

# ***The Organisational Salience and the Perceived Influence of Operational Safety Professionals***

*An examination of Hopkins' hypothesis that decentralised  
hierarchical structures limit the capacity of technical experts  
and specialists to promote operational safety priorities  
in corporate decision-making processes*

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*The work presented in this thesis is the original research of the author,  
except where otherwise indicated, and has not previously been  
submitted for credit towards another degree*

A handwritten signature in black ink, appearing to read 'Savitha Balu', with a large, stylized initial 'S'.

Savitha Balu

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*I am deeply grateful to two very dear friends and one very patient and generous emeritus professor for their kind support and steadfast encouragement.*

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## ABSTRACT

This research examines Hopkins' argument, in his analysis of the BP Texas City Refinery disaster, that a decentralised organisational structure contributed to a "blindness to major risk". Hopkins asserts that communications along hierarchical lines of operational accountability allow for safety-critical information to be discounted by intermediaries with commercial priorities. He suggests that fully independent and centralised lines of functional accountability for technical experts and safety specialists could ensure that safety priorities are recognised and advocated if decision-making can be readily escalated to their CEO.

Hopkins' recommendations are grounded in high reliability theory and supported by the analysis of several disaster investigations. A literature review identifies various theoretical issues that underpin the central research hypothesis that organisational structure impacts on the exercise of influence. The research itself is a practical inquiry: seeking to better understand how this hypothesis is interpreted and applied by safety practitioners within hazardous industry. I gather the opinions, insights and experiences of thirty professionals from nine participating companies within the Australian resources sector.

The key research objective is to examine the practical relationship between: the structured organisational salience of technical safety professionals; and their perceived influence on the priority given to operational safety issues in both operational and strategic decision-making. A secondary concern is to identify organisational dynamics that affect the influence that is exercised by technical safety professionals and to understand how organisational design parameters may be utilised to appropriately reinforce operational safety priorities.

The research findings are presented as nine corporate case studies, describing the structured positions and activities of technical experts and process safety professionals within the operational hierarchy. The research finds that operational safety professionals and process safety experts are typically not able to fulfil their responsibilities within their defined roles. They are instead challenging or circumventing the structured parameters of their position and functions. The research findings confirm the underlying concerns that organisational design choices impact on the capacity within the organisation to reliably communicate safety-critical technical details. Hopkins' hypothesis is extended to include organisational design parameters beyond structure.

Three other modifying factors are identified as also able to elevate or undermine the influence of technical experts and safety specialists. These are: leadership support; management systems; and personal credibility, as illustrated below.

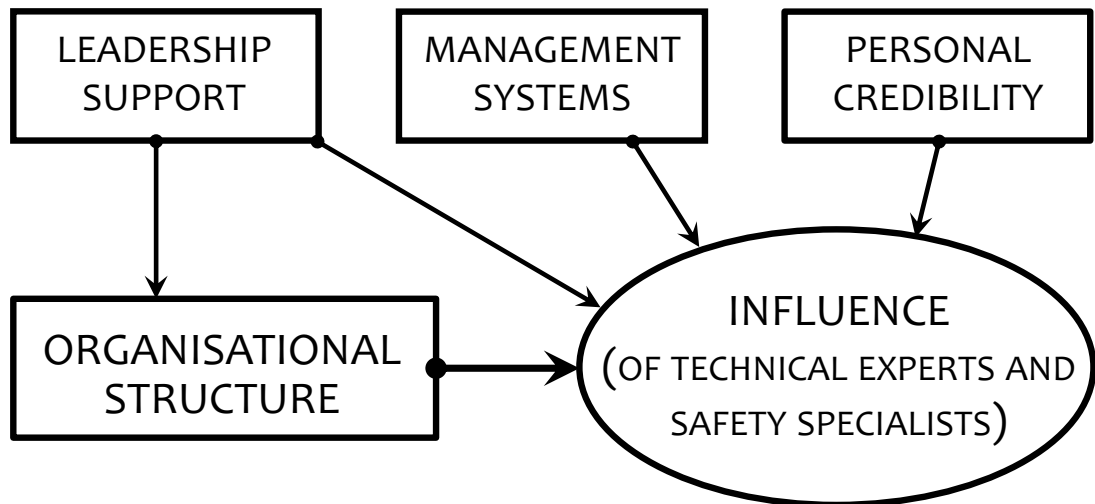


Figure: Organisational Factors that Modify Influence

In particular, the capacity of leadership, such as CEOs, to dictate and modify organisational structure and to establish and reinforce corporate priorities has both indirect and direct impacts on the influence that operational safety professionals exercise. There is also a widely acknowledged expectation that safety practitioners, including technical experts, should be personally persuasive with “an ability to influence”. This suggests that delegated authority for safety practitioners is accepted as being limited and unlikely to be available.

Promoting a single cohesive safety message that does not account for such issues of influence and authority may present the appearance of a unified safety culture in spite of recognised underlying conflicts: between organisational sub-cultures such as managers, operators and engineers; or between corporate goals such as production and safety.

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## 1.0 INTRODUCTION

### 1.1 OVERVIEW OF RESEARCH

This research project examines the impact of organisational structure on the capacity for technical experts and safety specialists to influence decision-making that affects the overall safety and fundamental integrity of operations. The central research question is derived from Hopkins' argument, in his analysis of the BP Texas City Refinery disaster, that BP's decentralised hierarchical operational structure contributed to an organisational "inability to learn" and abetted a "blindness to major risk" (Hopkins 2008, p158).

This thesis considers the critical concepts underlying Hopkins' hypothesis, which suggests that a centralised, functional line of accountability to the CEO could enable safety-critical technical advice to be independently escalated to appropriate decision-makers (A. Hopkins 2008, p163). Direct lines of communication between operational safety experts and leading executives is intended to ensure that the organisation can recognise circumstances in which operational safety may need to be prioritised over commercial imperatives (A. Hopkins 2008, p95). The focus of this research is on: whether or not decisions are informed by such expert advice; and not on any evaluation of impact of such advice on the actual outcomes or potential consequences of such decisions.

The principal organisational issues highlighted in Hopkins' discussion refer to the impact of a decentralised structure on the lines of accountability and lines of communication available for the flow of safety-critical information. The related recommendations tackle the critical structural aspects which define and underlie the organisational framework that establishes both the access to, and the independence of, expert advice. The importance of technical expertise and ready access to specialist advice in decision-making is one of the five core characteristics notions of a High Reliability Organisation (HRO) model. The particular value of Hopkins' hypothesis is that the abstract notion of a "deference to expertise, as exhibited by encouragement of a fluid decision-making system (Weick and Sutcliffe, 2001)" (A. Hopkins 2014, p8), is translated into a recommendation for practical implementation.

A serious concern within the safety science discipline is that "there is a wide gap between the level of knowledge published and debated in academic circles on these issues and the level of knowledge transfer that has actually occurred to the industry" (Bourrier 2011, p12). This research seeks to address this rift between academic theory and industry practice by undertaking a targeted inquiry that seeks to evaluate how Hopkins' hypothesis is itself interpreted and applied by the technical experts and safety professionals that it refers to.

Rather than testing or verifying the generalised applicability of Hopkins' hypothesis, the objective is to consider the relevant issues within the same corporate context. Instead of simply observing and evaluating the subjects of interests, the objective is to gather their observations and insights and seek to comprehend their points of view. This predominantly ethnographic approach and a narrative format allows for each of the research participants to discuss their perspectives in their own terminology and a personal context. The inherent value of such case-based study of the organisational dynamics that affect how operational safety is being prioritised in corporations is appropriate to "gain as great an understanding of causal relationships and mechanisms as possible" (Bazeley 2013, p345).

Access to safety professionals in nine companies within the Australian resources sector has afforded candid interviews with thirty safety experts, specialists and managers. These active professionals all have roles and responsibilities that are related to their organisations' operational safety activities. They all have positions and functions within the corporate environment, and personal experience of the organisational dynamics that are the focus of this research.

To promote frank and forthright dialogue and to avoid any reputational risk to either the individual participants or to their employers, confidentiality has been offered and fully accepted. Therefore, the participating organisations are not identified by name or even by any identifying or notable details of their core activities. The interviewees are also discussed and quoted anonymously. The names and pronouns used are randomly male or female as anonymity, not gender, is the vital concern within this study. Approval for this research and associated fieldwork has been obtained from the ANU Human Research Ethics Committee.

## **1.2 EXAMINING HOPKINS' HYPOTHESIS**

The most compelling reason to explore Hopkins' hypothesis is that well-established safety science theories are applied to develop a specific organisational remedy that addresses the long-recognised issue of missed opportunities to recognise and respond to emerging safety risks. This approach is emulated in the design of this research project which establishes a composite framework to bridge the widening gap between academic safety theory and industrial safety practice such as between safety culture concepts and the assurance of operational discipline. Therefore, this research is predominantly a practical inquiry within the corporate context of hazardous industry, that is informed by academic analysis and theoretical perspectives.

The essential concerns are threefold:

- The application of safety theories: how can concepts of organisational design and of power and influence contribute to understanding and establishing whether appropriate structures are in place to advance the effective utilisation of technical expertise?
- The investigation of corporate practices: how do organisations, that are developed around essentially unsafe materials, processes and environments, structure themselves to manage the inherent hazards and risks of their core activities?
- The examination of industry practices: how do those safety professionals, who comprehend inherent hazards and risks, perceive that they influence and contribute to strategic and operational decision-making and prioritise operational safety issues?

The focus is on those who are responsible for managing and maintaining operational discipline and overall operational safety. The primary objective of this research is to identify the relationships between the independent variable of their structured organisational salience; and the dependent variable of the perceived influence that is available to them. The strategy for data collection and analysis is developed to consider what organisational factors are observed by the interviewees to be critical in supporting or undermining safety practices and priorities. The essential concern is whether organisational dynamics can be useful to industry in designing structures that are intended to ensure operational discipline and promote operational safety as priorities that can over-ride commercial imperatives.

There is indisputable recognition of case studies as the most widely accepted approach to learning from major accident events. Hopkins' hypothesis addresses a substantive and substantial problem in safety research that, though such opportunities for learning are fortunately so rare, the lessons that they impart are unfortunately and often too familiar.

### **1.2.1 A RARE OPPORTUNITY**

The BP Texas City Refinery Disaster is not considered to be one of the worst industrial accidents in terms of lives lost and cost; nor is it particularly remarkable in terms of the problems that were identified to have contributed to the incident (Hendershot 2015, p38). These were as subtle and complex (but predictable and seemingly inevitable in hindsight) as many other industrial disasters. The distinction of this particular event is the manner in which it was prosecuted through the courts with civil actions seeking damages against the parent company, BP (Hopkins 2008, p2). As with the Longford Gas Plant disaster that had interrupted domestic gas supply, the societal impacts of the Texas City Refinery incident motivated legal actions that involved comprehensive investigations and documentation.

BP itself undertook a “soul-searching inquiry” which closely examined the role of senior executives but “with the knowledge that the report might be made public” (Hopkins 2008, p2). Also, the families of those killed or injured in the Texas City Refinery incident sought to clear the plant operators of culpability when BP identified these individuals as the principals in causing the disaster. In addition to claiming damages against BP as the actual responsible party, one of the victims’ family members brought a legal challenge for BP to make public all of the documents and depositions related to all of the civil cases (A. Hopkins 2008, p3).

Hopkins therefore had access to material that included lines of inquiry and investigation for testimony from involved site personnel that was intended to be used as potentially incriminating evidence. This wealth of extensively documented and publicly accessible data allowed for what Hopkins refers to as “desktop ethnography” (Hopkins and Tillman 2016, p94) and an exploratory immersion through the legal paperwork.

The value and significance of such a vast accumulation of data can be understood when the BP Texas City incident - which directly affected only those at the refinery itself - is compared to an incident such as the devastating toxic gas release from the Union Carbide plant in Bhopal. Recognised as one of the worst industrial disasters, this accident remains poorly investigated despite the deaths of some 20,000 people and harm to a quarter of the local population with “nearly 200,000 people ... exposed to the poisonous gas by varying degrees” (Varma and Varma 2005, p37). Despite the severe and unmatched repercussions of this event, neither legal action on behalf of the victims nor investigation of contributing organisational factors was facilitated by the parent organisation (Broughton 2005).

The underlying circumstances of the Bhopal incident continue to be debated three decades later because Union Carbide resisted any close evaluation of causes beyond the immediate plant, systems and processes at the local production facility (Broughton 2005). The affected population of Bhopal had no legal recourse to appropriate compensation, and the Indian government was unable to impose the full extent of liability or culpability on the major multi-national organisation that was ultimately responsible for oversight and management of the local facility. The local site and plant were simply “closed after the accident, and Union Carbide became a subsidiary of Dow Chemical” (Varma and Varma 2005, p37).

This is a stark contrast to the reach of the many investigations that followed the BP Texas City Refinery disaster, which had dramatically more localised impact. Unlike for Union Carbide after the limited investigation of the Bhopal disaster, the broader systemic problems within BP, the multinational parent corporation, were exposed due to the public inquiries into the disaster and the successful bid to publicise the investigative reports.

Thorough and comprehensive examinations were conducted specifically to understand the organisational issues, management responsibilities and executive accountabilities of BP as the parent company and how these contributed to problems at the Texas Refinery site (Hopkins 2008, p3). These served to highlight that the strategic governance issues of BP contributed significantly to the operational issues at the site that ultimately resulted in the accident. As pointed out, “the internal workings of the corporation ... have been laid bare, in an almost unprecedented way” and “...the inquiry trail after the Texas City accident jumped the Atlantic to examine the role of BP’s most senior officers in London. That is one of the factors that make this accident worth studying” (Hopkins 2008, p2).

### **1.2.2 A FAMILIAR LESSON**

Hopkins’ argument reiterates the common findings of several major accident investigations and extends their critical lessons. He recommends, with simple and concise rationale, that an independent hierarchy of technical accountability be created (A. Hopkins 2008, p163) in order to counter the inherent and long-acknowledged problems related to decentralised operations. The function of this independent line of accountability would be to ensure that decision-makers have access to accurate technical advice and relevant information. Hopkins proposes that organisations should be structured to ensure that operational safety decisions are made as high up in the organisational hierarchy as may be necessary to overcome competing pressures of production and profit. The objective would be to effectively give operational safety professionals “more clout” (A. Hopkins 2008, p163).

Hopkins’ book on the BP Texas City Refinery Disaster is titled “Failure to Learn” which is the principal theme as indicative of “a blindness to catastrophic risk” even though many such previous studies have demonstrated that “catastrophic risks need to be treated quite differently from other risks”. The critical problem identified in his analysis is that, despite adequate opportunity, BP “should have learnt this, but hadn’t” (Hopkins 2008, p4). Hopkins goes on to “show how BP’s organisational structure and functioning impeded learning” identifying four aspects of organisational behaviour as significant contributing factors (Hopkins 2008, p7, pp73-120) and he discusses each in detail.

In summary, the following hypotheses are advanced - that the reliability, integrity and safety of operations from catastrophic risk is impeded by:

1. the intrusion of cost cutting priorities at the operational level;
2. misdirection of reward structures for senior decision makers based only on profit;

3. ineffectiveness of technical expertise and specialist advice communicated through a decentralised operational hierarchy; and
4. a lack of mindful leadership reflected by inadequate resources and a lack of attention.

The research specifically examines the third of these organisational aspects about which Hopkins suggests that the operationally decentralised, hierarchical organisational model inherently limits information exchange. “Large organisations have a range of people with specialist safety knowledge ... and they may be separated from key decision-makers by a layer of management that effectively filters or muffles their voice.” (A. Hopkins 2007, pp119-120). This has a cumulative and detrimental impact on the strategic oversight, management priority and the resources that are allocated to the safe operation of hazardous processes.

This lack of attention consequently limits the potential for many otherwise readily available opportunities to be recognised at all, or with enough time, to avoid major accident events or to mitigate the consequences of serious incidents. Hopkins’ case study suggests that a decentralised organisational structure precludes:

- the effective communication of complex operational risks by specialists and experts up to senior decision-makers; and
- the appropriate oversight and control by senior decision-makers down to the specific details of safety-critical processes.

The argument for organisational learning is that “organisations must find ways to embed lessons from accidents into their organisational structure and functioning” and that “ultimately, says Kletz, accident prevention depends on educating people at all levels of an organisation about previous accidents and how they occurred” (Hopkins 2008, p8) (Kletz 2003, p210). The basic problem has been how to achieve such an education at any level of the organisation when the openness and depth of inquiry of the BP Texas City Refinery disaster makes this a rare scenario for study and analysis of organisational factors, rather than the norm.

It is commonly known that “underlying management and leadership failure in its many forms ... attracts much less attention” (Pasman, Rogers and Mannan 2018, p80) than the “material and equipment aspects” in the identification of operational hazards and risks. However, with current access to powerful information sharing technology, there is now much more readily available knowledge of safety failures that are related to organisational issues, accumulated from many historical disaster investigations. Also, the capacity to

accumulate more specific knowledge of the potential for disaster within a particular organisation for a particular operation has been enhanced by sophisticated, specialised processes of hazard identification, risk management and systems analysis (Pasman, Rogers and Mannan 2018, p103). This should provide ample opportunity for the application of both predictive foresight and instructive hindsight in relation to the need for technical expertise and independence that was articulated as an organisational recommendation as far back as three decades ago in the findings of the Challenger Space Shuttle disaster investigations (Rogers Commission 1986, p200).

Therefore, this project examines the structure of corporations and organisational dynamics that impact on the effectiveness of specialist technical advice and safety expertise. In gathering examples and experiences of how designed structure has affected the available influence that safety professionals are able to exercise, the research seeks to evaluate the potential of the central hypothesis to guide effective organisational design for safety.

As a postgraduate engineer with technical expertise who is researching the application of an established sociologist's hypothesis, I hope to take advantage of my industry experience and this academic process to enhance the value of this thesis. I argue that the interview discussions and interpretations will be better informed with my own technical background. It is clearly advantageous to have the contextually relevant knowledge and experience to explore recommendations that bridge a gap between safety theory and safety practice.

### **1.3 OUTLINE OF THESIS**

This first section has introduced the research hypothesis that is to be examined and has defined the research objective as identifying those structural parameters and other critical organisational dynamics that support operational safety priorities in both strategic and operational decisions within hazardous industry. The research strategy is described as the collation of material and interview data from nine organisations, optimising an opportunity to gather the expert insights and observations of experienced safety professionals.

The next section reviews the relevant literature to establish the background for research that seeks to combine practical inquiry and theoretical analysis to inform both industry practice and academic interpretations. The underlying concepts of relevance to Hopkins' hypothesis are discussed in terms of safety science and disaster studies as the research background. The application of the hypothesis is discussed in terms of both industry and corporate practices. The critical parameters of Hopkins' hypothesis are developed with reference to sociological theories of organisational design and of power.



Section 3 defines the research design in terms of postulating that if the hypothesis and recommendations were accepted and implemented in their entirety, the ideal subject of interest would be the organisation's Principal Operational Safety Specialist or POSS. The independent variable is defined as organisational salience; the dependent variable is defined as perceived influence; and the collation of all research data as independent case studies is outlined. Also, each of the two research variables is discussed in terms of how they are specified, observed, interpreted and analysed; while the research processes of sampling and data collection are explained with reference to how both fieldwork and analysis methods are adapted and refined (based on preliminary issues) in order to maintain focus on the fundamental research concerns.

The fourth and largest section presents the independent case studies of each of the nine participating organisations and the potential POSS roles identified in each. The companies are each described in terms of: their operational safety activities; how related roles are structured; and what influence is perceived to be exercised by the various POSSes. Each case study includes a discussion of significant themes arising from the observations and insights of thirty safety professionals. The interview discussions - with technical experts, safety specialists and senior managers - focus on the ways in which industry professionals, in corporations that are engaged in hazardous operations, are able to utilise or need to challenge or bypass the structurally defined parameters of their roles.

Section 5 discusses the research outcomes in terms of the specific parameters that define the organisational salience of each identified POSS and compares these to the postulated ideal POSS. The impacts of these structural parameters and of other modifying factors on the perceived influence of each POSS are considered in terms of common themes that have been identified. The research questions related to industry and corporate practices are both answered with the expansion of Hopkins' hypothesis to include other significant organisational factors. The most significant themes of the research findings also suggest that organisational structure could be useful as an indicator of design intent that reflects corporate values and commitment to operational safety priorities. The implications of the findings on both academic and industry approaches to operational safety are considered to identify observations and issues of current concern and of potential interest to both safety science theory and practice.

## **2.0 BACKGROUND**

### **2.1 OVERVIEW OF LITERATURE**

The overview of literature is presented as two separate perspectives that differentiate between the basis of the central research hypothesis and the underlying concepts that are examined in this research. Firstly, the background literature is presented to provide the broader themes and safety research perspective that have informed Hopkins' hypothesis. Then the corporate context and academic literature, that inform the research strategy by which to examine Hopkins' hypothesis, is presented as a tighter perspective.

Hopkins argument refers to aspects of HRT and to safety culture concepts to consider a common finding amongst several disaster investigations. The literature is discussed in Section 2.2 as the foundational elements of the safety theories and case studies on which the central research hypothesis is grounded. This initial review therefore examines both the theoretical and practical frames of reference in establishing the research background. This broader safety research perspective establishes how Hopkins' hypothesis and this specific research project are placed within the safety science discipline.

A separate review of the academic literature is presented in Section 2.3 to specifically define a composite practical and theoretical framework by which to consider both: the critical aspects of organisational structure; and the concepts of power and of influence. The practical context of the research process is discussed in further detail to outline industry approaches to hazard and risk management. This aligns the research design with the corporate environment of the interviewees, who are all safety practitioners within participating organisations. This composite literature review therefore establishes common terminology both: to balance the theoretical and practical frames of reference; and to integrate the several distinct but directly relevant subjects and essential disciplinary approaches. It is important to clarify that this tighter perspective is focussed on how to examine Hopkins' hypothesis and establishes the conventions for the research methods, fieldwork; and findings that are presented in Sections 3, 4 and 5 respectively.

### **2.2 SAFETY RESEARCH**

In current safety research literature, there is a notable "separation between the advances of the social sciences in the field of risk and organisation and the way in which the corresponding activities are managed on a day-to-day basis. Yet progress cannot be achieved without a significant change in the relationship between the industrial and

organisation science community” (M. Bourrier 2005, p101). Bourrier also acknowledges “the premise that the lack of both debate and cross-fertilization of ideas between managers and engineers who decide on organisational design, and scholars who study high-risk operations, has a high cost in terms of safety” and “this situation must be challenged” (Bourrier 2005, p99).

Section 2.2.1 outlines the relevant theoretical concepts of organisational behaviour, that are discussed as mindfulness, maturity, culture and learning within safety research, and are grounded in organisational theories of HRT and safety culture. They sit well toward the “applied” end of social science as they focus on analysis for major accident prevention. Actual studies of industrial disasters are discussed in Section 2.2.2 as the sources of much of the raw material that safety scientists study; which provide many of the lessons for the organisational learning that safety science theories promote. The organisational factors that are related to safety management and to technical expertise are therefore discussed in terms of how they are understood to have contributed to known failures. Both refer to technical expertise in terms of the foundational knowledge on which hazardous processes rely and the information that is sought, analysed and communicated for safe operations.

### **2.2.1 HIGH RELIABILITY THEORY (HRT) AND SAFETY CULTURE**

The expectation that gives rise to Hopkins’ recommendations is that organisational systems that conform to the operating principles of HRT may improve safety awareness and behaviours within high hazard organisations. The original research that engendered HRT sought to broaden safety science research by “rejecting the notion that trial and error is the best way to manage potential risks”. Instead a group of Berkley researchers sought to study “organisations that to their knowledge continuously met and often surpassed the criteria set by society for reliable performance.” (M. Bourrier 2005, p9) to identify their defining characteristics.

