pit Mining Disaster in 1910 (Ewing and Ali 2010). The initial explosion was followed immediately by a crude-oil fire that engulfed the platform in oil. Fire spread quickly throughout the platform causing multiple smaller explosions, with the first of three gas safety risers failing after only 20 minutes. When it sank it took 167 lives with it (including two emergency response personal who died during a rescue attempt). Only 61 people survived. The platform was totally destroyed. In total it took only 22 minutes for all the events of that night to unfurl (American Institute of Chemical Engineers 2005).

Figure 4.2 Location of Piper Alpha off Scotland. Source: Taylor 2013.

The Piper Alpha platform was located off the coast of Scotland at the time of the disaster, some 120 miles from Aberdeen (Figure 4.2). The oil field was first discovered in 1973 with work on the platform also commencing that year. Due to the water depth the well was situated in, "the development and installation of the Piper Alpha platform represented a major step in the development of both UK offshore resources and technology. The basic design of the topside was based on those used in the Gulf of Mexico" (Drysadle and Evans 1998, p. 2929), this was in line with the earlier descriptions in this paper of technological transfer from the US to the UK. The platform was at the time the biggest in the world and produced over ten percent of all oil and gas in the North Sea. It was an economic miracle for the region replacing dying out industries, such as fishing as the dominant employer, and tax payer in the area. It was owned by Occidental Petroleum, an American company operating on a global scale with interests in all major oil regions.

However, the platform was not a standalone affair but was in fact linked to multiple refineries and other platforms through a complicated web of piping that measured just over 300 miles (Figure 4.3). Piper Alpha served as the central hub in this complicated underwater network connecting other large oil fields such as Claymore, Frigg and Tarter to on land refineries.

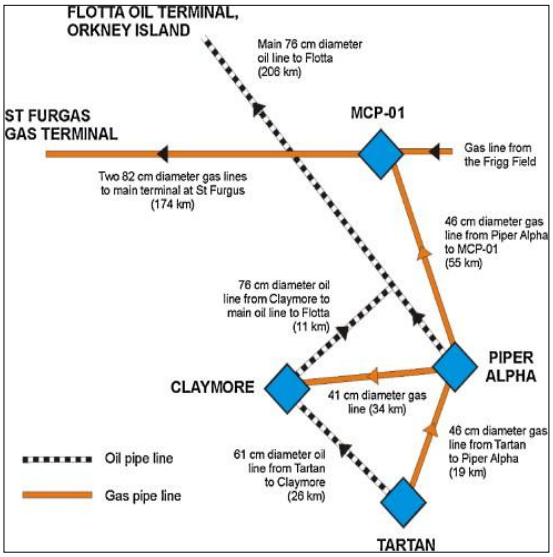

Figure 4.3 The complicated web of interconnected oil platforms and pipe lines Piper Alpha was central to. Source: Shallcross 2013

Due to this, the scale of the disaster was immense; the fire reached heights of 700 feet, could be seen from 70 miles away and melted the rescue boats like they were made of plastic. "At the height of the event, natural gas was being burned on Piper Alpha at a rate equivalent to the entire United Kingdom natural gas consumption rate" (American Institute of Chemical Engineers 2005, p 1). It took three weeks to extinguish the remains of the platform and to cap the leaking wells. The amount of oil that leaked is actually unknown as nobody counted or tracked the spill, and no mention is given in the official report on the disaster, although Occidental state it was somewhere around 180,000 barrels. The vast scale of the disaster led to a huge public reaction and a since of outrage, media coverage of the event and its fallout was intense.

In reaction to the public outcry and the damaging affect the disaster had on moral in the highly important industry for the British State a public inquiry was launched, it was headed by Lord Cullen and so was aptly titled the Cullen report when published. Its remit was to "establish the cause and circumstances of the disaster and the lessons to be learnt, in total the inquiry sat for 180 days and

heard evidence from 260 witnesses, who spoke in excess of six million words of evidence. Lord Cullen's report was published in November 1990 and contained 106 recommendations" (Drysdale and Evans 1998, p.2930).

The report found that the disaster happened because of a mix of technical, human, institutional, and regulatory failings. Foremost the causes of the disaster were due to human error in not communicating the ongoing maintenance of pipes to the next shift which led to the initial leak and so explosion. This was compounded by failed operational procedures such as permit to work systems (PWS) which were not implemented according to procedure and were in fact knowingly and flagrantly disregarded. This was followed by management /organisational failure. Managers on the other platforms kept pumping oil into Piper Alpha even after initial explosions due to the fact that they had to wait for orders from higher management, 60 minutes passed before all pipes were eventually shut down. Another failed organisational procedure was the fact that the fire system was turned off and put on manual due to divers being in the water. This practice was not supposed to happen.

Besides the human/organisational part in the disaster; the technical side was also to blame according to Lord Cullen. Even if the water was on automatic, only 50% of sprinklers were operational due to blockages, breakages etc. (a retrofit of the entire platform was called for by an engineering consultant just months before the disaster). In addition the structural steel had no fireproofing and only lasted 10-15 minutes after the fire started. The gas risers were also technically not good enough to slow down the release of gas to allow an evacuation. In addition to the human, organisational and technological failings were the wider failings of regulation by the state where the same institution, the department of energy was in charge of production and safety in offshore production. Finally, Lord Cullen put the blame on industry and politicians due to them having their priorities in the wrong order, and that safety and not production should be the number one goal in offshore drilling (Cullen 1990). In other words the disaster was caused by a system failure instead of any one individual source.

4.2 Deep Horizon

The Deepwater Horizon disaster (which is also identified by many other titles such as the BP oil spill, Gulf of Mexico oil spill and Macondo blowout) occurred on the 20th of April 2010. Just before the completion and capping of a deepwater well, an uncontained release of hydrocarbons (oil and gas) emitted from the well in to the platform resulting in explosions and a fire which destroyed it (Figure 4.4) and killed eleven of the workers on board (Ramseur 2010). The hydrocarbons had broken through a newly placed concrete cover, travelled up the riser, ignited and resulted in the sinking of the platform two days later on the 22th of April. The sinking of the platform resulted in an uncompleted well cap. With no control or collection mechanism in place the hydrocarbons freely flowed into the

ocean. It would as a result become the largest oil spill in the petroleum industry's history, overtaking the previous largest spill the Exxon Valdez in only four to five days. In total, the disaster released approximately five million barrels of crude oil into the Gulf of Mexico over an 84 day period. In this time period multiple attempts were made to cap the well, all of which failed.

Figure 4.4 Deepwater Horizon before and after explosion. Source: *LA Times* 2010.

The Deep Horizon was owned by BP plc (formally British Petroleum) which is one of the largest companies in the world in terms of revenues, market capitalisation and production. It is a British company with its headquarters in London. BP bought the drilling and production rights to Canyon Block 252, some 41 miles (66 km) off the Louisiana shore in 2009 (Figure 4.5). This was where the platform was located at the time of the disaster. The platform was positioned in a water depth of 4,993 feet (1,522 meters) with the drilling equipment reaching a depth of 18,000 feet (5,486 meters) (Pallardy 2011). Drilling began in February 2010.

Figure 4.5 Location of the Deepwater Horizon disaster. Source LA Times 2010.

As was stated in the first chapter Louisiana has over 3,000 offshore platforms so the location of the platform was not out of the ordinary (although in deeper waters then the norm). The platform was one of the newest and most sophisticated in the world (built 2001) with the latest industrial technological innovations incorporated. In fact according to Transocean, the operators of the platform the Deepwater Horizon , the platform set new world records for both the deepest oil well dug (35,055 feet) and for operating in the highest depth of water(10,011 feet) (Transocean 2013).

A massive operation was put in place from the minute the disaster began to try and contain the oil spill. Due to its location, it was very accessible and crews arrived within hours to attempt to stop the fire and control the oil leak. The by then raging fire on the platform however meant that despite its technological prowess, attempts to stop the leak using the still functioning safety risers on board was made impossible and with the platform collapsing two days later, the possibility of easily capping the well were over.

The resulting oil spill was enormous in both scope and scale. The effect of it was seen especially in the impacts on the economy of the neighbouring states, on the industry, on politics and on the environment to which President Obama when addressing the nation particularly focused, describing it as "the worst environmental disaster America has ever faced" (Anasta *et al*. 2010, p. 9250). The extended duration of the disaster resulted in sustained media coverage and a huge public outcry that was fuelled by imprecise information and unkempt promises (Jorgensen 2010). These promises ranged from technical, to environmental to economical. Technical assurances by BP and the government such as that the spill could be contained and that the technology being employed was full proof turned out time after time to be false assurances. Economical guarantees of payments, compensation etc. were delayed, re-negotiated or slowed down. Environmental promises and information stating that the well would only leak 5000 barrels a day and it would have little impact on the environment were false. In fact it leaked approximately 65,000 barrels a day and had an immense impact.

Reports such as *The Fate of the Oil* were composed for the US congress and published on what happened to the leaked oil. The report created three categories of what happened to the oil,"1, human intervention direct recovery from the well (17%), in situ burning (5%),skimmed (3%); chemically dispersed (16%). 2, Natural processes: naturally dispersed (13%); evaporated or dissolved (24%). 3, Other , remaining, on sea floor, ingested by microbes etc. (22%)" (Ramseur 2010, p. 1). However, within the same article they also say they are not sure about any of the figures (their own) due to "considerable uncertainty" (Ramseur 2010, p. 3). This false information and uncertainly fuelled public anger and media coverage and unlike most disasters which last only a week in the media, the Gulf of Mexico oil spill was a slow-motion disaster that exceeded the usual media attention span, commanding substantial coverage week after week (Pew Research Centre 2013).

The specific causes of the disaster were laid out in the national commissions report to the president entitled *Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling (National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling 2011)*. The main findings of the commission in relation to the cause of the disaster were the following. A series of specific human, managerial and technological/engineering failures were the immediate cause of the disaster. These included faulty valves, inadequate cementing, misinterpreted pressure reading, non-monitoring

of safety readings and off centre pipes that lead to the fail-safe not functioning. All of which could have stopped the leak of hydrocarbons and so the initial explosion. In addition was the wider culpability of the industry (in its focus on speed and profits) and government (lack of regulation) and on an even wider scale, which the commission described as a culture of complacency and risk taking. In summary the cause of the disaster was due to a systemic failure of the technological system both internally and externally.

5. STS and Disasters

This chapter will highlight STS literature and research on the subject of disasters. It will begin with a brief overview of the discipline and the particular interest that disasters could have for it. The second section will examine the different directions STS research is taking, including expertise, knowledge transfer, public understanding and responsibility. Both established and contemporary STS studies on disasters will be highlighted owing to the fact that much of the STS research on this specific topic is still in its infancy.

5.1 STS and Disasters an Overview

Although STS as a field of study is comparatively young[3] when compared to its contemporaries such as the philosophy of knowledge, it has managed to complete a lot of highly respected and referenced research on the subjects of science and technology. STS has built up quite an array of literature that has both expanded our knowledge of both topics and also resulted in new ways of viewing both fields. Key focuses of STS have been on how techno-scientific knowledge has been and is been produced and the intertwined role that wider society (economic, political etc.) has in this process. In addition much STS research has in turn been conducted on how this techno-scientific knowledge subsequently affects society's structures, systems, and ideologies. It examines how we think and see the world and perhaps most importantly examines the questions that we ask, not only of ourselves but of what is "out there". Narrowing the focus to technology and STS, one can see that the analysis of technology outside of a purely deterministic paradigm only became a focus in the mid to late 1980s with Mackenzie and Wajcman (1985) concentrating on the social shaping of technology. This was preceded by Biker and Pinch (1984) who examined the social construction of facts and artefacts. They later expanded on the idea with Hughes in their seminal study on the social construction of technological systems (Bijker *et.al.* 1987), which calculated that the sociology of scientific knowledge's (SSK) theoretical and methodological approaches could also be applied to the research of technology.

[3] Although the initial attempts at examining the functionality of science can be traced back to the 1920s-1930s the birthing of STS is usually attributed to Kuhn and his seminal (and at the time quite controversial) work *The Structure of Scientific Revolution* (1962). Kuhn outlined how scientific facts were not just a representation of nature but in fact were a representation of the scientists socially conditioned and influenced research and was linked to other social happenings such as policies, ideologies, structures etc.

According to Woolgar these works created "the turn to technology" (1991, p. 2), no longer was science alone analysed in how it produced knowledge and its effects on society. The traditional technological deterministic approach was now challenged by attempts to apply relativist-constructivism to technologies and so resulted in the opening up of new avenues of research that had previously remained hidden or over looked by others such as historians of technology and philosophers of technology.

Although a lot of STS research has being conducted on technology, a lot of the focus has been on the development and the diffusion of technology and on the inherent make up of technologies and technological systems and what actors, both human and non-human, are involved. Some aspects of technology as a subject still remain somewhat under developed, one such aspect I would argue is that of technologies and disasters or to put it in another way socio-technical disasters. As can be seen from the recent Fukushima nuclear plant disaster and the increase in the amount of socio-technical disasters as shown in the previous chapter, one can see that technology is deeply involved in most modern disasters. What is surprising is that while these disasters are technological happenings and result in large scale technological and scientific activity, including new scientific research, technological debates, technological policy changes and the inclusion of new lay actors that are not normally involved in technological brokerage, the STS research on the topic is quite thin when compared to other STS research areas. In fact technological:

> Disasters are not only techno-scientific in their origins, but also unleash torrents of techno-scientific activity, directly and indirectly. These activities have included basic and applied research, policy innovations, technology development, the creation of new funding mechanisms, expert-lay collaborations, and the reorganisation of scientific networks. These recent examples leave little doubt that large-scale disasters contain wide ranging techno-scientific practices, knowledge, and incorporate multiple institutions and communities. They also suggest that the social dynamics of science and technology are deeply implicated in how governments, industries, legal systems, affected communities, and other social institutions deal with disaster, risk management, emergency response, and long term rescue.
>
> (Fortun and Frickle 2013, p.4)

Socio-technical disasters thus create a multitude of interesting STS topics and possible research areas. They also allow researchers to move away from the typical long term examination of the development of a technology, marked by long intervals of relatively nothingness, to a vibrant singular event that can change everything in a nanosecond and alter the institutions and structures of the technology and its place in society, but "to date, however, a synergistic body of STS research on disaster has not emerged" (Fortun and Frickle 2013, p.4).

Nevertheless, this supposed apathy towards disasters seems to be changing and STS and disaster studies are not the only social sciences that are now becoming interested in disaster research. In fact a quite diverse number of disciplines have taken an interest in disasters since the "big three" of the

2000s i.e. Hurricane Katrina, Deepwater Horizon and Fukushima. Other social scientific disciplines, such as environmental studies, public health studies, security and public affair studies, are now focusing more and more on disasters, especially in America where two of the big three took place. These disasters have also resulted in an exponential growth of interest in recent years in new disaster research from within the STS Field, with new conferences, workshops and numerous papers in production on multiple aspects of disasters. They have also resulted in bringing established STS scholars who had previously examined disasters back to the topic. A good example is Jasanoff who did a lot of research around the Bhopal disaster in the 1980s and early 1990s (Jasanoff 1994). Since then she has focused on other areas, but after the Fukushima disaster returned to the topic penning a number of articles. In general however, the major scholars of the STS field have remained absent such as Latour, Wajcman and Haraway.

In saying that, different theoretical approaches to studying disasters, including examining scientific expertise and other types of knowledge, inclusion and exclusion in the governance of science, different epistemic cultures, institutionalisation of risk and of black boxing of knowledge, promoted by well known STS scholars like Wynn ,Collins and Epstein are been included in research (by mainly new scholars) but it remains the case that many of the fundamental theoretical and methodological approaches of STS still remain absent. As a result, unfortunately no complete body of work exists on technological disasters within STS. Perhaps there never will be and maybe it is not even possible due to the number of ways one could examine them. Even though there are no real STS schools of thoughts or circles on the topic, lately new research is beginning to emerge on the theme. Different approaches and ways of looking at disasters are now being highlighted by new STS research.

The number of specific STS forums/conferences and workshops related only to disaster research are on the rise, a good example is the STS forum/workshop on the 2011 Fukushima disaster held at the University of Berkley (Berkley 2013). Besides specific forums such as this, the focus of STS in general is now beginning to shift towards disaster research (Table 6.1).

Table 6.1 Content analysis of papers presented at 4S/Easst conferences

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
4S/EASST	0	0	1	1	2	3	4	21	18	16

I conducted a content analysis of STS titles presented at the principal STS conference, the society for social studies of science conference (4S). Some years also include titles from the European association for the study of science and technology (EASST) as they were held jointly[4]. And although it is only one conference and there are others, the 4S conference attracts over a thousand participants from the STS discipline; it is nearly forty years in existence and is seen as a legitimate "place" for the production and dissemination of STS knowledge and so is a good indicator of trends within the field. From the analysis of the papers submitted to the conference, the years 2011 to 2013 have seen a marked increase in the interest by STS scholars and administrators in disaster studies rising from zero in 2005 to over twenty in 2011. In fact 2010 saw the first time in which disaster studies was a distinct theme of study being assigned its own specific niche. In 2011, disasters had moved centre stage with the then president, Wajcman, particularly pleased with the topic "Dealing with Disasters: Perspectives on Fukushima from the History and Social Studies of Science and Technology", giving it special mention in the president's address. In fact that year there were nine distinct sessions dedicated to just disasters, laid out in the program as: *Dealing with Disasters, Uncertainty and Disasters, The Politics of Uncertainty One, Two and Three: Disasters and STS, From Many Angles: The Deepwater Horizon Disaster and Disaster Science Studies, Nuclear disaster and Communication, and Narratives of Place in Communities of Exposure and Disaster*. Since then each conference has had multiple sessions dedicated to examining and discussing disasters and the STS literature on them. While the trigger for this "turn to disaster" (to borrow and modify Woolgar's term) within STS was probably due to the "big three" that marked the beginning of the century, the focus has gone beyond them and so a wide array of disasters are now the subject of research. The research ranges from the Dofiana disaster in Spain to California wildfires to the Heibei Spirit Oil Spill in Korea to name but a few.

Just as no core disaster is the focus of all STS research, neither is there only one methodological or theoretical approach to the STS study of them, which of course is a positive as it does not lead to the rehashing of the same old same old. Approaches vary from public understanding of science to historical narratives of the institualization of disasters to information communication technology (ICT) and subsequent knowledge flows and citizen science that emerge as a result. In addition to the disasters themselves STS is also focusing on the science that's involved in the making of disasters and also in the response. Topics of study range from examining how epistemic orders are constructed (Fickle 2013) to the forming of paradigms (Bond 2013) to the collaboration between different scientific fields (Olson 2013). Of course that is just a brief overview; the following section will

[4] Content analysis was conducted on the program of presented work by year. Only included in the analysis were submitted papers and not round table discussion, debate, speeches etc. Only titles contenting the key word "disaster" were included in the result. The rise in the number of titles relating to disasters cannot be put down to the fact that it was a joint conference between 4S and EASST. The 2004 conference was also a joint meeting yet had 0 results while the 2011/2013 conferences were solely 4S and produced multiple results. Also note that the 2010 conference was jointly conducted with the Japanese Society for Science and Technology Studies. All programs are available and were accessed on the following website http://www.4sonline.org/meeting/past_meetings.

highlight the major directions STS research is taking in relation to disaster studies with an examination of contemporary work along with more established research that can contribute to the understanding and mechanisms of disasters.

It must also be noted that while an increase has been seen in STS focus towards disasters, STS focused journals have been slow to follow suit, as can be seen in their publication of new material on the subject. For example the journal Science, Technology and Human Values has only two articles where disasters are in the title since 1976[5], the journal Social Studies of Science has published four articles since 1971 where disaster is in the title[6] and finally the journal Science Communication has published one article since 1979 with disaster in the title[7]. Of course this is a limited analysis, and of course papers on disasters do not have to have the word contained in the title[8], but what can be seen is that compared to the publications at STS conferences where the same analytical criteria are applied there is a vast void between contemporary research and interest within STS and STS journals publication prerogatives in recent years. For this reason some of the papers highlighted will be from STS conferences in order to give a better sense for the current directions in disaster research which is expanding at an exponential rate.

5.2 Different Directions in STS Research

The remainder of this chapter will focus on examining a mixture of established STS texts that cover a wide spectrum of disasters, including the Chicago heat wave (1995), the Challenger explosion (1986) and the Bhopal disaster (1984) (they are the groundwork in many cases upon which contemporary STS disaster research is now building) and emerging research that focuses usually but not always on recent disasters. As will be seen, four main directions are emerging within STS research focusing mainly on communication, expertise, responsibility and the aftermath. Besides these dominant positions other probing research is being promoted, such as the effects of disasters on scientific "truth" and legitimacy (Haran and Kitzinger 2006), group identity and imagination (Heems and Kothuis 2012) and the role of non-humans and risk (Rodriguez 2013). In addition some STS work on

[5] Data for the content analysis was accessed using the following search engine: http://sth.sagepub.com/search/results

[6] Data for the content analysis was accessed using the following search engine, http://sss.sagepub.com/search/results

[7] Data for the content analysis was accessed using the following search engine, http://scx.sagepub.com/search/results

[8] It must be noted strongly that this analysis just gives a possible inclination of the course of events. It is of course possible that the authors of research do not put the notion of disasters as the central focus, but instead the individual disaster is referred to by name or the category of events it belongs to. Also the possibility exists that research is titled differently for different audiences and different "places of knowledge". Including all eventualities was outside the scope of this paper, the observation was only highlighted due to the research of the state of the art. Perhaps the question of 'whether research labels go through a transformation process when applied in different situations and places' could make for interesting further research.

disasters will remain absent from the following segment as it is expanded on in more depth in the next chapter, as it forms the backbone to the hypothesis of this paper.

5.2.1 STS- Disasters- Communication

One of the main themes in current research on disasters within STS is on the media's role during and after disasters in both the construction of the event, transference and transformation of knowledge (science communication) and in event setting. In 1980 the National research council (USA) completed perhaps the first comprehensive examination of the media/disaster dichotomy when it formed a committee to examine disasters and the mass communications media and the important role they play in constructing disasters. Starting out initially as a workshop but developing into a comprehensive book, it examined the mass media and the relationships between government leaders, relief agency officials and media professionals. Some of the chapters included in the work were on mass media disaster reporting, comparison to other mediums of communication and the rights and wrong of media coverage of disasters (National Research Council 1980). A more contemporary examination of the media and its role during and after a disaster was examined by Anderson and Marhadour in their well titled paper, *Slick PR? The Media Politics of the Prestige Oil Spill* (2007). In their paper they examine the ways in which different national newspapers framed the Prestige oil disaster. They contrast it with earlier disasters to highlight differences in reporting over time and in their findings show how geographical propinquity to the accident increases coverage. They also explain how different newspapers focused on different stories to tell, be they ecological or economic narratives and finally they relate this to the wider notions of globalisation and the politics of risk.

The focus of new research, however, is not just on traditional media sources, such as newspapers and television, but also on social media websites or on the combination or comparison of both types. Shineha (2011) for example, focuses on the triple disasters of 3/11, i.e. the earthquake, tsunami and Fukushima nuclear disaster that hit Japan on the 11th of March 2011. He examines the different discourses and representations about the disasters and the scientific information used to construct them in both social media sites such as Twitter and Facebook and in several elite USA/UK/Japanese newspapers. He raises questions related to public understanding of science, science journalism and science/risk communication and how they are enacted differently by different media types and in different countries. Mikihito and Kakubayashi (2011) continue on a similar theme of disasters, the media and science communication and also focuses on the 3/11 disaster[9]. The core of their work deals with what they refer to as the problem between science and the media. They studied the conflicting

[9] Interesting to note how Ryuma and Mikihito both refer to the events of 3/11 differently, one seeing the happenings as one event while the other as a set of three distinct happenings. This topic will be discussed in more detail later in the paper.

information coming from the scientific community and the internet and they tracked how the disaster shifted from being a natural disaster to human disaster and the various scientific explanations given along the way. Eventually the scientific community told experts to refrain from commenting due to the conflicting reports. Various sensationalist news headlines that travelled through the internet from other countries also created much doubt and further confusion. Mikihito and Kakubayashi analysed the role of media and the scientific community in the face of unprecedented disaster). Social media played a large role in the 3/11 disasters according to Ito (2011) who focuses solely on Twitter as a source for examining the rise and fall and the circulation of knowledge during disasters. He argues that information and its distribution during the disasters was vital as it was a matter of life and death. Social media at the time emerged and became a viable alternate to traditional media sources. How technical information circulates during disaster, how information is judged reliably and how new media technology helps in constructing experts and non experts are all examined. The study analyses "twitters" as various kinds of experts as well as actors in the circulation of knowledge (Kenji 2011).