HRT commends the organisational practices of high-hazard, technologically complex and operationally dynamic industries that have to function within a tightly- constrained and highly-scrutinised socio-political environment. The theory has influenced many complex technical industries to aspire to be high reliability organisations or HROs. HRT suggests adopting, adapting and implementing the practices that are inherent to organisations that must operate under very high expectations of operational integrity and safety. There are various works that seek to define fundamental HRO characteristics, of which the most cited are the five organisational processes that are considered by Weick and Sutcliffe to be most consistent with the principles of high reliability and reflect a “mindful organisation”:

1. Preoccupation with failures rather than successes
2. Reluctance to simplify interpretations
3. Sensitivity to operations
4. Commitment to resilience and
5. Deference to expertise, as exhibited by encouragement of a fluid decision-making system (Weick and Sutcliffe, 2001) (A. Hopkins 2014, p8)

It is easy to transpose Hopkins' argument for the structured centralisation of technical experts and safety specialists onto the fifth characteristic of "deference to expertise". In fact, this fifth characteristic is sometimes discussed as "under-specification of structures" such as in earlier versions of the "mindful infrastructure for high reliability" (Weick, Sutcliffe and Obstfeld 1999, p89). It was intended to represent the observed fluidity of structures in HROs that allow them "to operate in both a centralised and decentralised manner" (A. Hopkins 2006, p885) and "loosen the designation of who is the important decision-maker" (Weick, Sutcliffe and Obstfeld 1999, p89). The underlying principle was that atypical events that needed to be recognised by experts would "migrate around the organisation in search of a person who has specific knowledge of the event" (Weick, Sutcliffe and Obstfeld 1999, p103). Ongoing references to HRT in disaster studies further refined this structural discussion as an issue of how responses to developing problems could be undertaken with appropriate input by technical experts at whatever level of the organisational hierarchy is appropriate. This is therefore a clear relationship between centralisation and technical input, and is discussed in Section 2.3.1.

A key issue with HRT is that these broad guidelines, which are directed at organisations seeking to be HROs, suggest that they should seek a somewhat intangible mindfulness. Some specific work exists that is related to ways in which HRO principles could be adopted and adapted for organisational learning, such as by fostering an HRO culture in employees (A. Hopkins 2008). However, a significant limitation of HRT based models is that they offer vague advice on how organisations that are aspiring to be HROs should approach their problems but do not provide specific details to assist organisations to determine the necessary steps. This lack of specifics may be inherent to the original theoretical model. The founders of HRO theory are known to have intended to offer a different perspective for consideration of high hazard, complex industries and be more concerned with promoting alternative discussions rather than prescriptive recommendations (M. Bourrier 2005, p10).

The very lack of directives and specifics may be one of the reasons that HRT remains such a powerful, lasting and broadly acknowledged paradigm, despite few real examples of HROs. One of HRT's founders, Karlene Roberts, actually acknowledges the issue that "reliability enhancement requires constant attention, is expensive, and is very fragile. This is one reason organisations fail to engage it" (M. Bourrier 2005, p95). It is a crucial and defining aspect of HROs that they operate within a socio-political environment where the pressure for operational safety and process integrity is equivalent, or greater, than commercial or production pressures. If the objective of HRT is to guide the modification of organisational behaviour, related models may require a much greater focus on promoting and establishing internal organisational motivation for such modification.

The reality of attempting to achieve HRO standards appears to be - very much by definition - that HROs must be driven to achieve high safety performance by external socio-political pressures that are accepted within the organisation as exceeding or at least challenging other factors, such as the economic imperatives of the operation. This is an immensely difficult attitude to adopt in industries and companies that do not have an external driver towards exceptional safety performance or high reliability but are simply hoping to learn from those that do. When the quality of operational safety performance within an organisation is primarily motivated by internal drivers - essentially a corporate choice - it is far more easily threatened by economic priorities. Imitating behaviour that arises in high-performance environments may focus attention and provide direction, but it may also be self-defeating and ultimately limited in applicability without adequate consideration of the impacts of the external operating environments.

HRO theorists within the safety science space are aware of the issue that "there is a wide gap between the level of knowledge published and debated in the academic circles on these issues and the level of knowledge transfer that has actually occurred from these circles to the industry or regulatory circles." (M. Bourrier 2005, p12). Bourrier goes on to state that "Hopkins (2001, p72) is right when he observes that 'this is not just a theoretical debate. There are practical consequences for the way we go about accident prevention'." Hopkins' work attempts to interpret the academic knowledge for practical edification.

This research project is itself motivated by the possibility that developing and implementing a hypothesised organisational practice may offer guidance to industry for improvements in operational safety management and prevention and mitigation of major accident events. However, unlike HRT, the specific value of Hopkins' hypothesis is a focus on quite specific

organisational parameters that can be interpreted within a corporate context to improve the capture and communication of knowledge as implemented within hazardous industry.

It should be noted here that the concept of learning organisations is a common theme to the concepts of safety culture and maturity. Safety culture is also quite an abstract concept with debate on whether the term itself refers only to organisational cultures that promote safety or to the ways in which all organisational cultures impact on safety (A. Hopkins 2006, p876). Regardless of this debate, the focus is on collective organisational values and practices “summarised by Schien as “observed behavioural regularities, group norms, espoused values, formal philosophy, climate, embedded skills, habits of thinking, shared meanings and root metaphors” (Schien 1992, pp8-9)” (A. Hopkins 2006, p876).

As with HRT, safety culture conceptualisation offers a way of looking at operational safety as a fundamental factor of normal operations rather than just a response to incidents and accidents. It also offers a language in which to discuss (and debate) the issues common to risk or safety management. But also, like HRO theory, safety culture research is inherently limited as it “rests upon a harmony model of organizational life” (Antonsen 2009, p183). Antonsen identifies this as a “fundamental short-coming of the existing research” and argues that to give a “realistic account of the dynamics of organizational life”, power and conflict need to be considered. The focus on influence still differs greatly from the use of broader indicators such as safety culture or maturity. As influence is an essential component of examining Hopkins hypothesis, safety culture is not discussed further but the concepts of power and authority are further detailed in Section 2.3.

There is a tacit acknowledgement that the roots of safety performance are still very much related to the way in which operational safety priorities are adopted and implemented by organisations. This suggests that organisational design is widely understood to possibly dictate the prominence of safety in the cultural mindset of the organisation. Both of these organisational theories, related to major accident prevention, tend to assume that operational management systems and safety cultures are robustly in place and ready to be refined, whereas actual disaster studies tend to reveal that they are often not. It is important not to assume any level of mindfulness or safety culture as being built into an organisation but instead be careful to consider that the gathered evidence is based on actual behaviours with due consideration of corporate attitudes. When considering the findings and discussions of disaster studies, it appears that attention still needs to be paid to implementation of safety management systems and practical development of safety cultures in organisations than is addressed by any of the major theoretical approaches.

### 2.2.2 DISASTER STUDIES AND TECHNICAL AUTHORITY

Industrial safety practice has long been dependent on learning from experience and the central research hypothesis is based on findings of disaster investigations and analyses. It is a crucial aspect of the practical frame of reference that corporate organisations in high hazard industry attach practical significance to actual accidents. An incident – whether a minor local event or a major accident event - provides tangible evidence of consequences that are otherwise only predicted. Tangible evidence can be understood and interpreted more broadly in terms of real impacts and business concerns. Safety investigations and disaster case studies continue to provide highly effective rationale for motivating improvement in corporate organisational behaviours and systems.

From the practical industry perspective, this research based on case studies, still sits at the “theoretical” end of the spectrum, far from the social, reputational, commercial and financial consequences of major accidents. The fully theoretical approaches are valuable for developing models of causation and frameworks for discussing commonalities between different accident situations that can be shared between organisations and even between industry sectors. However, because they remain quite abstract (and therefore difficult to either assess, apply or implement) the most valued work in safety research remains those case studies into disasters. Major accident events display operations under circumstances with a comprehensible causation sequence to eventual failure. The major accident events that are discussed here include: the Challenger space shuttle disaster (as a significantly consequential incident that presents an early iteration of the safety impacts due to organisational structures); and the two recent BP incidents at the Texas City refinery and the Macondo well (discussed with direct reference to the research hypothesis).

Case study research provides the minimum tangible evidence that appears to be needed to motivate substantial change. Accident scenarios generate examples that operational safety professionals can more readily translate and present as lessons for managers and operators to relate to and build on in their own workplaces. On the other hand, predicted, hypothetical accident scenarios present too many variables that can be debated or even dismissed with statistical manipulation of likelihood and inaccurate estimations of consequence. It is inherently easier to follow unique sequences of causation that have been demonstrated than those that are only speculated. Also, as patent risks are most likely to be recognised and addressed by appropriate risk management measures, it is to be expected that mostly latent hazards and unknown combinations of risks create conditions for the cumulative impacts that are more often than not revealed in major accident events.

The most common theme of many studies of significant industrial disasters is that there were failures to act on known information. Disaster studies will inevitably continue to identify available evidence which could have been acted upon. There will be technical experts or safety specialists, front-line operators or auditors, who would have predicted and could have reacted to prevent escalation and disaster. These events are inherently complex and limit the capacity of foresight due to multiple variables and perspectives to consider how social, legal, political pressures impact internal organisational processes.

The technical specialist role that is the subject of interest came under significant scrutiny after the Challenger space shuttle disaster. The circumstances of this incident and the sequence of events that were identified by subsequent investigations into NASA threw the organisation, its management and the concept of technical expertise under the harsh spotlight of political and public debate. The nuances that were added to the interpretations and findings of the technical reviews and studies, by raising issues of personal integrity, independence and accountability, clearly demonstrate the value of safety science and sociological considerations in understanding the causation of major accident events.

Original findings in the Challenger investigation identified that clear warnings from experts such as design engineers and technical analysts within the organisation were ignored or dismissed at higher echelons by managers who were responsible for decision-making and ultimately determining what were acceptable safety risks against the broader priorities of the organisation. The focus of these investigations was on how risks were quantified, evaluated, prioritised and communicated within the organisation (Committee on Shuttle Criticality Review and Hazard Analysis Audit, Space Applications Board, and Commission on Engineering and Technical Systems 1987).

It is typical for engineers to build in several factors of safety to allow margins for error between design and implementation, so risk assessment for mitigation by design to “acceptable” levels is a common concept. An enterprise such as NASA that was at the forefront of technological progress and could never operate without establishing specific criteria for what constituted an acceptable risk. With the hindsight of a long-time engineer reflecting on some of the history of this disaster, it seems ludicrous to me that an agency responsible for effectively throwing humans into space could warrant public condemnation for decision-making that allowed for acceptable risks. The picture that was drawn in the early original literature was of technical specialists with sincere safety concerns about the mission being ignored by managers with agendas that overrode safety priorities. The outcry and outrage made little sense unless technically acceptable risks were misrepresented.



It was not initially considered – except by Richard Feynman - that NASA's own technical experts were part of the overall problem. As discussed by Marshall and other biographers, Feynman was notable as the single, fully independent member of the investigating Commission, displaying no particular respect for the political forces that were in play. That the technical expertise in NASA was of significant concern was the only way to understand and interpret the somewhat sensationalised ease with which Feynman, an independent scientific expert, disputed with NASA's analyses (Marshall 1986).

It was noted that Feynman maintained his distance from the socio-political pressures that affected his peers and colleagues on the Rogers Commission (Marshall 1986). Feynman's demonstrated and stated concern was with the pure science and objectivity of examining the causal factors. His independent and separate assessment of the technical expertise as applied to risk assessment at NASA was highly critical of NASA's technical specialists. Examining the disaster from the purely scientific perspective, it was clearly concluded that NASA had not lived up to its status as an organisation with objectivity and standards that are typically associated with scientific and technical enterprise (Rogers Commission 1986).

The specific concern to this research is that Feynman's independent assessment was that NASA's technical specialists were detached from the broader scientific community in responding to the demands of their organisation, thereby reducing their own effectiveness. This is somewhat different to the clear message arising from the other early investigations and analyses of this disaster which suggested that financial and political pressures on NASA had impacted on technical specialists, who needed to be protected from such forces for the scientific process to be effective. Comprehensive work was published many years later by Vaughn that proposed that the entire organisation of NASA, including its technical experts, suffered from a process of risk normalisation. Vaughn suggested that any "successes" of having avoided a failure were leading to inappropriate and unnecessary risks because they were being considered to have been proven and normal to the process (Vaughn 1996).

This concept implied that, whatever pressures there may originally have been on technical specialists to compromise reliability or integrity, the actual compromise became acceptable of itself even if those pressures were still impacting on the process. Conscious choice was not necessarily a factor for unacceptable operational risks to become common and hence accepted. In the first perspective, the issue was highlighted that a conflict between the engineers and the decision-makers was not resolved by the merits of the case but was instead influenced by external pressures. In the second perspective, the issue that was highlighted was that the engineers themselves did not correctly evaluate the risk and

recognise that the safety issue was critical. Other agendas were being absorbed from the culture of an organisation continuously challenged to meet economic and political goals.

It would be appropriate to expect that technical experts are insulated from such cultural impacts by their own professionalism, keeping up to date with their peers and the leading edge of their profession. A technical specialist is someone who is an expert in their field of endeavour. They “know their stuff”. Others turn to them for crucial advice on critical issues so that decision-making is based on the best available understanding of the best available information. It is implicit in the terminology that the priority for a technical specialist is maintaining expertise in their specific discipline. It would also be anticipated that they exhibit integrity and proficiency in following and fostering the guiding principles of their profession. It may be unreasonable to expect such immunity from their own workplace.

This is obviously a crucial difference in what organisational parameters are required to ensure that experts remain fully independent and strongly committed to their discipline. In the first perspective, technical specialists would need to be given a voice to match that of other decision makers and NASA in fact instituted “technical authorities” that recognised the need for certain decisions to remain unaffected by economic and political pressures. In the second perspective, the technical specialists need to be given more than a clear voice – they need to actually be given a clear directive to ignore, refuse to consider, and even proactively resist the culture and values of the organisation in which they function.

So, technical expertise has a very clear significance to operational safety and Hopkins’ hypothesis draws the same conclusions as previous disaster investigations. In particular, that such expertise should remain an independent priority with expectations set by the functional discipline. It is also contended that technical expertise should maintain best practices available to their wider technical community and that it should be readily accessible to senior decision-makers without dilution through layers of management hierarchy. This research examines if and how these observations and recommendations are being translated into any practical or meaningful solutions within industry.

Hopkins’ hypothesis is presented as part of a broader review of the BP Texas City Refinery disaster and reflects the significance given to potential for organisational theories and practices to address known issues of utilising technical expertise within and organisation and to capture and reinforce prior learning. The responses of BP Global to addressing the causal factors identified at the facility and along the lines of management accountability are therefore significant to the question of practical applicability.

Hopkins discusses how BP had spent several years implementing an educational program of culture change – the BP HRO program (A. Hopkins 2008, p113). The program was an attempt to change the individual values of the organisation and thereby its culture and according to Hopkins was “never likely to meet with a great deal of success” without the “prerequisite organisational change”. Real organisational change was in fact adopted after the Texas City refinery disaster in 2005, with BP creating independent reporting lines, for its engineering authorities within each operation, up to a functional Vice President responsible specifically for operational safety (A. Hopkins 2008, p103). The expectation was that these independent lines of technical accountability would afford more influence to specialists in the roles of engineering authorities so that priorities such as operational safety were not over-ridden by cost and production imperatives at the site and operating levels of the management hierarchy. Functional lines would provide dedicated advocates the means to champion safety and technical integrity at all levels up the entire organisational hierarchy.

The organisational structures that were adopted based on studies and findings were considered to be more likely to “move BP in the direction of the HRO culture to which it aspires” (A. Hopkins 2008). This change, however, had not been fully implemented in the organisation before the Gulf of Mexico Deepwater Horizon incident in 2010, which left BP open to the same criticisms of poor technical oversight and authority as had been levelled five years earlier after the Texas City Refinery disaster. BP’s organisational response to this later, major accident event expanded the organisational changes to include a total overhaul of the operational safety function by the creation of a Safety and Operational Risk group. The principal manager of this group was not only to report directly and independently to the CEO, but was to be given the authority to intervene in production and operations.

This organisational reform was not discussed in the first internal investigation of the 2010 Macondo incident. The BP investigation did however include recommendations that “procedures and engineering technical practices ... should include, as a minimum ... a description of the technical authority’s (TA’s) role in oversight and decision-making” (BP 2010). The many issues that BP identified as significant concerns from the internal investigation identified key operational safety aspects including various issues that were discussed as: procedures and engineering technical practice; capability and competence; audit and verification; and process safety performance management (BP 2010).

As previously suggested, greater relevance is inevitably placed by operating corporations on actual examples of disasters or incidents than on theoretical discourse; and the responses of corporations to a major accident event tend to provide the clearest indication

of what businesses may perceive to be fundamental in modifying and updating their operational safety management systems. The slow uptake by BP of a safety culture prior to the Texas City refinery accident was accelerated to organisational changes to improve safety management. After the Deepwater Horizon incident at the Macondo well, these changes were accelerated by an urgent transformation of the corporate structure.

Not only did the BP CEO speak of and very quickly institute a global restructuring of the entire organisation but addressed this ongoing issue by centralising the operational safety function, including an executive solely responsible for process safety and operational risk at the most senior management level. This suggests that Hopkins' hypothesis for changes to the organisational structure has perceivable, practical merit to industry, whether or not such issues are identified in the industry investigations as contributing factors.

### **2.3 HAZARDOUS INDUSTRY**

The gap in the academic discourse on safety is clearly visible between: the abstract models and ubiquitous behavioural theories; and the reliable analytical tools and unambiguous guidance that business and hazardous industry need in order to recognise and reorganise for safer operations. The research explores how corporations, involved in high-hazard industry reflect and apply a social science hypothesis that attempts to bridge several gaps – between industry and research; between organisational and safety theories; and between social models of harmony and conflict. This research is therefore utilised as a valuable opportunity for discussion of these issues with practicing industry managers and safety engineers to examine the discontinuity between studying safety and operating safely from multiple perspectives.

This thesis examines the impact of organisational design as a fundamental factor that affects the influence of safety professionals on decision-making. The various corporate activities related to management hierarchy and engineering functions that deal with oversight and control of operational risks are discussed as operational discipline and safety. The specific variables of the hypothesis are: the corporate dynamics of centralisation, or decentralisation (which is a foundational characteristic of organisational design); and available influence in decision-making (which refers to foundational sociological themes of independent agency and authority or legitimate power). It is also observed that safety theories are inherently limited as they “rests upon a harmony model of organizational life” (Antonsen 2009, p183). Antonsen argues that to give a “realistic account of the dynamics of organizational life”, power and conflict need to be considered. Effectively this research needs to allow for these several distinct paradigms.

In order to establish the industry perspectives for this research, the discussion in this section includes a targeted review of hazard and risk management processes that are typically applied within industrial operations. It is also noted that they may be affected by the organisation's corporate environment.

There is practical disparity between the detailed technical processes and requirements for operational safety and the more strategic approaches of governance and management oversight. These are both discussed in order to provide an adequate level of detail to cover the technical language of hazard identification and risk management as context for the research interviews, data and findings. The prevailing business frame of reference, dominated by economic motivations, and their significance to hazardous industry practices and to addressing accident prevention is a specific issue of concern to this research.

### **2.3.1 CORPORATE AND INDUSTRY PRACTICES**

The fundamental factual basis of the central hypothesis is that investigations into the causal factors of many major accident events have shown that both relevant expertise and pertinent advice have been available and may have made a difference to the outcome if acted on. However, issues that were raised, or recommendations that were made, have been disregarded or undervalued at lower operational levels and may have not even been communicated to senior or executive management.

The recommendation of the central hypothesis is that an independent functional hierarchy for competent technical experts and safety specialists could be structured as a direct centralised line of communication and accountability to executive management, avoiding operational hierarchies with different priorities. Hopkins differentiates between line management of the core activities of an organisation that are commercially motivated; and functional management of activities that are motivated by other imperatives, typically to satisfy regulatory requirements, or social and political expectations.

In any corporate organisation, one can generally observe that the core activity comprises some form of production or process leading to profit. Most organisations then have several subsidiary activities that support or govern those core operations. Subsidiary activities or functions that typically surround the core operations would be finance, human resources and sales. Other such functions might supplement core operations (such as product development and quality control), support core operations (such as administration and asset maintenance) or provide oversight and governance (such as environmental, occupational health and safety management).

The larger an organisation, and the more complex its core operations, the greater the significance and complexity of the subsidiary activities or functional systems that are required to maintain those core operations. For example, one would typically find that major multinational organisations (with diverse core operations spread out across several countries) will inevitably have highly resourced and strongly managed financial and corporate divisions with large functional teams in each.

It is also quite likely that support staff (whether IT, human resources or maintenance) and specialists (such as engineers or lawyers) are readily on hand in various functional roles (for example as technical support or legal advisors). The fundamental purpose of such support is to ensure that the profit-making, core operational activities continue to operate as efficiently and productively as possible within social, environmental and legal constraints.

In high-hazard industries with core operations that comprise complex and high-risk production and distribution processes, it would be generally accepted as a fundamental requirement that the functional support activities include those related to ensuring that the overall process and operations are safe. Such functional activities would typically comprise engineering support, process control, monitoring and maintenance to confirm that core operations are proceeding within specified tolerances for both plant (which is major equipment) and processes (technological systems of operation).

There would inevitably be technically competent staff employed within these organisations who are dedicated to managing operational safety and integrity. There may also be specialist staff in governance roles who could be expected to maintain oversight and reporting on safety performance and to promote operational safety priorities. The research focus is on the structured, formal lines of accountability and independent access that decision-makers within the organisation have to the expertise and advice of these operational safety professionals.

The industry language still reflects a highly technical focus on the specific details of operation and also reflects the acknowledgement of safety risk as inherent to the enterprise. The technical core professionals – the engineers and safety specialists - discuss and address as a matter of course: equipment specifications and operating envelopes; hazard and operability studies; process control systems; asset integrity and technical integrity; programs of repair and maintenance; standard operating procedures and protocols; monitoring, audits and inspections; and quantitative risk assessments and mitigation measures.

A crucial differentiation that is made in examining the central hypothesis is that the context of the investigation is operational safety as opposed to occupational safety. Process safety, technical integrity and operational discipline are common terms used to describe the activities related to establishing appropriate operating limits and maintaining production processes within those safety-critical parameters. The related hazards are typically identified as risks to production, failure of process control and/or potential for major accident events. These types of safety issues and incidents that are “often the result of hidden, latent, interacting causes obscured due to complexity” (Pasman, Rogers and Mannan 2018, p81) are managed through highly technical and specialised activities. Process safety management has moved “towards more accurate predictive operational dynamic risk assessment and management” with “digitization, automation and simulation” used to identify and assess various scenarios (Pasman, Rogers and Mannan 2018, p80).

Approaches to safety management systems for risk management, operations control, task delegation and responsibilities are now also informed by human and organisational factors based on concepts of human biases and organisational factors, and interactions with the immediate and broader social and political environments (Reiman and Rollenhagen 2011). These are addressed collectively in this thesis as issues of “operational safety” that include technological, organisational and personal aspects of identifying, mitigating and managing the potential for catastrophic risks. These are not to be confused with the personal safety risks that are generally discussed and managed as occupational health and safety.

Though personal safety and occupational health are significant in hazardous industry, they are not relevant to examining the central hypothesis. The overarching terms “occupational health and safety” and “personal safety” include: acute injuries and even fatalities (such as from slips, trips and falls or acute exposure to dangerous materials and hazards); and chronic health problems (from continuous exposure to minor risks or low hazard environments which have a cumulative effect on health).

Examples that range from minor injuries, to chronic health effects and fatalities include: poor work posture or repetitive motions causing muscle strain and pain; continued high noise levels gradually affecting hearing, chemical exposure causing scarring or severe damage to eyes or irreparable damage to lungs from unsafe entry into contaminated, confined spaces; and – of course - workplace vehicular accidents and awkward or high falls that can result in death. These are all very different to the types of risks and consequences that we discuss as operational safety issues, as they do not relate to the basic, technical integrity of core operations, processes and activities.

Consider a boiler where high temperatures create steam under pressure. The plant and equipment can operate safely (that is within the specified operating envelope or conditions for which the system has been designed) but still present personal safety risks to operators. A typical boiler would be surrounded by low-lying pipework that presents trip hazards and risk of burn injuries (if the lagging – that is, insulation – on heated pipes and equipment parts has been damaged). Boilers also have pressure relief valves as a process safety feature. These ensure that pressure is kept at a safe operating level by releasing steam to reduce pressure.

When a pressure relief valve is activated by dangerous pressures, steam is vented from the boiler in a controlled manner and yet, this may create a personal safety hazard that could blind or scald an operator. However, if the pressure relief valve did not vent steam to atmosphere, pressure within the boiler may exceed the structural tolerances of the vessel or of the pipework and both process and plant could be compromised. Such a failure would involve rupture and uncontrolled release of high pressure steam, presenting a much greater hazard and posing a more catastrophic risk. This has the potential to severely harm multiple persons; to slow or entirely halt production processes; and to cause associated damage to the plant. In fact, a common phrase related to process safety is “keeping it in the pipes” referring to avoiding such breaches of containment.

The term “operational safety” will be used throughout this thesis to include any and all functions undertaken by a corporation that are related to maintaining safe core operations. Activities related to engineering specification, process control and technical integrity are highly technical, requiring specialists and experts to establish and maintain a baseline performance to mitigate risks and manage the hazards associated with typical operations.

Other operational safety functions include less technical activities such as operator training and competency management; documentation of standards and procedures; monitoring and reporting of critical indicators; and audits and investigation of safety-critical processes. The more comprehensive term of operational safety establishes a broader context of the central hypothesis and facilitates the discussion of functions such as executive oversight and governance as fundamental components of risk management in hazardous industry.

By referring to these broader expectations as matters of operational safety, discrepancies and shortfalls can be more easily identified and collectively discussed, whether they are related to process safety management; asset or technical integrity activities; or management systems and corporate strategies and policies that establish organisational operational safety priorities in any given scenario.



One of the key concerns that is significant to this research is how the responsibility for operational safety is managed in a complex business environment. The underlying factors can be appreciated by simply considering the various roles and functions into which responsibilities for aspects of operational safety fall. These are briefly outlined to provide the practical context for the research:

- process safety is well recognised as an engineering design function with HAZOPs (hazard and operability studies) being a primary tool;
- process control is specialised field focused on maintaining operations within tightly defined parameters through monitoring, automated regulation of equipment and often continuous oversight by specially trained operators;
- ongoing inspection, calibration, repair and upgrade of critical plant and equipment is managed through the asset maintenance function;
- technical integrity of plant and process is audited by more senior operators and managers against operating standards and requirements that are legislated or affected by operating regulations; and
- safety professionals attempt to monitor and track near misses and non-personal-injury incidents to provide indicators of overall performance.

With operational safety now increasingly understood as a separate aspect of safety to occupational and personal safety, there is considerable pressure on the safety sector to at least agree on an acceptable treatment of leading and lagging indicators of operational safety performance (even if it is never as rigorous a treatment as the financial industry has developed for successful economies). The issues that need to be addressed include the lack of evidence and raw data for analysis; and the subsequent reliance on operational safety performance indicators that must be interpreted rather than monitored and measured.

There is also the inherent difficulty of encouraging people to recognise when a position of denial can actually be rationalised to avoid the added cost and difficulty of preventative measures. Though such measures may reduce the likelihood of an event, they may still not provide proportional returns as to the consequences. BP could arguably be said to have implemented a majority of their improvement program which would be expected to have reduced the overall risk of disasters. Regardless of any such reductions that were achieved (a calculation that is not possible), none of these measures could be expected to reduce the consequences or costs of the major disaster that did eventuate at the Macondo well.

### 2.3.2 CONCEPTS OF ORGANISATIONAL STRUCTURE

This research examines organisational salience as the independent variable that relates to several organisational design parameters, that can potentially be modified and adjusted to benefit operational safety priorities. It is therefore imperative that the research be informed by organisational design theory when evaluating and discussing the central hypothesis throughout the research process. It is generally accepted in organisational theory that the structure of an organisation is designed to facilitate communication and coordination in order to ensure appropriate decision-making and task performance.

According to Duncan, organisational design has two key objectives: firstly to “facilitate the flow of information ... in order to reduce the uncertainty in decision-making” and secondly to “integrate organisational behaviour ... so [activity] is coordinated” (Duncan 1979, p60). There is also comparatively little debate or discrepancy between theory and practice that the principal goals in designing an organisation are to: ensure that the appropriate level of decision-making is applied to each task; and that decision-makers have the necessary access to both the information and the authority required to ensure that those tasks are carried out effectively in terms of both time and resources.

Organisational design has evolved from self-contained forms with clear boundaries, inputs and products, through horizontal forms that emphasised the actual work processes or team capabilities to modern forms that are basically open (Anand and Daft 2007). Modern designs allow for hollow structures (with outsourced core processes), modular structures (with separately managed modules) and even virtual structures (transitional organisations to link existing assets resources).

Despite changes to the ways in which companies operate and ongoing developments in organisational models, hazardous industry is heavily invested in technological processes and long-term assets. These operations can therefore still be described as self-contained models for which several fundamental characteristics are used to describe organisational design. When referring to the structural aspects of an organisation, the four most common characteristics that are discussed include: formalisation, specialisation, centralisation and hierarchy as detailed below (Duncan 1979).

“Formalisation is the degree to which the organisational structure has been codified in rules” (Matheson 1996, p36). Formalisation is relevant to this research in the sense of the bureaucracy that supports the “structure of control over task performance” or how many (and how strictly) rules are applied to managing and controlling the activities of personnel.

This formalisation is separate to the types of rules that govern employment relationships (such as timesheets, contracts wages and such). These latter rules may be quite strictly controlled even in organisations where formalisation is low and the control systems related to performance of tasks related to core activities and functions remain quite informal.

Specialisation is the degree to which tasks are separated or overlap and may also be discussed as departmentalisation (Matheson 1996, p38). Categorisation can be according to functional parameters (such as skill and knowledge, work processes and units, or time - such as day or night shifts) or according to divisional parameters related to market aspects (such as customers, locations or output – such as products or services). An organisation may have specialised divisions, such as business units based according to each major facility - and also have several functional units such as human resources and corporate services.

Centralisation is the degree to which decision-making is distributed - to different divisions or functions or levels of the hierarchy - and relates to the degree of autonomy held by subordinates. In addition to ensuring that subordinates are better controlled, centralisation enables activities to be better coordinated. The inherent value of decentralisation lies in subordinate tasks being better performed “in cases where flexibility and rapidity of response is a prime requirement” (Matheson 1996, p42). This structural characteristic is crucial in that it is clearly understood within organisational design theory to reflect whether “the values to which one seeks to give priority are those of a larger organisation or those of a subunit only” (Matheson 1996, p43).

Hierarchy is essentially the chain of command and is discussed in terms of both horizontal differentiation (span of control or number of people managed by each succeeding level) and vertical differentiation (number of actual levels). The aspects of hierarchy that are most relevant to this research will be delegation of authority down the hierarchy and access to senior management up the hierarchy. These are both observable and manipulable organisational design parameters (Matheson 1996, p40).

These structural characteristics are therefore highly significant to the independent variable of organisational salience. They are considered in the more detailed evaluation of the role of each POSS and in terms of how these four organisational parameters dictate the processes by which the POSS interacts, namely: the mechanisms of communication, coordination and control. In terms of the broader organisational structure, these four characteristics are often collapsed by organisational theorists into two common types of organisation as predominantly considered by business managers (Duncan 1979, p61):

- The Functional organisation is typically more formalised (and bureaucratic); significantly more centralised; less defined by its vertical hierarchy; and it is specialised according to functional categories.
- The Decentralised organisation is less formal and bureaucratic; less centralised; more strictly defined by its vertical hierarchy; and it is specialised according to market aspects such as products and locations.

These two archetypes are discussed as opposite ends of a sliding scale in order to acknowledge structural variations between the purely Functional organisation and the purely Decentralised organisation. These variations, that are commonly based on business priorities, are discussed as lateral relations (Duncan 1979, p68) and are also known as horizontal overlays or cross-functional teams (Anand and Daft 2007, pp330-331).

A typical business is of course unlikely to be purely Functional and completely specialised according to functional parameters. Both of the functional and the market aspects are of considerable significance to operational performance and business success. For example, a predominantly Functional engineering consulting firm may offer services according to skills and qualifications but may still require some departmentalisation by location to reflect different local regulations and practices. Also, the Functional aspects (controlled engineering disciplines such as civil, electrical, process and structural specialists who each answer to their discipline's chief engineer) may be supported by a lateral relation to deliver a specific project. Such a lateral relation would be when a team of engineers from several disciplines are required to answer to a coordinating project manager for a specific project.

A typical business is also not likely to be completely Decentralised, because there will always be a range of activities that require different systems and processes of control and coordination. For example, each business location of a production company might manage and control its clients and sales independently, but the advertising templates and contract forms may be coordinated or dictated by corporate marketing and legal departments to ensure consistency across the organisation. In the case of a Decentralised organisation, a lateral relation or horizontal overlay would be the human resources manager at each location reporting regularly on staffing issues to a corporate human resources manager.

It is quite possible that organisations using cross-functional teams could need both strong decentralised control and strong functional coordination, so that they have equivalent vertical and horizontal structures. They may be specialised equally by functional parameters (such as skills or processes) and divisional parameters (such as output or location). This

form of organisation is classified as a matrix organisation and is characterised by dual equivalent accountabilities, along both functional and divisional lines. This form is discussed by Hopkins as a possible organisational solution to the problems of decentralisation in his examination of the BP Texas City Refinery disaster (A. Hopkins 2008, pp96-102).

The most critical organisational characteristic when considering the range between the Functional and Decentralised structural archetypes – even more so than specialisation – is centralisation. Designing effective communication and decision-making links into the organisational structure is essentially hardwiring into place a consistent and reliable route for the transfer of critical information. For the purposes of hazardous industry, these links would be needed between those who understand how operational safety is impacted upon within core activities of the business and those who are responsible for the direction and management of the business. Hopkins suggests that the decentralised organisational structure with inherently fewer such interactions and connections should be avoided.

Alternatively, a centralised organisation is one that has highly placed managers making all of the significant decisions, with lower-level staff simply acting on their instructions. This is preferable when the organisation's operating environment is stable; when decisions are important or the company is facing a crisis; or when the company is large but the "effective implementation of company strategies depends on managers retaining a say over what happens" (Robbins, Bergman and Coulter 2009, p272).

In a decentralised organisation, decision-making is distributed down the hierarchy to the managers who are "closest to the action". This is preferable when the operating environment is more complex and uncertain; when decisions are relatively minor; when business units are geographically dispersed; and when the "effective implementation of company strategies depends on managers having involvement and flexibility to make decisions" (Robbins, Bergman and Coulter 2009, p272).

A significant organisational phenomenon that is not part of the structural design, is the inevitable formation of well-developed social groupings that will remain informal and independent of the organisational design. These informal networks and casual groupings may have as much impact on the subsequent culture (and thereby the behaviour and performance) of the organisation as do the formal processes that arise from the defined organisational structure. There will be some attempt to identify these informal aspects as part of the organisational case studies where these are relevant to the research questions. However, the research examines the impacts of the structured roles and so will focus on the formalised elements of organisational design to describe organisational salience.

“Most theorists today believe that there is no one best way to organise. What is important is that there be a fit between the organisation’s structure, its size, its technology, and the requirements of its environment. This perspective is known as contingency theory” (Borgatti 1996). These factors all contribute to performance requirements of the business and thereby to the organisational structure that will best support that performance. It is not necessary for the purposes of this research to analyse how the overall structures that are encountered were specifically designed or gradually evolved. It is, however, imperative that the objectives and goals of an organisation are understood in the correct context.

A complex combination of various factors will ultimately dictate the required performance of a business and thereby the organisational structure required to perform effectively. In the language of organisational theory, it is unquestionable that organisational design and structure has an impact on a company’s behaviour and performance. This research project will attempt to translate these recognised connections into the language of operational safety and risk management practice and governance in interviews with technical safety practitioners. The objective is to understand corporate limitations and motivations that contribute to organisational dynamics as related to operational safety activities.

The basic hypothesis that is being investigated is that technical experts and operational safety specialists should be positioned along centralised lines of accountability that report directly to the CEO of the organisation. Such a conduit for safety-critical information is hoped to increase the access to relevant expertise and the significance of operational safety as a factor in high-level decision making. The degree of centralised control adopted by an organisation will most often be dictated by its size and the priorities of the business in managing its core and support activities. The HRT characteristic of deference to expertise has already been noted as representative of migrating decision-making to where it will be most effective for addressing issues as they arise and are recognised. A fully centralised functional line separates operational safety from the operational hierarchy without ramifications to the commercial and environmental drivers of the organisational model.

As previously discussed, after the disaster at the Macondo Well in the Gulf of Mexico, BP appointed a specialist on the executive team with responsibility for operational integrity and process safety, creating direct functional access to the CEO. The rationale for this executive safety manager role is that the line of reporting allows for operational and strategic decision-making to access safety-critical information independently at any level of the hierarchy without intermediate interference. Feedback on operational safety performance, and direction on operational safety strategies can be readily exchanged.

### 2.3.3 CONCEPTS OF POWER AND INFLUENCE

The dependent variable of the research hypothesis is the perceived influence of the potential POSS(es) that are identified in each organisation. The research fieldwork relies on gathering data and examples from interviewees of their perception of situations when influence was exerted or attempted. Perceived influence is also an observable parameter that adequately reflects the issues of concern without attempting to qualify operational safety performance or somehow describe degrees of avoidance of major accident events. These are not readily assessed and therefore are not within the scope of this research.

It is important to establish how power and influence are discussed within this thesis. There are two levels at which power and influence are considered in this research. The first relates to power as a fundamental sociological theme that is discussed by as dimensions of power and forms of power, informed by Lukes and Antonsen. The second relates to the ability to impact on decisions and actions of colleagues within the business context and refers to categories of influence, informed by Antonsen. Lukes' three dimensions of power (Lukes 1974) address overt, covert and latent levels of power and then Antonsen's two forms of exercising power (Antonsen 2009, p186) are discussed to differentiate independence from influence. The research fieldwork process is informed by industry practice, utilising the corporate language of authority and influence: based on six types of power such as status and resources (Antonsen 2009, p185).

According to Lukes (who cites Dahl), the first dimension of power is simply the capacity to impose one's will on another against their own intent or interest. The concept centres on the idea of an open forum of conflict. In contrast, the second dimension of power is a capacity to shift the entire agenda and effectively sidestep any conflict by denying any such forum for the first dimension of power to even come into play. The third dimension of power is exercised at the very highest level where it defines the primary objectives of the community or organisation and the associated priorities can be accepted without thought.

In reference to the corporations that will be the focus of this research, these three dimensions can be explained by a simple example. Consider a management meeting at which an issue is raised but various attendees have different opinions on how the matter should be resolved. A debate would be likely to ensue and the decision would be made in favour of whoever is able to exert the greatest power at that meeting. Whatever the form or type of authority or influence wielded, that person is exercising power in the first dimension: in a direct and open conflict where there is a forum for discussion and debate.

To understand the second dimension of power, consider if that same contentious issue was raised and included on the agenda for that same meeting but someone is able to decide on that issue and simply report their decision at the meeting as an outcome. In this scenario, the issue is not included as a topic for discussion and is not debated. The decision-maker is exercising power in the second dimension, where they have the capacity to decide without even considering or engaging with other conflicting points of view in an open forum.

The third dimension of power is somewhat less obvious and more profound as it lies in the inherent value system of the setting, or organisation, in which that meeting is held. In this case, a person who might raise an issue outside of that setting may not even consider that such a matter is necessary to debate within their organisation or address at their meeting. They accept the expected values, priorities and norms that run counter to a personal view.

In a corporate context, such an inability - to raise or define an issue – is a manifestation of the third dimension of power on the part of the organisation, its leadership or even a peer or manager, whose mindset is so fixed that debate or discussion are dissuaded. An example pertinent to this research would be where production priorities or cost pressures are so high that other conflicting priorities, such as operational safety issues, are not considered as even having enough inherent value to be a recognised responsibility.

It is interesting to note here that modern trends such as “triple bottom line” accounting (which holds organisations accountable for environmental and social performance as well as financial) is an effort to exercise power in the third dimension. It is an attempt to shift the value system of entire corporations at the highest levels and it is significant that operational safety does not warrant a similar form of bottom-line accounting.

In terms of the research process, the influence that is investigated during fieldwork will predominantly be related to the exercise of power in the first dimension. The interviews focus on how operational safety is advocated throughout a company’s hierarchy. Ideally, we would identify representatives along the entire chain of command who engage in debate on behalf of operational safety issues; but realistically find the most-senior of any operational safety advocates available within a participating company.

A critical perspective is that organisational design is itself an act of power that is exercised in the second, and possibly third, dimension(s). The delegation of decision-making authority up or down the hierarchy may establish who can set the forum and decide whether issues are raised and debated (power in second dimension). It can also reflect or establish the value system and culture of the entire organisation (power in the third dimension).



The other fundamental sociological conceptualisation of power that is relevant to this research is the type of power that may be available. Antonsen discusses power as being “not only the ability to restrict someone else’s freedom; it can also constitute a form of freedom in itself” (Antonsen 2009, p186). The differentiation is between the “power over someone” which is discussed as a relational authority that is reflected in how a person relates to others, and “the power to do” which is discussed as legitimate authority and is reflected in how a person acts themselves.

The differentiation is crucial to this research in terms of whether the potential POSS(es) and the operational safety specialists have influence themselves over others or not; and are also free of influence from others or not (independence). Also, those who may be exercising influence may or may not actually have actual authority to act independently in order to maintain and promote operational safety priorities. Does such authority allow them to compel others to act against their own interests (such as operations managers who may maintain competing goals and interests such as profit and production rates to take action that prioritises operational safety instead of their own priorities)?

So Antonsen’s two forms of power are a crucial perspective in discussing and assessing operational safety professionals in industry: one that highlights both independence and authority as distinct from the exercise of influence. A person could have responsibility for operational safety that is a structured accountability within their role and they may or may not be supported by actual independent authority or authority over others. This is a subtle but significant difference from perceived influence, which is assessed in terms of outcome and how operational safety specialists actually impact on decision-making.

These two forms of power discussed by Antonsen are a different framework and do not correspond to the three dimensions of power as discussed by Lukes. A person may have the power to act independently but may choose to seek a better outcome through discussion and debate of an issue. This does not change their “power to do” but it does shift their exercise of power from the second dimension to the first dimension if a compelling argument from a colleague influences them to change their decision. That influential colleague would be exercising their power in the first dimension, but it does not indicate that they have independent power or change their subordinate status.

It is very important to recognise that such an imbalance in the organisational design of a role would itself be considered an exercise in power by higher echelons of management (either deliberately in the second dimension, or intuitively, in the third dimension). It is also relevant that a lack of structured authority could reflect company values that allow lower-

echelon managers to deny a forum for discussion of operational safety issues (exercising power in the second dimension). So, certain matters may not even be “on the table” if executive management, who have both the responsibility and power to delegate authority throughout their organisation, allow such imbalances within their organisational design.

While the analysis refers to the sociological concepts of power, it is considered to be most important that interviewees discuss the dependent variable of perceived influence in whatever terms they are most familiar with. For the purposes of research fieldwork, where interviewees are expected to discuss matters in more familiar terms, power is discussed as actually structured authority or overall influence. This corporate terminology for the fieldwork phase is based on six sources of authority (Antonsen 2009, p185):

- Hierarchical positions;
- Information and expertise;
- Rewards and resources and access to them;
- Coercive power, such as ability to dig in or pose a threat;
- Alliances and networks; and
- Personal power, such as charisma or credibility.

It is apparent, in terms of the previously discussed meeting, that these various aspects of authority would be significant in the influence that any person exerts at that meeting. It is very important to clarify here that “hierarchical position” is status and therefore it has a duality in this context. Those that designed the organisation have exercised a higher dimension of power in determining how various persons are positioned within the structure. However, in an actual first-dimensional conflict that hierarchical position of itself has a bearing on the first-dimensional power of that person.

Also, of the above six sources of authority, the first five can all be affected by the organisational design of structure and management systems which is related to the independent variable, while the sixth is purely person-specific. So, it is also worth mentioning that Bachrach and Baratz, who have had significant impact on the sociological discussion of power, speak of exercising several different types of power, including: force, coercion, influence, authority and manipulation (Lukes 1974). These various distinctions highlight the degree of interchangeability between these many terms.

For the purposes of the thesis, interpretation of the gathered data is clarified during review and analysis to align with the typologies discussed above and the conventions below:

- Discussions of power will predominantly be in the abstract: as an exercise in the first dimension (superior or subordinate), second dimension (absolute) and third dimension (inherent); and also as power to do (autonomy and independent authority) or power over others (informal influence and structured authority);
- Discussions of authority, including those above will be primarily used to reference a structured, formal authority including personal authority based on formal qualifications and expertise, which is significant for consideration of experts and specialists; and
- Discussions of influence will refer to the overall capacity to dictate or affect outcomes and the actual impacts of exercising such power on decision-making, whether they are related to informal, unstructured and personal sources or to formalised authority.

## **3.0 METHODS**

### **3.1 OVERVIEW OF PROCESS**

Hopkins identifies corporate practices related to decentralised structures as observed causal factors in actual case studies of disaster investigations. He proposes that a centralised structure be adopted by organisations that seek to identify emerging incidents and to prevent their escalation into major accident events, by more effectively prioritising operational safety. His argument is based on the central problem that the advice, of those technical experts or specialists who are able to recognise potential or emerging issues of operational safety, is neglected or dismissed in both strategic and day-to-day operational decision-making that concentrates attention on other priorities – particularly commercial.

The research design is developed around the three critical parameters related to the primary research objective of examining Hopkins' hypothesis. These are summarised in Section 3.2 as the subjects of interest (technical experts and safety specialists), the independent variable (relevant characteristics of organisational structure) and the dependent variable (capacity to advise and influence decision-makers). The research strategy, which is to postulate the ideal subject of interest as the POSS who represents a context-specific benchmark for each separate organisation to be assessed against, is also outlined; as is the data to be gathered for analysis. These include: defined formal structural characteristics; observed sources of influence; and common themes of concern that are discussed by the interviewees in relation to organisational dynamics that they experience.

Each of three critical research parameters is discussed in detail (in Sections 3.3, 3.4 and 3.5) to establish how each parameter is interpreted, observed, assessed and presented. The related problems encountered during early fieldwork are also acknowledged with relevant references to the adjustments that were required to address these issues. Other issues for consideration are included in Section 3.6, such as: conventions adopted for how interviews are conducted, interpreted and analysed; as well as the limitations and opportunities of this particular research design. The objective is to collect real data by which to examine the application of Hopkins' hypothesis, not to determine whether management would be more likely to make different decisions after receiving direct specialist advice. It is important to note that there is no expectation that research findings and analyses will be concerned with demonstrating any impacts on safety outcomes. The focus is rather on whether, and how, organisational structure may affect safety priorities.

### **3.2 RESEARCH DESIGN: APPLYING HOPKINS' HYPOTHESIS**

#### **3.2.1 DEFINING CRITICAL PARAMETERS OF RESEARCH PROCESS**

The essential concern of the research project is to determine how best to assess and compare actual organisations in terms of the central hypothesis. There are myriad variables of organisational design and dynamics associated with a structured position and function. The critical concerns for research design (data collection, collation and analysis) are:

- what specific parameters do we consider to be the independent and dependent variables for the purposes of this research; and
- how do we define and assess these without losing the rich data that is available or oversimplifying the phenomena under investigation?