Another interesting and slightly different approach of examining disasters and the media is to observe how the media through films, books, documentaries and other literary modes create an imagined since of disasters and technologies role in them. In a very interesting and compelling read Woodcock (1979), perhaps before his time, wrote about how "disaster thrillers" can influence the public imagination even without them been plausible. He refers to many different literary works which describe some technology or technological system bringing about a large scale disaster. He highlights how these disaster thrillers can impact public perception even more as they highlight their scientific credentials using actual scientists as advisors and actively telling the public this to add some scientific legitimacy to their disaster narratives. Woodcock argues that a further step in this process is where scientists themselves are the authors of some of these novels and fill the books with technical detail all of which seems credible to the reader with a basic lay knowledge of the technology. It is a very interesting early work on the creation of a public imagination of disasters and technology and the relationship of mass media and science in the process.

The Typhoon Morakot disaster which hit southern Thailand in 2009 was the central focus of the research completed by Wei-Chu (2010), who also focused on social media during the disaster. He however, focuses not just on social media as a transmitter of information but as a place where government, non government and citizens can pool knowledge to try and manage the disaster and relay that information to the public. He goes beyond just examining the happenings within social media sites however, and expands the issue to the broader idea of ICT's and their use in public participation during disasters and how they can be employed for efficient government responses. ICT's were also the focus of Eden (2011), where she examined the effect of disasters such as earthquakes and how they shape national communication infrastructures. The relationship of communication technology, disaster and socio-political dimensions are all studied with a focus on

Chile, where she studies the idea of a centralised state, a national communication systems and the 2010 earthquake and how they all actively shape each other). Sims (2007) touches on this notion of resilience also, by drawing attention to Hurricane Katrina and the false assumptions that technologically advanced societies can withstand natural disasters. He focuses on infrastructures that enable human action or allows technology to operate and the risks associated with them and how they are an interest of study for scholars, engineers and policymakers alike.

5.2.2 STS- Disasters-Responsibility

Of course the cause of disasters and who is responsible and to blame are also areas of study for STS scholars. The attempt is usually made to go beyond the blame game and finger pointing so often seen after disasters, but this is not always the case. This segment will begin with the well referenced book *The Challenger Launch Decision* by Diane Vaughan (1996) who focuses on the Challenger Shuttle disaster, specifically on the decision to launch it and the causes of the disaster. She goes beyond the immediate technical problems that were highlighted as the cause of the disaster in the conventional explanation and instead looks for a deeper account of the disaster within a complex technical system and culture and highlights the risks of such technical cultures going forward. Reasonability in the advent of such advents is regularly placed just on simplified socio-technical components where one or two entities are highlighted as being the fault. Instead she looks at the disaster as part of a wider system and cultural failure. While other academic fields highlighted managerial wrongdoing and production problems/pressures as the main cause of the disaster, she talks about ideas such as risky technology and culture and deviance within organisations, notably NASA. She argues that the report of the presidential commission on the space shuttle challenger accident is lacking in its analysis of the event and as a result could lead to such further events in the future. The technical failure of one component was not where blame should lay, no one event or individual was to blame but it was the result of what she describes as a technical culture where "acceptable risk" and "normalisation of deviance" were inherent. Over time organisational blindness to uncertainty and risk and the use of designs known as flawed, will on numerous occasions lead to the disaster and if repeated will invariably lead to more.

In a similar tone Fickle and Vincent (2007) focus on the unintended organisation of ignorance. They highlight a system of knowledge production composed of expert systems that give society an unfounded understanding of environmental and public health hazards. They focus on scientific disciplines and regulatory agencies who, they argue, leave a lot of knowledge production undone due to the inherent practices for producing knowledge inbuilt into the system and so can impact on the cause of disasters.

Clarke (1999) examines the subject of disaster from the perspective of how documents/contingency plans are used by organisations and institutions, such as the government and big businesses, to prepare for disasters. He argues that in fact these documents are mere "fantasy documents", used to create confidence both within the organisations and in the organisations portrayal to the public. Clark argues that these documents are ways of relaxing our fears of technological progress when in fact we cannot control our technological advances. He gives empirical examples of how the contents of these plans are useless in the face of the actual disaster. He goes further when discussing plans for fires in Manhattan and contingency plans for an oil spill in relation to the Exxon Valdez disaster. He focuses on the dependence of society on big organisations and the experts within that who allay our fears and that possibly admitting that we cannot control all outcomes (such as during disasters) of our technological activities is preferable and so create a more realistic reaction to disasters. Like Vaughn the idea of risk and organisational culture being blind to risks are made apparent.

Klinenberg (like Vaughn) in his quite famous work *Heat Wave A Social Autopsy of Disaster in Chicago* (2002) tries to dig deeper into the idea of what constitutes a disaster and so where responsibility lies. According to Klinenberg stating that a disaster was an act of nature and therefore natures fault is too simplistic. The heat wave that occurred in Chicago in 1995 resulted in the death of over 700 people in just two days. Temperatures reached heights of 52 Celsius and overwhelmed the social systems of the city. While many recorded the event as a natural disaster, Klinenberg examines the social and organisational entities within the city that, if not created the disaster, at least aided in its construction. Key areas that Klinenberg focuses on in the book are why so many died at home and why certain neighbourhoods suffered more than others. How the media, the government and scientists constructed the event and why so many different narratives emerged are also key focuses. The disaster opened up for analysis the institutional abandonment of certain neighbourhoods, isolation of the elderly and a general failure of social systems in which no single entity was to blame. He argues that while this disaster highlighted the cracks in the social foundations of America, it is again business as usual until the next disaster takes place, with the same inevitable conclusion yet again unless decisive action is taken.

The Hurricane Katrina disaster was examined along similar lines by Woodhouse (2007). He approached the work with three questions in mind. Firstly was the event an aberration or was it something deeper? Secondly, was the cause of the event the result of decision making processes similar to those governing other public outcomes? Finally, he posed the question, does post disaster analysis lead to systemic learning and better policy or to nothing? After answering these questions he focuses on the idea of usable knowledge and expertise in relation to the disaster. The cause of disasters is also a theme returned to by Korean researchers who examined the Heibei Spirit oil-spill, one of the worst disasters in Korean history which damaged one of Asia's largest wetland areas, harbouring many fishing villages, migratory birds and a national maritime park. Responsibility was a

key factor in the disaster due to the cost and scale. They use Perrow's theory of "normal accidents" to examine the nature of the accident, and then focus on the community's reaction and fortitude to the disaster and so the relationship between technological risk and capacity (Chung 2011).

Other STS researchers focus on the social responsibility of individual scientists, engineers and other experts or on groupings of them. Fujigaki (2011) examines the idea of disaster itself and what "unexpected" means and how this can impact on the responsibility, or not, of scientists and engineers. He looks at how responsibility can be measured by scientific fields on levels of risk, blame, cause etc. He highlights preventive training and simulation of tsunamis in the region by experts and their obvious failure to predict or prevent the disaster, and he asks does that mean they are responsible? Also, he looks at the gap in opinions between different scientific fields on how best to measure the fallout and how it led to citizens making their own minds up from the internet and other "lay knowledge". Again he focuses on who is socially responsible.

Catalon (2011) also writes about the idea of ethics, specifically engineering ethics, in the aftermath of disasters and how they are seen as the cause of the disaster and those morally responsible. He examines engineering ethics and the call for more to be done to protect the environment and society from future disaster. He approaches the question of ethics and responsibility from a complex system approach. Knowles who has written on different aspects of disasters focuses on three disasters, Katrina, Sandra and the World Trade Centre; he investigates two areas of "learning from disasters" and looks at engineering roles in disasters (Knowles 2011). A central interest of his is how engineers are being put at the forefront of disaster mitigation and what this means for their traditional engineering practices and ethics that are specific to their discipline. Knowles also asks what it means for the future, are engineers going to be the fall guys for failure to prevent, predict or lesson the impacts of disasters?

5.2.3 STS- Disasters - The Aftermath

Besides the cause of disasters and how responsibility is constructed, STS research is also interested in seeing the reconstruction or fallout in the aftermath of a disaster, the roles scientific institutions, lay communities, legal institutions and other groups play and their reactions and the relationships that form after a disaster. Jasanoff edited a collection of articles in the early 1990s and published them in a book titled *Learning from Disasters: Risk Management after Bhopal 1994.* She acknowledges that the disaster was the result of a complex relationship between technology and society but the book focuses more on things that changed directly or indirectly due to the disaster, such as industrial risk management. The book aims to address the wider questions about transfer and control of hazardous technologies and the capacity of human societies to learn from failure. The paper highlights what can

be learnt from disasters but also the limitations due to economic, political and institutional constraints. Jasanoff herself focuses on the role of society in the making of socio-technical disasters and in the possible role changes to social rules and practices could play in minimising them.

Barrios (2008) examines the recovery planning after Hurricane Katrina, and if, as suggested by governmental institutions, it allows residents to be the ones to direct the cities reconstruction. Barros argues that this is not the case, that it is a complex procedure where different actors and their knowledge engage one another but where local participation was not fully engaged. Post disaster negotiation, expert knowledge, institutional procedures and local communities are the topic of study in his paper). Vaughan (2011) would disagree with this assessment, he examined the 3/11 disasters and the Hurricane Katrina disaster and showed the difference between them and the 1995 Kobe earthquake (Japan) post recovery plans. In the 3/11 and Katrina disasters local engagement was ignored but eventually was acknowledged due to public outrage and so local communities were included in the decision making process. According to Vaughan large scale public participation took place in New Orleans in conjunction with consultants and experts. Initiatives were laid out to include lay knowledge and upstream the lay citizen in participation. Within this context Vaughn focuses on various questions, including, if it was successful or not and how can you measure success? How does one configure oneself in the aftermath of a disaster as a citizen, expert or other category? How do the people living there see the boundary between the natural and built worlds (Vaughan 2011)?

Fortun (2001) examines the Union Carbide chemical plant disaster in Bhopal focusing on the global distribution of technological risk and the innovative model to deal with it that came about as the result of legal proceedings. Fortun examines the legal proceedings in different countries and different settings in relation to the disaster and how it was constructed and represented. She introduces the term "enuciatory communities" to understand how disasters create or entice the materialization of new social entities around notions of responsibility and ethics; she does this from the perspective of different groups such as lawyers, women, and workers and so on. Fortun is also keen to point out that Bhopal was not an isolated disaster and that it could happen again, especially with the transfer of risk to countries where laws are not as strict, in other words the globalisation of risk.

Shrum (2013) wrote on the subject of Hurricane Katrina and focuses like Fortun on the litigation that came in its aftermath. He showed how the investigation of the flooding was the most costly largest scientific and engineering investigation to emerge from a single disaster. He outlines three levels of intensity that made this investigation so costly and time consuming. First, on the rescue level and the seeking of rough knowledge, second, on the organisation level and the competing and collaborating groups constrained by legal issues and the third level was where liability had to be proved by expert consulates and witnesses. He argues that the litigation progress shaped the location and character of the investigation and the explanation of the disaster.

Fickle has completed a number of works on disasters but a lot of his focus is based around the Hurricane Katrina disaster especially its aftermath (Fickle 2008). He investigated among other things the uneven spread of knowledge, or as he puts it knowledge gaps, in the New Orleans area in relation to hazardous material. The Environmental Protection Agency's (EPA) hazard assessment of soil and flood sediment was mapped and analysed by Fickle. He uses it to see how lost historical knowledge and contemporary knowledge gaps, created by agencies such as the EPA, are related. The failure of past generations to collect data and the subsequent institutionalization of this lack of knowledge and the associated inequalities are the main focus of his work, which was highlighted by the Hurricane Katrina disaster. Staying with the Katrina disaster, Fickle with Campanella and Vincent focus also on the epistemic resources or knowledge investments and how they are distributed differently in different neighbourhoods such as in the African-American neighbourhood, which were heavily contaminated. The social and policy implications of such actions are analysed in the aftermath of the Hurricane Katrina disaster (Fickle *et al.* 2009).

5.2.4 STS- Disasters - Expertise

Expertise and the idea of citizen science, prevalent throughout STS studies, also finds a home in disaster studies. While Knowles' book entitled *The Disaster Experts: Mastering Risk in Modern America* (2011) is a new publication, it could soon become a go to book for STS scholars examining disasters and expertise. Knowles highlights how various experts such as scientists, public officials and engineers repeatedly failed in their preparation and in preparing society for disasters. He discusses who the experts are, how they influence decisions, how they became so powerful and how nothing has changed in the last decade in relation to the prevention of disasters. He chronicles America's disaster expertise over a 150 years span, highlighting the rise of experts and the disciplines they belong to. He examines how they have affected American disaster policy in an urbanising society, and what will be the future of disasters and experts in the American context. Knowles (2012), focusing on experts and using STS analytical tools, reveals experts to be more than just neutral arbiters of "the facts" of a disaster. He argues that disaster experts are in fact actors who actively construct the event along with others and create a narrative of what exactly the disaster was. The experts are themselves a product of the society that created the disaster and so the facts they create cannot be seen as neutral. Knowles examines the investigation committees into the Fukushima disaster to see how the different experts created the disaster narrative, and whether they broke away from the norm of similar investigations which try to calm the public in the aftermath of a disaster.

Kimura (2012) focuses also on the aftermath of the Fukushima disaster but instead of examining recognised experts focuses instead on how citizens created their own knowledge and actual knowledge practices in the absence of real science. He examines how citizens, using Geiger counters,

measured, recorded and disseminated the information to the public. This "citizen produced science" and the scientific institutional knowledge was at times combined to produce maps to relay information to the public on radiation risks. Disasters create confusion and loss of control by existing scientific institutions and the paper highlights how knowledge generated by individuals can help inform the public and bring back a sense of control to the situation.

Building on this theme, research is being carried out at MIT on citizen science and the efforts of non-scientists to document the Deepwater Horizon disaster. Individuals are actively collecting data and archiving it in a mapmaking process called *Grassroots Mapping*. They are not connected to any institution but do it, in their own time, for free, to document the event. The researchers believe this alternative scientific data collection and storing outside of existing institutionalised fields is an interesting area of research for environmental justice issues and for STS in general. They examine the different individuals and their expertise that make up this mapping process and the relationships between them and the development of the concept of a Public Laboratory for Open Technology and Science (PLOTS) (Dosemagen *et al*. 2011)[10]. Allen (2007) also examines this idea of expert knowledge and environmental justice in the aftermath of disasters and attempts at creating competing science from the public. She focuses on citizen groups and their attempts after Hurricane Katrina to fight for different causes; environmental justice, against the placement of hazardous sites in minority or poor areas and for payment of damages to communities by pollution. She examines the workings of such groups, the formation of relationships with outside groups (national, multinational etc.), the use of activist or independent experts and the inclusion of different racial and social class members.

Frickle is also currently undertaking research on citizen science in the aftermath of the Deepwater Horizon disaster (McGuire 2010). He is studying how the "experts" involved in the disaster worked with members of the local community to produce meaningful scientific results in the environmental outcomes of the event. Working mostly with coastline fishermen, the ultimate goal of this research will be to analyse a real-world example of a citizen science collaboration to better understand how it functioned and how successful citizen science can be performed

[10] More information can be found on the current research and the state of the PLOTS project on the website http://citizensciencequarterly.com/, where they have also begun to publish an online journal called Citizen Science Quarterly, which is "dedicated to the open pursuit and sharing of scientific knowledge".

6. Theoretical Approach

The previous chapter highlighted the different approaches that STS researchers have used in examining disasters, and the questions that they deemed required answering. From this analysis it was noted that while the media's role in constructing socio-technical disasters, and the possible effect on the public's understanding of them has been examined, the research has focused only on single disasters or on the reporting within a single nation. Little research has been completed on how national media sources frame the same socio-technical disaster and how the framing might change at different moments in time. A knowledge gap in general exists in relation to how different publics get their understanding of disasters based on location and moment in time. It is not just within the STS realm that this knowledge gap exits, but across the social science spectrum there is a general lack of research done on how the media frames disasters. This chapter will first illustrate the approach this paper utilizes in analysing the two case studies. This will be followed by a section exemplifying the hypothesis, the rationale for it and the literature underpinning it. In addition the research questions that will be used in analysing the data sets will be established.

6.1 Media Framing

This paper's approach is to examine if the media frames socio-technical disasters differently in different countries and at different moments in time. This assessment includes examining the dominant issues, the coverage, the causes and the sources included in the framing of the case studies. The results of the analysis could help to shed light on how different publics get their understanding of such disasters. This is due to the fact that the media is the principle source of information for the public, and the source that has the biggest influences on public perception. This examination will use the Piper Alpha and Deepwater Horizon disasters as case studies in order to determine if the media in the US and the UK frame disasters differently. For each disaster a media outlet from both the US and UK will be analysed to see how they framed it. One can then determine whether location matters in how the media frames disasters. After this has been completed a comparison will be made between how the UK media outlet framed the disasters in 1988 and 2010. The same procedure will be completed with the US media outlet. One can then determine if there were any fundamental changes after a twenty two year gap in how the same media outlet frames similar socio-technical disasters. This segment of the paper will examine what is meant by media framing, and why it's important. In

doing so it will highlight the diverse range of literature that is available and which approaches the topic from different angles.

6.1.1 The Premise of Framing

The theory of framing and frame analysis can trace its origins back to Goffman (1974). "Goffman proposed the frame as a construct, for how people organise experience, suggesting that people practice frame analysis as a way of determining what is going on here. He referred to frame analysis as a 'slogan to refer to the organisation of experience" (West 2001, p. 62). To quote Goffman directly he assumed "that definitions of a situation are built up in accordance with principles of organisation which govern events (…) and our subjective involvement in them; frame is the word I use to refer to such of these basic elements as I am able to identify" (1974, p. 10). To reiterate Goffman's theory, frames on the individual level are generally constructed independently of thought and come about due to the social world one resides in, as well as autonomous cognitive consideration. Frames work subconsciously to structure what is judged relevant and important in a given situation, and so form the reality of what's happening. Likewise what is deemed inane or futile is ignored and so remains outside of our attention, or focus in relation to given happenings. In its simplest form a frame answers the question, what is happening here?

Take for example the following situation. A large number of people are gathered on a street. They have signs and are making noise. This imagery might allow for an onlooker to frame the event as a "demonstration". One might notice the banners, signs and demeanour of the crowd associated with such a frame. Framing the event in this way however can also mean other possibilities or other happenings are ignored or given less notice such as on the interaction of the individuals in the group, what else is taking place in the proximity, or even the way one interacts with the environment. Certain frames stay in a motionless state while others are subject to flux. Returning to our example, if someone from the group was to suddenly throw a rock, the framing of the event might change from "demonstration" to "riot" as attention and focus is now placed on different aspects of the event.

The theory of framing has evolved beyond the individual, and the analysis of how he, or she, organises and structures reality. It relates also now to how organisations, institutions, groups and even cultures also complete this process. The possible outcomes of such framings for other aspects of the social world are also analysed. Today "framing is concerned with the way interests, communicators, sources, and culture combine to yield coherent ways of understanding the world" (Reese in Gandy *et al.* 2001, p. 11). Reese has developed a comprehensive definition of the concept and its use in analysis;" frames are organizing principles that are socially shared and persistent over time, that work

symbolically to meaningfully structure the social world" (In Gandy *et al*. 2001, p.11). Reese basis this definition around the following key points:

• Organizing: Framing varies in how successfully, comprehensively, or completely it organizes information.
• Principles: The frame is based on an abstract principle and is not the same as the texts through which it manifests itself.
• Shared: The frame must be shared on some level for it to be significant and communicable.
• Persistent The significance of frames lies in their durability, their persistent and routine use over time.
• Symbolically: The frame is revealed in symbolic forms of expression.
• Structure: Frames organize by providing identifiable patterns or structures, which can vary in their complexity.

(In Gandy et al. 2001, p.11)

Different academic interests have incorporated framing analysis into their methodological and theoretical arsenals, namely organisational studies, public administration studies and media studies. The focus of this paper is on how framing analysis is used within the later. Various conceptualisations of what media framing is, what it accomplishes, and its relationship to the framing procedure of individuals have emerged. The notion of separated media and individual framings existing in tandem is popular within media analysis, Entman describes this respectively as "information-processing schemata of individuals and attributes of the news itself" (1991, p. 7). This concept of having the ability to separate framings is however contested. Overall however it can be said that the concept of framing opens up an important field of analysis relating to how precisely the media constructs issues, discourses, and meaning.

6.1.2 Framing and the Media's Construction of Reality

Entman has written a number of papers on media framing. He states that media "framing essentially involves selection and salience. To frame is to select some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the item described" (1993, p.52). Just like Reese who argues on a wider sociological level that frames are organisational principles, Entman believes that media frames organise, and structure the social world by both conscious, and unconscious decision making, on the part of those who control what is published. In other words the media constructs a certain reality. Frames can be constructed through written word, images, or even by the selection of sources. For Entman when examining how frames are constructed, what is missing from media coverage is just as interesting as what's included. He also argues that media frames can influence the public, "frames call attention to some aspects of reality while obscuring other elements, which might lead audiences to have different reactions" (1993, p. 55).

Entman focuses more on the effects of frames as do Bliss *et al* who state that " a frame is a central organizing idea for news content that supplies a context and suggests what the issue is through the use of selection, emphasis, exclusion and elaboration" (1991, p. 11). In other words their view is that journalists/media institutions choose to concentrate consciously or not on a particular aspect of an event at the expense of other aspects, and can as a result affect the public understanding of it.

In a similar tone to Entman and Bliss *et al*, "Reese defines media 'framing as selecting and highlighting some facets of events or issues, and making connections among them so to promote a particular interpretation" (In Grimm 2009, p. 171). He goes on to say that framing is "the way events and issues are organised and made since of especially by media, media professionals, and their audiences" (In Gandy *et al.* 2001, p.7). Reese's focus however is not just on how the media frames events and subsequently influences the public, from his research on the media's role in framing political life he argues that simply reducing, labelling and classifying issues to a simple issue is far from easy. Reese believes that framing is a "interplay of media practices, culture, audiences and producers, the framing approach guards against unduly compartmentalizing components of communication (sender, content, audience)" (In Gandy *et al*. 2001, p.7).

Reese implies here that media frames are socially shared and organised while Entman and Bliss *et al.* lean more to the notion that the media socially shapes other actors reality through their construction of particular frames. Other academics in the field are also of this belief that the media plays a hierarchical role in how societies view the reality of certain events:

> Like a picture frame, media framings "allows for the inclusion and exclusion of certain content which changes how one views the picture. A picture's frame defines its boundaries, and at the same time influences the appearance of the content by managing the inclusion and exclusion of information and thus defining its bias. Changing the frame changes the contextual environment and the meaning of the picture.
>
> (Bauer *et al.* 2006, pp. 129-130).

"Gamson and Modigliani conceptually defined a media frame as a 'central organising idea or story line that provides meaning to an unfolding strip of events (…) The frame suggests what the controversy is about, the essence of the issue" (Gamson and Modigliani in Scheufele 1999, p. 106). It would seem therefore that the media plays a role in framing the reality of events. Is that significant in itself? "According to a constructivist media effects model, audiences rely on 'a version of reality built from personal experience, interaction with peers, and interpreted selection from the mass media" (Neuman *et al.* in Scheufele 1999, p. 120). Applying this theory to oil platforms most of society has no personal experience of them, and especially not of oil platform disasters or interaction with those that have. Consequently in order to organise and structure their understanding of such a disaster the public must rely heavily on the media's construction of it. Therefore the idea of sender, and audience not being strong devisers as Reese suggests is conceptually weak in this situation.