The subjects of interest to this research are those technical experts and safety specialists in hazardous industry who are involved in operational safety activities. They include those with responsibilities to address safety management by providing oversight and governance as well as those who understand, define and maintain the necessary operational discipline.

The independent variable of the hypothesis is the organisational design and the ways in which structure is used to create lines of responsibility, accountability and communication to manage the functions of the organisation. The relevant aspects of interest include the degree to which functional activities are centralised or decentralised; the degree to which functional priorities are affected by accountabilities and the structured processes by which knowledge is captured and communicated.

The dependent variable is ultimately how effectively operational priorities are advocated in strategic and operational decision-making within the organisation, and is defined as what influence is exercised by the subjects of interest. Organisational theories indicate that structure establishes how authority is delegated; and some influence may be recognised as an extension of such authority. The research requires that position and power be clearly differentiated to understand their relationship within the reported organisational dynamics.

#### **3.2.2 POSTULATING THE IDEAL POSS AND DEFERRING TO EXPERTS**

The research strategy is developed to address the multiple variables of a structured role by considering what organisational design characteristics would constitute an ideal organisational structure when the central hypothesis is adopted in its entirety? If the

recommendations of a model structure are adopted as a baseline for the research, we can postulate the ideal Principal Operational Safety Specialist (or POSS) as the leader of an operational safety team who is directly accountable to the CEO.

Therefore, in conducting the fieldwork, the objective is to identify those persons who qualify as the most senior (Principal) advocates and experts (Specialists) who have clear priorities within their role (that relate to matters of Operational Safety) in each organisation as the subject(s) of interest. The independent variable and focus of the research will be the organisational salience of these potential POSS(es).

In operationalising the characteristic or trait to reflect the dependent variable of Hopkins' hypothesis, the perceived influence is defined as an appropriate indicator. As discussed by Hopkins, the critical outcome for any organisational restructuring that addresses the problems of decentralisation are to avoid or overcome limitations in information exchange, thereby leading to better operational safety outcomes.

These potential outcomes are the basis of interview questions that invite interviewees to relate their experiences as examples that indicate the influence exercised by the identified POSSs and the operational safety team. The questions quite openly focus on how the designed, structured organisational salience of a POSS' role is perceived by each of the interviewee(s) to contribute to their available influence within their own organisation.

The interviews are proposed as valid and valuable sources of data because the interviewees are practicing safety professionals. Their insights and observations will inevitably be based on their direct experiences of organisational practices throughout their careers. Even their biases and personal opinions will reflect the impacts that their defined positions have on their ability to fulfil their functions. It is considered an appropriate aspect of the research strategy which adopts Hopkins' hypothesis in its entirety to defer to their expertise.

The dependent variable of the POSS' perceived influence serves as a basic but clear indicator of how effectively an organisation's foremost operational safety professional, specialist or manager promotes operational safety as a significant priority when required. There may be many other factors at work that would interact through more complex relationships. But by considering the perceived impact on operational safety priorities, the research analysis can avoid the distractions of defining intermediate parameters such as the degree of centralisation achieved in each structure. These would only suggest a concern with complex minutiae that are not yet appropriate to address. As the literature review indicates, there is too little evidence to meaningfully direct such specific or exclusive focus.

The primary source of data is the interview process to seek the opinions of the operational safety professionals, whether they are a potential POSS or their colleague. The interviews of these technical experts, safety specialists and functional managers allow for a broad discussion of operational safety management practices within the organisation. Data collection for this research also includes the review of any available documents related to organisational structure (charts) and position (job descriptions).

The research data is presented as an independent case study for each of the participating organisations. This format allows for the organisational structures to be described and establish the context for discussions with the interviewees of organisational dynamics and examples of conflicts in which they exercise influence. As with any case study, it is expected that the insights and observations gathered from these experienced safety professionals will then be readily accessible for other industry professionals to relate back to their own workplaces. The ultimate value of this research is to provide evidence that assists industry to understand and improve organisational approaches to operational safety management.

A clear priority of the research, in directly investigating organisational dynamics related to the central research hypothesis, is to analyse the findings without oversimplifying or losing the value of the context-rich data that is being gathered. Flyvbjerg makes “an impassioned plea for the value of case-based research” (Bazeley 2013, p220). “Context-dependent knowledge and experience is at the heart of expert activity. Such knowledge and expertise also lie at the centre of the case study as a ... method of learning.” (Flyvberg 2004, p421) (Bazeley 2013, p220).

Safety science fieldwork, based on investigation and analysis of accidents and disasters, is often undertaken as case studies. These can range from ethnographic studies (workplace immersion and observation) to interviews (with various degrees of formality or structure) and review of existing documentation or by more detached means such as surveys and questionnaires. This is therefore an ethnographic investigation of existing organisations involved in hazardous industry that seeks to gather safety professionals’ opinions within the context of their own organisation. The case study approach to analysis therefore provides an internal perspective on how the organisational structure supports, or obstructs, those professionals who have a functional responsibility to support safety priorities. It is common to acknowledge that such priorities will often differ from the commercial or production rate imperatives of the operating core and corporate objectives of the organisation. The focus is on how such a well-recognised concern is addressed in hazardous activities which require operational discipline and process control just to be safe.

### 3.3 THE SUBJECTS OF INTEREST

#### 3.3.1 IDENTIFYING RELEVANT TECHNICAL SAFETY PROFESSIONALS

The research subjects are the technical specialists and safety experts who understand operational safety issues adequately to recognise the potential for problems with core activities that can escalate into significant incidents. The research hypothesis that is being examined is that better safety outcomes may be achieved if reliable, relevant information is appropriately communicated to those with adequate authority to act on such advice. The research strategy is to identify the effective lines of sight that exist between the POSS and the strategic leaders and decision-makers within their organisation, particularly the CEO.

The investigations into the Challenger disaster that were discussed in Section 2 conclude that both independence and authority to act are required to empower those who have the technical focus and expertise to monitor and maintain operational safety. However, Hopkins' hypothesis can be interpreted to suggest that even independence from conflicting priorities is the more fundamental problem. The argument arises from findings of several major accidents that continue to identify missed opportunities to contain, mitigate or even avoid major accident events. This potentially chronic inattention to issues of operational safety is associated by Hopkins to the decentralised control of operational safety experts and specialists. They may then be held accountable to operations managers who have responsibilities for safety but are also themselves accountable for production or profit.

There are several ways in which to identify the appropriate research subjects within the participating organisations. The selected approach is to focus on the key aspects that are most pertinent to Hopkins' hypothesis. In framing the research question, the central research concern is considered to be whether, and how best, unadulterated technical advice is communicated to strategic decision-makers, and particularly to the CEO.

The first stage of the research is therefore to identify the **Principal Operational Safety Specialist (or POSS)** in each participating organisation as the research subject. The critical elements of this terminology are detailed as follows.

**“Principal”** reflects that the research subject should be the most senior of the technical experts or safety specialists. They would be the person most likely to have the opportunity to communicate with corporate leaders. The term also reflects that the subject should be the leader or the head of any functional group that is responsible for operational safety.



**“Operational Safety”** reflects that the main functions of the research subject should include the integrity of core activities and risks related to the fundamental operations of the organisation. These responsibilities are different to personal safety, occupational health and the work environment; and may require specific technical qualifications or expertise.

**“Specialist”** reflects that the research subject should not be responsible for commercial or business outcomes. The best-informed advocate for operational safety should not have to be accountable for concerns or interests related to production costs or production rates, as they are conflicting priorities in the context of the research hypothesis.

The first phase of the fieldwork process is to identify the potential POSS(es) within an organisation, as the research subjects. These will necessarily be the individuals with appropriate technical knowledge and expertise to understand operational safety issues and the potential for risks to escalate. These potential POSS(es) are primarily sought amongst the safety function and amongst the engineering function: based on seniority within the organisation and also based on specialist qualifications and expertise. Participants in the interview process include valuable and experienced safety professionals who fill other roles - such as auditing, compliance, process control, operations and maintenance functions.

The roles of the potential POSS(es) are discussed in terms of: their hierarchical position (which pertains to status and lines of accountability); their operational functions (which pertains to their assigned tasks and related responsibilities); and their key relationships (which pertains to the formal communication arrangements).

### **3.3.2 SEEKING POTENTIAL POSS(ES)**

There are many corporate activities that are related to the prevention of major accidents and many organisational functions which align with management of operational safety performance. Such activities can include: ensuring reliability; maintaining asset integrity; striving for operational excellence; controlling operating processes; mitigating operating risks; identifying and assessing hazards and avoiding escalation of non-conformances.

There are also many terms used for the various functions or professional roles of safety specialists and technical experts, such as: design and support engineers; senior safety advisors; team managers; compliance auditors; site safety officers; maintenance crew; and, of course, the highly technical, highly specialised SMEs (subject matter experts).

It quickly became obvious that, in seeking to identify and describe the roles that related to operational safety, corporate terminology was inconsistent and problematic. For example,

a simple request to speak to persons involved in high-level risk management or asset integrity garnered introductions to financial professionals and business strategists. Asking the company receptionist for the department that addressed operating hazards and risks consistently led to corporate finance or corporate affairs and never once led to a technical specialist or safety expert. Even asking for departments responsible for safety and risks got connections through to corporate affairs, and sometimes to occupational health and safety specialists – but again not to technical experts. It was only a request for any managers who specifically provided engineering support or managed technical integrity and maintenance - that led to any technical experts.

The roles of the experts and specialists involved with physical hazards and risks clearly does not resonate with the administrative, public-facing employees within many organisations. The resources sector is involved in high hazard industrial operations and investment in complex technology and physical plant. However, corporate financial risk management - diversifying interests, maintaining equity and limiting liabilities - has greater recognition than the risk management that is related to the control of core production processes and the assurance of the physical integrity of operations. These initial, introductory interactions with corporations are significant because they provide validation (at the most fundamental level of simple identification of risk-related roles) of Hopkins' underlying concern that operational safety is minimised.

It was also very quickly determined that the technical persons that were eventually reached are not positioned high enough in the organisational hierarchy for the purposes of the research. They do not have access to the type of organisational data that is sought for the project (charts of structure and position descriptions for operational safety roles). Most also do not have the autonomy to choose to participate in the proposed research (requiring approval from more senior managers). Attempts to follow through - seeking management approval and management involvement in order to gain access to the necessary material data and to the research subjects – are for the most part quite unsuccessful.

The other specific issue during the sampling phase is that the potential POSS is often difficult to determine. It is typical to find several levels of operational safety activity amongst several separate departments. It is often not possible to identify the research subject within the organisation. It is sometimes not clear who is responsible for operational safety matters or who is most senior manager until the interviews actually take place. Though the research participants that are interviewed do not have to themselves be a

potential POSS, considerable portions of several interviews were dedicated to identifying the research subject, even when there was available data on the organisational structure.

### **3.4 THE INDEPENDENT VARIABLE**

#### **3.4.1 DESCRIBING ORGANISATIONAL STRUCTURE**

Organisational structure, has been discussed as the independent variable of the research hypothesis in Section 2, as characterised by the critical parameters of: formalisation, specialisation, centralisation and hierarchy. The structures of the participating companies that are described in this thesis focus on centralisation by identifying the key lines of accountability and responsibility as well as the levels of hierarchy within each company.

As discussed in Section 2, the purpose of any organisational structure is to appropriately distribute information, activities and decision-making processes. Variations in the degree of centralisation are typically dictated on the basis of which common or simple decisions can be delegated further down the hierarchy and which significant or complex decisions require the attention of more senior decision-makers. The status of a particular position in decision-making that sets priorities amongst multiple responsibilities must necessarily be balanced by the capacity of that position to effectively oversee those different accountabilities. If done effectively each role is neither overburdened by too many trivial matters or given authorities that exceed their responsibilities.

In a decentralised organisation specific functions (responsibilities for various activities) and specific authorities (delegation of decision-making) will be widely distributed across and down the hierarchy, often to the lowest effective levels. The distribution of information (lines of communication and formal reporting) is typically along the same lines of sight that are established by the structured lines of accountability. In a centralised organisation, the various functions will be more widely distributed than various authorities. There will be broader requirements for reporting and lines of communication so that decision-making power can be more tightly retained amongst the central, higher levels of the organisation.

The organisational structures that are presented as a chart of the company in each of the research case studies will indicate:

- positions in terms of hierarchy, particularly status in relation to the CEO, and the lines of actual management accountability; and

- functions in terms of the principal role title, while the scope of decision-making and responsibilities for operational safety and safety management are described in text.

The lines of accountability within an organisation are simply based on who controls the salary and evaluates the performance of the relevant operational safety position. In the organisational charts, this is indicated by a solid line = “accountable to”. An alternate indicator – a dotted line – is used for responsibility to show where a position is only “reporting to” other senior managers. The differentiation of responsibility from accountability is necessary to clarify that some responsibilities, even when reporting as a subordinate, may be to a person who has no direct control over a position.

The lines of accountability essentially establish the priorities of a position and operational safety professionals can be gauged as functionally independent (with managers who prioritise safety) or embedded within operational lines (with managers who prioritise production efficiencies). This simple distinction is a critical aspect of this organisational design parameter as an indicator of design intent in how each position is managed and expected to contribute to the organisation’s objectives.

The concept of the function of any position is that it will have a defined role with specified responsibilities for specific tasks that relate the position to others within the organisation. The scope of decision-making as it relates to organisational design is that any defined role must have associated authorities to achieve the functions of that particular position. For operational safety, these may typically be activities such as development of standard procedures; authorisation of processes such as management of change; and approval of risk assessments for proposed operational tasks.

In examining the functions of the potential POSS(es) and of other operational safety staff, the most critical aspects to understand are therefore the formally delegated or legitimate authorities related to their roles. These would typically be the resources (staff and funds), information flow (reporting requirements) and access (internal and external networks). In addition, there could be authorities related to development of procedures, authorisation of processes such as management of change, approval of risk assessments of proposals and even the authority to over-ride design decisions (usually in a project situation).

These aspects are not shown on the organisational charts to ensure comprehensibility. Lines of communication can be broader than the lines of responsibility, in the same way that additional responsibilities can extend beyond the main line of direct accountability. Hopkins’ hypothesis suggests that ensuring a direct line of communication between the

principal of the operational safety function and the CEO will provide the best circumstances for operational safety decisions to be made. Consideration is given to clarifying what independent access to executive leadership is available to the potential POSS(es).

### **3.4.2 RELEVANT STRUCTURAL CHARACTERISTICS**

Ultimately, the sample pool comprised nine companies. These participating companies are found to all be involved in medium- to high- hazard industry but are otherwise quite disparate. They cover a broad range of sizes, industry sectors, regions of operating and degrees of technological complexity. It is clear from the first phase of the research that the participating organisations are predominantly decentralised due to size and geographical distribution of core activities. It is also clear that all of the broad structural characteristics – formalisation, specialisation, hierarchy and centralisation – could be affected by the many differences in the business enterprises and environments.

All of the organisations have essentially decentralised business units with a corporate head office providing centralised governance at the level of executive leadership with various, predominantly functional, lateral overlays. It should be noted that one company has a fully centralised, functionally defined, executive management team but the majority of the core activities are carried out by contractors. Though the company staff sit in a centralised organisational structure, the contracted activities are carried out on a project by project basis with little to no cross-over amongst projects and contractors. This is therefore also quite decentralised because the projects are based at independent sites.

It is also significant that operational safety is not widely considered to be a separate function. As the research subjects are typically found to be scattered along different lines of accountability, the general description of the functional structure of operational safety within a broader overall organisational design would effectively be “scattered”. The data gathered therefore relates to the organisational dynamics and structural characteristics of the potential POSS(es) allowing each participant company to be discussed without any overall categorisation of structures.

Instead, each of the various operational safety activities and the related roles and responsibilities can be explored with reference to organisational dynamics. The extent to which their different lines of accountability, responsibility and communication intersect within the structure is discussed as an indicator of how centralised these aspects are.

Material data that has been sought from all research participants as the first stage of the data collection process. These included: organisational charts of the corporation and of any safety function; available position descriptions of the most likely POSS roles identified; and any corporate documentation related to operational safety policy and management. Even amongst participants who allocated many hours of interview time to the research project, it was a problem of itself to provide basic, hierarchical configuration of positions in the form of an organisational chart.

The crucial issue of structural chart availability is also related to how long any particular organisational chart actually reflects the company structure. Every one of the nine participating organisations has been through, or is going through, a transitional process of restructuring. Also, several organisations maintained fluidity and flexibility in their organisational structures to respond to their business environment. For one company, the two research interviewees included the potential POSS before restructuring and a newly appointed potential POSS with a new position in a newly centralised functional safety group. In these unexpectedly dynamic corporate environments, insights are available from the staff on the rationale and the processes of their own company's restructuring.

The principal sources of data are the participants themselves and the company background is established as early as possible during the interview. The discussion is initially directed towards understanding the formally structured positions, functions and communications of the potential POSS roles and other key operational safety professionals and executives. Details such as what regular meetings and reports make up the most likely POSS(s)' and operational safety staff's responsibilities assist to understand how and why various lines of communication are maintained. The type of operational safety information that is reported and considered within the function and within the organisation is also examined in order to clarify the operational safety priorities of the organisation. In particular, each participant is asked to clarify if the POSS has unimpeded access to the CEO.

All of the research participants are asked to reflect on their broader career experiences with differing organisational dynamics from their current role, and there is particular value in their views of organisational restructuring as it occurs. It has been possible to discuss the known motivations for restructuring and what dynamics are expected to be improved; and to consider the possible impacts on the safety function within their organisations. These more detailed and direct personal observations, and in some cases actual involvement in the redesign, are valuable to understanding how operational safety is functionally integrated; and how and why it is a centralised, independent function - or not.

A qualitative comparison of the actual POSS roles identified within participant organisations with the characteristics role of the postulated ideal POSS will then be possible. This comparison will effectively establish a rough but comprehensible measure by which to gauge the centralisation, independence and effectiveness of operational safety activities within each organisation. The ideal POSS, that would satisfy the central hypothesis, must combine three critical characteristics:

- Technical Competence: in activities related to operational safety which is discussed in terms of both the specified roles and responsibilities of the position and the associated competency requirements;
- Functional Independence: in managing a team of operational safety specialists which is discussed in terms of accountability through purely functional managers with dedicated focus on operational safety priorities; and
- Access to Authority: in having a position recognised amongst executive leadership which is discussed as position in the organisational hierarchy in relation to the CEO and in terms of typical access and interactions.

This combination of complex organisational parameters defines the independent variable of the research and is collectively discussed as the organisational salience of the POSS. The term is used throughout this thesis to refer to the structured role of a potential POSS in comparison against the postulated ideal POSS role.

### **3.4.3 THE ORGANISATIONAL SALIENCE OF POTENTIAL POSS(ES)**

The variations in organisational structures are being scrutinised in some depth as the differences in the organisational dynamics of the positions of the research subjects. The potential POSS role(s) identified in different organisations are not directly compared. Rather, the comparison is with alternative organisational dynamics experienced by the interviewees due to changes within their own company and also in their careers as operational safety professionals. A consistent measure to characterise the independent variable of organisational salience is the extent to which each potential POSS represents the characteristics of the postulated ideal POSS. If an ideal structure has been established, then information capture and flow is along a clear, independent line of sight between the potential POSS and the CEO.

The fundamental characteristic of an ideal POSS is of course Technical Competence, as relevant to each industry, related to the organisation's operational safety activities. This

aspect is discussed in terms of the specified function (that is, the roles and responsibilities of the specified position) and in relation to other positions that are responsible for necessary operational safety activities. Technical competence is also considered to be related to professional expertise and specialisation, and is therefore discussed in terms of the credibility and competency that is associated with each structurally defined role.

The other defining ideal in Hopkins' hypothesis is Functional Independence which relates to having centralised management or a dedicated function of operational safety specialists. This is discussed in terms of the accountability of any operational safety specialist through purely functional managers. Whether or not a position is embedded in operations lines, there is a basic expectation that responsibilities focus on operational safety priorities and remain independent of commercial pressures of operations such as profit and production.

The final characteristic of an ideal POSS role is referred to as Access to Authority. An ideal POSS, may not have actual power to act, but will at least have a clear line of sight and direct access to CEO and executive leadership team and perhaps even to the Board of Directors. The ideal described by Hopkins is a recognised position on the executive leadership team, accountable directly and solely to the CEO.

### **3.5 THE DEPENDENT VARIABLE**

#### **3.5.1 OPERATIONAL SAFETY PRIORITIES OF DECISION-MAKERS**

In examining Hopkins' hypothesis, the central concern is how organisational structures improve the capacity of technical experts and safety specialist to impact or change how decision-makers act rather than on their own capacity to act. It is of critical significance to understand how the research subjects influence decision-makers to prioritise operational safety. Unlike the "independent technical authority" that was found to be lacking in the Challenger investigations, Hopkins hypothesis suggests that even "independent technical advice" may not be available due to decentralised structures.

Hopkins argues that decentralised organisational structures delegate decision-making too far down in the corporate hierarchy. A broad overview of corporate performance is required to evaluate how effectively safety issues are being managed without losing sight of the details of operational discipline. A decision-maker with inadequate status cannot account for strategic perspectives or challenge the day-to-day commercial priorities to focus attention on operational safety issues that arise.



It is a recognised obstacle that measures and indicators that can be used to profile an organisation's safety performance are neither standardised nor reported with adequate reliability to use for quantification or even comparison. It is therefore not possible to easily or comprehensively discuss how well an organisation is doing in terms of its operational safety performance. In many cases, technical and operational information is still being translated into meaningful indicators within the entire industry or the organisation itself. Events such as loss of containment, near misses and accidents are common enough to be monitored in incident records. Preliminary fieldwork indicates that it is unlikely that such data is collected and collated as operational safety issues that are clearly and consistently differentiated from occupational health and safety statistics.

By designing a centralised and functional structure, companies may be able to more reliably elevate operational safety issues to a higher, strategic decision-making level of the hierarchy – ideally, to the head of the organisation as the CEO. The suggestion is that clear lines of sight between technical experts and corporate leaders could at least ensure that appropriate detail and complexity of risk management actions are communicated. This will then provide more information and greater opportunity for executive managers to understand and address operational safety as a priority for ongoing operations.

The appropriate dependent variable to examine Hopkins' hypothesis is defined in this research as: the prioritisation of operational safety in corporate decision-making. The relationship between the independent and dependent variables that is sought to be understood is: how structural characteristics of the organisation affect the influence that potential POSSes are able to exercise on decision-makers to prioritise operational safety.

### **3.5.2 AVAILABLE AUTHORITY OR EXERCISE OF INFLUENCE**

There are several ways of understanding and discussing influence as discussed in Section 2: as authority in the practical context of corporate organisations; and as dimensions of power in the theoretical, sociological framework. While it is necessary to be clear on the different frameworks of this research, it is also important to recognise that the dependent variable is being examined as a potential consequence of the independent variable. This is crucial to any examination or discussion of a relationship between: the organisational structure that defines the salience of the research subject; and the ability of the research subject to influence the operational safety priorities of senior decision-makers.

It is therefore very important to clearly differentiate between influence that is defined as a measure of the dependent variable of research, and the ways in which structure, the independent variable of this research, contributes to that influence.