Others such as Goodman and Goodman take this concept even further, they argue that the media's selection and emphasis on aspects of an issue defines that issue for the public particularly when the public's level of personal experience with the topic is limited" (2006, p. 361), as is the case with oil platforms. It can be said so that how the media frames disasters so is not some abstract endeavour with no meaning, but it is in fact important to how the public comes to understand events, "mainstream news is a vital conduct of information to the lay public and to policymakers (…) news story frames highlight certain factors and thereby define problems and promote particular interpretations" (Antilla 2010, p. 241).

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This concept has been developed further by others such as Nisbet, who while analysing the public perception of stem cells demonstrated that framing by the media of an issue is not just some abstract deed but can influence public understanding of an issue. "Through framing, 'fluctuations in media attention and tone can affect whether the audience views stem cell research as beneficial (by arguing that this research can cure diseases), or dangerous (by emphasising moral questions related to abortion)" (In Grimm 2009, p. 194). According to Antilla, "how news organisations translate facts and frame their articles builds meaning and significance- or socially constructs the issue in the public sphere. The selection of stories by journalists can help shape public policy as well as influence public support for or against measures" (2010, p. 241). Although many researchers believe that the media influences public's perception, to what degree is somewhat in dispute:

> Marshal McLuhan's famous aphorism, 'the medium is the message' may be a simplistic way of understanding the power of the media in shaping audiences perception of reality, but media do present information that is framed, and therefore the messages can be powerful and persuasive (…) frames do make certain elements of stories more salient, and therefore can potentially influence audiences (the level of impact for salient portrayals of reality is questionable however)
>
> (Carter 2013, p.12)

In addition to how the media frames events it is also to what degree they frame them or what coverage is assigned to them that is also important. If a newspaper reports on for example the Deepwater Horizon, but only has one article in two years while another newspaper has 500 articles on three or four main issues then the public is more likely (obviously enough perhaps) to get its understanding of the disaster from the latter.

> "Research has found that when a substantive amount of news coverage is given to a specific topic, that issue increases in priority with the public (e.g. Nelkin, 1995; Trumbo, 1996; Cook, 1998; Norris; 2000; Hargreaves *et al.*., 2003). Similarly, Schudson (1995:20) found that '[p]ublic amplification provides a certification of importance. In fact, most people pay little attention to an issue or event until it 'reaches saturation coverage and continues to make the news regularly for an extended period of time
>
> (Antilla, 2010, p. 242)

In summary, the major premise of framing theory is that an issue can be viewed from a variety of perspectives with certain information becoming the reality while other information is ignored and made redundant. When framing theory is applied to the media it means that only certain perspectives, topics, actors and so on are included while others are excluded from the coverage of an issue. This inclusion and exclusion process in turn impacts on public understanding, and perception of that issue due to the media's special role as the main medium of information. When reporting on the Piper Alpha disaster for example, the media could decide to focus on one of many different issues and not report on others. If the bulk of the articles talked about the suffering of the survivors, people could infer that this is the most pressing issue involved with the disaster. Likewise if the media focused on the cause of the disaster in the majority of its coverage, people could conclude that finding the cause of the disaster is the most pertinent issue relating to the disaster. Summing up one can say that media framing concerns the way an issue is represented in the mass media. "It includes such factors as the actors that become associated with the issue; the aspects of events that are covered; the consequences that are explored; the causes and responsibilities that are attributed; and the conclusions that are drawn. At its most basic, a frame is one way in which an issue is written or talked about; other frames are always possible" (Bauer *et al.* 2006, p. 12*)*.

6.2 Hypothesis and Research Questions

From an analysis of previous research on the media framing of socio-technical disasters, and on similar topics such as the outbreak of diseases, food crises etc., from theoretical work and from the observations of the author the following hypothesis has been developed.

The Media frames socio-technical disasters differently and gives them different levels of coverage due to geographical location and moment in time, however the cause of the disasters remains constant irrelevant of place or time as do the sources used in constructing the framings.

For a methodical analysis, the paper breaks the above hypothesis down into four separate hypotheses which will be analysed separately against the data to see if they hold true or not. Naturally the results of this exercise will determine whether the overall hypothesis of the paper is valid or void. The Hypothesises are as follows:

Hypothesis 1: The media gives different degrees of coverage to socio-technical disasters in different geographical locations and at different moments in time.

Hypothesis 2: The media frames socio-technical disasters differently in different geographical location and at different moments in times.

Hypothesis 3: The causes of socio-technical disasters are always framed the same i.e. as "abnormal accidents" irrelevant of geographical place or moment in time.

Hypothesis 4: The media uses the same sources i.e. elite sources as their predominant source irrelevant of geographical place or moment in time.

In order to check the soundness of these hypothesises the paper aims to ask four questions of each data set. The questions are as follows:

Question 1: What degree of converge was given by the newspaper to the disaster?

Question 2: How did the newspaper frame the disasters?

Question 4: What reasons were given by the newspaper for the cause of the disaster?

Question 4: Which sources did the newspaper focus on while constructing its framing of the disaster?

The findings that are derived from answering these questions will be used on two levels. First of all they will be used to answer the core hypothesis of the text as mentioned above. Once this is completed I would than like to expand on certain notions that could become of interest due to the findings. Examples could be the possible rise of NGOs, the changing focus to the environment, narrative building in relation to wider events, differentiation, categorisation, localisation and even globalisation. Also how do the different media outlets construct the disaster? Is it a technological happening, a social happening or a combination of the two? As of now these are only possible areas of interest that could arise. The real findings will be discussed in chapter nine after the data has been analysed.

6.2.1 Coverage and Framing

In this section the rationale behind the following two hypotheses (due to their interwoven characteristics) will be highlighted based on previous research that has been completed on similar topics.

Hypothesis 1: The media frames socio-technical disasters differently in different geographical locations.

Hypothesis 2: The media gives different degrees of coverage to socio-technical disasters due to geographical location.

A vast analysis of the relationship between geographical location and media coverage of disasters was conducted by Endreny *et al.* in their book *Media Coverage of Disaster: Effect of Geographical Location* in 1991. They conducted a content analysis of major newspapers in the US between 1960,

and 1984 and demonstrated how the amount of coverage a disaster gets is related to its geographical location. They found that a disproportionate amount of attention was given by US press to US disasters with much less given to foreign disasters. They use a quote of Rosenblums to sum this up, "one dead fireman in Brooklyn is worth five English bobbies, who are worth 50 Arabs, who are worth 500 Africans" (Rosenblum in Endreny *et al.* 1991 p. 48). They imply that media sources first give more coverage to disasters within which they are located, and that secondly media sources within countries that are closer to each other all other things being equal both geographically and culturally will get more coverage. Numbers of dead or damage is not as big a factor as the location of the disaster. In their conclusion they say that "geographical location does influence the space and time devoted to natural disasters in the press" (Endreny *et al.* 1991 p. 58).

It is not just media coverage that varies by geographical location but also the framing as Anderson and Marhadour established. They analysed both in relation to the Prestige oil disaster (Anderson and Marhadour 2007). The Prestige disaster happened in 2002 and encompassed events surrounding attempts to rescue a stricken oil tanker 133 kilometres off the coast of Spain, which ended up sinking, and polluting the coast of Spain and France. Their research focused on completing a content analysis on how the media (in this case newspapers) framed the event. They focused on the local press in Spain, and the national press in Spain, France and the UK for their analysis of how the media framed the event, and the amount of coverage given to it. It was, according to the research, the most reported upon environmental disaster in Spain's history, and created large scale political, and public unrest.

In their findings they found that the Spanish newspapers provided the most sustained coverage of the disaster, and that the geographic propinquity to the accident was a good predicator for frequency and intensity of reporting. They found that Spanish newspapers in the time frame published over 700 articles on the disaster while the French newspapers focused only 57 times on the event, and the English newspapers had just over 70 articles[11]. The disaster was framed differently by all newspapers, based on their location. It was framed by the local newspapers predominately as an economic disaster and by the National Spanish newspapers the framing related to the ecological disaster and public protests. In the UK due to not being directly affected the focus was on the environmental impacts and on relating it to older similar events in the UK. Interest was not on socio economic concerns. Although France escaped the worst of the disaster, the sighting of "oil balls", and the risk of future oil spills were the main issues of concern. Initially the narrative was based around fishing and the effects upon it but the framing quickly changed and focused on a singular topic, how the spill could affect tourism.

[11] It must be noted however that many more newspapers were analysed in the context of the UK, 8 in total versus 2 for France. If the average was taking than French newspapers would in fact have being seen to have published more articles then their British counterparts. Again this would be in line with the notion of proximity to an event and so subsequent higher media coverage.

Bauer *et al.* have also researched the hypothesis that geographical location can influence coverage and framing of events, they researched how newspapers covered the outbreak of BSE/CJD in the UK once it became apparent it was a crisis (Bauer *et al.* 2006). In addition to geographical location they also demonstrate how over time the framing of crises can change. They examined both the coverage and the main way the issue was represented by the media in the UK, Finland, Germany, and Italy beginning in 1988, and ending in 2007. They analysed 21 newspapers in total and over 3,000 articles. Coverage wise they saw that the epicentre of the disaster the UK had sustained coverage from 1990 to 2000, that Germany had less coverage in the beginning, but as the crisis spread to mainland Europe the amount of coverage increased dramatically while both Finland, and Italy who remained distant from the crisis compared to the other two nations only covered it in depth when the crisis was at its peak in 1996-1997. So distance from the crisis/disaster and moment in time can be directly correlated with newspaper interest in the topic. The crisis was framed differently by the national media in each country. In the UK the research found that the most common frame used by the media was "food safety and public health", the media in Germany most frequently used frame was the "national interest" while in Italy and Finland it was the "cost/benefits of the crisis". However, at different stages different stories were the focus of the newspapers attention, and the paper ends its discussion by stating that "an overall observation can be made, that the framing of the BSE issue did not remain constant over time, most notably regarding "national identity" or in terms of "industrial food production". Such fluctuations in framing illustrate the fluidity of media discourse" (Bauer *et al.* 2006, p.162).

Finally this segment will reemphasise how at different moments in time the media can frame socio-technical disasters in different ways. Koerner and Friedman in separate research examined three nuclear reactor disasters at different times in history and showed how the same newspapers framed the events differently. Friedman focused on US media coverage including television and newspapers and found that there was an evolution in the framing of them over time with emphasis being put on different aspects of the disasters (Friedman in Sharon 2011). Koerner examined newspapers from Canada the US and the UK to see how they reported on the Three Mile Island, Chernobyl and Fukushima incidents. She analysed how they were framed in the since of the articles being positive, negative or neutral frames. Over time it can be seen from her research how the newspapers framing of similar events jumped widely with some newsperson framing of the similar events changing by over 25% (Koerner 2013).

6.2.2 Normal and Abnormal

In this section the rationale behind the following hypothesis will be analysed:

Hypothesis 3: The cause of socio-technical disasters are always framed the same i.e. as "abnormal accidents" irrelevant of geographical place or time.

To my knowledge less focus has being placed on how the media frames the cause of accidents (either as normal/system accidents or as abnormal/system accidents), when compared to other topics surrounding the subject. Focus has been generally placed on simply appointing blame to individual, human, or nonhuman actors and as Vaughan suggests in her research on the Challenger disaster, one must go beyond this simplistic recounting of events in order to allow the full story to emerge. For this reason the focus of this section will be on highlighting what a "normal accident" is, and why it is thought that the media do not frame the cause of the socio-technical disasters in this way.

The book *Normal Accidents: Living with High-Risk Technologies* by Charles Perrow shows us another way of looking at the cause of accidents and disasters (Perrow 1984). Socio-technical disasters it can be said are the result either of accidents or deliberate acts of terrorism. In his book Perrow focuses on the former and so tries to unravel the causes of them in high-risk systems. In doing so he develops his hypothesis of the "normal accident". He argues that instead of just blaming individual human or technical errors or faults for accidents in complex systems that there is another way. Following this new approach Perrow argues will mean society can avoid many risks associated with simplistic diagnostics.

He describes high risk systems as "enterprises which have catastrophic potential, the ability to take the lives of hundreds of people in one blow, or to shorten or cripple the lives of thousands or millions more" (…) every year there are more such systems" (Perrow 1984 p. 3). Examples of the high risk systems Perrow refers to are nuclear power plants, chemical plants, aircraft and damns among others. Perrow believes that "the characteristics of high-risk technologies suggest that no matter how effective conventional safety devices are, there is a form of accident that is inevitable" (Perrow 1984 p. 3), and so could be then regarded as normal. These "normal accidents" are the result of the interaction of multiple failures, and the way in which the system is constructed. Perrow believes looking at high risk systems in this way will allow for a better understanding of why accidents occur in systems and why they will always happen.

With this in mind Perrow argues that it is then easier to make decisions such as abandoning technologies that are too risky, and so preventing disasters, or if too important for the functioning of society then the alteration of such systems. Throughout, he emphasise that risk is a constant and can never be gotten rid of and that analysing accidents in this way will better highlight the real reasons for the accident. As a result, blame will not be put on the wrong cause and so make the system riskier. Any manufactured systems that contains many components, i.e. procedures, parts, operators can be analysed this way. Two or more failures in a system are needed usually to result in an accident. The design of such systems usually doesn't expect this to happen, that is that nobody planned that if X

happened then Y would also happen, or be happening. At the time the interaction is not understood, and so the situation spirals out of control and even after the event the situation might not be understood, and so can result in design changes that can lead to more unexpected interactions. Perrow refers to this as the interactive complexity of a system.

Next he argues that this complexity is reinforced and results in accidents due to "the idea of tight coupling i.e. processes happen very fast and can't be turned off, the failed parts cannot be isolated from other parts, or there is no other way to keep production going safely, it will spread quickly and irretrievably for at least some time. Indeed, operator action or the safety systems may make it worse, since for a time it is not known what the problem really is" (Perrow 1984 pp. 4-5). Perrow highlights that these two concepts together are the cause of most accidents that lead to disasters, even in the face of better organisation and technology fixes they still happen. He argues that in fact these increased organisational and technological fixes lead to just more interactive complexity and tight coupling and so more prone to inevitable accidents, and so can be deemed a normal /system disaster. Perrow describes "normal not in the sense of frequency or being expected, indeed neither is true, which is why we are so baffled by what went wrong. It is normal in the sense that it is an inherent property of the system to occasionally experience the interaction" (Perrow 1984 p.8).

Perrow argues that in such systems when looking at the cause of the accident one cannot just highlight one primary cause. In the case of oil platform disasters, what was the actual cause that led to the accident, human error, mechanical failure, the environment, the design of the system or the procedures? Can blame be assigned to just the human error and so move on, or even to faulty cement. Perrow argues that "the cause of an accident is to be found in the complexity of the system, that is each of the failures, design, equipment, operators, procedures or environment which are in fact trivial in by themselves. Such failure is expected to occur and we normally take little notice of them" (Perrow 1984 p.7). Failures are trivial usually on their own as there is always a redundant backup/failsafe; it is just when they interact with each other that they become serious. The interaction of multiple failures is the cause of all complex system accidents.

These accidents are the result of an industrial society; that relies heavily on systems that are highly interactive and tightly coupled and unfortunately some of them have high potential for catastrophic accidents i.e. accidents that will inevitably result in disasters. Perrow gives many examples in his book of such accidents ranging from aviation to maritime to space accidents. He argues that seeing this complex interaction is not always easy. "In complex industrial systems the normal accident generally (not always) means that the interaction are not only unexpected, but are incomprehensible for some critical period of time" (Perrow 1984 p. 9). This results a lot of the time in simplistic accounts arising with regard to the cause of the accident.

To my attention there has been less than extensive research completed on examining whether the media constructs complex system accidents as "normal accidents" or not. However from Perrow's research it would seem logical that the media would not be able to construct the accident as a normal/system accident as period of time exits in which it is incomprehensible to establish all the failures and their interactions. As the media must report in a live day to day environment it cannot wait through this time period and then report the findings when they become clear through scientific research or government inquires. In fact it is very unlikely that the media will not report on a cause of the accident even if they are no scientific, or official reports on the account as they are prone to sensationalism and have a duty/service to inform the public (Patterson and Wilkins 1987). Instead the more likely construction of the cause by the media of complex accidents in their aftermath would be as a simplistic account in which single actors/actants are highlighted as being the root cause. In other words, the media reporting on complex systems accidents is that they are "abnormal", so indicating that the cause can be easily identified/ rectified, and future risk contained. In other words, the opposite of Perrow's theory.

6.2.3 Elite Sources

In this section the rationale behind the following hypothesis will be highlighted with previous research done on similar topics.

Hypothesis 4: The media uses the same sources i.e. elite sources predominantly in their framings of disasters irrelevant of geographical place or time.

Elite sources in a media context are those such as government officials, industrial professionals, scientific experts, engineers, and so on that are used by the media in their framing of events. Non elite sources would be from the wider public with no specific connection to institutions, or officialdom, even if they contain lay knowledge. According to Nelkin and Wilkins who examined the Bhopal disaster the use of elite sources often precludes the inclusion of a wider range of community sources, and persons, who otherwise might give different viewpoints on the disasters (Nelkin 1995; Wilkins 1987). This focus on certain types of sources can lead to the possibility of a public misunderstanding of the disasters and a focus in one direction. Coleman and Dysart back this theory:

> Sources often take a primary role in shaping coverage and researchers in the constructionist paradigm hold that news organisations limit the range of information about a topic because journalists judge that there are few credible sponsors (i.e. sources) about the topic. They limit themselves to single sources in reporting science stories. Even in cases where controversy would seem to demand multiple sources, a sizeable proportion of journalists may use very few. Elite sources, particularly scientists, are given time and space to speak as experts without much scrutiny.
>
> (Coleman and Dysart 2005 p. 8)

They go on to say that the media favours scientists for a number of reasons:

> First, journalists typically prefer sources in positions of authority because of their perceived trustworthiness. This favours scientists who are automatically deemed experts. Second, journalists lack the time and/or the specialized knowledge required to interpret scientific matters critically and therefore must defer to expert analysis. Third, scientists are revered as neutral purveyors of the truth and therefore suit the journalistic norm of objectivity
>
> (Coleman and Dysart 2005 pp 8-9)

The rise in the use or perhaps reliance of the media on scientists in recent years in general has being well documented. In Denmark for example, in research carried out on data from 1961 to 2001 it has been shown that a seven fold increase in the amount of scientists that appear in newspapers exists (Albaek 2003). Many research papers have asserted the fact that the media focuses on certain sources not just scientists at times of crisis, disaster, controversy or other major uncertainly. Signorielli in examining health crises "found that U.S science and medical news coverage tended to overemphasise official sources, especially governmental officials, and leaders of physician and health care organisations" (Signorielli 1993 pp. 364-365). Logan *et al.* did a follow up to Signroielli's work and completed a content analysis of Korean newspapers and their coverage of a 1999 health crisis examining what sources were dominant throughout. In their findings it can be seen that there was a high frequency of the "use of government officials and experts while a low frequency of civic groups, general public, political parties and so on by the media" (Logan *et al.* 2004 p. 392).

Alcibar in his work on human cloning in Spain found that generally scientific institutions and consulted experts were used in the framing of the event by the media. His research shows that scientist and government representatives were essential in the media's framing of the controversy and that there was a profuse level of scientific sources in the newspapers analysed. Alcibar states that this "bias leads to restricted public debates and channels them to definite exclusive ideological and/or argumentative lines […] as in a pubic techno-scientific controversy, the selected sources determine the tone and context of the journalistic discourse" (Alcibar 2008 p. 262).

Climate change is always a very contested and controversial topic. Research in Peru on sources used in newspaper coverage in relation to climate change revealed a disproportionate use of government officials, international organisations, scientists and industry officials as the sources in news stories on the topic (Takahashi 2011). Nanotechnology, another controversial scientific and technological topic also contains a disproportionate level of elite sources compared to others in media coverage. Analysis of Slovenian newspaper articles relating to nanotechnology give quite stark figures to the reliance of the media on certain sources with " the data revealing that scientists and experts sources were quoted or cited almost across the entire sample of articles (94.5%)"(Groboljsek and Mali 2012 p.42). A further controversial issue is that of cloning. Holliman conducted a content analysis of UK newspaper

and television coverage of the "Dolly the Sheep" incident and found that the sources again focused on elite sources, scientists and scientific institutions receiving over 53%, other professionals and experts, 28% and politicians and officials just over 11 %, with the rest being spread among various others (Holloman 2004).

Finally, a very informative paper on the topic of media and source selection was conducted by Nisbet and Lewenstein on Biotechnology and the American media between 1970 and 1999 (Lewenstein and Nisbet 2002). Their findings show that the sources included in the articles on average over all the years to be scientists 60%, industry 20%, government 10%, public 4% and environmental groups around 1.5%. They point especially to the sharp rise in one source, that of the industry. In later years of the research they highlight the rising strength of industry as a source in the media's framing:

> Another influential source is industry, by providing the media with expensive information subsidies—including video releases, well crafted Websites, and materials produced by public relations professionals—industry interests are often able to make it easier for journalists to file their story on time and efficiently. Industry may also rely on paid direct media access in the form of political advertisements or through the direct financial support of independent think tanks that produce experts used as objective sources
>
> (Lewenstein and Nisbet 2002 p. 382)

It would seem from the above, and a wide range of other work that elite sources are used predominately by the media, irrelevant of place or time in framing technological, or scientific controversies or crises. It is therefore the working belief of this paper that the predominate sources used by the media in framing the Piper Alpha and Deepwater Horizon disasters will be elite sources composing of experts, government and industrial officials at the exclusion of other sources such as advocacy bodies, NGOs, individuals and community groups.

7. Methodology

In order to answer the research questions a suitable methodology was employed. The initial stage consisted of source selection, data gathering and structuring (see 7.1, 7.2 and 7.3). Subsequently an analysis of the newspaper's coverage was conducted (see 7.4). Once this work was completed a mixed methods qualitative and quantitative content analysis was applied to the data (see 7.5 and 7.6). This approach consisted of three different levels of analysis. First, the articles frequency and distribution over time were measured in order to get the coverage of the disasters by each paper. Second, the main frames contained within the data were coded and categorised. Third, the sources used in the construction of these themes were measured. The data was analysed on these levels individually for each paper and subsequently compared against the other papers in a comparative fashion. A more detailed look at the methodology used is outlined in the following sections.

7.1 Media Selection

As this paper examines how the Piper Alpha and the Deepwater Horizon disasters were framed due to their location it would be logical to take media sources from both locations. One source would highlight how the disasters were framed by the media within the of the disaster and the other from outside. In addition, both countries have similar levels of media freedom and maturity, are culturally similar and share a common language. After this decision was made the next step was to decide on the specific type of media. Due to a lack of availability of television or radio transcripts in relation to both disasters, and the fact that the internet did not exist in the 1980s, this research focused on newspapers.

It was decided to use elite (quality) and not tabloid/red top (mass) newspapers as they tend to sensationalise less and give more in depth coverage of "serious" news - "tabloid journalism tends to simplify issues, eschew reflective and complex coverage, and favour journalism inspired by sensationalism and entertainment" (Ariss 2013, p. 23). Elite newspapers differ on many counts such as content, target audience, design, paper format and journalistic ethics. The main differences are that "elite papers act as watchdogs of democracy, as a result they report the hard news, there target audience are opinion leaders and they adhere to a higher level of ethical practice" (Seletzky and Wilzig 2012 p. 2).

Two major national newspapers were selected from within both countries. The *Guardian* in the UK and the *NYT* in the US were chosen as they are both elite newspapers, have similar circulation levels (per capita), and are distributed nationally and internationally. Both newspapers fall within the highest circulated newspapers category within their own country and when one looks at elite newspapers alone they are both the second highest circulated in their respective countries. In addition, both newspapers are considered to be very much liberal in their world view and in their reporting. This, hopefully, will reduce the possibility of differences in findings due to a newspapers inherent stance on events. Finally, both were readily accessible, through the LexisNexis database, with other elite newspapers only having partial data available for the dates required.

7.2 Sampling

Having decided to use articles from newspapers as my source material and having decided on two specific papers, the next task was to decide on timelines and to physically collect the data, organise it and structure it. I decided that for each disaster I would examine them from the day of the incidents up until three months after the official government report. This would give ample time for the dominant frames to fully emerge.

The dates for the Piper Alpha disaster were from July 1988 until February 1991 (32 month time frame), finishing three months after the government report and recommendation. The Deepwater Horizon time frame was shorter, dating from April 2010 to March 2011 (11 month time frame), again ending three months after the government report. While the timelines are not the same, the fact that they finished three months after the government report is consistent. By this three month stage the number of articles had also reached from few to zero per month and so no actual data was available after these dates.

The database I used to access the newspapers, and thus the articles, is called LexisNexis. LexisNexis is the world's largest electronic database for public recorded information and is regarded as one of the most legitimate archives for research purposes.In order to find relative articles I first conducted a pre-examination of the literature on both disasters in order to get the key words used in naming and describing them. I tried to include a diverse range of literature ranging from books, government press releases, and media reports to NGOs and internet articles. I then used the information extracted from the literature to do a key word search of the *NYT* and the *Guardian* in the LexisNexis database in order to extract the relevant articles.

For the Piper Alpha disaster there was only one key word that was used and that was Piper Alpha itself, as that is the only name it was commonly known by. The total numbers of results from this

search were 27 for the *NYT* and 257 for the *Guardian* out of a total of 284 articles within the time frame. After the initial examination of the literature I found that there was more than one key search term for the Deepwater Horizon search, as it was referred to by various titles. It was labelled as the Deepwater Horizon oil spill, BP oil spill and Gulf of Mexico oil spill, which in total returned 210 articles from the *Guardian* and 200 from the *NYT*. Other titles included the Macondo Blowout and BP oil disaster; however, they only returned ten articles from the *Guardian* and six for the *NYT*. In total there were 220 articles on the Deepwater Horizon disaster from the *Guardian* and 206 from the *NYT* out of a total of 426. An interesting note was that even though the newspaper articles returned a relatively low number for the key term Macondo Blowout it was used predominately when the disaster was described in technical books or reports.

It is necessary to add that limitations were found in relation to the database and my body of work. Certain items, for example, that may have been important were unavailable or not accessible, including viewing which section of the paper the articles were published in or viewing the images that accompanied the articles. The location of the sections within the *NYT* was available. In relation to Piper Alpha, the majority of the articles were from the financial section, the coverage of the Deepwater Horizon was spread across all sections of the paper. LexisNexis contained no such information for the *Guardian*. The limited information on the section location was, therefore, not included. If images had been available they could have added an interesting dimension to the analysis but unfortunately they were not.

7.3 Data Structuring

Once the collection of the data was complete, the subsequent step was to organise and structure it for analysis. Structuring the data was relatively straightforward and did not result in much alternation once extracted from LexisNexis. This process, although minor, was still necessary because the datasets were not always in the correct order/date. The latter occurred as the data size was too large to extract en masse, rendering it necessary to extract the articles in different parts. As a result the articles were organised by date oldest to newest. After this was completed the next step was to edit out any data in the articles that would have manipulated the results of the word frequency analysis or made it unusable. Examples of this were the page numbers, authors names, and information put on each page by LexisNexis that was not originally in the articles such as date accessed, copyright information etc.

7.4 Overall Coverage

The method used was a simple numerical count of the articles containing the key words per newspaper per event in order to get the coverage breakdown. Once completed the numbers were then compared against each other. First, each dataset was analysed by total number of articles, then by the percentage of the total data and after that the coverage was broken down monthly to see when coverage peaked and waned. This could then be matched with the different frames, as highlighted in the following section. Having completed this method I was able to tell which papers covered which event in what detail, for how long and with what strength at different time periods. This allowed for an analysis of how time and place might or might not have played a role in the interest given by each paper to each event.

7.5 Qualitative Content Analysis of Frames

Now that the method to examine the coverage by the papers of the disasters had been established, the next step in answering the research questions was to analyse the main themes/categories within the articles, due to the fact that "unobtrusive data are often not amenable to analysis until the information they convey has been condensed and made systemically comparable" (Budd and Thorp 1963 p. 238). To make this possible, I borrowed heavily from the work of Strauss and Corbin and their work on Grounded Theory and especially on their micro analysis approach "which is the detailed line—by-line analysis necessary at the beginning of a study to generate initial categories (with their properties and dimensions) and to suggest relationships among categories" (Corbin and Strauss 1998 p. 53). A set of fixed questions were asked about each sentence (what is going on here? What are the properties of this object? What is the relationship between this and the other concepts? Does it stand alone or not? Which concepts are well developed and which not?).

In addition, the use of constant theoretical comparison was employed throughout this method, "comparison between each incident for similarities and differences was grouped or placed into a category (…) the properties of one object were taken and compared to the others and in that way, what was similar and different was discovered and thus the objects defined" (Corbin and Strauss 1998 p.79). Asking questions and comparing allowed me to see the bigger picture and the variation of categories that existed within the data and to compare them against others. Conceptualising involved breaking down the data into ideas and naming them, similar ideas or objects found at other parts in the data were then also given the same name, which were, placed in the same code, in other words

"events that evoked similar imagery in my mind were coded together" (Corbin and Strauss 1998 p. 105). Below is a brief example of coding and categorising from a data extract[12]

"Britain is engaged in a bitter debate over oil-rig safety after the explosion of a North Sea rig in which officials say 166 workers died **[" Platform Safety "]**!!M17.About 150 workers on three British Petroleum oil rigs in the North Sea quit their jobs today to protest what they called inadequate safety measures**["Risk to workers"]**.. Labour Party and union officials heatedly accused the British Government of cutting corners on industry safety **["Safety and Government to blame in Disaster"]**.. In addition, Armand Hammer, chairman of Occidental Petroleum, the operator and principal owner of the rig that exploded Wednesday night, pledged that any new rigs his company built would be safer than the Piper Alpha platform**["Safety and Technological Inadequacy "]**.. It exploded and split into a tangle of collapsed metal. Six Coast Guard vessels found no survivors or bodies today among the 149 oil workers still missing."[1]**[Human Loss]**

!!Memo 17: Safety of platform, new occurrence, 6 mentions now in different ways

Figure 7. 1 Extract taken from analysis notes during open coding and category building.

The concepts from this short extract were Platform Safety, Risk to Workers, Government to Blame, Technological Inadequacy and Human Loss and would with more coding form other sections of the data combine to form categories. Later, for example, other language or ideas expressing the same idea of government blame would result in the category titled Government Complicity being formed. Properties of the category were that it refers to the "government", employees of the government, state officials, agencies or departments and not to politicians or politics. Language such as failed, responsible, in bed with industry, no regulation, lax laws, no rules all fell within the category properties.

Each sentence was analysed by asking questions, followed by labelling, the creation of a memo (if necessary) and finally the conceptualised ideas were placed in the relevant category. The process was reproduced by each paragraph, working its way up to article level, if articles had more than one category or theme this was allowed for. However, if one theme dominated the article then this was taken as been the theme of the article. The question always in mind when building the categories was to see where the properties (or characteristics) and dimensions finished and when and how new categories or sub-categories began. This was a rewarding analytic exercise as it resulted in a constant revision of different codes and categories and the restructuring of them as became necessary.

[12] Sample taken from a *NYT* article on the Piper Alpha disaster titled, *Britain: Bitter Debate over Oil Safety*-July 1988.

7.6 Quantitative Content Analysis of Sources

In order to see what sources were used by the newspapers in creating the frames I conducted a word frequency analysis of the data. Each dataset was examined individually to see which actors, institutions, organisations; experts etc. were involved in the media's construction of the events. I used Tropes text analysis software to conduct the frequency analysis (Figure 7.2).

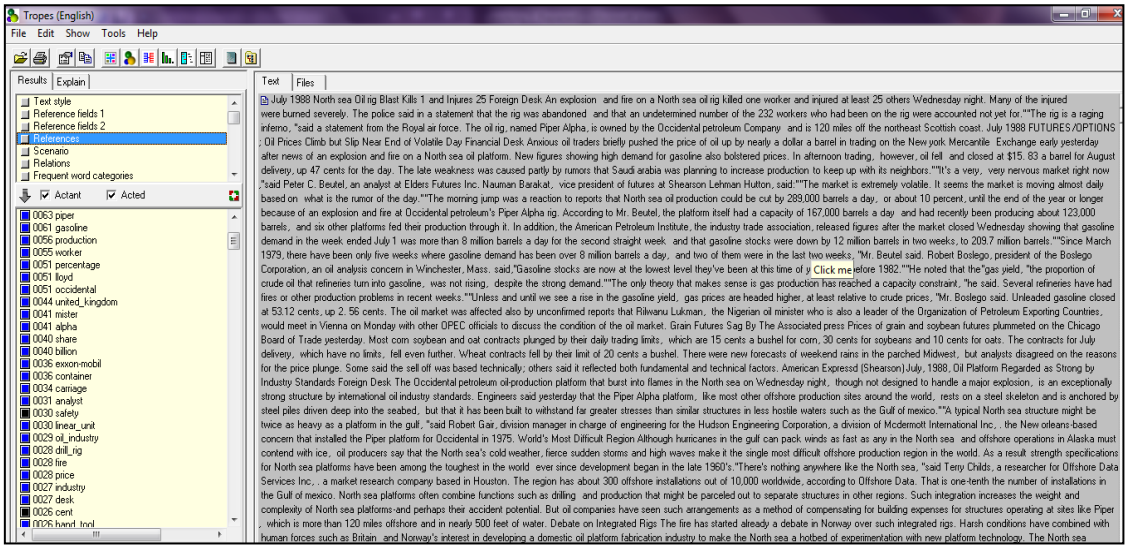


Figure 7. 2 Screenshot of the Tropes semantic text analysis software: word frequency count. Source Semantic Knowledge 2013.

I took only sources that appeared in over 10% of the text to make it accessible and relevant. This made analysis possible and also highlighted reoccurring reliance on certain sources. Once the analysis was complete I assigned each actor to a wider category such as expert groups, politicians, government, key individuals and so on. When this was completed I had the categories that showed the main individuals, organisations, and experts etc. in each dataset which the media used to build their frames.

The software also has an in built hypertext system which allowed for easy movement through the data when wanting to read passages that contained words, phrases or even whole sections of text. This was vital when working with over 600 articles as it allowed for different queries on the texts to be quickly and efficiently examined. In addition it allowed for a proficient method for completing a relational analysis. A relational analysis was necessary in order to make sure the actors included in the coverage were actually used as sources and not as third party references.

In order to check the reliability of the software, I conducted a sampling of the data. I manually coded the main sources for a number of the articles. Then I analysed the same sample with the Tropes software, returning identical results.

8. Analysis

This chapter examines the data extracted from LexisNexis using the methodological approach highlighted in chapter 7. It is broken into four segments which analyse separately the articles published by both the *NYT* and the *Guardian* on each disaster. These segments are subsequently broken down into an additional four sections. In each section one of the research questions of the paper will be applied to the data. This will allow each dataset to be analysed in-turn. The raw numbers or data will be made evident in relation to the four different parameters under investigation. The chapter will begin with an analysis of the *NYT articles* on the Piper Alpha disaster. The first level of examination will be a numerical count of the overall number of articles (also broken down by month) to examine the newspaper's coverage of the event. The second level of analysis is to examine the frames the *NYT* developed in relation to the Piper Alpha Disaster. The third section will analyse how the *NYT* framed the cause and the final section will examine the sources used by the *NYT* in it's articles. The process will then be repeated for the *Guardian* and the subsequent three datasets.

8.1 Analysis of the *NYT* Articles on the Piper Alpha disaster

This section will analysis the articles published by the *NYT* in relation to the Piper Alpha disaster. It is broken down into four sections with each section answering one of the paper's research questions. Each section will first highlight the research question pertaining to it, followed by a detailed answer emanating from a thorough analysis of the data.

8.1.1 The *NYT* Coverage of the Piper Alpha Disaster

What coverage was given by the newspaper to the socio-technical disaster?

The following table shows the total *NYT* coverage of the Piper Alpha disaster over a 32 month timeline.

Table 8.1 Total amount of articles plus frequency

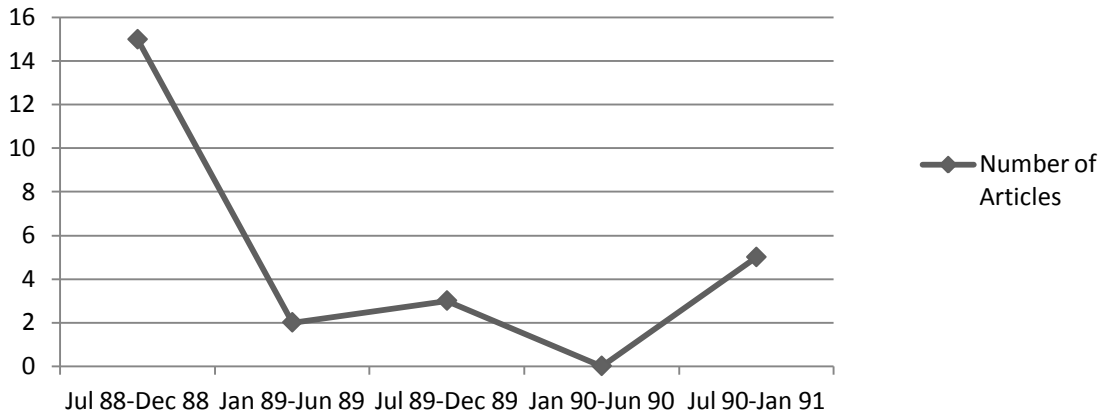
Total	July88-Dec89	Jan89-Jun89	Jul89-Dec89	Jan90-Jun90	Jul90-Feb91
25	15	2	3	0	5

As well as the total, the frequency of articles is also broken down into periods of six months[13]. As was previously mentioned in the method section the number of articles published was 27. However, after analysing the articles the number of relevant articles was equal to 25. In this case two articles were apologies/corrections and brought no relevant information in relation to the research. For this reason they were excluded from the analysis.

Below is a graphical distribution showing the high and low points of the *NYT* coverage of the disaster showing that the first month had the highest concentration of articles. There was a spike of articles in September (1989) due to another disaster in the North Sea. As the end of 1990 approached and the long awaited Cullen report on the incident was reported, surprisingly, only one article was published, this containing at most five paragraphs. This was unforeseen as the report was extensive and in fact very critical in a number of aspects. In fact, the paper reported more on the death of the charismatic owner of Occidental and billionaire Mr Armand Hammond than on the Cullen report in relation to the Piper Alpha disaster.

[13] The final period covers eight months. The odd number is a result of the methodological requirement to cover the time period for three months after the Governments official inquiry. In this case, the official inquiry, the Cullen Inquiry, was published in November 1990.

Graph 8.1 Distribution of Articles



8.1.2 The *NYT* framing of the Piper Alpha Disaster

What frame(s) were apparent in the newspaper's coverage of the disaster?

The Piper Alpha disaster was framed by the *NYT* in different ways at different times (Table 2). Most of the frames were temporary, that is to say they lasted for only a certain period of time, usually not a long one and were not persistent throughout the data. There was only one permanent frame that lasted throughout the data and had constant coverage. There were four temporary framings and in no particular order (as some came and went) they are as follows: human interest, safety, responsibility and cause. The single permanent frame was an economic one.

Beginning with the human interest framing, the *NYT* focused on the tragedy of the deaths and suffering of the people on board the oil rig and of the rescue workers. The impact on the families of the dead and the wider community was also included. This framing was strongest in the initial days and returned on different occasions such as during the raising of the platform (and so finding the remains of the trapped), funerals of the dead and after the official inquiry. Safety was not an initial focus of the *NYT*; however, once the overall death toll was realised it became a central focus. This framing was also enthused by workers strikes for better safety and working conditions and by other disasters in the North Sea.

Table 8.1 The *NYT* Framing (Overall) of the Piper Alpha disaster

Frame (Overall)	***Timeframe***	***Example***
Economic(Market)	*Permanent*	"The unexpected troubles of the world's sixth-largest petroleum producer have been the main force propping up oil prices recently"-May89
Human Interest	*Temporary*	"The survivors, some unscathed, some with burns over 50 percent of their bodies, were brought back to this port city in northeast Scotland. About 21 were hospitalized"-July88
Safety	*Temporary*	"Roger Lyons, assistant general secretary of the Manufacturing, Science and Finance Union, whose members were working on the platform, told reporters that "in the interests of the 10,000 oil workers in the North Sea and their families," the Government should name an independent health and safety inspection team for the oil rigs"-July88.
Responsibility	*Temporary*	"But the operator of the platform, Occidental Petroleum, has faced accusations that part of the platform was flimsily constructed and that workers aboard the platform complained of gas leaks days" before the blast. Occidental has denied the allegations."July88.
Cause	*Temporary*	"John Donaldson, a former safety manager at Occidental, who said part of the accommodations for workers on the platform were "a rather flimsy form of construction," not sufficient to safeguard personnel in the event of a fire or explosion"-July88

The notion of responsibility was also a temporal frame. Blame was placed upon many different actors at different times such as individual workers, management, Occidental, government, and regulators. Who was responsible was a frame that persisted early in the data and again after the Cullen report. The cause of the disaster was also a topic that became the central focus of the coverage at different times. Like the safety frame, it was usually in correlation with a new accident in the North Sea oil sector.

The economic frame was the only one to be permanent throughout the timeline. From the initial reports to the final days after the Cullen report the economics associated with the Piper Alpha incident were hard to miss. Articles focused on the cost to the company, the related effect on share prices and the markets, futures and the impact on insurance. Articles contained numerous quotes like the following "The morning jump [in the markets] was a reaction to reports that North Sea oil production could be cut by 289,000 barrels a day, or about 10 percent, until the end of the year or longer because of an explosion and fire at Occidental Petroleum's Piper Alpha rig" - July 1988 and "the explosion on

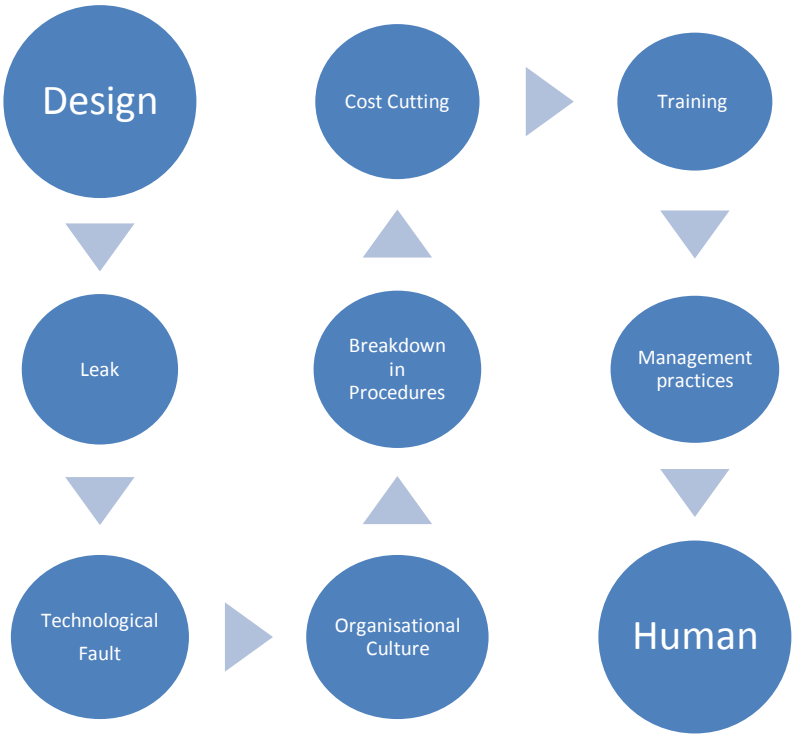
the Piper Alpha oil platform on July 6 cost about $1.3 billion (relation to insurance premiums)" - Sep 1988. Rising cost of oil, cost of construction, lower profits and huge losses now all came to be associated with the Piper Alpha disaster. Although not the strongest framing in the initial days due to the scenes of death and destruction it quickly took centre stage and began to dominate the *NYT* coverage. This framing was also bolstered by the *NYT* linking the disaster to the wider Middle East oil crisis (leading to higher oil process/lower supply) and other oil companies financial difficulties.

8.1.3 The cause(s) of the disaster as framed by the *NYT*

What reason(s) was/were given by the newspaper for the cause(s) of the socio-technical disaster?

Focusing on the how the *NYT* framed the cause of the disaster it can be seen that there was not one central constituent that was seen as the cause. In fact the *NYT* framing of the cause of the accident changed eight times, going through an exhaustive and diverse range of possibilities. The graph below has the different causes the *NYT* highlighted in chronological order.

Graph 8.2 The Cause of the disaster as stated by the *NYT* in chronological order



According to the data the first reason given for the cause of the disaster was the design of the oil platform. The idea of integrated rigs was highlighted as the primary cause with a former safety manager at Occidental quoted as saying “accommodations for workers on the platform were "a rather flimsy form of construction," not sufficient to safeguard personnel in the event of a fire or explosion”- Jul 1988. He proceeded to sate that one weakness with the Piper Alpha was that it lacked adequate "blast walls" separating the gas compression chamber from the living quarters.

The next explanation featured for causing the accident was simply a leak. This answer to the cause was created by one of Occidental’s Chief Executive who said that “the explosion apparently resulted from a natural gas leak in a gas compression chamber that was directly below the workers quarters”- Jul 1988. Just a leak, no other explanation was given at the time. It did not take long; however, for the subsequent cause of the accident to be highlighted. Technological failings arose as the central foci- “The rig's control room had dozens of sensors to detect gas leaks, but they apparently failed to give sufficient warning during a series of large explosions”- Jul 1988. “Several oil industry experts have suggested that the gas leak was created when a broken rotary blade or a piece of piston tore through the metal casing of the Piper Alpha's gas compressor, allowing gas to escape”- Jul 1988.

One month after the disaster the cause was blamed on the organisational culture inherent on the platform. Numerous safety concerns were highlighted by workers leading up to the disaster and the week before the disaster workers had to wear breathing masks because gas levels seemed unusually high but yet work continued. By the following year the cause was attributed to a breakdown in procedures. Apparently, a dangerous gas leak occurred on the platform when control-room operators started a gas pump at the same time that a safety valve had been removed for maintenance. However this was contested shortly afterwards with the *NYT* quoting a “ Union representatives of offshore workers that the oil companies' penchant for cutting costs in the North Sea after oil prices slumped in 1986 has contributed to the shutdowns and safety problems”- May 1989.

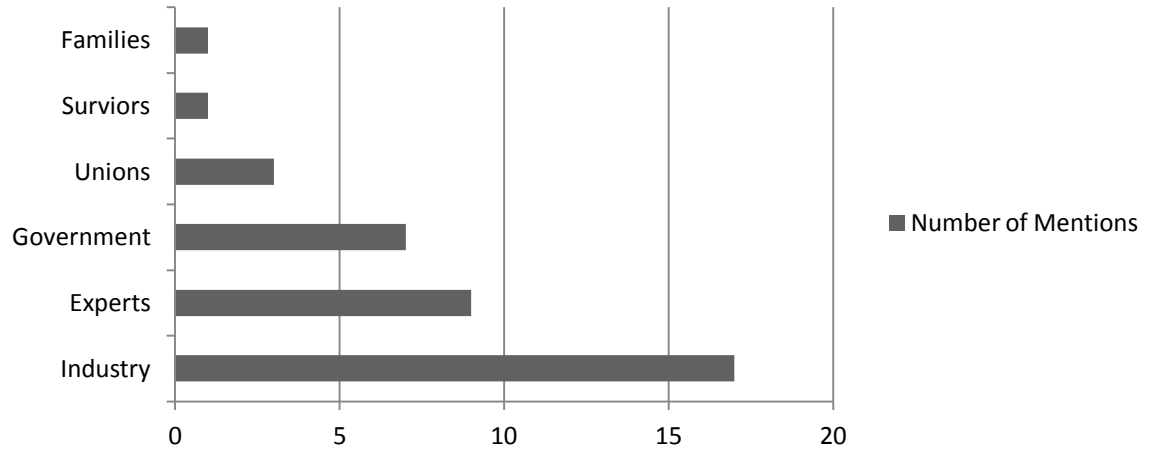
Finally, after the government’s report, three causes were given by the *NYT* for the disaster occurring, training for emergencies was inadequate, management practices were unsatisfactory and that government inspections had been lax. They said that without these causes the disaster would have just remained an accident. The actual cause for the initial accident was assigned to human negligence - “The inquiry found that the accident resulted from the failure of one work shift to inform the next of maintenance work needed to seal a gas leak on the platform. A small explosion knocked out safety equipment, setting off a series of blasts. That led to a fireball that engulfed the platform” - Nov 1990.