There is a clear relationship to the theme of influence which is considered to simply be the power available to be exerted by the individual. Whether that power is formally defined, or through access to others with more power, alternately available through operating systems or inherent to the person not the position can be effectively captured through the analysis. While there is no particular distinction made between power, authority and influence in the terminology of the interviews, the following conventions will apply within the thesis:

To ensure clarity and consistency throughout this practical section of this research in relation to the issues under discussion, the terms “influence” and “power” and “authority” are quite specifically used in the case studies according to the following conventions:

- “influence” will refer to the practical application and various ways in which power is used to impact on how another person prioritises operational safety in decisions;
- “power” is rarely used but will refer to the ways in which formalised authority or structured influence is observed (by interviewees) to be available to and exercised by the potential POSS(es); and
- “authority” will refer to the legitimate or formally recognised sources of either influence or power, rather than casual, informal or personal sources.

Formal authority is considered to be a structured authority that provides for the direct exercise of influence or power. This is not necessarily the actual authority to do something but is simply the authority over another to affect what they do. Such formal and direct authority is very clearly related to the independent variable of the structured salience of a particular role, while informal and indirect forms of authority are related to the dependent variable. The critical issue in discussing available influence with research participants and within this thesis is therefore to differentiate between formal and informal authority, as well as the direct and indirect exercise of authority.

By way of an example: if a manager controls the budget, they have the ability to conduct transactions on behalf of the business. They have the commercial authority to decide how their budget is allocated and on what items their money will be spent. They could be formally and directly influenced to make certain decisions by persons higher up in the chain of command. Alternatively, they could be convinced to make decisions by the advice and

recommendations of others, including their subordinates. Either would be said to have influenced how the money is spent but neither would be said to have the actual authority of allocating the budget.

If the other person is senior to the manager along their line of accountability, they could be said to be exercising the direct, formal hierarchical authority that is structured into their role. It is important to note that the available influence that is related to such structured authority (and therefore associated with the independent variable) is a specific subset of the overall influence that is observed to be exercised. However, if advice is followed by a manager choosing to accept opinions (because the person is recognised as having valuable insights or are simply persuasive) they would be said to have exercised influence by means of indirect, informal authority.

As technical competence is a fundamental characteristic, professional qualifications and experience would be considered to be a formal source of authority but reputation alone, even with experience, would be regarded as informal. The research process for seeking and recoding data on the dependent variable, will involve identifying the source of any authority: that is available to each of the most likely POSSs; and that allows them to influence a decision-maker to prioritise operational safety.

### **3.5.3 THE PERCEIVED INFLUENCE OF POTENTIAL POSS(ES)**

The recommendations of Hopkins' argument aim to facilitate delivery of appropriate advice on operational safety priorities to the relevant decision-makers up to even the CEO. The objective is to ensure that operational focus on commercial imperatives do not obscure potential indicators of operational safety risks. The expected consequences of adopting the central hypothesis can be aligned with each of the structural parameters defined above as:

- that appropriately trained and qualified experts are involved or engaged in the broader strategic decision-making processes;
- that there are lines of information flow that can independently deliver “unfiltered” details of operational safety issues; and
- that critical decisions related to operational safety priorities are made at the highest possible levels of the organisational hierarchy.

While the ultimate outcome of improved operational safety as disaster avoidance is an impossible variable to assess, these hypothesised consequences can be observed and

assessed. This provides some clarity in understanding how to qualify the potential for impact on the operational safety performance of each organisation. Collectively, these three potential outcomes are discussed as the perceived influence on both operational and strategic decision-making. The term refers to the capacity for prioritising operational safety that the identified POSS(es) in each organisation are perceived to have.

The data that is being sought is testimonial evidence from the interviewees of perceived influence, supported by accounts how effectively issues of operational safety have been prioritised and managed. The research participants are asked to relate their own experiences and stories of their ability to affect the prioritisation of operational safety. They are asked to assess the influence of operational safety professionals and the most likely POSS(s), independently or as a functional group of within their organisation. They are asked to provide examples of the circumstances in which they are enabled to influence decisions and compare them to circumstances in which they are hindered from advocating safety priorities. The data on the dependent variable considers several lines of inquiry:

- the expressed opinions and insights of interviewees on the differentiation and coordination of operational safety activities as a function of oversight and support or distributed amongst various operating lines and technical functions;
- the available details on the overall organisational structure and the specific basis of hierarchical status and structured (direct, formal) authority of operational safety professionals within their organisation;
- the perspectives and information that interviewees may have on the rationale and/or impact of proposed and/or previous changes in organisational structure (lines of accountability, responsibility and communication) that they have experienced;
- the experiences and examples related by interviewees that highlight how their structurally defined status has affected (supported or obstructed) their ability to promote operational safety priorities in their current organisation;
- the various forms and sources of effective authority that interviewees have encountered throughout their careers as well as in their current organisations and whether they are direct or indirect, formal or informal; and
- the interviewer's observations of the variations in attitudes and behaviour of interviewees in relation to the status of the most likely POSS(s) within their organisation – when self-perceived influence was being discussed.

## 3.6 OTHER CONSIDERATIONS

### 3.6.1 INTERPRETATION AND DISCUSSION

The research is a targeted exercise to examine Hopkins' hypothesis as it could be applied and interpreted in the corporate environment of hazardous industry. There is a rather fundamental problem that is apparent from the literature review and background analysis for this research. The theme of confusion with terminology is noted in interpreting the technical aspects of process safety and operational integrity into concepts that can be understood by corporate management. The need for skill in this type of translation is identified by Hopkins' reference to the neglect of process safety details (Hopkins 2008). Even within safety science and between different types of safety professionals, there is a paucity of any common or widely recognised terms by which to discuss operational safety.

Any academic discourse between safety theorists and technical experts would be fraught with translation errors. For example, "normal accidents" is perplexing as it is a term that would typically refer to common events. However safety scientists would disagree as the term refers to a particular usage due to Perrow's conceptualisation and there are apparently no actual examples of "normal accidents". It is not just confusing to encounter such a powerful paradigm when using very ordinary language. It is also contradictory to an engineer such as myself that this paradigm is trapped by association with earliest attempts at articulation instead of later refinements. Engineering practice is typically to focus on what works and discard what doesn't.

Another example is the use of the word "reliability", which to engineers suggests a proven product or process that can be guaranteed to perform. It is likely to be used to refer to differentiate between something that "rarely fails" and something that "almost never fails". The central concept of HRT in this research uses "high reliability" to refer to those organisations that operate exceptionally well under stress which is compatible with engineering terminology such as the high reliability of say, an aircraft engine. However, the approaches to HRO functioning is not so compatible because almost by definition, all organisations have obviously error-prone and underspecified components (such as people).

This is noted as a broader issue, based primarily on my own personal experience and perspectives as a professional engineer. However, it is particularly relevant to the research interview process as interpretations and analyses of research data will be required to balance comfort and context for interviewees with the sociological conventions related to safety science, organisational studies and discussions of power.

### 3.6.2 LIMITATIONS AND OPPORTUNITIES

Several problems have been encountered during the early stages of fieldwork that required some adjustment to research methods. Preliminary analysis therefore informed the final research design. The project objective remains consistent with the examination of Hopkins' hypothesis and the research is in fact more tightly focussed on the underlying concepts and interpretation of Hopkins' underlying arguments. The issues that have been addressed by changes to the definition of critical research parameters and research methods are:

- lack of any interested participants in non-hazardous and institutional organisations and the unexpectedly few interested participants even in hazardous industry (found to be due to concerns with confidentiality and sensitivity of issues of relevance) - which required a change from random sampling of a range of organisations to opportunistic sampling from within the medium to high hazard industry;
- lack of clearly defined operational safety functions or roles within even the high-hazard industry organisations - which required a change in the selection of participants from technical experts to functional managers and shifted the discussion of operational safety activities more towards management oversight than operational discipline;
- lack of basic documentation related to the organisational structure of corporate hierarchy and roles or of associated position descriptions for critical roles - which required a change in from collection of supporting material data to reliance on predominantly interview-based data;
- fluidity of organisational structures encountered with no single participant company able to provide a description of a fixed organisational design, including delegated accountabilities and allocated priorities, that had not been somehow modified within recent – which provided the opportunity to directly discuss the corporate expectations and concerns that had motivated specific changes of relevance to the research;
- the keen interest of the research participants in direct discussion of the research topic - which provided the opportunity for moving from interpretation of interview data to extract specifics of relevant information to an analysis of context-rich data from which additional insights could be derived; and
- the familiarity of the research participants with the research hypothesis and their capacity for sophisticated discussion of its applicability to their own organisation, which

introduced expanded opportunity for deeper discussion but added to narrow specificity of sampled organisations and interviewees.

Three aspects of the research process that were not adjusted for but taken advantage of as potentially quite valuable to the research findings are that:

- Firstly, as a professional engineering specialist myself, I have my own direct technical knowledge of safety and risk management and of working as a specialist in a corporate environment. This familiarity has inevitably informed interviews and interpretations, not only through familiarity with relevant engineering principles but also with recognition of certain dynamics that resonate with my own experiences of functional priorities and the expectations of operational managers.
- Secondly, many of the research participants describe themselves as quite familiar with the research hypothesis. The research sample pool is not only opportunistic but is also effectively a snowball sample that comprises organisations employing such operational safety professionals that have an existing interest in Hopkins' work and have therefore welcomed the opportunity to participate in this research project.
- Thirdly, the adoption of Hopkins' hypothesis postulates an ideal POSS by assuming that all of the associated recommendations are implemented in an ideal organisation. As the basis of the research design, this of course presumes that industry: could implement such a structure; would want the same outcomes; and should consider both to be "ideal". This precludes close examination of any alternative "non-ideal" structures, except those aspects that are encountered in seeking the potential POSSes.

These opportunities are all related to "how personal involvement, far from lessening distance, creates opportunities for generating particularly strong theoretical insight" (Anteby 2013, p1278). Anteby's argument for "relaxing the taboo on telling our own stories" and "upholding professional distance and personal involvement" is related to ethnographic research. However, several points can reasonably be applied to this research, recognising that the interviewees have direct knowledge of Hopkins' work. It is suggested that - as there is a "dearth of papers in organisational behaviour dealing with power (and status)" (Anteby 2013, p1285) - such intimacy with the subject matter could be the type of involvement that "might yield insights into power issues in organisations" (Anteby 2013, p1284). Personal interpretations and insights are presented as valuable and professional observations that may be of considerable benefit to examining the underlying concerns of Hopkins' hypothesis by addressing the research questions from an "involved" perspective.

## **4.0 NINE ORGANISATIONAL CASE STUDIES**

### **4.1 OVERVIEW**

This section presents the data gathered during interviews conducted with various technical experts, safety specialists and senior managers who are involved with operational safety management or activities. Each interviewee is from one of the nine companies that are participating in the research project. Each of these organisations is described and discussed as a separate and independent case study that considers the positions and functions of those identified as occupying a potential POSS role. The significant themes that are encountered and recounted are those that highlight the perceived influence of these potential POSSes and of the operational safety professionals in each company.

The ideal POSS has been postulated to reflect the centralised, independent, functional expertise with ready access to the CEO that Hopkins' hypothesis recommends. Each case study therefore commences with a description of the corporate structure and operational safety functions, with a review of the potential POSS roles within the organisation. The focus is on the distribution of the various functions and responsibilities to manage those safety activities that maintain operational discipline and provide strategic oversight in each company. Those that most closely resemble an ideal POSS are identified as the most-likely POSSes. These roles have been difficult to determine even in companies in which there are clearly identified and dedicated roles and responsibilities for operational safety.

Throughout the research process, it has been typical to find various operational safety activities widely distributed amongst several separate departments - both functional and operational groups. Also, technical safety expertise has been found at many different levels of the organisational hierarchy but rarely at a level that allows for discussion of strategic issues such as organisational structure. It has often not been possible to identify anyone within the organisation who has an ultimate responsibility for operational safety issues without any competing priorities. Therefore, the research interviewees may not always themselves be identified as the most-likely POSS or even considered to be a potential POSS.

All of the interviewees are, however, professionals who describe themselves as being closely involved with operational safety activities, either as technical experts, safety specialists or senior managers in a related function. Their various roles and accountabilities are identified in standardised organisational charts (represented as accurately as was possible to determine from the available data) which indicate the relative positions of the



participating interviewees; of the potential POSSes; and of the executive leadership. These charts clearly highlight how far below the CEO each of the relevant roles sits along either functional or operational hierarchies. To respect issues of confidentiality, the names used in this thesis to refer to the interviewees or to the identified POSSes are not their own and also do not necessarily reflect their gender.

Each case study then presents the key themes that have been identified during the research interviews, discussing: the described roles of technical experts and specialists in operational safety; and the types of authority and influence that they are able to exercise. Particular attention is given to the various ways in which operational decisions are perceived to be influenced and how safety priorities are promoted or advocated above commercial or production priorities. These themes are developed by consideration of data from various sources, including:

- the charts, partial chart or sketches of the company structure and any position descriptions, competency requirements, corporate policies, management strategies and assessment reports that are made available by the interviewees;
- the expressed opinions and insights of interviewees on the differentiation of activities related to operational safety, on the sources of status in their corporate hierarchies, and on the various types of authority and influence that they have encountered and used in their current roles and throughout their careers;
- the experiences and examples, as related by interviewees, of situations in their current organisations that highlight how position and status has affected the ability to promote operational safety priorities or to exert influence on related decision-making; and
- the interviewer's observations of the attitudes of interviewees in relation to their self-perceived status within their organisation or the significance of operational safety as a corporate priority, such as expressed optimism, confidence, doubt or frustration.

The collected observations and insights highlight those aspects of organisational design that are seen to affect operational safety professionals to either promote or undermine operational safety priorities. Each case study therefore includes a commentary of the most significant organisational dynamics and themes in terms of whether the potential impacts on the promotion of operational safety priorities are considered to be positive or negative. These discussions are informed by the theoretical concepts that have been previously detailed in section 2.0: including various structures and characteristics of organisational

design; and types of authority and influence exercised within a large organisation. The most critical concern of each case study is to consider how these themes contribute to the research question of the impact of organisational salience on perceived influence. There is a more detailed and comparative examination of these research findings in section 5, which collates data and summarises the most common themes from all nine case studies.

The organisational chart that has been provided for each of the participating companies illustrates the lines of accountability and responsibility that are mainly as described by the interviewees: amongst the executive leadership team; and key operational safety roles. There are several conventions established and used in describing each organisation and for drawing up each organisational chart from interview material:

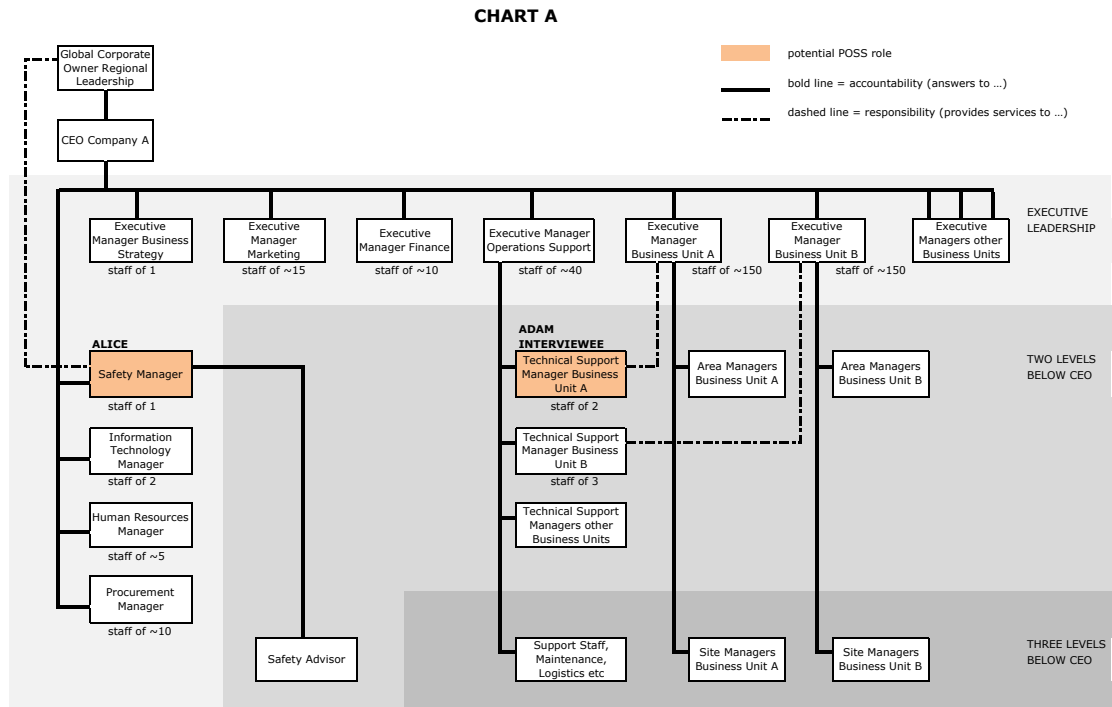
- the organisational charts refer to all corporate heads as CEOs, and to all of the CEOs' direct reports on the leadership team as "executives" except where there is a clear differentiation of status within the structured hierarchy;
- managers who are responsible for various operations are identified by their actual responsibility, whether it is a site, facility, region, product or technology;
- operational safety functions that are within the scope of this research include the highest of the identified professionals in operational excellence, process safety, risk management, technical support and asset integrity and maintenance; and
- an abbreviation of key functions is used to identify responsibilities for roles related to safety: typically, either HS (health and safety) or HSE (health safety environment) with a "+" to indicate any additional responsibilities (such as quality, sustainability or security).

## **4.2 COMPANY A**

### **4.2.1 POSITIONS AND FUNCTIONS RELATED TO OPERATIONAL SAFETY**

Company A is involved in the relatively simple core activities of the storage and distribution of hazardous products. These operational activities are supported by various corporate functions. The company is fully owned by a global business entity and the CEO of Company A answers to the regional head of this larger corporation. This situation is related to a fairly recent change in ownership and Company A still operates predominantly as an autonomous business. The research interviews take place during the transition phase when new global corporate governance systems and formal lines of reporting and communication beyond Company A's CEO are still being introduced within the organisation.

The lines of accountability and the estimates of staff numbers that are presented in Chart A are as detailed at the time of the research interviews. There is only one interviewee, referred to as Adam, who has worked for over a decade in Company A and the research focus therefore remains on the organisational structure and dynamics of Company A and not of the larger global corporation, of which it is now a subsidiary.



The organisational structure of Company A is quite flat when considered without reference to the broader global organisation. There are at most five levels of hierarchy between a site-based operator and the CEO of Company A. The CEO has several operational Executive Managers (each managing a separate business unit and responsible for a specific product or region of operational activity) and various functional Executive Managers (who manage corporate functions including: Finance; Strategy; and Operations Support).

The executive leadership team of Company A is described by Adam as including the CEO, all of the operational and functional Executive Managers plus the Safety Manager. There are also several other corporate-level managers who are responsible for minor corporate functions, such as Human Resources and Procurement. They answer directly to the CEO but are not part of the leadership team and are not considered to be Executive Managers.

The Safety Manager, who is also not considered to be an Executive Manager, is identified in Chart A as Alice and is not available for an interview. Alice has a governance role and is responsible for establishing safety policy and corporate strategy for Company A. She

reports on the overall safety performance of operations to the leadership of Company A and also to the global corporation above the CEO of Company A. This is shown in Chart A as a solid line of accountability to the CEO of Company A and a dotted line of responsibility to the regional leadership team of the global entity above the CEO.

Alice is also responsible for the review of reported safety incidents and for the investigation of those that require follow up actions. Alice is a potential POSS by virtue of her access to authority (with a place on the leadership team) and is also considered to be functionally independent (without any operational or commercial accountabilities). As a direct report of the CEO, her role is of considerable importance to operational safety oversight. Alice's influence and impact within the organisation are discussed with Adam, whose personal observations of this potential POSS are presented in Section 4.2.4.

The operational hazards and risks are relatively easy to control in Company A because the core activities comprise quite basic processes that are quite distinct and independent in terms of both time and space. This allows for simple, rather than complex, operational safety systems and Company A does not have an integrated operational safety function. The various operational safety activities occur in several different departments, including: Safety, Operations Support and the regional operating business units.

Company A integrates both occupational safety and operational safety requirements into their corporate operating standards. These operating standards interpret all relevant regulatory compliance requirements without distinguishing between safe work practices and safe operating processes. It is the responsibility of each business unit to manage their activities and perform in accordance with the corporate operating standards, including: routine operations; reporting of performance and incidents; and training and induction of staff. Various operational safety activities, including: technical support; maintenance; and compliance assurance, are undertaken by staff in the functional Operations Support unit.

Adam, the sole interviewee from Company A, independently expressed interest and sought participation in this research project. He is a technical professional who is closely involved with managing operational compliance in Company A and is identified in Chart A as a regional Technical Support Manager, reporting to the Executive Manager of Operations Support. Adam's role in the organisation qualifies him as a potential POSS by virtue of both technical competence and functional independence and he also has good access to authority as the direct report of a functional Executive Manager. His responsibilities, which are discussed in Section 4.2.2, require his involvement in many of the technical review and asset integrity activities that are typically associated with operational safety management.

Each of the regional Technical Support Managers is positioned two levels down from the CEO of Company A in the organisational hierarchy. They each answer to their functional boss, the Executive Manager of Operations Support and are each responsible for assuring that Company A's activities comply with relevant local regulations in their own regional jurisdiction. They are also each responsible for providing technical support and specialist advice to the operational Executive Managers of their regional business units. The structure is illustrated in Chart A with solid lines (showing accountability) to the functional Executive Manager of Operations Support and dotted lines (showing responsibility) to the respective operational Executive Managers of their own regional business units.

Adam says that he also has "dotted lines to everywhere" because many Site and Facility Managers independently request his input and advice. These interactions do not involve any actual authority over Adam, or a formal obligation, and are therefore not shown as lines in the organisational structure depicted in Chart A. These interactions are discussed as part of Adam's informal sphere of influence which extends to other regional business units than just his own in fulfilment of casually expanded functions. This broader influence is explained by Adam as primarily due to his being the most senior of the Technical Support Managers. Site and Facility Managers will often contact Adam directly on various technical and compliance issues, bypassing their own regional Technical Support Managers and seeking the reassurance of Adam's more experienced input as another opinion.

In addition to providing assistance and assurance that Company A's activities are compliant with the applicable regulations, the regional Technical Support Managers provide technical input to engineering projects and to management-of-change processes. Their various tasks include developing and maintaining their local operating standards and procedures; and managing the reporting and documentation necessary to satisfy relevant regulatory requirements. They assure full operational compliance, as the procedures are written to incorporate: technical operating standards; personal safety requirements and operational safety parameters for the routine activities of the organisation.

Adam has a small staff to assist him, as do each of the other Technical Support Managers in the Operations Support group. These small Technical Support teams undertake compliance audits of sites and facilities in their jurisdiction to ensure that the established standards and procedures are being appropriately implemented. The Technical Support Managers can also be called upon by Site, Facility and Area Managers to confirm the technical competency of their operations staff, as part of Company A's competency management system.

Adam's role as a regional Technical Support Manager has direct responsibilities for operational safety management which is more POSS-like in than Alice's role as the Safety Manager. Despite her position on the executive leadership team with functional priorities and her more senior status (reporting directly to the CEO) she has no defined authority over any operational safety or compliance activities. The three most significant themes, that arise from discussions of the crucial differences in the organisational salience and perceived influence of these two potential POSS roles, are discussed below.

#### **4.2.2 MANAGING THE MANAGEMENT SYSTEM**

Adam has been with Company A for over a decade and, as a Technical Support Manager, he has played a major role in developing the operations management system that is used to ensure that core activities comply with corporate standards throughout the organisation. This is primarily associated with his responsibility for keeping abreast of all relevant industry standards and regulations within his jurisdiction. He ensures that these standards are communicated through to all of the operating sites and facilities in his region and also ensures that they are being effectively implemented.