8.1.4 The source(s) used by the *NYT* in constructing the framing

What sources did the newspaper use in constructing the frame(s)?

The total number of times sources were used by the *NYT* to frame the disaster was 35. The sources consisted of six distinct groups, namely survivors, families, unions, experts, government and the industry (Graph 8.3). Survivors and families were each used once. Survivors literally relates to those that survived the disaster while families were generally the families of the deceased. Labour unions were used a total of three times in the framings. The experts group refers to those experts outside of either the government or industry; they were used by the *NYT* nine times and include engineers, scientists, academics etc. The industry was by far the most used source (17 times); quotes or references to the industry in the construction of the frames were used over twice as much as the government (7 times). The industry group included the main companies involved in the incident and other associated companies, their employees and experts in their employment. The government group included ministers, civil servants, employees and experts in service of the government.

Graph 8.3 Sources used in the *NYT* coverage



8.2 Analysis of the *Guardian's* articles on the Piper Alpha disaster

This section will analyse the articles published by the *Guardian* in relation to the Piper Alpha disaster. It is broken down into four sections with each section answering one of the paper's research questions. Each section will first highlight the research question pertaining to it, followed by a detailed answer emanating from a thorough analysis of the data.

8.2.1 The *Guardian's* coverage of the Piper Alpha disaster

What coverage was given by the newspaper to the socio-technical disaster?

The following table shows the number of articles published by the *Guardian* newspaper over a 32 month period in the aftermath of the Piper Alpha disaster.

Table 8.2 Total amount of articles plus frequency

Total	July88-Dec89	Jan89-Jun89	Jul89-Dec89	Jan90-Jun90	Jul90-Feb91
307	159	62	29	18	39

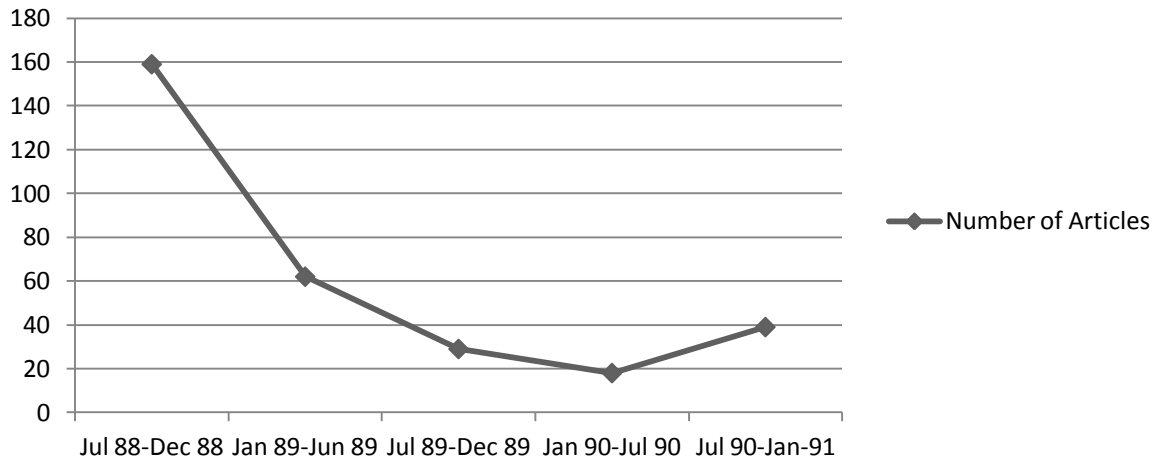
The table gives the total number of articles by the *Guardian* and also the frequency, which is broken down into six month time periods[14]. The reporting by the *Guardian* on the events of the 8th of July was to remain active throughout the timeline. In total 313 articles were published of which six were deemed irrelevant to the case. That left a final number of 307. The six articles were excluded due as they were either corrections or apologies or at a level of abstraction unsuitable for analysis. An example is the article of the 12th of November 1989 titled *Televising the Commons: A viewer's guide to the finer points of Parliamentary procedure*.

The first six months saw a vast number of articles published on the disaster, 160 in total with the first month alone having just over 50. A continued high level persisted throughout. At this stage it is worth noting that the year 1988 and 1989 was marked by many disasters in the UK, ranging from train accidents, to airplane crashes to football stadiums going on fire. In the final months, there was a

[14] The final period covers 8 months. The odd number is a result of the methodological requirement to cover the time period for three months after the Governments official inquiry. In this case, the official inquiry, the Cullen Inquiry, was published in November 1990.

general spike in the number of articles on the disaster. This can in fact be attributed solely to the Cullen report on the disaster, as all articles in the final three months gravitated towards discussing the crisis in this context. From November, when the report was made available, to January, when the data finished there were around ten articles a month published on the Piper Alpha disaster (Graph 8.4).

Graph 8.4 Distribution of Articles



8.2.2 The *Guardian's* framing of the Piper Alpha Disaster

What frame(s) were apparent in the newspaper's coverage of the socio-technical disaster?

The Piper Alpha disaster was framed by the *Guardian* differently at different times: albeit two frames were present more or less throughout (Table 8.3). Most of the frames were temporary i.e. they lasted for only a certain period of time, usually not a long one and were not persistent throughout the data. There were three temporary framings and in no particular order (as some came and went) they are as follows: human, responsibility and cause. The two permanent frames were safety and economic respectively.

Table 8.3 The *Guardian's* framing (Overall) of the Piper Alpha disaster

Framing (Overall)	Timeframe	Example
Safety	Permanent	"A row over safety on the ill-fated Piper Alpha platform two years ago led to the worker-management safety committee being abandoned, and it had not been reformed, a union official revealed yesterday"-July88.
Economic (State)	Permanent	"The Piper Alpha rig disaster in the North Sea cost Britain's balance of payments nearly Pounds 300 million this year, Mr Cecil Parkinson, the Energy Secretary, told the Commons yesterday"July88.
Responsibility	Temporary	"The Department of energy, whose inspectors are responsible for monitoring offshore safety, last night denied any knowledge of the 1986 report which Mr Lyons described as a 'secret external safety audit report with specific recommendations for action which could have possibly prevented the tragic second explosion, the destruction of the platform and the loss of 167 lives"-Jan89
Cause	Temporary	"Mr David Martin, president of Occidental International Exploration and Production, has suggested metal fatigue may have caused the gas leak which sparked off the explosion on the platform."Aug88.
Human Interest	Temporary	"A policeman has no emotions, is not entitled to have any, and anyway if he does he must never show them. He must keep a stiff upper lip, set an example. To admit that they felt sadness, to admit that there are times when they, like any human being, want to show emotion, need to show emotion " Jul88

The human interest framing was very important for the *Guardian*. It was the initial framing which dominated reporting and focused upon the human cost bestowed upon Aberdeen and the other affected communities along with the wider "oil worker family". The *Guardian* went into great detail on the collective and individual suffering of the communities that were affected by the disaster. However, after the first month with the exception of a few articles this framing more or less vanished, which perhaps could be seen as surprising as the paper was located in close proximity to the location of the disaster and to those affected.

Responsibility was a frame that emerged initially, after specific events and again towards the end of the data after the Cullen report. Liability was placed upon many different actors especially the big three of industry, government and the unions. They were blamed for the disaster by families, survivors, workers and experts. The big three responded in like by unanimously blaming or holding accountable the technology as the actor responsible for the disaster. Eventually however the government would be framed as the party most responsible due in no small part to external happenings such as the Hillsborough disaster and the Lockerbie disaster (later the latter was shown to be an act of terrorism).

The cause of the disaster was also a topic that became the central focus of the coverage at different times. The cause was placed firmly around technology: with age, construction and hasty deigns during the oil crisis all constructed as reasons for the disaster. Other reasons, including human error and cost cutting were also highlighted in the framing. A large number of other accidents and disasters the following year, both within and outside the oil sector, resulted in a large scale investigation. This looked at the causes of the Piper Alpha disaster and at the possible connections to the disasters.

The permanent framing of the disaster in an economic sense began from the first month and continued until the last. From the analysis an interesting fact emerged; it was an economic framing based on the nation i.e. based on the UK and not based on the oil industry/ individual companies profits or on the impact on the local region. Aside from mention of the effect of the disaster on insurance the total focus was on the disaster and the resulting impact upon the British economy. This construction of the disaster and its link to economics was full of lush key national economic terms such as the British economy, mentioned 151 times, trade deficit (43), drop in production (46), trade boost (31), accelerated economy (14), national output (21), lower GDP (12) etc. To put this in context financial markets were mentioned in total only 15 times while company profits were mentioned nine times. As a result it can be said that the disaster was framed as a national economic one. Yearly the British government took in close to eight billion in taxes from the oil industry and this was being hit hard by the Piper Alpha disaster. In addition to this they now had a trade deficit in oil in which they had to import at a time of political uncertainty in the world. These two factors helped to fuel the *Guardian's* framing of the Piper Alpha disaster as an economic one.

Safety was the second permanent framing that the *Guardian* focused on. Initially safety was a key topic within the data, covering workers safety (their ability to work in a safe environment) and to prevent similar accidents and disasters happening again. Additionally, the conflict of interest within the safety watchdog the Department of Energy was a key focus of this early framing; as it was also the department tasked with increasing energy production, a clear conflict of interests. Safety became a central political theme with politicians being used in the framing like "shadow employment spokesman, Mr Michael Meacher, who believes the government's stance towards health and safety

has created a climate in which corner cutting by industry is tolerated in the guise of market economics"- Aug 1988. This framing was driven also by outside factors and it soon spawned into a wider political, economical and social call for change within Britain due to the unprecedented number of disasters in the years from 1987-1990 which resulted in hundreds of deaths and billions in costs.

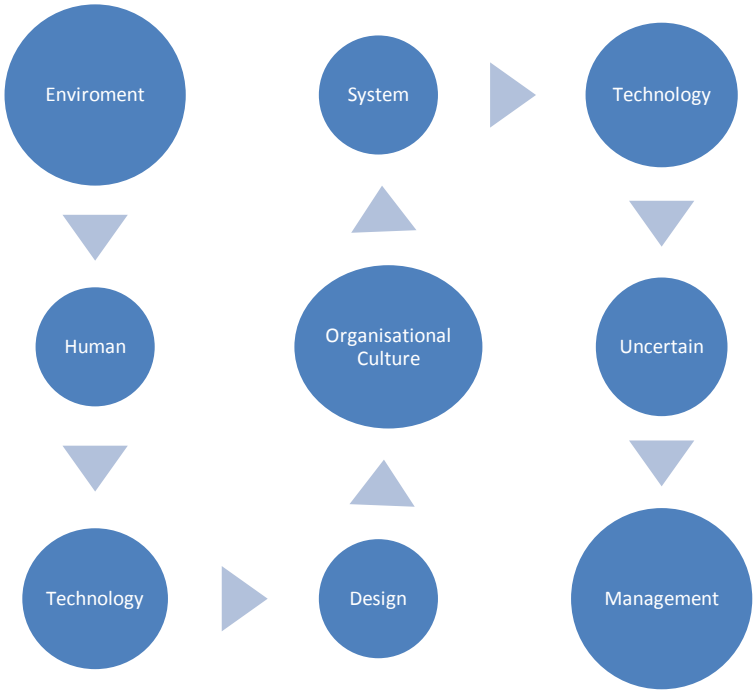
Safety in relation to the Piper Alpha took on a whole new dimension after the first few weeks. It was then framed in the sense of unions, families, opposition politicians, experts and even health and safety executive. Construction safety or technical safety of the technology was not now just the centre of attention but a new way of thinking was needed over procedures, legislation and even culture in relation to health and safety. "Zeebrugge, King's Cross and Piper Alpha have done more than anything to shoot health and safety further up the political and industrial agenda"- Dec 1988. Strikes, protests and political debates on this subject formed the core focus of most of the articles by the *Guardian* in relation to the Piper Alpha disaster.

8.2.3 The cause(s) of the disaster as framed by the *Guardian*

What reason(s) was/were given by the newspaper for the cause(s) for the socio-technical disaster?

When framing the cause the *Guardian* focused on seven different possibilities (Graph 8.5).

Graph 8.5 The cause of the disaster as stated by the *Guardian* in chronological order



The first explanation for the cause of the accident was that due to the nature of the work and its interaction with the environment, that sometimes the environment is just too much as in the case of Piper Alpha.

With 28,000 people working offshore in some of the worst weather and collecting the most combustible naturally occurring materials, accidents are inevitable and have been numerous. Many have been caused by winter storms, which have broken the rigs' giant legs or caused them to drift, salt water corrosion and blow-outs from unexpected pockets of gas and maybe it is the case here too. "One possible cause suggested yesterday by a North Sea engineer is a 'gas kick' caused by methane which has contaminated the lubricating 'mud' pumped through the drilling bit and back to the surface

(July 88)

In the same article the *Guardian* also raised the possibility of human involvement - "if the gas is not immediately detected by the mud logging engineer, whose job it is to monitor gas levels, the slightest spark - from a falling hammer for instance - would cause an explosion"- Jul 1988.

Towards the end of July the age of the actual platform was highlighted as a possible cause:

The investigators will have in mind that the Alpha platform is one of the oldest in the North Sea, commissioned 12 years ago. The problems of corrosion and metal fatigue that afflict all these structures - for example in the constantly vibrating 'risers' which bring the crude oil to the surface - will have been especially severe in this case (…) one of the fundamental design questions is whether crew accommodation should ever be packed in among the machinery as it was on Piper Alpha"-. Once the explosions turned into a fireball, there was no way crewmen could escape, even as far as their special lifeboats - designed to survive a fire. They had to jump into the darkness.

(July 1988)

The start of August saw the idea of organisational culture on board the platform being raised as a possible factor behind the disaster- "the dispute over the chain of events which led up to the disaster on Piper alpha intensified yesterday, with claims that there was smell of gas on the platform the day before but that nothing was done"-Aug 1988. The culture of working through possible dangers was raised by the *Guardian* as a cause of the accident. Again in August the cause of the accident was also framed as the result of the interaction of many components as purported to by two different MPs who stated that "there is no single cause to the Manchester aircraft fire, the Zeebrugge sinking, the King's Cross fire or Piper Alpha. The Piper Alpha disaster could have been caused by a combination of bad design; faulty machinery and the overwhelming pressure to continue oil production"-Aug 1988.

The following month saw a return to the idea of there being a technological rationale behind the accident when "Mr David Martin, president of Occidental International Exploration and Production, suggested metal fatigue may have caused the gas leak which sparked off the explosion on the platform"- Sep 1988. Human error was also rehashed as the cause at the end of September as "the failure to record the absence of a pressure relief valve was yesterday pinpointed as a likely cause of the Piper Alpha oil platform disaster on July 6, in which 167 men died"- Sep 1988.

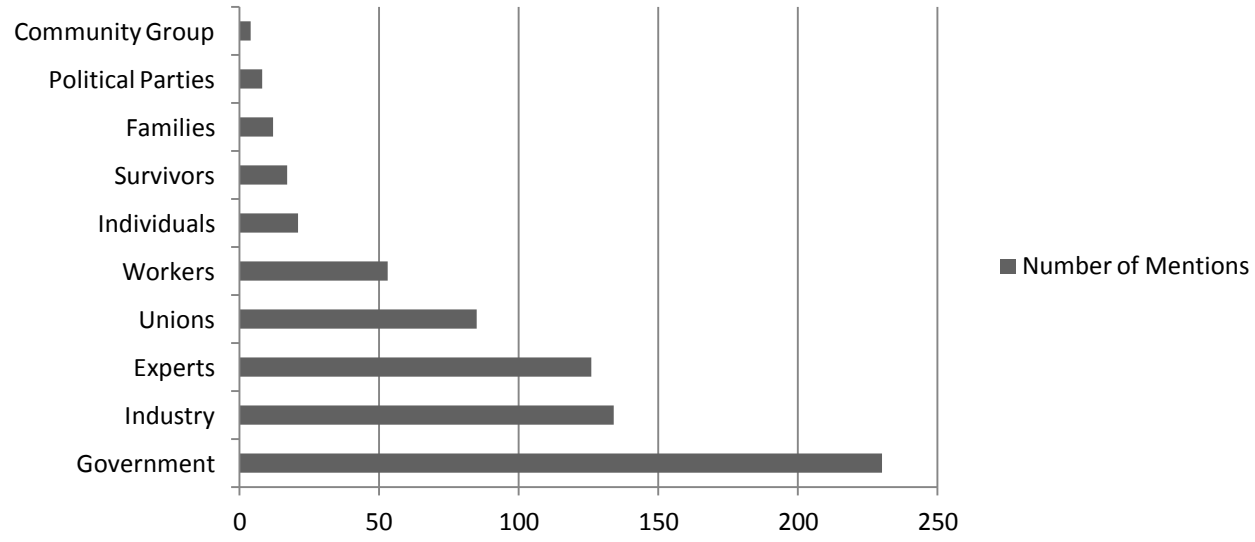
In December 1988 "the surprising findings of an interim official report were reported, they found that after nearly three months of investigation government safety specialists had been unable to add a*NYT*hing to the findings of the September 29th interim report into the Piper Alpha oil platform disaster in which 167 workers died last July. The precise causes, therefore, remain unknown"- Dec 1988. After the multitude of causes the *Guardian* had suggested the December article now stated that the cause was uncertain. This uncertainty was finally put to rest by the *Guardian* who reported on the Cullen report over two years later, the cause was then framed as a result of managerial failings, giving slight mention also to human error and organisable malpractice -"the shortcomings on Piper Alpha represented failures on the part of management to give adequate attention to process safety" Dec 1990.

8.2.4 The source(s) used by the *Guardian* in constructing the framing

What sources did the newspaper use in constructing the frame(s)?

The total number of times sources were used by the *Guardian* to frame the disaster was 690. The sources consisted of ten distinct groups, namely community groups, political parties, families, survivors, workers, unions, experts, industry and the government (Graph 8.6). Community groups (4) and political parties (8) were used least frequently. Community groups refer to different action groups established within the community in relation to the disaster and also to pre-existing community groups that mobilised over the issue. Political parties include all politicians/parties outside of the government. Three groups were used more or less an equal amount of times in the framings, survivors (17), individuals/others (21) and families (12). Individuals/other refers to all those who had no affiliation to the other groups such as priests or fishermen or other individual members of the community. Both workers (53) and unions (85) featured predominately. Workers refer to those still working on offshore oil platforms. The group unions consisted of a number of different unions representing different industrial and technical sectors. The government (230) as a source outnumbered all the previous sources combined, with industry (134) and experts (126) also featuring predominately.

Graph 8.6 Sources used in the *Guardian's* coverage



8.3 Analysis of the *NYT* articles on the Deepwater Horizon disaster

This section will analysis the articles published by the *NYT* in relation to the Deepwater Horizon disaster. It is broken down into four sections with each section answering one of the paper's research questions. Each section will first highlight the research question pertaining to it, followed by a detailed answer emanating from a thorough analysis of the data.

8.3.1 The *NYT* coverage of the Deepwater Horizon disaster

What coverage was given by the newspaper to the socio-technical disaster?

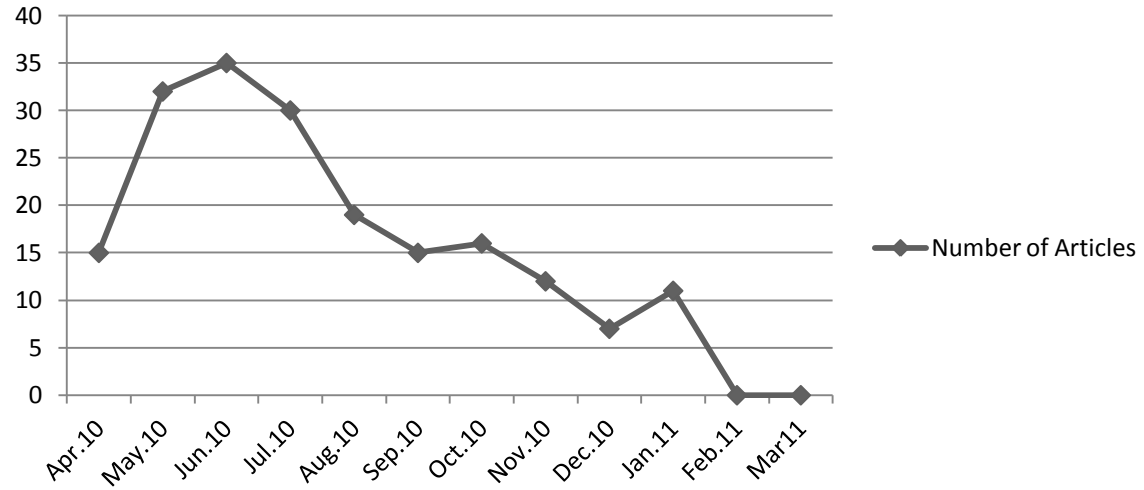
Although the Deepwater Horizon disaster took place on the 20th of April, the *NYT* did not begin to discuss the story until 18 days afterwards on the 6th of May. It wasn't until it became apparent that the containment of leaking oil from the oil well wasn't under control and that engineers were expressing grave concerns that the *NYT* begin it's reporting. In total there were 219 articles published on the disaster in the following twelve months. Out of this total 25 were omitted from the final analysis as they were either duplicates, corrections, or irrelevant to the research. An example is the article published on October 12th 2010 which was a Television guide of "what's on tonight". In total therefore 192 articles were included for analysis (Table 8.4). The chart below highlights the total amount of articles and the monthly breakdown.

Table 8.4 Total amount of articles plus frequency

Total	Apr10	May10	Jun10	Jul10	Jul10	Aug10	Sep10	Oc10	Nov10	Dec10	Jan11	Feb11
192	15	32	35	30	19	15	16	12	7	11	0	0

The graph below shows clearly that the reporting started to peak in June, in fact it remained steady for a three month period at over thirty articles per month. From August on there was a continuous drop in the number of articles per month until January 2011. This coincided with the publication of the government report but surprisingly the articles did not focus on this, instead this spike had more to do with BP moving away from US investments towards growing economies. From the graph it can be seen that in the last two months of data just over two months after the government report and ten months after the crisis, the number of published articles had reached zero.

Graph 8.7 Distribution of Articles



8.3.2 The *NYT* framing of the Deepwater Horizon disaster

What frame(s) were apparent in the newspaper's coverage of the disaster?

The Deepwater Horizon disaster was framed by the *NYT* differently at different times (Table 8.5). Most of the frames were temporary i.e. they lasted for only a certain period of time, usually not a long one and were not persistent throughout the data.

There were four temporary framings and in no particular order (as some came and went) they were as follows, human interest, responsibility, cause and the technology itself. There were also three permanent framings i.e. they were present throughout the coverage and in high number. They were as follows: an economic frame, a political frame and an environmental frame.

Table 8.5 The *NYT* Frames of the Deepwater Horizon Disaster

Frame (Overview)	Timeframe	Example
Political	Permanent	"The nation's political leaders have had a lot to say in recent years about America's addiction to fossil fuels and the need to find cleaner, more climate-friendly alternatives. In recent weeks, they have had a lot to say about the Gulf of Mexico oil spill. On Wednesday, President Obama put them together."-June10.
Environmental	Permanent	"Newsrooms are grappling with the same questions that the rest of the country is, after spending months watching oil gush into the water: Is the oil spill really over? And how damaging will it ultimately be to the gulf's environment"-Aug10.
Economic (local)	Permanent	"Almost all of the closed fishing grounds had reopened, and economic recovery in tourism was well under way, with hotel and sales tax revenues in the fall of 2010 similar to those from the same period in the year before"-Feb11.
Technological Failure	Temporary	"As a crew prepared to lower a giant steel container 5,000 feet below the ocean's surface Thursday evening to capture oil leaking from a ruptured well, the top executive of BP said he was not actually counting on it to work"-May10
Responsibility	Temporary	"I'd like to join in on the blame game that has come to define our national approach to the ongoing environmental disaster in the Gulf of Mexico. This isn't BP's or Transocean's fault. It's not the government's fault. It's my fault. I'm the one to blame and I'm sorry"-Jun10.
Cause	Temporary	"The federal panel investigating the causes of the rig explosion that resulted in the Gulf of Mexico oil spill has focused this week on whether financial calculations may have trumped safety considerations in the weeks before the disaster"-Jul10.
Human Interest	Temporary	"It would be the kind of smart government intervention that creates jobs, lifts the economy and improves quality of life. The long-suffering people of the Gulf Coast deserve no less"-July10.