Company A's current operations management system has been developed to centralise the many procedural requirements, so that oversight can be effectively managed and relevant information can be disseminated in a timely and efficient manner. The objective of Company A's operations management system, as stated by Adam, is to effectively integrate aspects of operational safety (such as asset maintenance) and occupational health and safety (such as personal safety gear) within the routine work procedures that establish operational compliance. Adam's explanation is that clear directions, on specific safety issues that are relevant to each routine task within a standard work procedure, are more easily understood by operators than generalised references to broad safety responsibilities. The operators can then comprehend and appreciate exactly what expectations or potential consequences may be related to carrying out each of their tasks as stipulated.

Adam is firm in his opinion that the evolution of the current management system has been predominantly driven by the Technical Support Managers. The focus of this development has been to fulfil their function of assuring regulatory compliance, for both technical operating standards and for personal and public safety requirements. Adam acknowledges that the executive leadership team has also provided consistent and substantial support. He confirms that there is adequate and appropriate motivation for Company A to operate with discipline and diligence, in order to satisfy the stringent legislative and regulatory expectations that constrain their core business activities.

Adam believes that Company A has now achieved a very proactive attitude to safety by incorporating safety initiatives into routine operations. He believes that this is promoting a sense of personal responsibility for compliance to the established safety requirements within the routine tasks of each operator. He also believes that there is an associated increase in situational awareness because the significance of various restrictions and limitations is clearly and consistently identified to the operator and compliance can consequently be enforced and reinforced by operations managers. Adam observes that operators are willing to take ownership of doing things in the right way if responsibilities are well-defined and clearly spelt out as a basic element within their standard procedures. Adam feels that a poor attitude of "safety is someone else's problem" had previously been prevalent within the organisation and that this attitude has finally been overcome.

Interestingly, Adam identifies that the source of this previously prevailing attitude was the approach of the person who was the Safety Manager before Alice. Adam feels that the operations lines were being burdened with a management system that was based only around documentation and was not integrated with the daily routines of operators. Multiple stand-alone documents were written up specifying various safety requirements as separate aspects for compliance and for application. This configuration of a corporate safety management system was too cumbersome and too vague to engage the operations staff. The approach had allowed both operators and managers to regard their safety responsibilities and obligations as a bureaucratic conundrum that was best left for "someone else" to deal with - and ultimately for the Safety Manager to resolve.

The implication is clear: that this one person in the corporate governance role of Safety Manager had adversely affected the performance of the organisation. This previous Safety Manager had developed and maintained a management system that simply added generalised documentation and safety goals to operating responsibilities. There was no actual definition or interpretation of the intent of those safety goals that could clarify the responsibilities that operators should actually fulfil. Adam reinforces that the Technical Support Managers drove the process of re-inventing the management system after the departure of the previous Safety Manager. A point to note is that Adam does not make any mention of the current Safety Manager, Alice, in this process.

Adam has the self-assurance of having contributed to the development and evolution of the current operations management system and of realising its successful implementation. "It was all in such a confused state ... we made it sensible". He feels that his personal status is predominantly due to the improvement of the operations management system which:

brought clarity to operational compliance requirements; streamlined the formal reporting and documentation; still satisfied regulatory requirements; and did all of this in “quite a reasonable” way. His general attitude is stated to be that ... when positive guidance that is clearly useful and effective is provided, it is inevitable that people will follow such guidance.

Adam is also fully aware that, as one of the interpreters of relevant legislation, he has the ability to modify company operational standards and requirements as he sees fit. He is comfortable with utilising this particular authority to justify safety initiatives and to challenge operating practices. He readily wields this power – based on his management of the operations management system – to influence decisions and behaviours in Company A. Though Adam isn't afforded any direct authority over operations by his formal role, he chuckles that he "can change the rules anytime". He appreciates that this gives his perspective, priorities and arguments considerable weight during almost any discussion.

#### **4.2.3 THE VALUE OF REPUTATION**

Adam's available influence is mostly derived indirectly from his functional responsibilities for ensuring compliance and it is supported by a management system that he also has the responsibility of maintaining. It is clear, however, that his own personal credibility is a significant factor and that he has extended his activities and garnered such authority for his role because he is known to be capable. Adam has a long history of professional competence and proven reliability within Company A. He is quite comfortable that he performs his functions well or “does a good job”; and that he is well recognised and well respected for his work.

Adam's self-assurance and status are demonstrated during the interview by a phone call, from a Site Manager from outside of Adam's business unit. After the call, Adam explains that this caller's region is supported by a "young" Technical Support Manager who has been in the role for “less than five years”. Adam's input is being sought in case his “less experienced” peer has given the wrong or inadequate advice on an issue. The implication is again clear: that Adam has a good reputation for giving the right advice. He confirms that this reputation is quite broad: "they all know" that he can “back up” (validate) his advice.

Regardless of this instance of providing technical re-assurance on behalf of his peer, Adam believes that all of the Technical Support personnel have the solid reputation of being part of a department that offers valid solutions. The operating units of Company A tend to utilise this department as a specialist resource to resolve issues as early, and therefore as efficiently, as possible. Adam is satisfied that the process works very well and that all of the



regional Technical Support teams are effective in dealing with issues that are raised. After all, each region's operators and managers must comply with the standard procedures that the region's own Technical Support Manager has developed.

Adam considers that his main problem is when operators or managers do not recognise that there is an issue and therefore do not involve their Technical Support teams. Even so, Adam is confident that the Technical Support Managers themselves have large enough spheres of activity and communication that they are unlikely to miss out on anything of significance before it becomes a major issue. He describes one such instance: of a marketing idea that had had a lot of development time invested in it without any input from the Technical Support group. He came to hear about it while working on another task and chose to get involved, taking steps to contact the Marketing Manager and put an end to a technically unsound proposition. Adam believes that, as a result of this intervention, the Marketing Manager is now somewhat more likely to seek technical input - and sooner rather than later - knowing that operational compliance may have the higher priority.

With responsibilities for regulatory compliance, assurance, management of change, technical advice, design engineering input and management of the management system, Adam's role in Company A is far-reaching, significant and prominent. The functions of his position as a Technical Support Manager, with two staff, are fulfilled with professional competence and self-assurance. This personal credibility adds to Adam's influence with his peers and senior managers and even with company personnel outside his of formally defined sphere of activity. This is a considerable contrast to what is discussed about the Safety Manager's position and functions within Company A.

#### **4.2.4 ON THE LEADERSHIP TEAM WITHOUT ANYONE TO LEAD**

The Safety Manager, referred to as Alice on Chart A, was not available to participate in the research. The description and examination of her role are therefore based on a description and various opinions provided by Adam. This is, of course, still valid and even important as research data because the perception of others is quite relevant when considering what influence is exercised by persons within any organisational role.

Alice's functions are described by Adam as involving: the development of corporate policy and corporate strategy; and the collation of performance reports for both the local CEO and for the global corporate office that oversees Company A. Alice also sits on a Health, Safety and Environment committee at the level of the global corporation. Adam observes that he himself sits on technical working committees at that level. He is not convinced that

much actual work gets done amongst the bureaucracy and personal manoeuvring that he has observed in the much larger global organisation.

Adam's firmly-held opinion of Alice's position as Safety Manager is that she sits on the leadership team with Company A's Executive Managers only because it satisfies the requirements of the global corporate centre. Adam is unimpressed by this nominal status: "They insist that the CEO has to have Safety reporting directly ... just a figurehead ... they need a scapegoat" are how he refers to the role and responsibilities of the most highly positioned safety role within the Company A hierarchy.

As Adam is the only Company A interviewee, it has not been independently confirmed just how widely his view of the Safety Manager is shared within Company A. It is, however, significant of itself that such a view is held by one of the other key professionals involved in assuring compliance of the organisation's activities to corporate safety standards. Adam presents some reasoning for his judgement to validate what could otherwise simply appear to be his own bias, cynicism or self-aggrandisement.

He explains that, although Alice joins the Executive Managers on the leadership team, she is nevertheless, not referred to as an Executive Manager. Her own status and authorities are not in fact comparable to any of the Executive Managers with whom she interacts. Adam actually considers that Alice is his own equal in terms of hierarchical status and he speaks of working "with her" and "alongside her" when they are addressing various safety issues. Reportedly, Alice also accepts direction from Adam's own boss, who - as the functional Executive Manager of Operations Support - is a member of the same executive leadership team as Alice. It is clear to Adam that the Safety Manager is not considered to be a peer by the other Executive Managers or by the CEO of Company A. Adam asserts that the Safety Manager's role is a passive, reporting function rather than active advocacy.

There is other evidence that independently supports Adam's opinion: in the form of the organisational chart. Alice only has one person on her "staff" while Adam himself has two direct reports though he is shown to be a full tier further down in the organisational hierarchy. Also, Alice's direct report - the corporate Safety Advisor - is reported to be a technically trained trouble-shooter. The Safety Advisor apparently works as much with the regional Technical Support teams on engineering solutions and regulatory compliance issues as she works with the Safety Manager, on incident investigation and safety performance data collation and reporting. It is a clear implication (and complete proof to Adam) that Alice must not be responsible for very much - beyond all of the corporate reporting - if her only staff member spends much of her time assisting another department.

The other Executive Managers do seem to hold far greater responsibilities within the organisation: managing many more people; responsible for major assets; and resourced with substantial budgets. There are no comparable responsibilities or authorities attached to Alice's position. Though there is clear status, with: direct access to the CEO and to the leadership team; and reporting lines to the global corporate centre beyond the CEO, Alice is seen as taking direction from an Executive Manager. It may be highly unlikely that Alice has the capacity to influence decisions at the executive level if she is included on the leadership team but maintains as subordinate a position as suggested by Adam's observations.

Another issue that Adam raises is that though the Safety Manager is the designated senior specialist who is responsible for safety policy and strategy, Alice's role does not actually include involvement in many safety-related activities or operational compliance. There are apparently very few responsibilities of substance that are attached to the Safety Manager's role that reflect the high status of a position on the executive leadership team.

Adam believes that the Safety Manager's seat at the leadership table exists purely to act as a "buffer" between Company A and the global corporation that owns it. Of particular significance is Adam's statement that the Safety Manager's role is limited "because the executive leadership want it that way". The implication is that, while the governance expectations of the global corporation are seen to be satisfied by the high status and executive-level position of the Safety role, actual decisions and corporate priorities are unlikely to be challenged by the otherwise altogether subordinate "peer".

#### **4.2.5 ORGANISATIONAL DYNAMICS OF OPERATIONAL SAFETY**

There are several interesting insights into the way in which operational safety is managed in Company A that have been garnered from the interviews with Adam. There are many positive indications of operational safety activities and priorities, such as the incorporation of compliance with operational safety expectations within routine operating standards and procedures and careful systematic monitoring of assets and their maintenance. The regular assurance of procedural compliance around engineering and management of change; the thorough definition of staff competencies; and the ease of interaction between operating facilities and the Technical Support function are also all positive indications.

The Technical Support teams are independent of the operating lines, reporting to a functional Executive Manager who has the responsibility of providing specialist support to the operating lines and is only answerable to the CEO. The function of Technical Support had previously been only to ensure that operations were compliant with regional legislation

and regulations, but this was expanded to include development and maintenance of the operations management system. The current operations management system and his own personal credibility considerably enhance Adam's ability to influence behaviours and practices within the organisation, beyond any authority that is associated with his role.

There are also several negative indications of operational safety management: in particular, the lack of an operational safety function. This could be warranted due to the relative simplicity of the core activities of Company A, which are heavily regulated and carried out with equipment that is often over-designed to provide additional layers of risk mitigation. However, there is also too little differentiation between operational safety activities and other compliance requirements because operational safety parameters are so thoroughly integrated with general compliance in operating standards for routine tasks. The concern is with the limitation that any potential for deteriorating operational safety or change in operating risks could therefore be very difficult to isolate and identify.

Another clearly negative indication is with the current corporate oversight of safety, which is reported to be quite superficial. Previous corporate oversight is thought to have actually impeded the capacity of technical specialists to promote and support operational safety and discipline. This is a significant finding: suggesting that status or hierarchical can either provide the potential for significant impact or be deprived of any influence, depending on how the specific functions associated with that position are defined or circumscribed. Also, the influence of a structured position may be ultimately dictated by how these associated functions are actually fulfilled by the individual occupying that role.

The current Safety Manager enjoys considerable status due to her place on the executive leadership team, with direct access to those with the authority to directly affect Company A's operations and performance. Though her personal influence is not able to be determined within the research process, it is clarified that her actual functions are quite limited. She has minimal involvement in safety compliance despite having responsibility for developing safety policy and strategy. Her role is perceived to be superficial and symbolic rather than substantial and effective. It is suggested that she has little real influence.

On the other hand, the previous occupant of the same position is reported to have had quite a considerable impact on the organisation's operations and performance. He also had fairly limited authority derived from the actual position, but his role included the functional responsibility of developing and implementing the operations management system for Company A. Through this function, he is reported to have created a considerable barrier to the promotion of operational compliance and assurance of operational safety. Though the

impact is discussed as being quite negative, this is demonstrative of more influence than Alice, the current Safety Manager, is perceived to exercise within the organisation.

Another significant finding is demonstrated by the appearance and implications of the role itself: of a Safety Manager on the leadership team who is directly accountable to the CEO. It is reported to be quite a subordinate role to that of the other members of the leadership team, supposedly answering for some tasks to an Executive Manager on the same leadership team. The defined accountabilities and responsibilities of the position therefore seem to be critical factors in the role's perceived influence within the organisation.

The organisational parameters of both Adam's and Alice's roles - their defined positions and functions - have a clear impact on their respective influence, which is also affected by other organisational and personal factors. Three critical themes that have been identified from discussions about the organisational dynamics in Company A around operational safety:

- the designated responsibilities and defined functions of each of the two roles that were examined are seen to modify the influence that can be exercised to impact on operational safety and the authority that is available to prioritise operational safety;
- the effectiveness of the operational management system in promoting compliance and monitoring performance is seen to modify the priority given to operational safety and can provide considerable influence to ensure implementation; and
- the personal credibility that is derived from professional competence and performance is seen to modify the type and extent of influence that can be exercised beyond what is formally structured in the organisational design.

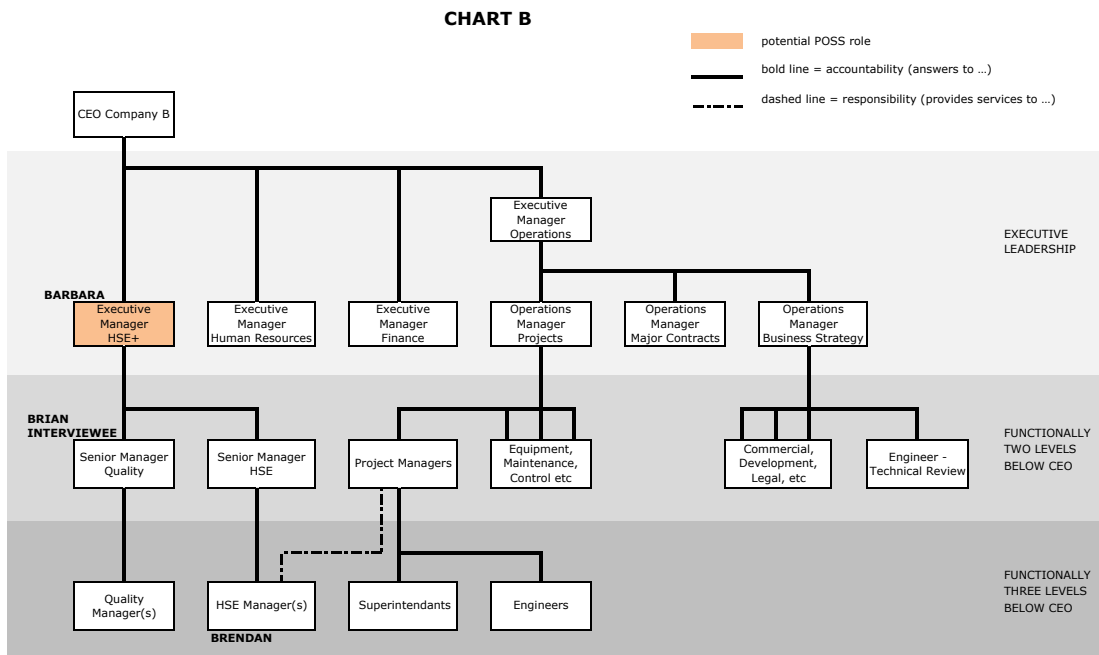
## **4.3 COMPANY B**

### **4.3.1 POSITIONS AND FUNCTIONS RELATED TO OPERATIONAL SAFETY**

Company B is a relatively small company involved in construction projects. There are no complex technologies or interlinked hazardous processes that might unexpectedly cascade into major accident events, as core activities comprise relatively simple and discrete operations. There are still the associated risks and hazards that are quite common to the construction industry, all of which are well defined and well regulated. The potential for unknown hazards is limited to discrete activities at specific construction sites. This has to be identified during engineering review and managed during construction activities. Any site-specific circumstances that require additional attention or increased operational safety

measures and activities are determined and implemented on a case-by-case basis during the project planning and preparation stages. The staffing requirements are also determined on a project-by-project basis and the majority of workers on each construction site are only contracted for the duration of the project.

The employees of Company B who are described and discussed in the research interview as being relevant to this research are the core group of permanent staff, shown in Chart B. These employees are either in the main operations group (involved in assessing, bidding for and managing the construction projects) or in one of several support functions which comprise finance, human resources and HSE+ (health, safety, environment plus quality). Core employees might be assigned to one specific project; required to contribute to several smaller projects; or be responsible for corporate oversight of all projects, as required.



Therefore, the organisational structure of Company B is quite fluid and core staff are regularly assigned different lines of responsibility whenever projects are commenced or completed; or when specific capabilities are required for specific tasks. Chart B presents the organisational structure of Company B as described at the time of the research interview, showing the mostly constant lines of accountability within the core structure. Only one functionally relevant line of responsibility for HSE+ is shown for later discussion but such lateral relationships may be numerous as they are established according to project tasking and allocation. Chart B delineates the internal structure of the executive leadership team and illustrates the levels below the CEO in terms of the hierarchy of the HSE+ function.

The CEO has several direct reports including an Executive Manager of Operations and several functional Executive Managers. The functional Executive Managers are identified in Chart B as having a slightly lower status equivalent to the Senior Operations Managers who are also on the leadership team though they report to the operational Executive Manager. Although, they are effectively two hierarchical levels down from the CEO, the Executive Managers of the three separate support functions (Finance, Human Resources and HSE+) and the Senior Operations Manager are all on the leadership team of Company C.

The higher status of the Executive Manager of Operations reflects her more significant role in the organisation. She is responsible for core activities and accountable for productivity and commercial viability of all operating projects. The Operations group is responsible for the activities of Company B that would be considered most significant to promoting and maintaining operational safety. These activities include engineering reviews undertaken in preparing project bids; and the technical designs that are undertaken to ensure that proposed works are adequately specified to be appropriate for the client's end-use.

The critical aspects of high quality project delivery are those that will be realised after handover – as safe and reliable operational performance during end-use by the client and owner of the constructed assets. All project delivery compliance whether: to design specifications; to established standards derived from relevant legislation and regulations; to corporate policy; or to the client's requirements, is the priority and responsibility of the one Executive Manager of Operations. Assurance of such compliance is the responsibility of the Executive Manager of HSE+ who is identified as Barbara. The interviewee is one of her direct reports and is identified as Brian in Chart B, the Quality Manager of Company B.

The only activities that are directly relevant to Company B's own operational safety performance are those that ensure safe operations during the project construction phase. These are typically defined during project planning: such as construction timelines, equipment maintenance and resource management. These activities then become the responsibility of the Operations group, with each individual Project Manager being held accountable for implementing recommended and appropriate practices; and for supervising permanent and contracted staff on their construction sites. The assurance of such compliance is the responsibility of the HSE+ group and more specifically of the HSE Manager, who is shown in Chart B as another direct report of the HSE+ Executive Manager.

The functional HSE+ group is responsible for development and maintenance of corporate policy, standard operating procedures and necessary documentation for tracking performance and recording incidents. There are few other responsibilities that are relevant

to safe operations for Company B. Only Barbara's role is therefore considered to be similar to a POSS role. As the Executive HSE+ Manager, Barbara is on the organisation's leadership team with direct access to the CEO and other senior executives. She has specific dedicated responsibilities for the independent functional group that she leads. The HSE+ group in Company B has an independent line of accountability to the CEO, as shown in Chart B. The focus of discussions during the interview with Brian is therefore on the organisational structure designed around the HSE+ group.

As neither Barbara nor her direct report, the HSE Manager, were able to participate in the research, but the research interviewee, Brian, is a close colleague and peer of the HSE Manager. As a member of the HSE+ group, himself, Brian is comfortably familiar with the HSE-related roles and is able to describe and discuss the particular responsibilities of the HSE staff, including project-based HSE+ specialists at the construction sites.

The key theme of relevance to this research project that is identified during discussions with Brian is the impact of the structured independence of the HSE+ function from the operations group. The effectiveness of this organisational structure in providing influence to functional roles at both the project level and at the corporate level is examined in the following two sections. These sections detail how the autonomy of Company B's safety specialists is enhanced by both personal competence and leadership support.

#### **4.3.2 STRUCTURED INDEPENDENCE PLUS PERSONAL COMPETENCE**

As illustrated in Chart B, the Safety Managers who are direct reports of the HSE Manager are also responsible to various Project Managers. They are each assigned by the HSE Manager to project management teams on a case-by-case basis. For each project, the Project Manager, who is assigned by the Operations group, has a management team with a similar structure to the Company's executive leadership team. Each of these project management teams includes: a Construction Supervisor (with several direct reports) who is considered to be senior to the Finance Officer, Human Resources Advisor and HSE+ specialists. The various support staff on a project management team assist the Project Manager and the Construction Supervisor to with project management and governance. They assist with ensuring that the work and activities on the construction site are undertaken in accordance with: the project's technical specifications; the client's expectations and policies; and Company B's corporate standards.

Brian discusses what he knows of the role of one of the project-based Safety Managers, who is referred to as Brendan in Chart B. Brendan is accountable to the HSE Manager in the



HSE+ group and he provides the "integrated" service of also being embedded in various project management teams. All of the project-based Safety Managers have such lateral relationships: providing specialist support to operational Project Managers, while ensuring the implementation of policies and standards developed by their functional HSE Manager.

In order to increase his effectiveness and efficiency, Brendan is given the authority to make independent decisions about various safety matters. The responsibility of his functional role is to actively enforce compliance to HSE standards. The direct influence that is available to him as a member of a project management team is to affect the decision-making of the project management team. This arrangement provides Brendan with some autonomy that allows Brendan to himself balance his project obligations (to support and advise his Project Manager) with his functional obligations (to ensure HSE compliance of the project). He is still accountable for his decisions, but he has the autonomy to decide and act independently of both of his direct managers, based on his own interpretation of appropriate priorities.

Brian describes this as a deliberate delegation of authority by the HSE Manager and the Executive HSE+ Manager and believes that this is seen by all parties to be both productive and positive. The structured accountability to separate managers is described as working well and as fully supported by both the Operations group and the HSE+ group. Brian qualifies the success of Brendan's autonomy by advising that Brendan's own experience and proven capabilities are significant contributing factors. Brendan is judged to have the competence to determine what issues might be resolved independently within the project management team and what issues need to be escalated to the HSE Manager. He is widely trusted to make good decisions on various and sometimes conflicting priorities between his project and his HSE obligations.

Brian is not certain if a different person in exactly the same role would necessarily be given as much autonomy as Brendan currently holds. Another project-based Safety Manager, who is described as younger and less experienced, is reportedly under the fairly close supervision of the HSE Manager. Brian suggests that there is an expectation and hope that this younger HSE specialist will gradually develop into a professional with adequate competence to be given increasing autonomy on par with Brendan, his more experienced colleague. Though it is not taken for granted that this will eventuate, Brendan's dual accountabilities and autonomy are seen to work well enough that the potential for such autonomy is expected to remain structured into the Safety Manager role, with functional supervision provided by the HSE Manager if required.

### 4.3.3 STRUCTURED INDEPENDENCE PLUS LEADERSHIP SUPPORT

Brian also speaks highly of his immediate superior Barbara, the Executive HSE+ Manager. Brian considers Barbara to be a proactive and effective advocate, and the CEO is described as being very supportive of Barbara and the functional team that she leads. Brian advises that, though the HSE+ function is considered to be a service provider to the Operations group, HSE+ is itself quite independent of Operations. Barbara has functional authority related to the development of corporate policies, strategies and operating procedures, and also for the assurance of compliance to Company B standards.

Brian also states that Barbara has considerable leeway to investigate and address issues and to develop and implement new initiatives that go beyond her responsibility for assuring compliance to existing standards. One example that is described during the interview is that of the documented presentation of standard operating procedures. There is a general pressure throughout Company B for activities to become more formalised and standardised with regard to documentation, but Barbara has been concerned that some complacency might be creeping in. She has invested considerable effort into modifying and updating HSE+ documentation for the stated purpose of "keeping it fresh". This process is described simply as an opinion that Barbara had formed and acted on, which is just as simply accepted and supported by leadership despite general pressure to maintain document formats. There is no mention by Brian of any high-level discussion or debate about corporate and functional strategies around this decision to refresh rather than standardise documents.

Another example that is described is a more complex problem that required a coordinated and integrated approach across the business, including at all of the construction sites that were operated and managed by Company B at the time. The issue required the development of a centralised policy to address specific problematic behaviours that had been recognised as increasing the risk and potential for significant accidents and/or personal injury. The problem was left solely to Barbara to resolve and she developed the necessary procedures and cross-checks for implementation. The Operations group, including the Project Managers, then had to take responsibility for introducing and maintaining the new policy (with the support and assistance of their embedded HSE+ personnel where required).

Brian's account suggests that the strong and visible support of the CEO greatly facilitates the advocacy of both HSE and Quality priorities within the organisation and that this clear leadership support ensures that all employees of understand HSE+ to be a priority for Company C activities. It is not possible to specifically examine how far Barbara's authority

extends with regard to ensuring compliance to HSE+ standards, as Brian is not able to offer any examples or stories to illuminate how conflicts might be resolved. Brian explains that the prevailing attitude is of operations and functional personnel working together towards safety and quality as common goals rather than as competing priorities that cause conflict.

A point of interest and significance is that the ability to "be persuasive" is the first of the various competency requirements that are listed in Company B's position description for the Executive HSE+ Manager. It may well be that such a skill set, leadership support and structured independence are all required to effectively utilise the level of authority and influence that is available to Barbara as a functional manager and the most-likely POSS.

#### **4.3.4 ORGANISATIONAL DYNAMICS OF OPERATIONAL SAFETY**

Though Company B is not involved in any complex hazardous processes, the core activities still require a fair degree of risk management to ensure the safety of staff and contractors. The project-based activities of Company B allow specific hazards and risk factors to be taken into consideration on a case-by-case basis. Therefore, the identification of specific hazards may not be so difficult as to require operational safety to be a distinct function. Although there is no operational safety function that is differentiated within the structure of the organisation, there is a strong functional HSE+ group with a clear focus on HSE management plus quality control.

Therefore, Company B does provide an example of authority residing in an independent functional line that is being effectively utilised to promote safety performance though it doesn't offer an example of an independent operational safety function. The most significant theme of interest arising from the discussions of the organisational dynamics of Company B is the success of the substantial delegation of authority to the HSE+ function, both at the corporate level and at the project-based level of HSE specialists.

In terms of organisational features, the type of autonomy that is evident in Brendan's role in Company B is a fundamental aspect of a genuine matrix structure. As discussed in Section 2.3, the effectiveness of a matrix structure is reliant on the ability of senior managers to delegate decision-making to lower levels. Each agent at a node of the matrix structure needs to be able to assess issues independently and respond to pressure from both of the managers to which the agent is responsible. They will have dual obligations that have to be correctly prioritised, with a broader perspective than that held by staff who have only one clear accountability or imperative. Otherwise, daily issues would always be escalated to

higher levels for discussion and decision-making and there would be no particular advantage achieved by establishing and maintaining the more complex, matrix dynamics.

In the case of Brendan, the effectiveness of the organisational structure of Company B is quite likely due to his personal competence and widely appreciated credibility that allows a role with dual accountability to be effectively utilised and facilitates the matrix dynamic. This suggests that, if autonomy is structured into an organisational role, a person with appropriate competencies has the capacity to themselves balance various priorities and make decisions. They can wield independent authority to influence behaviour within the organisation, even at lower levels of the organisational hierarchy.

The independent authority of the HSE+ group is also supported by Company B's leadership: promoting a strong culture of awareness and attention to safety and quality throughout the organisation. Company B therefore also provides a clear example of how the strong support of a CEO is perceived by staff to give validity to functional priorities, consequently reducing the sense of conflict between functional and operational priorities as having no common organisational goals. The critical themes, that are identified from discussions about the organisational dynamics in Company B (around HSE) include:

- the structured independence of the functional line in which safety is managed, which is seen to provide clear influence to the functional HSE Manager and to her staff including site-based specialists to exercise influence on decision-making;
- the influence of the functional HSE+ Executive Manager, which is reported to be fully supported by the CEO, thereby reducing the level of conflict perceived to exist between operational project priorities and functional HSE+ priorities; and
- the competence and personal credibility of functional staff allow for the successful delegation of decision-making down the functional line, providing local autonomy that is seen to enhance both perceived influence and positive interaction within the operational hierarchy and contribute to organisational HSE performance.

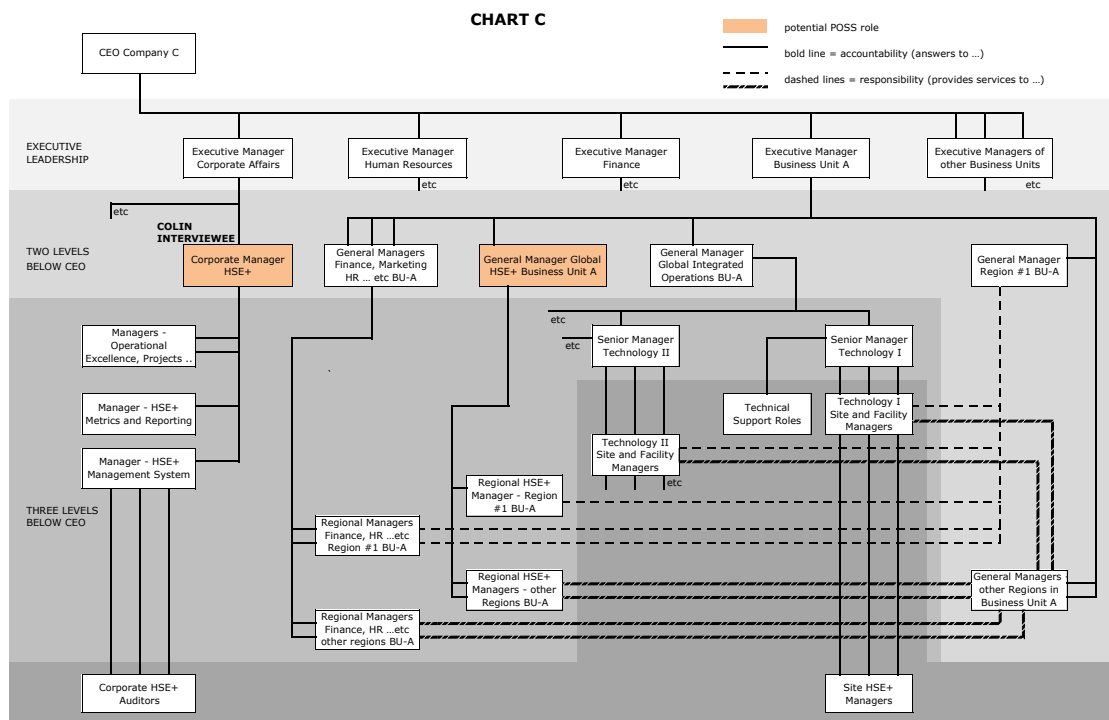
## **4.4 COMPANY C**

### **4.4.1 POSITIONS AND FUNCTIONS RELATED TO OPERATIONAL SAFETY**

Company C is a global organisation with several core production activities involving complex technologies and hazardous processes. These activities are fully decentralised and grouped into independent business units on the basis of production technologies. Each

business unit is led by an Executive Manager who reports to the CEO of Company C. The rest of the leadership team comprises Executive Managers of Finance, of Human Resources and of Corporate Affairs. The Corporate Affairs Executive Manager has several different functional responsibilities including Business Strategy, Technical Support and HSE+ (health, safety, environment plus sustainability).

The Executive Managers of the operating business units are each responsible for the worldwide activities of their respective business units. Each business unit has its own leadership team, comprising several Regional Operations Managers and various senior functional managers. The Regional Operations Managers are each responsible for their business unit's core activities in different geographically defined areas. The senior functional managers are responsible for support activities such as Marketing, Supply Chain, Finance and HSE+ across all of their business unit's various regions of operation. As shown in Chart C, this third tier in the hierarchy of senior management is structured as a matrix. Each support function has regionally based functional managers who report directly to a senior functional manager in their business unit and also to a Regional Operations Manager.



The organisational structure that is presented in Chart C is as described at the time of the first research interview with a participant from Company C. During the fieldwork period, the recently appointed CEO of Company C is undertaking a major redesign of the organisational structure, including the executive leadership team. By the time of the second interview with a research participant from Company C, the executive leadership hierarchy has been

substantially altered. Significant modifications to the HSE+ support function are also underway at the time of the third interview. The functional restructuring has not yet been finalised, so a modified organisational chart is not available to present for comparison with the previous structure that is shown above in Chart C.

Though this state of flux is not an ideal condition for providing a description and discussion of the organisational structure, it is nevertheless a valuable opportunity to consider the central research question. The total overhaul of an organisational structure presents unique and fundamental insights to directly explore those problems that have been recognised with the old structure that how they are expected to be resolved by the new design of the organisation. The older structure therefore remains the focus of various discussions with Company C interviewees, with reference to how issues are addressed in the new structure.

The core operations of Company C involve several highly hazardous technologies and processes. However, operational safety is not managed as an integrated function. The associated responsibilities are distributed amongst several distinct roles within the organisation. Neither the defined organisational structure nor the formal operational management system provides for coordination between the roles of corporate oversight and management; and the roles of site-based safety specialists or technical experts.

There is a corporate HSE+ management system which does identify and prioritise many elements of operational safety management: defining minimum standards of operations, and establishing a policy of seeking operational excellence. However, the corporate HSE+ group does not communicate or interact with the site-based HSE+ teams that support operations at various sites and facilities. Those HSE+ teams are fully embedded within the operations group and are accountable only to their own Site or Facility Manager. There is reportedly very little interaction between one HSE+ support team and another; and there are no interactions between the HSE+ specialists and any of the technical experts.

The technical experts in Company C are not defined at all in the organisational structure or included in HSE+ functional teams. There are lone Technical Specialists and small groups of engineers who are scattered throughout the operational business units. Some operations have their risk managers and process safety engineers distributed amongst completely different departments even when these technical professionals are based at the same operating site. One process safety engineer, positioned only four levels down from the CEO seems to be a potential candidate for a POSS by reason of seniority and access to authority; as well as his technical competence. However, his role has no formal, functional lines of responsibility with the other engineers at his facility, apart from his own staff of one.

The most prominent role in the organisational hierarchy of Company C that displays distinct POSS attributes is that of the first interviewee, who is identified in Chart C as Colin. Colin is responsible for managing the HSE+ function at the corporate level and for promoting operational best practice. Colin is a candidate for POSS by reason of these functional responsibilities and his proximity to leadership. As shown in Chart C, Colin is two levels below the CEO and reports to the Executive Manager of Corporate Affairs.

The Corporate Affairs Executive Manager does not herself qualify as a POSS because the range of her responsibilities is too broad, with potentially competing priorities. Her role encompasses business strategy and commercial activities as well as the oversight of several other support functions, of which HSE+ is only one. Though Colin also has responsibilities beyond the HSE+ function, one of these is project-based. Another responsibility is the oversight of technical support, which is itself an important aspect of operational safety management though it is separated from the HSE+ function. Unlike his immediate boss, Colin has a role that is independent of potentially conflicting business priorities.

The second and third interviews, in Company C, are with Catherine who has replaced Colin as the most senior manager with HSE+ responsibilities. Her position in the new structure does not equate with the old organisational structure and is not identified in Chart C. Catherine's role at the time of the interviews is extensive and influential, with both the responsibility and authority to establish a fully independent operational safety and risk management function by pulling together the numerous and varied safety and risk professionals within Company C. Though the potential POSS role that Colin held was limited in its scope and influence, by the time Catherine completes her task, the most likely POSS role in Company C is planned to be much more like that of an ideal POSS. This theme is discussed in further detail in Section 4.4.5.

The fact that Company C is going through a process of centralising operational safety activities gives credence to many of the complex concerns that are discussed by the interviewees as they consider the impact of the old structure on operational safety priorities. The most significant themes that are identified in the research and presented in the following sections, include the limitations of the old organisational structure relating to: corporate oversight; technical authority; and functional leadership.

The other significant factor, which is discussed as a critical theme in Section 4.4.6, is the attitude and commitment of the new CEO, who is driving this comprehensive change throughout the organisational structure - effectively "turning it on its head".

#### 4.4.2 LIMITATIONS OF CORPORATE OVERSIGHT

Colin is responsible for the corporate management of HSE+ and is identified on Chart C as the most senior of the HSE+ professionals in Company C before restructuring. This is one of several support activities associated with his position, which include some major projects and Operational Excellence. Colin describes his HSE+ role as that of a corporate-level expert available to provide advice and assistance to corporate-level operations managers in meeting their corporate HSE+ responsibilities. Colin expects to be involved in all executive-level decision-making related to operational safety and risk within the organisation but does not involve himself directly with operational activities. Nor is he a direct colleague of either the executive leadership team or of the senior operations managers.

Colin's senior position and corporate functions constitute a potential POSS role due to his functional independence from commercial priorities and his access to the authority of leadership, separated from the CEO by only one level of hierarchy. However, Colin has no authority over (and limited interaction with) the many HSE+ personnel employed within Company C's operating units. Each of the operating business units are expected to independently implement the corporate HSE+ policies, strategies and procedures throughout their operations; to review and document their ongoing HSE+ performance; and to report any incidents. Colin is unable to give a confident estimate of the number of HSE+ professionals employed in Company C (guessing "several hundred") or to even think of a way in which that number could be readily determined and verified.

Interestingly, when Colin identifies those of his staff who have input into operational safety activities, he does not include his technical support team. They are described as being responsible for technical oversight of operational excellence and improvement throughout the organisation. Colin, however, only discusses the staff members in his corporate HSE+ group, which is responsible for corporate governance and assurance activities. These activities include: the development of corporate policy and strategy; the documentation of operating standards and procedures; and the audits of operating sites and facilities against the requirements of the HSE+ management system. The corporate HSE+ group also collates HSE+ metrics as reported by the operations groups; and investigates reported incidents to review both incident management and the follow-up of actions and recommendations.

Colin has designated one member of his staff to maintain and update the corporate HSE+ management system, which broadly covers almost all aspects of operational safety, including technical integrity, risk management and process safety. He has designated another staff member to collate reported data and keep track of various measures by



which operational HSE+ performance is judged. Colin's remaining HSE+ staff members are fully occupied with a tight schedule of worldwide facility audits against the requirements of Company C's HSE+ policies, strategies and operations management system.

Colin only has a handful of corporate HSE+ Auditors to oversee Company C's worldwide operations. This paucity of personnel resources means that the scope and depth of the assurance activities undertaken through the corporate audit program is quite limited. The established protocol for the corporate audits is that each business unit presents the findings of their own in-house audits to the corporate HSE+ Auditors for their review. The operating units are expected to independently audit their own facilities and operations in order to ensure compliance to the corporate management system and report any issues. It is common practice for the HSE+ Auditors to confirm compliance to this management system but to not validate the in-house audits or verify that the actual operating practices are in compliance with corporate standards. There is a long-held expectation that Site and Facility managers will be diligent in self-reporting: identifying and seeking advice on any non-compliances that they themselves discover during their in-house audits.

Colin is satisfied that this self-regulation does in fact occur but he does not offer any information on verification activities that are undertaken by the corporate audit team to confirm such an assumption. The validity and quality of reported data used to generate the HSE+ metrics that are collated, analysed and reported as operational performance by Colin's team also rely on the operations groups attending to the monitoring activities with diligence and competence. Colin does not have the resources to investigate and separately verify any of the operational safety data that is processed through his department. The assurance activities undertaken by the corporate HSE+ group, as described by Colin, cannot actually be considered to be genuinely independent oversight of operations.

Colin is concerned with how little impact the corporate assurance activities have on operating practices. Colin garners some influence through his capacity as the corporate HSE+ Manager because he presents audit findings and recommendations, and reports on the operations groups' compliance to corporate standards, to executive leadership. However, this influence is limited and it is also undermined by a lack of any authority to enforce the implementation of the HSE+ Auditors' recommendations. Also, the corporate audits are infrequent: typically scheduled from two to five years apart. So, an audit recommendation can easily be ignored for several years without verification, and then several more years before being identified as a recurring issue. A Site Manager who simply claimed that an action from the previous audit is "included in next year's budget" could

have between four and ten years of non-compliant operations before the corporate HSE+ audit team could independently confirm or flag the Site Manager as recalcitrant.

The corporate HSE+ group is not part of any integrated functional group responsible for HSE+ related activities. Colin's HSE+ team is clearly limited to corporate governance, based on a well-documented operations management system that also generates documentation in the form of performance metrics, audit reports and incident records. The assurance activities of the corporate HSE+ group relies on the advice of the operations lines and Colin is not expected to: enforce compliance to corporate standards or audit recommendations; or assist with such compliance by instructing or guiding those HSE+ specialists who are fully embedded within the operating units.

The operational safety governance activities at the corporate level of Company C seem to rely on the appearance of diligence and attention – and only a nominal commitment to operational excellence. This actually obscures the simple fact that operational practices and management processes are not independently monitored or verified for compliance to even the minimum established corporate standards.

#### **4.4.3 LIMITATIONS OF TECHNICAL AUTHORITY**

Colin's position description includes a responsibility for maintaining operational excellence and engineering best practice within Company C. Interestingly, the extent of this particular responsibility is not discussed by Colin as an aspect of managing operational safety performance. With regard to the technical expertise and advice that is available within the organisation, Colin describes a system of technical oversight and review that is provided by teams of Technical Specialists as subject matter experts. These teams are each formed around a specific production process or production Technology that is used for Company C's core activities. The aims of this technical review process are included in the corporate HSE+ management system that Colin is responsible for, but he is not typically involved in the technical review itself.

Colin asserts that the identification and utilisation of these existing Technical Specialists in technology-specific teams of subject matter experts has evolved as a strategy to address specific concerns for operational safety. There had been a serious accident at one of Company C's facilities. Investigation of the incident revealed that the causal factors had been related to a technical problem that another facility had already identified and dealt with. The knowledge of the potential for failure, the associated risks and the resolution of that technical problem had not filtered through to other facilities or to other regions, even

within the same operating business unit of Company C. The recurrence of a known and resolved problem that led to an accident drew attention to the many discrepancies between standards of operational discipline and the age and condition of the available technology at different Company C facilities, even those with similar processes.

The executive leadership of Company C recognised that the technology, technical operating standards and their review had to somehow be centralised so that all similar operations were at least as safe as each other. The objective therefore became assurance that the established standards of operational discipline and technical integrity were being satisfied worldwide so that repeat incidents could be prevented by sharing technological progress.

Colin advises that there are now Senior Managers for each major technology in Company C and that they are three levels down from the CEO as shown in Chart C. Each of these Senior Technology Managers has put together an expert team of Technical Specialists to collaborate on developing, reviewing and updating technical operating procedures. Reportedly, the most experienced, qualified and proven specialists are included in these activities. In their expert teams, these Technical Specialists have the responsibility to develop technical specifications and recommendations which may relate to establishing operating parameters and managing technical integrity. These include: hazard analysis; risk mitigation and management; change management; process control; and oversight.

The teams are transient, being formed by the Senior Technology Managers when required and are only utilised for as long as they are needed. The interactions between various Technical Authorities are therefore task-specific. Colin advises that there is no structured interaction amongst the Technical Specialists, and that their functional responsibilities on their expert team might not even be related to or reflected in their “normal” organisational positions. They remain scattered throughout the business units (embedded in operations lines on engineering and technical support teams) and accountable only to their own Site or Facility Managers.

Also, they are not formally acknowledged in Company C's organisational structure or by any hierarchical status. According to Colin: "You won't find those [responsibilities] written up in any job descriptions and they [the Technical Specialists] aren't identified in the organisational charts ... everybody just knows who they are." It is significant that these technical experts are not recognised outside their “normal” roles and that, despite their acknowledged technical expertise, they are effectively anonymous within the formal organisational structure of Company C.

In discussing what the appropriate standards are, Colin notes that Company C rarely ventures outside of the organisation for specialist input. The use of specialist consultants or industry peers is avoided because there are so many technical professionals and expert resources within the organisation. The known Technical Specialists are sometimes utilised to undertake the more stringent and detailed audits of hazardous processes that are the responsibility of the operating business units. They are "borrowed" by Site or Facility Managers from their "normal" positions to act as independent advisors on technical issues and provide "external" scrutiny of the compliance of operations to relevant standards.

The limitations of this prevailing attitude with regard to technical expertise are identified and raised as a significant issue by Catherine, the second participant from Company C, in a later interview. She observes that there is a considerable gap between what is considered to be expertise within Company C and what is in fact expected of technical experts within the broader industry. This is particularly problematic as the stated objective of the corporate operations management system and operational excellence policy is to ensure that technical best practice is maintained in large part to avoid another serious accident.

Catherine, who is new to Company C, has a broader industry perspective. She expects that any Technical Specialists who provide oversight and review of Company C's operating practices should be on par with industry peers in operational safety and risk management as well as in their own areas of technical expertise or technological speciality. However, she reports that there does not seem to be any verification of the quality and competence of the available in-house technical expertise as it relates to safety and risk management skills or comparison against external industry standards and that there has not been for many years. Though these Technical Specialists are potential POSSes by virtue of their technical competence, their roles as subject matter experts contributing to operational safety management are not recognised in the organisational structure or confirmed against professional standards within their discipline.

#### **4.4.4 LIMITATIONS OF FUNCTIONAL LEADERSHIP**

The third role within the organisation that could qualify as potentially a POSS role is that of the General Manager of HSE+ on the business unit leadership teams, as shown in Chart C. There are as many General Managers of HSE+ as there are business units, each reporting to the Executive Manager of their own business unit. Each of these General Managers of HSE+ has a team of Regional HSE+ Managers, each responsible for a region within their own business unit. There are potentially multiple Regional HSE+ Managers in any given region, each independently aligned with their own specific business unit.

The organisational charts that are provided for the research only detail the largest business unit. The other business units are not confirmed to be structured according to a similar organisational hierarchy. The dynamics of Business Unit A are discussed as an appropriate example of operational and functional corporate structures as this business unit is arranged in part as a matrix organisation. The General Manager of HSE+ is a functional lead within the business unit and has direct reports (solid lines) who are the Regional HSE+ Managers, each of whom is also responsible (dotted line) to their Regional Operations Manager.