Beginning with an analysis of the temporary frames this segment will first analysis the technological framing that the *NYT* constructed. The framing relates to the coverage given to attempts at capping the well and to the original platform malfunction. The failing of the platform and subsequent technologies used by BP, Transocean and the US government to cap the well drove this framing for the first number of months. Questions of human technical abilities to deal with and stop the leak became the centre of the framing. Discourses within this framing focused on many different questions, among them were questions relating to technological uncertainty and whether humans had finally pushed technology too far. Was it out of control? Even talk of using the most destructive technology man knows, the nuclear bomb, was seriously contemplated as being a solution to the leak as all other technological endeavours had failed. The language in this framing became quite technical with

experts from various academic fields contributing their advice. The framing stopped however soon after the well was finally capped.

The framings responsibility and cause were closely intertwined. The blame for the disaster and who should fix the ongoing problem was an early issue. Was it the US government, BP, the workers on board the platform, Transocean (the operators of the platform) or Halliburton (contractors used for cementing the well)? A long and protracted blame game began with all parties blaming the other. This was a key focus of the *NYT* in the first few months and became an issue again a number of months later when issues of compensation arose. Compensation would run into the billions and so who was actually responsible became a central component to the overall story. Closely related to the responsibility frame was of course the discussion around the cause of the disaster. Without the cause being established no action could be taken on holding different actors accountable. The discussion of the cause however was not initially a central discussion, with the paper refraining for the most part to comment on the cause. After the government report this changed and cause began to be referred to more and more towards the end of the data.

At certain times the human interest element also at certain times came within the framing of the disaster by the *NYT*. Interviews with individuals and community leaders about the suffering that people were enduring became a topic that arose towards the end of the data. The effect of the disaster on the mental health of individuals along the coast was particularly focused upon. The increase in the number of people suffering from sadness, anxiety and depression were all linked to the disaster. The disaster, the *NYT* said had destroyed individuals trust in not only the industry but also in the government and institutions. It had created fear, a real fear of the future and affected the ability of people to remain in the coastal regions.

The *NYT* dedicated numerous articles to issues of the economy, when not the key focus of articles it was still usually present in some form. The economical focus was not on the markets, on the national level or even for the most part on the state level but instead on the local level. The economic impact among communities of Louisiana and Florida and the individuals within was regularly a topic when talking about the disaster. Contributions from "ordinary" members of the public about how the disaster had impacted them helped to highlight how the disaster was not just an abstract economic event but was in fact very real and something they had to live with -"coupled with the economic slump, Ms. Jenkines, 51, worried that any negative attention from the oil spill would torpedo her business. "There are a lot of sleepless nights," she said"- Jul 2010. Quotes like this were common in this framing. The loss of jobs for individuals and the closing of companies across the southern states were all associated with the disaster. Impact upon tourism, fisheries, industries and the loss of jobs for communities were all included in the disaster narrative as were the topics of compensation and settlement. The crisis as a localised economic subject was prolific throughout the eleven months.

The second topic that was to remain constant in the coverage was that of the environment and the impact of the oil spill on it. Focus was very much on the Gulf of Mexico region in the early stages. Deaths of animals and large numbers of fish as well as the impact upon the flora and fauna were reoccurring themes. As time went on a wider environmental disaster narrative linking it to other industries that are known for pollution such as the paper, pharmaceutical and chemical industries arose. Also it was linked to overfishing, over consumption and other quite abstract environmental issues that at best had a vague connection to this disaster. Government agencies such as the EPA and environmental groups as well as individual scientists from leading universities and research centres were involved in constructing this theme. The lay knowledge of individuals in the regions affected was also used to highlight the environmental aspect of the disaster. At the beginning the environmental issue was constructed uncontested with all sides saying the environment was drastically damaged. However by the end BP and their experts were fighting back and challenging this framing by saying that the damage to the environment was not so bad and that it had been exaggerated in order to increase compensation and for political reasons -" with the oil contained, possibly for good, another front has opened in the coverage: questions of how much oil is left in the water, and how damaging it will prove. Time magazine ran a story questioning if the environmental damage of the spill had been overstated"- Aug 2010.

The last framing was the political fallout in the aftermath and the attempts by certain elements to use the disaster to push through wide ranging energy policies that would not just effect offshore drilling but America's energy culture in general. During and after the disaster political debate increased around the need for a new energy policy and increased drilling regulations for the USA.

"As Congress debated the landmark 1978 law that governs offshore activity, Louisiana officials argued for a light federal touch. 'We have 20,000 oil wells off the coast of Louisiana, and we have been drilling out there for a quarter of a century,'' Senator J. Bennett Johnston, a Democrat, said on the Senate floor. "The so-called danger from oil spills has simply not been proved. Not only has it not been proved, it has been disproved, and we need to get on with that drilling."

(Aug 2010)

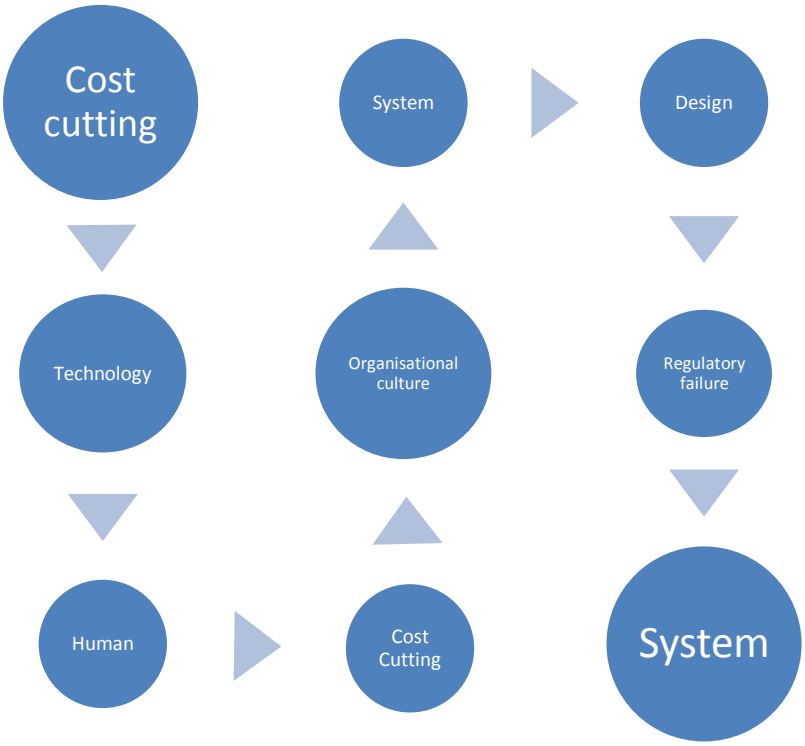
Banning of offshore drilling, the need to stop climate change, the necessitate for new energy sources and America's dependency on oil and the resultant relationship between the government and industry were all highlighted. It became a political question about whether America should and even could move away from its dependency on oil to more sustainable energy sources. This framing was reinforced by Obama's decision to temporally ban offshore drilling which got all sides quite agitated and loud in their support or opposition to drilling offshore. The framing extended to fracking, on shore drilling and the influence of the oil industry on policies and politics. It was to become the key framing of the *NYT* in relation to the disaster.

8.3.3 The cause(s) of the disaster as framed by the *NYT*

What reason(s) was/were given by the newspaper for the cause(s) of the socio-technical disaster?

When framing the cause of the disaster the *NYT* focused on seven different possible reasons, some of which reoccurred at different stages in the data (Graph 8.8).

Graph 8.8 The cause of the disaster as stated by the *NYT* in chronological order



The first cause given for the accident by the *NYT* was the possibility that it might have been due to cost cutting. However they were quick to discredit this cause by using as a source the lead investigator for the presidential panel "who said that he had found no evidence that anyone involved in drilling the doomed well had taken safety shortcuts to save money"- May 2010. As a side note but interesting none the less, it was revealed that it cost $1.5 million a day to operate the platform.

The standard line of the *NYT* for the next five months in relation to the cause of the accident was that no comment should be made until official investigations were completed. The start of October saw the *NYT* return to the cause as leaks started to spread from different officials. First the cementing was blamed, then the workers on board the platform – "the crew failed to close in the well after it failed

an important pressure test and crew members failed for too long to recognize that oil and gas were gushing up the well bore"- Oct 2010.

The cause was again blamed on cost cutting in mid November in a scathing attack on BP "What is fully evident, from BP's pipeline spill in Alaska and the Texas City refinery disaster, to the Deepwater Horizon well failure, is that BP has a long and sordid history of cutting costs and pushing the limits in search of higher profits."- Nov 2010. In addition the culture of risk taking inherent within the organisation was blamed as one of the leading causes. Towards the end of November the cause of the disaster was reported as being the result of the fact that "the deepwater well was a complicated system and that no single error or flaw was solely responsible"- Nov 2010.

The explanation for the cause of the accident returned yet again to focusing on certain specific features, with design being the next "The first part of Mr. Bartlit's presentation focused on BP's well design and the repeated problems BP and Halliburton encountered in preparing the well for cementing and whether BP made a fatal error by not installing enough "centralizers," devices used to keep the drill casing cantered within the well bore"-Nov 2010.

In January of 2011, in the aftermath of the publication by the government of its official report the *NYT* focused on regulatory failure as the cause of the accident, "government officials who, relying too much on industry's assertions of the safety of their operations, failed to create and apply a program of regulatory oversight that would have properly minimized the risk of deepwater drilling."- Jan 2011. By the end of January the *NYT* framing shifted for the last time with their last report on the cause of the accident. It was now according to the paper due to the interaction of many problems and so a system accident – "'The blowout was not the product of a series of aberrational decisions made by rogue industry or government officials that could not have been anticipated or expected to occur again," it concluded. "Rather, the root causes are systemic and, absent significant reform in both industry practices and government policies, might well recur."- Jan 2011.

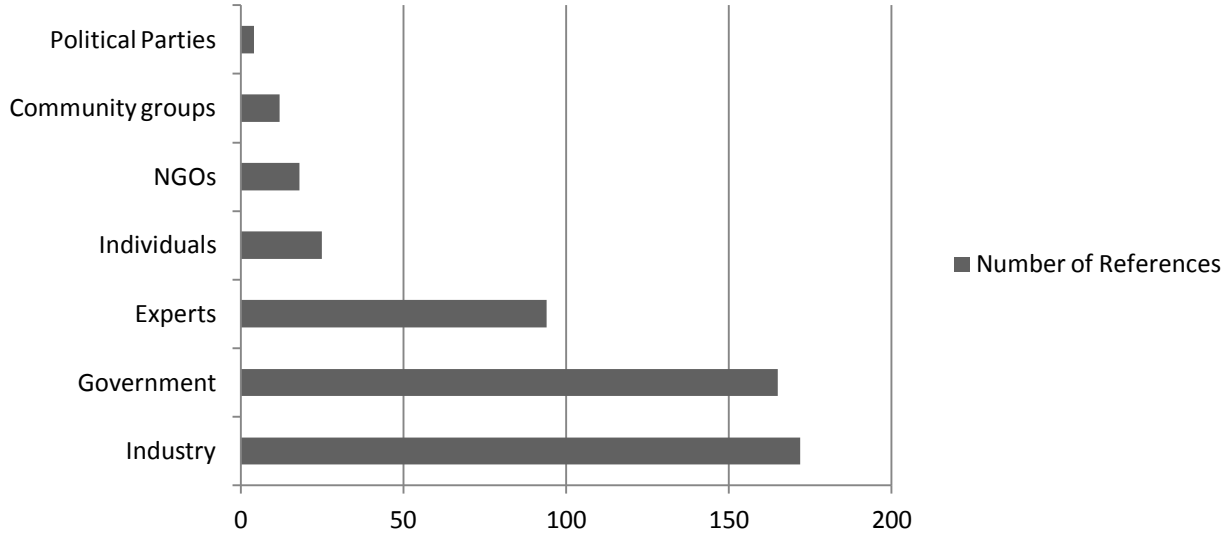
8.3.4 The source(s) used by the *NYT* in constructing the framing

What sources did the newspaper use in constructing the frame(s)?

The total number of times that sources were used by the *NYT* to frame the disaster was 490. The sources consisted of seven distinct groups, namely, political parties, community groups, non-governmental organisations (NGOs), individual/others, experts, government and the industry (Graph 8). Political parties were by far the least used group in the framings (4). The following three groups, individuals (25), NGOs (18) and community groups (12) were all used throughout the framings but not regularly. NGOs consisted of a number of groups such as Greenpeace and Friends of the Earth.

Experts (94), the government (165) and industry (172) were the most active groups. They were used throughout the framings and were heavily used in their construction.

Graph 8.9 Sources used in the *NYT* coverage



8.4 Analysis of the *Guardian's* Articles on the Deepwater Horizon disaster

This section will analyse the articles published by the *Guardian* in relation to the Deepwater Horizon disaster. It is broken down into four sections with each section answering one of the paper's research questions. Each section will first highlight the research question pertaining to it, followed by a detailed answer emanating from a thorough analysis of the data.

8.4.1 The *Guardian's* coverage of the Deepwater Horizon disaster

What converge was given by the newspaper to the socio-technical disaster?

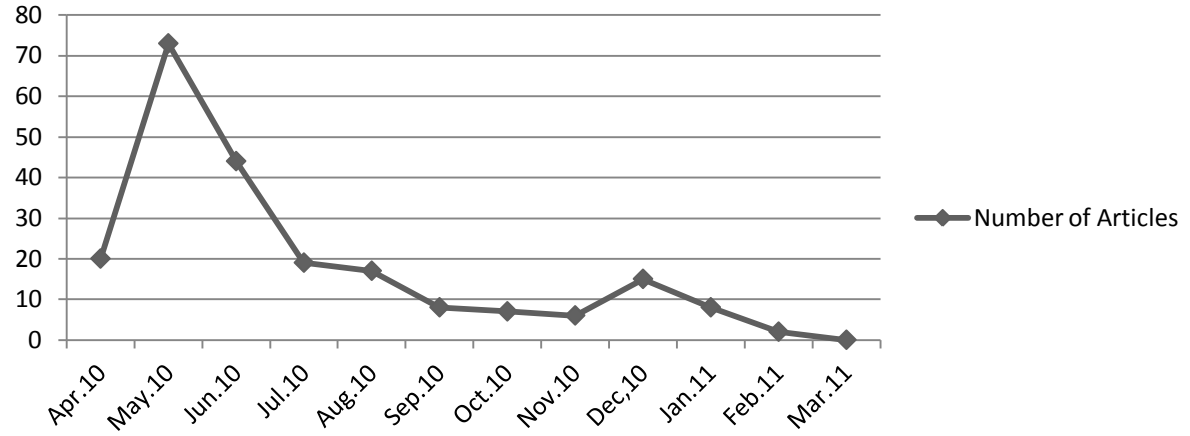
The *Guardian* began reporting on the Deepwater Horizon crisis right from the very beginning and in total wrote 232 articles on the topic. Of these only five were irrelevant to the topic and so excluded from the data and the table below. Similar to the previous analyses, these articles related to duplicates, corrections etc. In total, after exclusion of these articles, there were a total of 227 articles, which in the following table are broken down by month.

Table 8.6 Total amount of articles plus frequency

Total	Apr10	May10	Jun10	Jul10	Jul10	Aug10	Sep10	Oc10	Nov10	Dec10	Jan11	Feb11
219	20	73	44	19	17	8	7	6	15	8	2	0

In the first month, April when the event took place the *Guardian* reported 20 times on the disaster. The following month saw the number of articles skyrocket to over 70. Interest remained in the story during the subsequent month and going through July, albeit not at the same levels of June. From September on a rapid and then steady decline can be seen in the data. This coincided with the "killing" off of the well. There was a slight rise in articles towards the end of January; this marked the release of the US government report on the crisis. The renewed interest did not last long and within a month articles on the crisis had reached zero per month (Graph 8.10).

Graph 8.10 Distribution of Articles



8.4.2 The *Guardian's* framing of the Deepwater Horizon disaster

What frame(s) were apparent in the newspaper's coverage of the socio-technical disasters?

The Deepwater Horizon disaster was framed by the *Guardian* differently at different times (Table 8.7). Most of the frames were temporary i.e. they lasted for only a certain period of time, usually not a long one and were not persistent throughout the data. There were four temporary framings and in no particular order (as some came and went) they are as follows, political, responsibility, cause and technology. There were also two permanent framings i.e. they were present throughout the coverage and in high number. They were an economic frame and an environmental frame

Table 8.7 The *Guardian's* Framing of the Deepwater Horizon Disaster

Frames (Overall)	Timeframe	Example
Economic	Permanent	"In the UK for the first quarter of this year, £1 in every £4 paid in came from a single industry: oil and gas. And, from that sector, just two companies - BP and Shell - accounted for the vast majority"- Jun10.
Environment	Permanent	"In the Arctic, where BP is investing, pollution has far more serious consequences than in warm waters like the Gulf of Mexico. Meanwhile the company's proposed increased exploitation would see billions bumped into an operation that devastates both the local environment and the global climate (greenhouse gas emissions from tar sands exploitation are three times as great per barrel as from conventional crude"-July10.
Technological Failure	Temporary	"The whole might of American wealth and technology is displayed as utterly unable to deal with the disastrous spill" Jube10
Political	Temporary	"So what more natural than a crude, bigoted, xenophobic display of partisan political presidential petulance against a multinational company"-Jun10.
Responsibility	Temporary	"US government deflects blame on to company"- Jun10.
Cause	Temporary	"BP oil spill caused by 'negligence or misconduct"- Jun10.

The *Guardian's* first framing was to focus on the multiple technological failures that were being seen in the Gulf of Mexico. This aspect of the framing lasted from April up to July. It included various technological endeavours to stop the spill such as using remotely operated underwater vehicles to close the blowout preventer valves, complicated directional drilling techniques to "reduce the number of leak points that need to be fixed on the ocean floor, making it easier to drop a containment dome (125 tonnes) to bottle up the disastrous oil spill threatening sea life and livelihoods along the Gulf Coast"- May 2010 and using a technique called top kill, which involves pumping cement and fluids into the well. All failed and so the focus remained on this topic. In August, however, the leak was

finally stopped but that did not stop the focus being on technology, except the focus shifted to the oil platforms themselves and the idea that they are a failed technology.

The second temporary framing was political. Focus delved upon two issues. Firstly on the energy debate raging within the US with brief mentions also of the same in the UK, and secondly on the political fallout between the US and the UK over the disaster. The debate over whether America should abandon offshore drilling and move to other green sources was overshadowed by the dispute surrounding supposed bias against BP because it was a British company by the US administration. Strong anti-British feeling by the US government and people was heavily reported on as was the British government's response. Cameron (British PM) "was accused of being insufficiently patriotic recently for not challenging President Obama when he appeared to sanction anti-British sentiment in criticism of BP, as it struggled to get to grips with the Gulf of Mexico oil spill"- July 2010.

Responsibility and cause were two other temporary framings that were focused on over the first three months and again at the end of the data after the government presented its report on the matter. The US government was quick to blame BP, who themselves tried to blame their contractors. The contractors in turn accused BP of gross negligence and of cutting costs and pressurising them to put production deadlines before safety. The local population were shown to blame the government for the disaster. The cause of the disaster was focused on slightly at the beginning of the disaster with most focus coming in the last three or so months of the data.

The *Guardian* focused on the environmental impact of the disaster all through the data. However the focal point was not just the Gulf of Mexico. The disaster began to be highlighted alongside many other disasters and to become a symbol for the need for change. The wider environment, climate change, climate protests and discussions of peak oil were all spoken about. While to a certain degree focus was put on the environmental damage in the Gulf of Mexico it was always with the greater agenda of relating it to the global environment and the risks posed to it. For example "Greenpeace activists in Berlin urge Germany to prevent deep-sea drilling in the north Atlantic, and avoid a BP-type disaster"- Jul 2010. The disaster was also linked with other disasters of other industries to create some sort of disaster narrative which kept it in the news. The disaster was used as a battering ram by certain sources in the newspapers. They used it to highlight other agendas and attributed it as the reason for climate change, global warming, melting ice caps, rising waters etc. This framing played throughout the crisis.

The final framing was an economic one and a very specific one at that. The *Guardian* choose to report not on a national or social economic level or even very much on stock or energy market s but focused nearly all its energy on the disaster and its impact on BP. Recurring themes within this framing were around the cost to BP in terms of actual cost with questions in relation to cost widely used throughout the coverage, including how much would it be? Could they afford it? Will they go bankrupt? Other

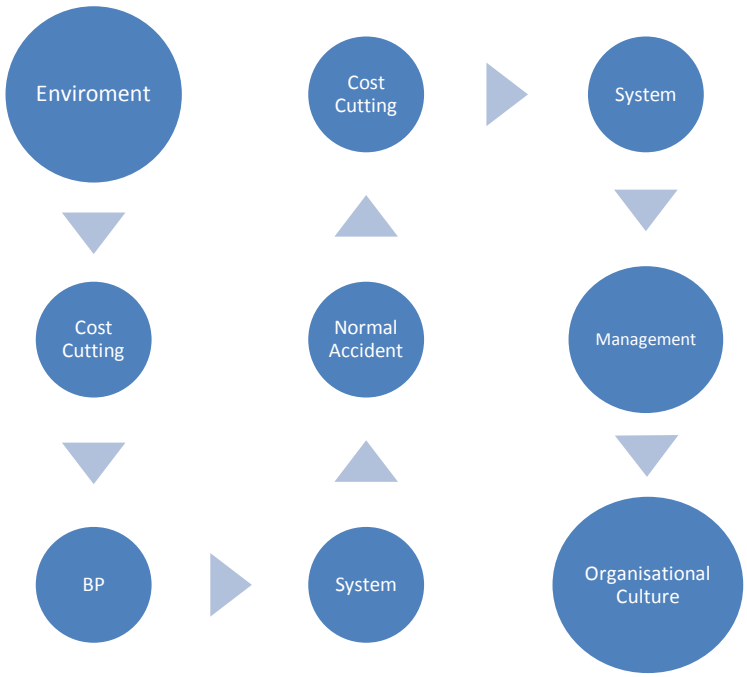
news such as the closing of certain leaks or some new evidence as to the cause of the disaster were often reported in an economic way, i.e. what will it cost/save for BP. The framing included near weekly reports on BPs stock price and also played into the wider role BP plays in the British economy and Britain's reliance on it. Britain's reliance on BP as a major tax payer (the largest in the UK) and as one of Britain's largest employers was highlighted. Lower profits at BP or even bankruptcy and the possible effects of such a scenario on the pension funds of British civil servants also received a lot of attention. The refusal to pay dividends, the payment of bonuses etc. became major issues that over shadowed other aspects of the disaster in the *Guardian's* reporting. The realisation that the leak could not be stopped caused this economic frame to emerge. It lasted throughout the data and can perhaps be best represented by the following quote "the disaster [deep horizon] was the biggest financial loss in UK corporate history which far overshadowed any of the other effects of the disaster"- Jan 2011.

8.4.3 The cause(s) of the disaster as framed by the *Guardian*

What reason(s) was/were given by the newspaper for the cause(s) of the socio-technical disaster?

When framing the cause of the disaster the *Guardian* focused on seven different possible reasons, some of which reoccurred at different stages in the data (Graph 8.11).

Graph 8.11 The causes of the disaster as stated by the *Guardian*



Methane hydrate deposits were highlighted as the first cause of the accident - "a quickly expanding bubble of methane gas shot up the drill column before exploding on the platform on the ocean's surface"- May 2010. In June, two months after the disaster had begun cost cutting had become the central theme being discussed in relation to the cause of the disaster. " There have been allegations, as yet unproven, that BP was cutting corners on the Deepwater rig - perhaps by filling the well with unstable water, rather than drilling mud"- Jun 2010. Also in June broad accusations were made by President Obama and Transocean that BP were behind the cause. No specifics were mentioned merely that BP was the cause of the accident. Obama was quoted as saying; "We will make BP pay for the damage their company has caused" while Transocean s chief executive stated that the accident was the result of BPs "gross negligence or wilful misconduct"- Jun 2010.

In September the disaster was reported as a systems disaster:

It has always believed that the accident was the responsibility of a wider group of companies and the investigators have backed up its claims, concluding that there was no single action or inaction that caused the accident. Instead they claim in the report that "a complex and interlinked series of mechanical failures, human judgments, engineering design, operational implementation and team interfaces came together to allow the initiation and escalation of the accident. Multiple companies, work teams and circumstances were involved over time.

(Sep 2010)

In January 2011 the cause of the accident was attributed to the fact that society was using offshore drilling in general and that accidents are part and parcel of such endeavours. Without a change away from offshore drilling then it was claimed it will just happen again. ”The only long-term answer is to wean ourselves off oil before the post-peak trouble really starts. It is not easy. It’s amazing stuff: energy-dense and easily transported. But alternatives exist, from electric vehicles to bio fuels. These need investment, but would we really rather spend billions on clean-up operations and lawyers?”- Nov 2010. The premise was based on the fact that BP was known to be the safest oil company operating in the region and yet they caused the biggest oil disaster in history, thus suggesting that no changes would prevent another accident and possible disaster.

Other framings for the cause of the accident were also present in January, “it was caused in part by a series of cost-cutting decision made by BP and its partners, many of the poor decisions taken on the Deepwater Horizon drilling rig before the fatal blow-out on 20 April were taken to save time and money”- Jan 2011. In January, the media’s coverage again returned to the idea that multiple failures caused the disaster:

In the months after the Deepwater Horizon disaster began, a number of other oil industry giants attested to the public that the accident was aberrance, the fault of BP's irresponsibility alone. But a peek at the much-anticipated report of the commission assigned to investigate the accident concludes that the crisis in the Gulf is evidence of "systemic" failures - and that without "significant reform" in industry and government, it "might well recur."

(Jan 2010)

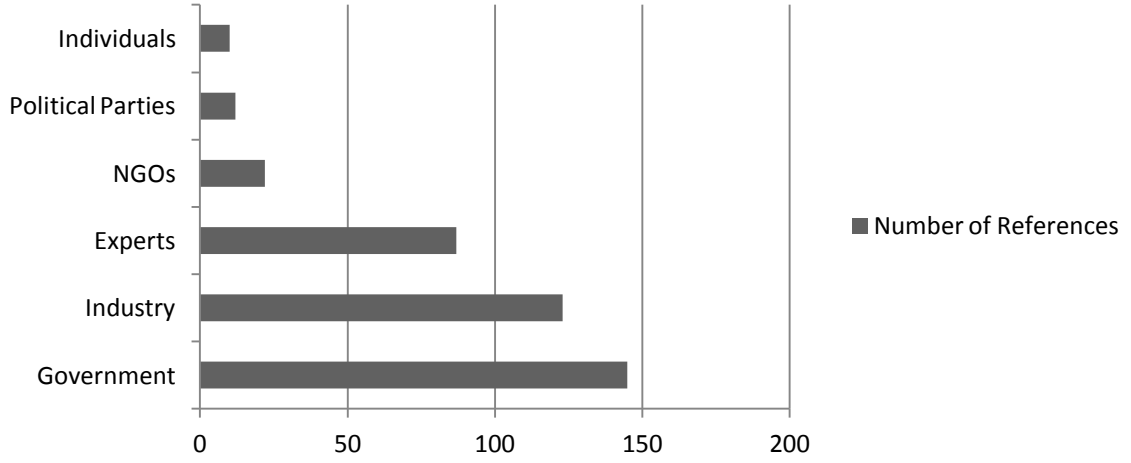
Finally the causes behind the accident according to the articles published by the *Guardian* were put down to “a failure of management” and the organisational culture in the industry. According to the *Guardian* they were responsible for the chief causes of the Deepwater Horizon disaster- “Most of the mistakes and oversights at Macondo can be traced back to a single overarching failure - a failure of management and a culture of complacency which ruled on the Deepwater Horizon oil rig and in the oil industry”- Jan 2011.

8.4.4 The source(s) used by the *Guardian* in constructing the framing

What sources did the newspaper use in constructing the frame(s)?

The total number of times sources were used by the *Guardian* to frame the disaster was 399. The sources consisted of six distinct groups namely; individuals, political parties, NGOs, experts, industry and the government (Graph 11). Individuals (10) and political parties (12) were by far the least used group in the framings followed closely by NGOs (22). Experts (87) were used throughout the data. Government (145) and industry (123) were the most active groups. They were used throughout the framings and were heavily used in their construction (Graph 8.12).

Graph 8.12 Sources used in the *Guardian* coverage



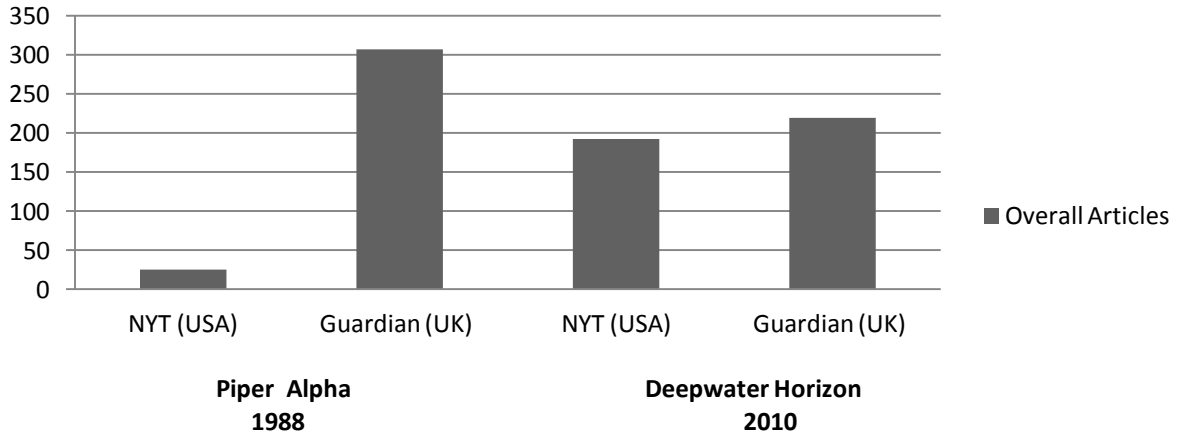
9. Results and Discussion

The aim of this chapter is to bring together the findings of each data set which were highlighted in the previous chapter and compare them against each other in order to extract pertinent results. These results will be used to prove whether the hypothesis holds true or not. In addition, the previous literature will be intertwined with the results in order to expand on interesting themes that arose, and which go outside the confines of the hypothesis and related research questions. The chapter is broken down into four sections; each section compares the previous findings against each other in order to see similarities, or differences that exist in the national newspaper's accounts. The chapter also seeks to highlight any differences, or similarities that have emerged between 1988 and 2010 in how the same newspaper reports on socio-technical disasters.

9.1 Overall Coverage

This section will first compare the coverage that both newspapers gave to each disaster to see if there was a difference in the reporting by the different national media. Then the section will compare the coverage given by each newspaper to both disasters, to see if there is a difference between 1988 and 2010. Finally the literature on media coverage of socio-technical disasters will be reintroduced. This hopefully will allow for the generation of possible explanations for the results.

Graph 9.1 Overall Articles broken down by newspaper and event

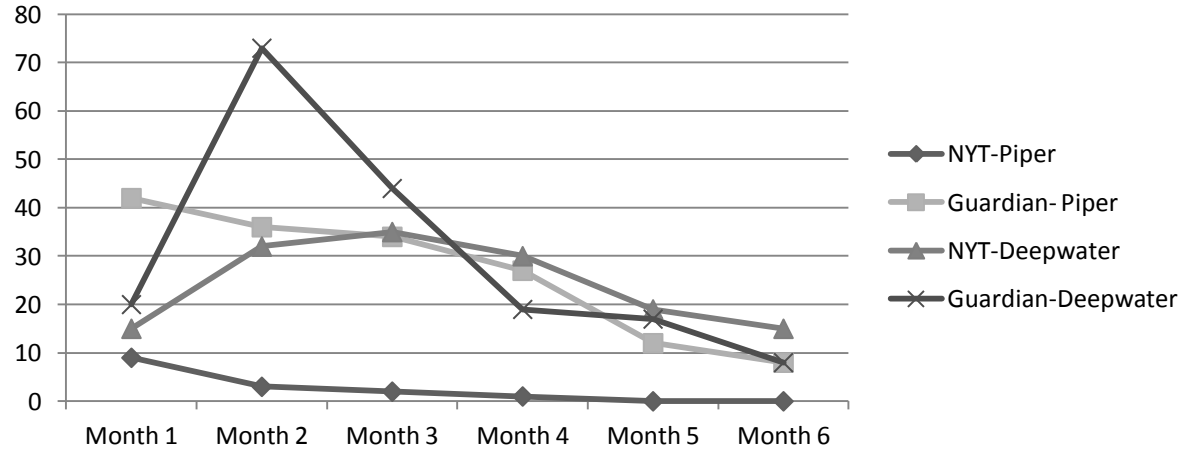


The above graph shows the huge discrepancy in the amount of articles published by the *NYT*, and the *Guardian* in relation to the 1988 Piper Alpha Disaster. In fact the *Guardian* published 282 more articles on the same disaster in the same time frame then the *NYT* did. If we focus on the coverage given to the 2010 Deepwater Horizon disaster in the UK, and in the USA, a different picture emerges. Both newspapers covered the disaster in depth throughout the timeline. The *NYT* published 192 articles while the *Guardian* published 219 articles on the disaster.

Focusing on the change over time within the same newspaper's reporting of socio-technical disasters it can be seen that the *NYT* saw a drastic increase in its coverage, in fact it increased by 167 articles, from 25 in 1988 to 192 in 2010 even though the time period analysed was a year or so shorter. In the UK the change over time was not so drastic. In 1988 the *Guardian* published 307 articles while coverage by the *Guardian* of the 2010 disaster had dropped to 219 articles. It must be again noted that the 2010 data is over a much shorter timeline, and if one was to calculate the average out over the same time period as for the Piper Alpha disaster the figures would be roughly the same.

The distribution of coverage over the time line did not reveal any pertinent information (Graph 9.2). An analysis of the first six months after the disasters showed the greatest divergence could be seen in the spike of articles published by the *Guardian* in relation to Deepwater Horizon. The most significant information that can be extracted from the following graph perhaps is that after six months the newspaper's coverage of both disasters was beginning to wane considerably. The number of published articles at this stage was either heading towards or already in the single digits.

Graph 9.2 Overall Coverage



In summary the *Guardian* had a much higher level of coverage in relation to the Piper Alpha disaster than the *NYT*. For the Deepwater Horizon disaster the *NYT* and the *Guardian* gave roughly the same coverage. The *NYT* increased its coverage drastically in its coverage of the Deepwater Horizon

disaster compared to its coverage of the Piper Alpha Disaster. The *Guardian's* coverage remained more or less the same for both disasters.

9.1.1 Discussion

If one goes beyond the boundaries of the research questions what interesting insights can be seen from these results? First and foremost is the huge discrepancy between the coverage given to the Piper Alpha disaster in 1988 by the *NYT* and the *Guardian*. This aspect of the results is in line with the work of Endreny *et al.* (1991) who stated that proximity to a disaster directly equates to level of coverage. However, the gap was still much wider then that seen in either the work of Anderson and Marhadour (2007) or Bauer *et al.* (2006).

Perhaps the mitigating factor that resulted in such a huge disparity in the levels of coverage was the fact that the UK experienced an exceptional number of abnormal events around that time. The 1980s in the UK was marked by multiple disasters including the fire at Bradford City Football Stadium (1985), which claimed 56 lives and injured approximately 256, the Kings Cross underground Station fire (1987), which resulted in 31 fatalities, the Lockerbie air disaster,, in which a total of 270 people were killed, and the Hillsborough disaster (1989) that killed 96 people and injured 170. In addition the 1980s witnessed the substantial growth in the concept of Health and Safety (H&S) as being a matter of concern for the social, political, and industrial worlds in the UK. A good example of this can be seen in the number of major H&S legislations enacted and commissions established in the 1980s and 1990s. This becomes particularly apparent when one compares the number to previous decades. In the 1950s only two acts were introduced, in the 1960s the number was zero, the 1970s saw four proposals being introduced. The 1980s however, would see this number rise to sixteen, and in the 1990s 14 new major H&S legislations, and commissions were introduced (HSE UK 2013) .This analysis of course raises the possibility that media coverage of a socio-technical disaster is related to other similar happening in the since of both place and time.

This explanation however does not explain the results in relation to the coverage of the Deepwater Horizon disaster. Firmly going against the findings of Bauer et al (2006), and Endreny et al. (1991), it can be seen that the newspaper furthest from the disaster (*Guardian*) actually reported more on the disaster than the newspaper situated in the region (*NYT*). The UK did not experience a rash of large scale accidents, or disasters, at this time as was the case in the 1980s. Nor can one use the explanation that BP was predominately a British owned company and so the reason that the *Guardian* focused so much on the disaster, owing to the fact that this possible solution is undermined by the fact that the owners (Occidental) of the Piper Alpha oil platform, consisted mainly of American companies. In other words the same underlying conditions prevailed.

Potentially (like Anderson and Marhadour suggest) the answer could be due to the globalisation of news, and the changing politics of risk. They argue that "globalisation and growing resilience upon new communication technologies have transformed the news media, fundamentally changing the very nature of political activism" (Anderson and Marhadour 2007, p. 4). According to Beck (1999) processes of globalisation have resulted in a global risk society in which national boundaries no longer offer the imaginary protection from environmental risk. As such "oil spills that were once seen as having largely national concerns have increasingly come to be seen as having international significance" (Anderson and Marhadour 2007, p. 4). The importance of place in relation to these types of socio-technical disasters it would seem plays little or no significance in the media's level of coverage. This again is in line with the thinking of Anderson and Marhadour, who state that national media "increasingly rely on global news agencies such as Reuters, one of the most accessed news sources on the internet, to provide rapid information and images of environmental degradation" (2007, p.4).

The results of the analysis of the coverage provide two opposing ideas in relation to the importance of place in relation to socio-technical disasters. In the case of Piper Alpha the importance of place is easily seen while its redundancy in the case of the Deepwater Horizon can equally be observed.

9.2 Overall permanent framing

This section will first compare how the newspapers framed the same disasters, i.e. how the *NYT* and the *Guardian* framed the Piper Alpha disaster and then how they both framed the Deepwater Horizon disaster. Once this has been shown than a comparison will be made between how the *NYT* constructed the 1988 disaster, and the 2010 disaster. Finally the same process will be completed for the *Guardian*.

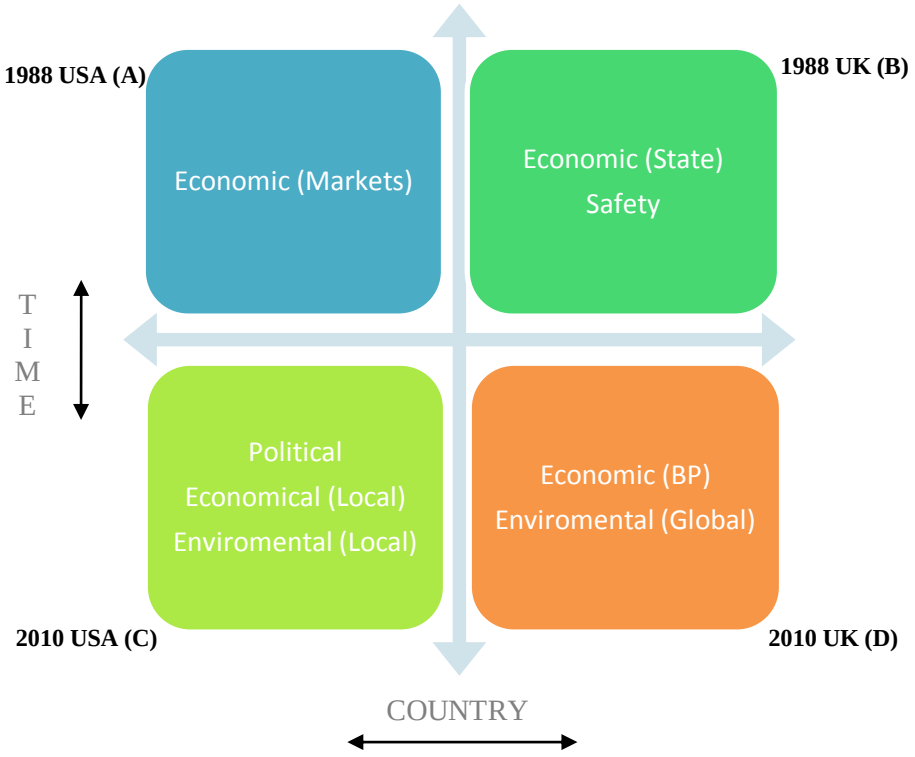
There was only one major topic that the *NYT* included in its framing of the Piper Alpha disaster, and that was the economic impact on the markets, the price of oil, insurance and investments. The following language was used throughout the *NYT* coverage, market collapse, stocks down, share prices, profit margins and so on. This is in stark comparison to the *Guardian's* economic framing which focussed instead on the impact of the disaster on the State. Tax revenue, unemployment, dependency on importing oil and state borrowing were all included in the framing. Words such as GDP, national output, trade effects and budget were common in the *Guardian's* coverage. The second topic included in the Piper Alpha framing by the *Guardian* was safety; it was given a large amount of coverage. The *NYT* did not make safety a permanent framing.

The *NYT* Deepwater Horizon disaster framing had three major focuses. The politics surrounding offshore drilling and wider energy policies, the economic situation of the local communities, and the

environmental impact of the disaster were the three ways in which the *NYT* framed the disaster. The *Guardian* in comparison framed the disaster in two ways. It focused too on the economics in the aftermath but instead of focusing on the impact on communities it was on the impact to BP. Nearly all topics relating to economics concerning the disaster reverted back to discussing BP. The second topic included in the framing was the environment. Again unlike the *NYT* who focused on the immediate area surrounding the disaster the *Guardian* focused on the global environment, and linked the disasters to others, and to wider areas of concern such as climate change, melting ice caps and so on.

The *NYT* framing of socio-technical disasters changed from been solely focused on the cost to the markets (and the price of oil during the Piper Alpha disaster), to the cost to individuals, and to communities while also focusing on political and environmental concerns in relation to the Deepwater Horizon. The *Guardian* shifted its focus away from safety and economic concerns relating to the state, and instead focused on the cost to BP and the global environment.

Graph 9.3 Overall Frames



A-Frames in the *NYT* in relation to Piper Alpha
B-Frames in the *Guardian* in relation to Piper Alpha
C-Frames in the *NYT* in relation to Deepwater Horizon
D-Frames in the *Guardian* in relation to Deepwater Horizon

In summary (Graph 9.3) the *NYT* included only one topic in its framing of the Piper Alpha disaster and that was the economic impact on markets while the *Guardian* included two topics in its framing, the economic impact on the British nation, and health and safety. In relation to the framing of the Deepwater Horizon disaster the *NYT* focused on the economic and environmental impacts on the Gulf of Mexico, the political disputes over offshore drilling, and energy policies. The *Guardian* framed it in relation to the economic effect on BP, and the global environment. The newspapers changed their focus between both disasters with the *NYT* moving the spotlight away from the economic impact on the markets to the impact on individuals, while the *Guardian* shifted its economic focus away from the impact on the State to the impact on BP.

9.2.1 Discussion

On its own the fact that the media, due to place and time decided to focus, and make salient different realities, is by itself quite notable. However when one delves deeper other interesting aspects of the framing process are made visible. As was seen earlier in the literature on media framing Reese (2001) explained how events are structured and organised and so become reality due to a mix of conscious and unconscious decisions due to personal beliefs as well as the culture that one inhibits. This of course applies to individual journalists as well as the institutions they belong to. While one cannot say for certain that the inclusion or exclusion of certain aspects of an event are due to culture or personal choice, one glaring omission in the results of the 1988 disaster perhaps could be put down to the prevailing culture of the time. Virtually no mention was given to the idea of the environment in the framing by either newspaper even through the wells connected to the Piper Alpha leaked for weeks.

This "cultural whitewashing" of the environmental aspect of the Piper Alpha disaster not only applied to the media framing (in both the UK and the USA) of the disaster, but also when one examines the broader social institutions of government (Cullen 1990), and industry (Pate-Cornell 1993), and their framing of the event. In fact there was no tracking of the leak or the amount that entered into the ocean by either the government or industry, with Occidental only after the event making a loose approximation, which they themselves said was unreliable. This cultural whitewashing within framing is different to a situation where a frame is underdeveloped which Entman (1991) would argue is normal in framing. For example the *NYT* focused on economic markets in most detail but also referred to multiple other framings in less detail throughout sometimes overlapping with the *Guardian*'s frames, such as on safety. Cultural whitewashing however could be said is the manifestation of society's beliefs, and priorities in framing and result in a complete disregard for particularly important aspects of an event. It is not just the case of individual institutions chosen to structure reality in a particular way, but society as a whole. Of course the problem with this hypothesis is that what is seen

as "important" is being viewed from a different culture, at a different time, with other priorities. For example the environment was a key frame during the Deepwater Horizon disaster, no matter which institution one examines. However perhaps future societies with another culture will look back upon this event with their own belief system, and ask the same question, but this time relating to a different issue that we find now unimportant. Nevertheless, the idea that such a "key" focal point was omitted from all the key societal institutions framing of the event should deem the topic worthy of more study.

In addition the aspects of place and proximity also seem to have played a role in the media's framing of the event just as they did with the question of coverage. The newspapers closest to the events focused more on the personal nature of the event, while the peripheral papers were more abstract in their framing. For the Piper Alpha event this is perhaps not surprising as we have seen already in the analysis of the coverage findings that place played an important role in the framing. Unexpected though was how the Deepwater Horizon disaster was framed so differently due to the location of the newspaper. With the advent of globalised news, and the supposed reliance on a handful of international news agencies one would think that the newspapers framings would have been similar. However, as was shown in the results above, the *NYT* focused on internal US politics, and the economical and environmental impacts on the Gulf of Mexico region, while the *Guardian* focused on the economical impact on BP and global environmental issues.

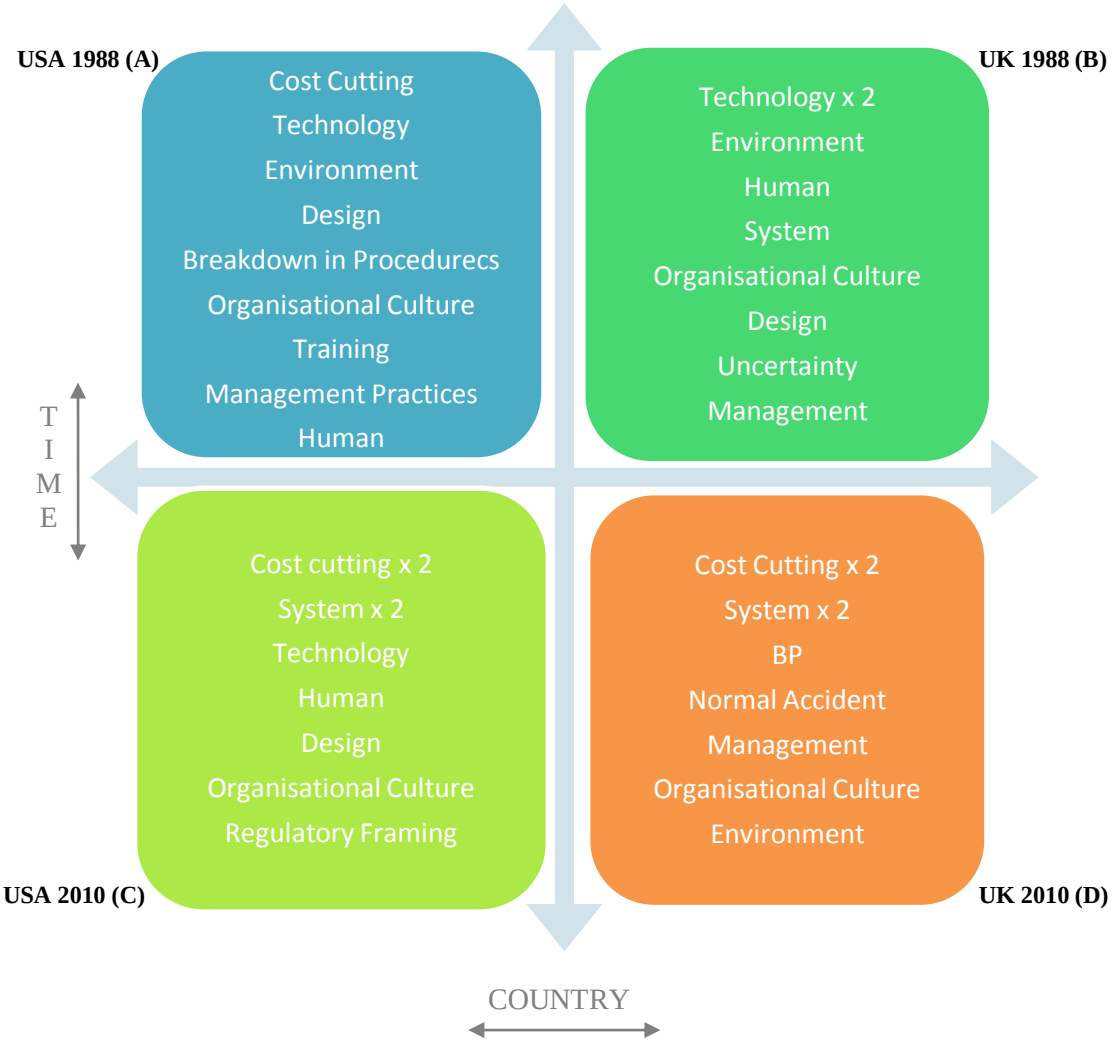
Therefore even with the notion of the globalisation of news that was highlighted earlier and the rise of the risk society, the likelihood remains that different cultures or at least the media institutions within them still focus on different aspects of the same socio-technical disaster. This hypothesis is also in line with the findings of Bauer et al. (2006), Anderson and Marhadour (2007) and De Jong who argues that "national cultures can enhance or undermine international activism due to the fact that media production is shaped by national forces" (2005, p. 111) Their research and the findings of this paper highlight the fact that while news events are going global, news stories about them are remaining local. One would perhaps have thought that with the globalisation and rapid dissemination of news we would also get the globalisation of frames, but that is not the case.

9.3 Overall cause of the disasters

This section will highlight the causes that the newspapers gave for both disasters.

As can be seen from the graph below the cause of both disasters was at different times put down to different things. The reason for the accident varied over time with specific actors either human or non human being highlighted. Across both disasters both newspapers highlighted single entities such as cost cutting, design, human error or technology as being the cause (Graph 9.4).

Graph 9.4 Overall Cause



A-Frames in the *NYT* in relation to Piper Alpha
B-Frames in the *Guardian* in relation to Piper Alpha
C-Frames in the *NYT* in relation to Deepwater Horizon
D-Frames in the *Guardian* in relation to Deepwater Horizon

Focusing on the Piper Alpha disaster, the *Guardian* highlighted once the possibility that the accident could be as a result of the system, i.e. a number of different factors caused the accident. In relation to the Piper Alpha disaster the *NYT* never mentioned this possibly instead putting the cause down to individual components. Examining the findings in relation to the Deepwater Horizon, the cause of the accident is again put down to many possibilities. However, a slight increase is seen in the amount of times the accident was referred to as having been caused by multiple factors/result of the system. The *NYT* twice said that the cause was the result of the system itself as did the *Guardian*. Also the

Guardian went as far as to say it was normal that such accidents happen due the nature of offshore drilling, and so the only solution to prevent future reoccurrences is to abandon the practice. Nonetheless when the results are seen from the macro level it can be seen that both newspapers put the cause of the disasters down to a wide range of possibilities acting alone and not in tandem with other components.

9.3.1 Discussion

What is interesting about the results firstly is the rise in the amount of times the cause of the disaster was described as being the inherent result of the system itself. Both newspapers reference this conceptualisation in total four times in relation to the Deepwater Horizon disaster. The *Guardian* even went as far as to say the disaster happened due to a "normal accident". It was the highest framed reason for the cause in the *Guardian's* coverage and in the *NYT* it shared pole position with the idea that cost-cutting was the cause. Compared to the framing of the cause in the 1988 Piper Alpha disaster the same idea of the cause of the disaster being the result of a "system accident" was mentioned only once. Here it can be seen how over time the cause of socio-technical disasters has come to be categorized differently. Place according to the results probably has less of an influence as both newspapers focused quite heavily on this concept in the 2010 disaster, while not very much in relation to the 1988 disaster. Of course system "accidents/normal accidents" refer to the previously carefully examined work of Perrow. At the time of the Piper Alpha disaster his seminal work was still only in its infancy haven being published in 1984. Over twenty five years later it would seem that his theory has begun to move centre stage in both the US and UK media's framing of disasters.

Additionally the results highlight the fact that both newspapers frame the disasters not just as technological occurrences. They actively construct them as socio-technical disasters with the cause of the disasters being assigned to human elements, technical components or even abstract social practices, and ways of organising such as cost cutting or organisational culture. Arising out of both of these observations one must ask the question, what effect has this constant change about what caused the disaster have upon the public understanding of the event, the risk associated with it and indeed the credibility of the sources involved? The next section will come back to the notion of source selection so here I would like to just focus on the notion of public understanding for a moment. Due to the nature of the media, and its need or requirement to inform the public of happenings it must relay information that it deems indispensable. Of course this information might turn out to be true, half true or in fact be wrong as new facts and information emerge. It is the presumption of this paper based on the results of the analysis that the public must get a misunderstanding of the risks associated with

socio-technical systems. This is due to the constant inclusion in media frames of conflicting probabilities for explaining the cause of socio-technical accidents and disasters.

9.4 Overall Sources

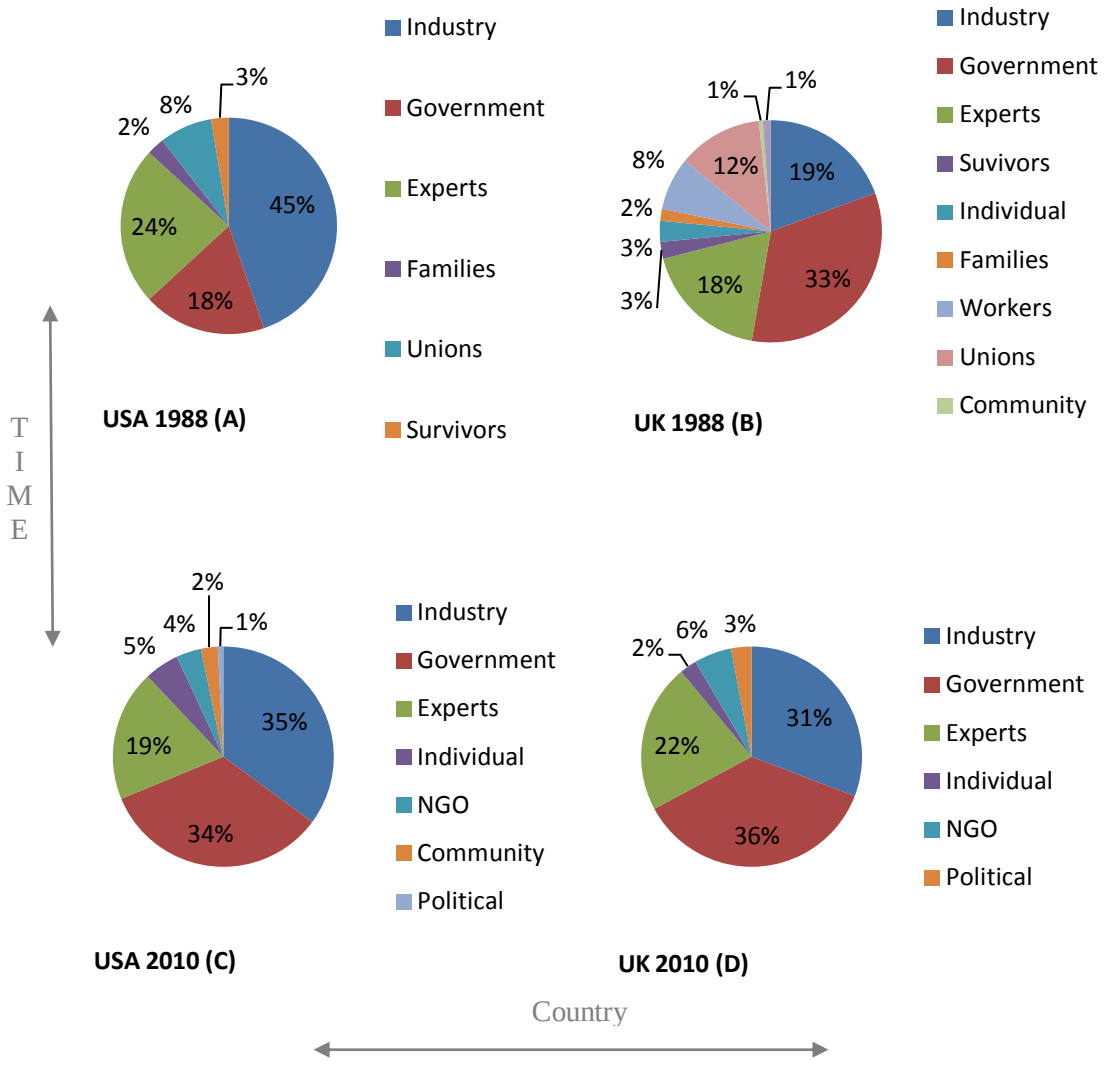
This section will highlight the major sources that were used by both the *NYT* and the *Guardian* in constructing their framing of the disasters.

The *NYT* and the *Guardian* used three sources heavily in their coverage of the Piper Alpha disaster. Industry, government and experts combined made up 87% of all sources used by the *NYT*. The *Guardian* used the same three sources 70% of the time with workers and unions accounting for 20%. Others such as survivors, individuals and families were also used but in very small numbers.

The *NYT* used the three sources government, experts and industry predominately in their reporting of the Deep Horizon disaster. They accounted for over 88% of all sources used by the *NYT*. Similarly the *Guardian* used the same three sources a total of 89%. Outside these three groupings the *NYT* used individuals and NGOs as sources almost 10% of the time while the *Guardian* used NGOs alone 6% of the time.

There was not much fluctuation over time in how the same newspaper used sources (Graph 9.5). The *NYT* used predominately the same sources in both 1988 and 2010; the only major change was the union sources being replaced by NGOs and individuals. The *Guardian* also used the same sources; however the use of the government, experts and industry increased even more in the 2010 reporting at the expense of unions and workers who had zero coverage compared to 20% in 1988.

Graph 9.5 Overall Sources



A-Sources in the *NYT* in relation to Piper Alpha
B-Sources in the *Guardian* in relation to Piper Alpha
C-Sources in the *NYT* in relation to Deepwater Horizon
D-Sources in the *Guardian* in relation to Deepwater Horizon

9.4.1 Discussion

This section will not focus on the idea of whether or not elite sources were the predominant sources used in the framings as this will be discussed in the conclusion. However, in the previous section an interesting topic arose about the concept that the public receives a misunderstanding of risk associated

with socio-technical disasters due to the speed at which the media must publish stories. Subsequently when new facts are released about the cause of a disaster it is often the case that the new findings contradict the previous finding. As can be seen from the above graph experts play a lead role as sources behind many of these findings. One must presume that these experts and the fields of expertise they belong have their public credibility damaged when it is shown that they were wrong. A logical question that should follow such a statement would be; should experts refrain from making hasty judgements on socio-technical accidents and disasters? Or even one could go further and ask; should experts refrain in general from interacting with the media in relation to complex socio-technical entanglements until official reports are published? In order of course to protect their own integrity and the authority of the institutions they are associated with.

The above graph also raises another interesting aspect in relation to sources. When one focuses on localisation an increase can be seen in both the amount of actors included in the newspaper's framing, and the frequency at which they are referenced. An examination of the *Guardian's* sources used in relation to the Piper Alpha disaster shows that: when the sources outside of any institutional grouping are added to together the total percentage of the total time these sources were referenced was 18% (coincidently the same as the expert grouping). When compared to the *NYT* coverage the total was 5%. When the same criteria are applied to the Deepwater Horizon coverage by the *NYT* it can be seen that it used the same grouping 7% of the time while the *Guardian* only focused on these sources 2% of the time (eleven times less than it did on the expert grouping). Why is this case? Perhaps it is to do with the fact that more sources are available the closer one is to an event. Trying to find families, survivors etc. related to an event could be a difficulty when the paper is not based in the area. Possibly it is also connected to the previous findings that showed that the newspapers closest to the disaster focus more on personal stories. Logically the best sources to use for these types frames would be individuals, families etc. who live in the region instead of scientist from nearby cities, politicians from the capital or industrial owners who might not even reside in the State.

Finally, it can be seen that a new actor has arisen in relation to who the two newspapers use as a source in their framing of these socio-technical disasters. In 1988 no mention was made of NGOs in either the *NYT*, or the *Guardian's* framing of the Piper Alpha disaster. When one examines the Deepwater Horizon sources it can be seen that the *NYT* uses NGOs as sources in 6% of cases, while the *Guardian* uses them 4% of the time. In both situations they easily surpass politicians and community groups as points of interest for the newspapers construction of the disasters. Why is it that NGOs are suddenly making such inroads into the newspaper's coverage? It would seem that NGOs have developed strategies for targeting media sources in order to be included more in coverage. This belief is supported by Anderson and Maradour who found through their research that "NGOs such as Greenpeace, and WWF operate on an increasingly global scale and have become hard to distinguish

form transnational corporations. Recent years have witnessed the increasing emergence of direct action protests and a rapid growth in the PR industry" (2007, p. 4).

10. Conclusions and Future Recommendations

Two of the study's four hypotheses received strong support:

- *The media frames socio-technical disasters differently in different countries and at different moments in times.*
- *The media uses the same sources i.e. elite sources as their predominant source irrelevant of location or moment in time.*

One of the study's four hypotheses received partial support:

- *The cause of socio-technical disasters are always framed the same i.e. as "abnormal accidents" irrelevant of geographical place or moment in time.*

One of the study's four hypotheses received equivocal support:

- *The media gives different degrees of coverage to socio-technical disasters in different countries and at different moments in time.*

The overall Hypothesis was not fully supported:

- *The Media frames socio-technical disasters differently and gives them different levels of coverage due to geographical location and moment in time, however the framing of the cause of the disasters remains constant irrelevant of place or time as do the sources used in constructing the framings.*

Consistent with the hypothesis of the paper the *NYT and* the *Guardian* both framed the disasters differently. Both focused on different stories in their reporting of the Piper Alpha and Deepwater horizon disaster. In addition each newspaper's own account of these similar socio-technical disasters differed between 1988 and 2010. A clear change in what themes were focused upon in the coverage could easily be observed. Also consistent with the hypothesis was the newspapers use of sources in the construction of the framings. Throughout all the data three predominant sources were used which can be categorised as elite sources. Industry, government and expert sources dominated the newspaper's coverage of the Piper Alpha and Deepwater Horizon disasters.

The cause of the disaster was consistent for the most part with that of the hypothesis. Both the *NYT* and the *Guardian* framed the cause of the disasters as being the result of "abnormal accidents".

Numerous reasons were given for the cause of the disasters by the two newspapers in relation to both disasters. The disaster as a result of a "one off" event or happening was the predominant framing across the two newspaper's coverage of both disasters. However, it could also be seen that on occasion the cause of the disasters was referred to as a system disaster. This framing became more evident in both newspapers coverage of the Deepwater Horizon disaster. The *Guardian* even went as far as to report the cause of the disaster as being the result of a "normal accident". Hence, while the *NYT* and the *Guardian* predominately stated that the cause of the disasters was due to an irregular occurrence, they also included albeit on a much smaller level the possibility of the cause being due to the inherent characteristics of complex systems.

The coverage given to the disasters by both newspapers was inconsistent with the hypothesis. The Piper Alpha coverage was greater in the local area (UK) compared to the international coverage (US). The UK coverage was about ten times greater than the coverage in the US .This was in fact consistent with the hypothesis. The Deepwater Horizon disaster coverage was greater in the international coverage (UK) compared to the national coverage (US). There was a difference of only 10% in the coverage levels, but the results still ran contrary to the hypothesis. The difference in the *NYT* reporting on the disasters between 1988, and 2010 saw a drastic increase in the number of articles published for the Deepwater disaster. At the same time the number of articles published by the *Guardian* on the disasters was significantly lower in 2010 when compared to 1988. The results emanating from the analysis of the data did not substantiate the hypothesis as the results contradicted each other.

Although the overall hypothesis was not supported, some insights can be extracted to see how the public might get a different understanding of socio-technical disasters owing to the media's framing. As can be seen from the above, publics in different countries are relayed different stories about the same happening. This (if a media constructionist approach is applied) results in said public's getting a different perception and understanding of the same events. As well as location playing a significant role in how the public comes to understand a socio-technical disasters so does the moment in time. The results of this paper's analysis demonstrate that at different times media outlets focus on different topics in relation to the same type of socio-technical disaster.

In addition it can be said that the media either relies on or uses (hard to decipher which) elite sources as the predominant reference in their framing of socio-technical disasters. The public in fact gets its understanding or misunderstanding of disasters (through the medium of media sources) from three distinct groups, industry, government and experts. Other sources play a significantly smaller role in the media's framing of socio-technical disasters.

Finally a shift in the media's focus in relation to the cause of socio-technical disasters over time can be observed. The public in 2010 compared to the public in 1988 would have read that the disaster was possibly the inherent result of it being a complex technological system. Although the predominate

reasons for socio-technical disasters was still put down to irregular happening which could be prevented. The idea that the disaster was the result of a "system/normal accident" which could not be prevented had gained more traction. The media instead of focusing solely on the infallibility or not of individual human or non-human actors began to inform the public more about the intrinsic risks of using such socio-technical systems.

10.1 Recommendations and Limitations

This paper's findings although of interest were somewhat limited by the scale and scope of the media sampling. Focusing on only two newspapers for source material resulted in an underdevelopment of data that could be used to test the hypothesis. This resulted in answers about certain topics (e.g. the media's coverage of the disasters) to remain ambiguous. Future possible work could reduce the timeline to six months (data began to decline rapidly after this time), instead of up to two years as was the case in this paper. This would allow for a wider range of newspapers to be used including the possibility of focusing on other media sources such as television, radio, and the internet. In addition the use of different timelines for datasets should not be conducted as it creates difficulties during the analysis process. If these additions were carried out a much deeper analysis of how the media frames socio-technical disasters could then be conducted.

A more in depth analysis could focus on a number of issues that were raised during the research. Coverage of the Piper Alpha disaster in 1988 was for example in line with the results of previous literature. However, coverage of the Deepwater Horizon disaster was not. It ran contrary to the work of Endreny *et al*. (1991), Anderson and Marhadour (2007) and Bauer *et al*. (2006). They found in their research that the proximity of a media source to a negative event would result in a higher and more sustained level of coverage when compared to a peripheral source. The analysis of the media sources in this paper showed in one data set a higher level of coverage in the periphery. Further research could seek to see if this result was an anomaly or if it is valid across recent socio-technical disasters. The possibility for such an eventuality exists due to the globalisation and centralisation of news.

The research also showed some evidence for the fact that the media is beginning to focus on Perrow's concept of "system/normal accidents" when discussing socio-technical disasters. The media framing of the 1988 Piper Alpha disaster focused heavily on individual causes as being responsible for the disaster. The 2010 Deepwater Horizon disaster while still framed predominately as been caused by individual acts, the idea that it was the result of the technology itself began to receive more attention. Perrow's theory of "normal accident" was only developed in the 1980s hence the reason little focus was given to such an eventuality at the time. Whether it is the case that socio-technical disasters are

seen as being the result of "normal accidents" today would be an interesting research area to expand on. The results of such a finding would be interesting due to the fact that we now purported to be living in the age of the risk society. In such a society the cause of socio-technical disasters and the risks associated with them are vital in the development and continued use of such technologies.

Finally, from the results it can be seen that the media regardless of place or time uses three main sources to support their framings of the disasters. Future research on this topic could focus on many different aspects, such as on the inclusion of lay knowledge, on the up streaming of public participation, and on the media-science relationship that helps in the legitimisation of both institutions.

Appendix

Abstract

This paper examines the different ways in which UK and US newspapers framed the oil platform disasters Piper Alpha (1988) and Deepwater Horizon (2010). The main aim of conducting this research was to investigate how these socio-technical disasters were constructed by the media in relation to place, and time. Once this examination was completed the results were analysed in order to assess the possible impact such eventualities might have upon public understanding of such disasters. To achieve this goal a mixed method qualitative and quantitative content analysis of the *Guardian* and *New York Times* newspapers was performed. The method explored four hypotheses which covered different aspects of the newspaper's reporting on the two events. The findings strongly suggest that both newspapers framed the disasters differently due to place and moment in time. The newspaper closest to the disaster focused more on personal frames while the paper external to the event focused more on abstract frames. In addition, the findings highlighted that both newspapers relied heavily on elite sources. Industry and government figures together with experts formed the backbone of sources used by both newspapers. The findings did not support entirely the notion that the media frames the cause of disasters as being the result of "abnormal accidents". Instead it found a relatively high use of the term "system accident" particularity in relation to the Deepwater Horizon disaster. The findings only gave limited credence to the importance of geographical propinquity, and its effect on the newspaper's coverage. Instead, what seemed to play a more important role in influencing media coverage were the existence of similar happenings and the idea of the globalisation of news. It would appear from the results of this paper that both place, and time can affect media framing and so also the public understanding of socio-technical disasters.

Abstract

Diese Masterarbeit untersucht die Berichterstattung einer britischen und einer US-amerikanischen Zeitung über die Unfälle auf zwei Ölplattformen, die 1996 und 2010 fast 200 Menschen das Leben kosteten und irreparable ökologische Schäden verursachten. Beide Ereignisse, sowohl *Piper Alpha* (1998) als auch *Deepwater Horizon* (2010) können als sozio-technologische Katastrophen klassifiziert werden. Ziel der Forschungsarbeit war es zu untersuchen, wie diese Katastrophen von zwei ausgewählten Medien durch die Art der Berichterstattung in Bezug auf Ort und Zeit konstruiert wurden. Durch eine Medienanalyse wurde der Einfluss dieser Art der Berichterstattung auf das öffentliche Verständnis solcher Katastrophen untersucht. Zur Durchführung der inhaltlichen Analyse der Artikel der *New York Times* und des *Guardian* wurden sowohl qualitative wie auch quantitative Methoden gewählt. Dadurch konnten vier Hypothesen untersucht werden, die die verschiedenen Aspekte der Berichterstattung über diese zwei Katastrophen beleuchten. Die Ergebnisse der Untersuchung lassen klar darauf schließen, dass beide Zeitungen die Ereignisse aufgrund von örtlichen und zeitlichen Gegebenheiten unterschiedlich bewerteten. Die Zeitung die dem Desaster geographisch am Nächsten war, fokussierte eher auf eine „persönlichen" Berichterstattung, während die geographisch weiter entfernte Zeitung aus einer abstrakteren Perspektive heraus über die Katastrophe berichtete. Die größte Gemeinsamkeit liegt in der Wahl der Informationsquellen, da Industrie und Regierungsinformationen von beiden Zeitungen jeweils am häufigsten als Quelle zitiert wurden. Allgemein konnte festgestellt werden, dass der Zeitaspekt bei der Berichterstattung eine wesentlich größere Rolle spielte, als der Ort an dem die zwei Katastrophen stattgefunden haben. Allgemein ergab die Untersuchung, dass trotzdem der Umfang der Nachrichtenberichterstattung über ein Ereignis global gesehen relativ ausgewogen ist, Fokus und Inhalt der Berichterstattung stark von geographischen Faktoren beeinflusst sind.

Curriculum Vitae

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