Interestingly, the matrix structure appears to be limited to the one hierarchical level of senior management. There are no functional lines of accountability shown between a Site HSE+ Manager and their Regional HSE+ Manager. Instead the Site HSE+ Manager sits on the leadership team of the operational Site Manager and the only lines of accountability for the HSE+ professionals who are embedded in operations are to their Site or Facility Manager. Colin cannot confirm whether or not there are any functional responsibilities of the site-based HSE+ teams to their Regional HSE+ Manager. He advises that the principal role of the site-based HSE+ team is to assist their Site Manager to meet the requirements of the HSE+ corporate policy, strategy and management system. Similarly, the role of a Regional HSE+ Manager is to support their Regional Operations Manager and the role of an HSE+ General Manager is to support the operational Executive Manager of their business unit.

Colin advises that the organisation has "as little as possible in the centre" and prefers in principle that the responsibility for all execution reside with the operating business units. The impact of the organisation's commitment to such decentralisation is that there are operational safety professionals located throughout Company C, seemingly employed wherever an operations manager feels that there is a need for HSE+ input. There is no coordination, collaboration or even established competency standards amongst these HSE+ professionals. The impacts of an extreme case of such dysfunction in the corporate structure is provided when Colin discusses several recent appointments in the HSE+ group of managers with no relevant professional qualifications or a technical background or even any operational experience. Senior HSE+ management roles are apparently used to groom rising "corporate stars" who have business or financial backgrounds but who need a role in which to develop their leadership and management skills.

One very recent example is discussed: of a business manager appointed to the position of General Manager of HSE+ for their business unit, despite a corporate policy that specifically precludes such an appointment. She apparently has excellent leadership skills and has put together sound strategies and clear reports for the HSE+ team and her comprehensive

plans are greatly appreciated by the executive leadership. There is no concern that she must rely entirely on communicating highly technical, specialist advice of her professionally qualified staff. The “obvious” benefits of her leadership style are valued by those up the hierarchy and so, the benefits of the technical competence that should be associated with such a senior functional role are not missed.

The impact of this appointment on the mood of those down the hierarchy, including her own technically competent staff, is reported to be one of frustration and cynicism. HSE+ professionals who should themselves have been considered for promotion have instead been overlooked in preference of a business-minded leader with no technical background at all. This is taken by technically qualified professionals involved in HSE+ to clearly indicate that Company C’s executive leadership does not value specialist or expert input. Colin muses that the leadership actually recognises that the appointment is not in keeping with their own policies. They continue to justify the choice up to even the Board of Company C because they consider that HSE+ professionals are “not generally known” to have the necessary and appropriate skills for senior management and leadership.

#### **4.4.5 CENTRALISING OPERATIONAL SAFETY AND RISK MANAGEMENT**

The organisational charts that have been provided for the research show that the Site and Facility Managers all report directly (solid lines in Chart C) to their own Senior Manager of Technology, who is responsible for the performance of all sites and facilities related to their technology-specific processes. The Site Managers have "only" commercial responsibilities (dotted lines in Chart C) to their Regional Operations Managers. In essence, Site and Facility Managers each have a functional manager who controls their position and salary based on performance, and an operational manager who controls their budget and resources based on commercial productivity.

This structure suggests that Company C is seeking to structure Business Unit A to ensure that their senior management can perform more effectively and comply with operational standards if they focus on technology-specific requirements as a priority. Though this attempts to elevate operational excellence and technology-based efficiencies over the commercial demands for productivity and profit, there has reportedly not yet been a successfully implemented structure that has evolved, been developed or established to reflect this objective. The key issue here, as indicated by the organisational chart, seems to be that the manager to whom there is a dotted line (of commercial responsibility) has a higher status in the organisational hierarchy than the manager to whom there is the solid line (of functional accountability for technology).

Colin admits that the organisation has been trying to make this structure work for years but that it is still very difficult to manage and maintain. This is understandable, because it would be difficult to treat a responsibility for profit and loss to a General Operations Manager as secondary to a responsibility for operational performance to a Senior Technology Manager. With two clear corporate objectives, it would be reasonable to surmise that even though immediate functional accountability is indicated in the organisational chart, Site and Facility Managers effectively feel the pressure of two disparate and equal lines of accountability.

Colin's discussion of the general corporate approach (to decentralise as much management activity as possible) explains why the matrix structure that is implemented does not have adequately centralised corporate functions that work together easily. The organisation is not used to being controlled by a centralised leadership team. Various issues that have been recognised over the years as a problem related to decentralisation have been partially addressed (such as by the Technical Specialist system). However, the extent of associated problems is not fully appreciated until the new CEO commences his complete overhaul of the organisational structure.

An example of such problems of decentralisation that are being revealed is noted in a chart that has been provided by Colin during the first interview with Company C. The chart clearly shows that one Senior Technology Manager has several direct reports who are “technical support specialists”. These specialists have responsibilities for process safety, reliability, integrity and for ongoing improvements across the global operations of their technology, despite the fact that the corporate HSE+ management system and Technical Specialist process address all of these aspects of operational discipline. This Senior Technology Manager is clearly seen to be managing his responsibility for operational compliance and excellence independently of the General Manager of HSE+ of his own business unit and the corporate HSE+ group. Nor is he relying on the existing HSE+ professionals who are employed at the various facilities within his own jurisdiction.

By the time of the second and third interviews, the decentralised structure of the HSE+ function, with its related professionals, has been acknowledged as inappropriate to addressing basic operational safety performance standards. The new CEO is driving major changes, starting with redefining the role of the corporate HSE+ Manager. Discussions during Catherine's interviews are centred on the recognised issues of the old structure that require such sweeping changes to the organisational design. Due to the circumstance that the structural realignment has not been completed by the end of the research fieldwork, Catherine could not offer comment on any positive impact of these changes.

The revised role of Colin, that is now occupied by Catherine, the second interviewee, includes the primary task of developing a fully centralised operational safety and risk management function answerable to her own position. She is required to implement this function throughout Company C as a corporate priority. Effectively, Catherine is to be the functional leader of an integrated operational safety and risk group in Company C, independent of operations. She has another business focussed responsibility and still answers to the General Manager of Corporate Affairs but she is expecting to be far more effective and influential than Colin has been.

#### **4.4.6 SUPPORT FROM THE TOP**

In the first interview, when changes to the structure were being planned but had not yet been implemented, Colin spoke highly of the attitude demonstrated by the new CEO. Comments on the new CEO were also sought from Catherine in later interviews.

Colin described a non-compliance issue that had not been addressed for over a decade that came to the CEO's attention. When he queried the Facility Manager, the CEO got the same response as every other person usually got: to the effect that "it's a major capital project - several million dollars - not in this year's budget - we'll find money for it next year". The CEO's response was essentially "Yes. It is in the budget - get it done now." Colin spoke of how he then used this story whenever he spoke to recalcitrant operations managers with outstanding audit actions. "I can't say that they have to do it, but once I tell them that story, they start thinking for themselves that maybe they should [get it done]".

Colin has far less trouble getting HSE+ issues acknowledged by operations managers with such a clear example of the new CEO's attitude towards compliance to the corporate HSE+ management system. Even before the restructuring is affected, the new CEO is making sure that the entire organisation hears directly from him that just documentation and reporting are not enough to demonstrate compliance. The HSE+ management system, and the operational discipline that it requires, is to be supported and followed through with real actions. This attitude of the new CEO alone has a clear and definite impact on how Colin is able to influence others in the organisation to promote operational safety priorities.

The new CEO continues to demonstrate a proactive attitude with the fully restructured executive leadership team. He has broadened the scope of various executive functions, and almost doubled the number of Executive Managers who answer directly to him. This is to be followed up by restructuring of entire departments, including the HSE+ function: which is to then encompass nearly all operational safety and risk professionals in the one group,



answering to Catherine and collaborating with each other. The corporate management system is to also get a boost, initially with a demand for compliance with recommended actions, followed by more streamlined processes of reporting and documentation to relieve the old system of repetitive requirements to satisfy procedures and standards.

In her interviews, Catherine speaks of considerable resistance to change within the organisation with examples of several arguments and various long discussions about how so much change could possibly be necessary, let alone positive, for Company C. She also states that the new CEO has already taken this into account and has settled in for the long uphill battle that accompanies any major change. Her own mandate, supported by the CEO, involves the entire organisation at all levels from the General Managers of HSE+ down to site-based HSE+ Advisors. The most senior HSE+ management role in Company C is now one that comprises significant responsibility and status.

Catherine's position in the organisation is still two levels down from the CEO, but she has been given considerable authority over all of the operational safety and risk professionals in order to develop a coherent functional unit. Also, even after the restructuring is complete, she will have access to this additional status as an inevitable association with being a focus of the attention of the new CEO and his leadership team.

#### **4.4.7 ORGANISATIONAL DYNAMICS OF OPERATIONAL SAFETY**

There are several key dynamics that are identified in the material gathered from Company C that relate to operational safety. The preceding five sections discuss those that directly relate to the research focus of organisational salience and perceived influence. The most important finding from Company C interviews is that the organisation has limited corporate focus on operational safety activities even though the core activities of the company are highly hazardous and rely upon complex technologies. Company C's approach of promoting decentralisation has led to disparate and disjointed attempts to address operational safety issues at several levels of management without any functional integration or interaction.

The strategy and policy that are managed at the corporate level do not translate into actual operational excellence or appropriate risk management. More than one safety incident within the global operations has been related to a lack of collaboration and communication amongst operational safety specialists between and even within the various business units. There is a stated interest in addressing operational safety and discipline that is described as a building a strong safety culture, supported by comprehensive HSE+ and technical integrity chapters in the documented operations management policy and procedures. However, the

lack of clear corporate direction by commitment of associated resources has led to a chaotic mix of specialists, experts, advisors and managers scattered throughout the company, without any means of interacting with each other or any motivation to do so.

It cannot be said if the effects of an inadequate structure reflect inadequate functional leadership or if the functional leadership is inadequate because of an inadequate structure to work with. Either way, it is clear that the ultimate effect on Company C's operational safety performance does not reflect the operational excellence and discipline that are described in their operations management system as fundamental aspects of their core activities. The corporate HSE+ Manager has had too little authority and too few resources to develop or implement a coordinated approach to fulfil even the functions of assuring that operations comply with Company C's own corporate expectations for safety, let alone industry best practice in hazard and risk management.

The new leadership of Company C has since instituted a program of centralising the HSE+ function, including elements of technical expertise and risk management. This is a clear confirmation that the decentralised structure is not considered to be appropriate to integrate operational safety management or to provide the necessary, cohesive framework for operational discipline. Leadership is a significant factor with the overt and advertised commitment of the new CEO in following up issues of safety and risk with active resolution considerably raising the priority placed on operational safety management. In addition to the CEO's full support, the newly defined role of corporate HSE+ Manager has broader authority with a responsibility for pulling together HSE+ and technical safety professionals into an integrated group that is to be fully independent of the operations accountability.

It is clear that both of the interviewees consider that the decentralised structure of the company has made it difficult to coordinate efforts or effectively share information. This failing has resulted in various incidents at various times that could have been averted by better communication and collaboration amongst those responsible for technical protocols and operational discipline. This situation has been recognised as a critical issue that is being directly addressed by centralisation of a functional group for operational safety and risk that gathers together the majority of in-house technical expertise and safety experience.

It is also of note that the decentralised structure of the company allowed for a baseless and self-sustaining complacency due to both inappropriate guidance and incorrect feedback between corporate leadership and operations management with inadequate information flows. This generated a misplaced confidence in a supposedly sound corporate culture and an unrealistic claim of operational excellence, when basic expectations were not yet met.

The corporate message of a strong safety culture was supported only by the documented operations management system which was distributed throughout Company C without the adequate centralised corporate resources to ensure that it was implemented. The structure and the system also did not include any process or provision for timely, consistent and effective assurance activities that would identify gaps in compliance by the independent verification of actual operational performance against the established corporate standards.

In fact, as soon as centralised functional communication was developed under the new centralised management structure, fundamental systemic management failings were found within the routine practices of the organisation, such as with technical competency management. In this organisation, the widely recognised operations management system had actually reduced the effectiveness of HSE+ staff by providing operations and leadership a false sense of confidence that the risks and safety issues were appropriately managed.

The lack of necessary leadership could be partially attributed to this false sense of security, itself due to the superficial corporate oversight. There was no leadership focus on operational safety because there was no sense of needing such focus because neither the structure nor the management system provided clear lines of recognising non-compliances. However, there is also evidence of a lack of investment in developing and maintaining the necessary technical and professional skills that are required to fulfil or support the technical leadership roles that did exist within the organisation.

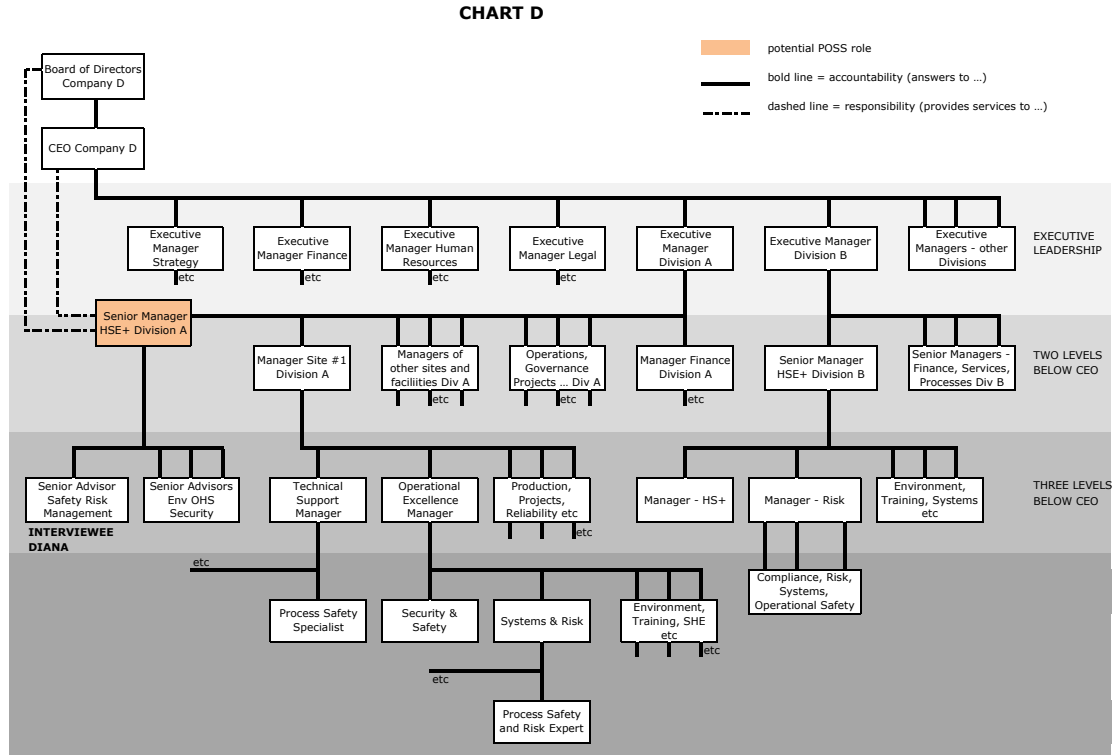
The other significant theme arising from examination of Company C's restructuring is that the leadership of Company C had valued management skills above technical expertise and there was no incentive or reward for the technical competence and specialised skills of operational safety professionals, which contributed to the lack of rigour in managing operational safety activities. It would be reasonable to surmise that the competency and credibility of both technical professionals and leaders has had a significant impact on the priority given to operational safety management in this organisation.

## **4.5 COMPANY D**

### **4.5.1 POSITIONS AND FUNCTIONS RELATED TO OPERATIONAL SAFETY**

Company D is a moderately sized organisation involved in hazardous core activities that require complex technologies and continuous processes. The organisation is divided according to its core activities with a number of Executive Managers, each responsible for the operational divisions that are associated with different core activities.

The operational divisions of Company D are identified in Chart D as Division A, Division B and so on. The other Executive Managers of Company D manage support functions such as Corporate Finance, Strategy and Human Resources. These Executive Managers all report directly to the CEO of Company D and form the executive leadership team.



Due to the hazardous nature of the core activities, there is a clear recognition within the organisation of the need for operational safety. Various technical professionals, specialists and experts throughout the organisation are specifically identified as responsible for operational safety related responsibilities. The various positions and functions address all aspects of operational safety management, including: corporate oversight; operations management system; audits and investigations; hazard and risk analysis; technical integrity and asset reliability; incident reporting and review; competency training; and monitoring of performance against corporate standards and best practice criteria.

The two principal operating divisions of Company D manage their operational safety tasks differently, each in a manner that best suits their own operations. Division B, which is considerably smaller than Division A, has a centralised functional group responsible for operational compliance throughout the division with a Senior Manager who answers to the Executive Manager of Division B.

In contrast, Division A has various small technical teams with functional leaders distributed throughout the division and fully embedded in the operating lines. These various functional

teams are each separately responsible for Technical Support, Asset Integrity, Operational Excellence and HSE for each site and facility as shown in abbreviated form in Chart D. The various functional team leaders in Division A are directly accountable to their own operational Site or Facility Managers.

The Executive Manager of Division A has, as a direct report, a Senior HSE+ Manager responsible for support of various functions, including HSE plus process safety, risk management, security and operational excellence. This functional Senior HSE+ Manager in Division A supervises only a small team of technical specialists who provide support and advice to the higher echelons of operations managers in Division A. This position is a potential POSS role and the most-likely POSS role in Company D.

At the time of the research interviews, the Senior HSE+ Manager for Division A sits on the executive leadership team of Company D. Though accountable to the operational Executive Manager of Division A (shown as a solid line in Chart D) he also has a responsibility to the CEO (shown as a dotted line) and direct access to the other Executive Managers in the organisation. However, there is no functional responsibility or accountability between this corporate level team and the functional HSE+ teams that are embedded in Division A's operating lines.

This role is therefore considered to be the closest to a POSS position by virtue of the access to authority (made available by this additional status); and due to the functional independence of the role (focussed on promoting best practice and ensuring that operational risks are appropriately managed). The role is not specialised and the functional responsibilities are quite broad: including security, environment and OHS in addition to operational safety activities. However, there are no direct commercial responsibilities related to the role that would introduce conflicting priorities. The senior functional manager in Division B, though lower in the organisational hierarchy and not on the executive leadership team, may also be a candidate for POSS as the head of a team of specialists in a similar range of functions. This was not confirmed during interviews.

The research interviewee from Company D is not either of the senior functional managers, but is a direct report. She is identified in Chart D as Diana, a Senior Advisor answering to Division A's Senior HSE+ Manager. Diana's specialist role is fully dedicated to HSE+ issues and particularly to process safety. Diana speaks of her role in the organisation as mostly reactive and as a service provider to Division A operations managers. Diana is positioned only a few levels below the CEO but she does not have any staff of her own nor any functional authority over the various professionals in HSE+, even for those involved with

operational discipline and risk management. All of the HSE+ professionals who are embedded in the operating lines and are accountable only to their various Site and Facility Managers. The scope of Diana's role and the extent of her influence are discussed in further detail in Section 4.5.2.

During the interviews, Diana speaks of her concern with how different the current model of support as a service provider is to an earlier, more proactive model within the organisation. It is of considerable interest to this research that Company D previously had the POSS-like position of Diana's boss - the Senior HSE+ Manager of Division A - as being accountable only to the CEO. This previous role as a functional Executive Manager, was responsible for HSE plus Risk Management, Operational Excellence and Security for all of Company D and was fully independent of the operating divisions. At that time, the focus was not on service provision but rather on "policing" the operating divisions. Diana notes that Division B has retained attributes of this earlier model while Division A has not. These issues and Diana's observations of these changes to the organisational dynamics are central to the research concerns. Their impacts are discussed in greater detail in Section 4.5.3.

Diana also discusses the reasons underlying the various changes to the corporate structure and management, attributing them to different approaches of executive leadership. She describes how the organisation has had several different CEOs in recent years and how each CEO has restructured the executive leadership team to suit their own vision for the organisation. Each CEO also has had different attitudes about centralised control of various functions and several critical changes have been made on the basis of these attitudes and preferences. Diana suggests that the different backgrounds and capabilities of each new CEO have had both direct and indirect consequences to the management of operational safety activities. The impacts of CEO attitudes and aptitudes on positions and functions of the senior safety professionals in Company D are considered in Section 4.5.4.

The descriptions of the different structural models and the reasons for the changes are of such interest and relevance to the central research concerns that the previous Executive HSE+ Manager was also sought out and interviewed. This second interviewee, David, is not shown on Chart D which represents the most current organisational structure. David used to be the functional Executive Manager for HSE+ in the version of the corporate structure where he answered only to the CEO of Company D. David sat on the leadership team with no accountability to any of the other Executive Managers, including those responsible for implementing HSE+ in their own operations facilities. The characteristics and issues of this older structure and the associated authorities and influence are discussed in Section 4.5.5.

#### 4.5.2 AVAILABLE AVENUES OF INFLUENCE

As shown in Chart D, Diana reports directly to the Senior HSE+ Manager in Division A. Diana has a specialist role related to risk management for both process safety and HSE issues. Diana's specialist colleagues, who also answer to her boss, provided expertise in various other fields including environmental management, occupational safety and general security. The role of this corporate level team is to support and advise the higher echelons of operational management in Division A in order to help those operational Executive Managers to both promote and ensure operational compliance. Diana describes her personal experiences of authority and influence as part of this team in the current organisational structure and this will be contrasted, in following sections, with her experience as part of the same team in the previous organisational structure.

Diana describes her current functions as a mostly reactive service to the senior operational managers in Division A. Her principal responsibilities include the development of standard operating procedures and performance measures. This involves working with the operations staff and monitoring applicable regulatory requirements to ensure that such requirements are appropriately interpreted and incorporated into Company D's operational procedures and standards. Diana's sphere of activity includes regular interactions with external regulators and with the various functional specialists on Division A's various site and facility leadership teams. Diana is also responsible for the audits of Division A sites and facilities against the corporate standards of operation and for the investigation of any serious incidents that involve her technical expertise.

Though she is several levels down in the hierarchy, Diana's role gives her access to the CEO and to the Board of Company D through reports of audit recommendations and incident investigation findings. They provide her the opportunity to foster co-operative relationships with various senior operations managers. Diana explains that nobody wants any audit reports to include negative findings that do not also include a clear plan of action that has already been agreed with her. The same motivation is useful in dealing with major incidents, which are investigated and reported on by her corporate team. Diana classifies these aspects of her role as highly effective avenues of exerting influence within the organisation that are primarily due to the considerable attention given to the audit and incident reports by both the executive leadership team and the Board of Company D.

The other critical avenue of influence available to Diana in the current structure is her responsibility for the operating standards that apply to Company D's activities. The experts in Diana's team are expected to assist in the development and implementation of corporate

standards and to interpret and provide advice on regulatory requirements and how these affect the corporate procedures. This is spoken of as another opportunity to exert influence rather than as any actual authority over the operational management system. The model of interaction that Diana describes is of specialist support and service provision to the operating line to ensure their compliance to Company D's operating standards.

#### **4.5.3 STRUCTURED CONFLICTS OF INTEREST**

Diana also discusses the role of her boss, the Senior HSE+ Manager of Division A who holds a position on the executive leadership team but is also accountable for his role to the Operations Executive Manager of Division A. This creates an ambiguity in the role: reporting to the CEO on operational performance but from a position that itself reports to the most senior operational manager. This ambiguity is identified by Diana as a source of some concern: in particular that the functional specialists employed within the corporate HSE+ team are not fully independent from the operations unit.

Diana views this dynamic as an impediment "in principle" that is currently managed well only because of the safety-conscious attitudes and technical competencies of the two key agents: the current Operations Executive Manager of Division A and his direct report, the Senior HSE+ Manager of Division A. Diana's opinion of this operational Executive Manager is of considerable interest. She says that he has quite deliberately selected a person with specific attributes to fill the Senior HSE+ Manager: someone that he expects to be able to stand their ground on any issues and challenge decisions when necessary.

Diana expresses complete confidence in the current incumbents of the two roles and, when asked if the relationship has ever been tested, replies that a mutually agreed way forward has always been found. However, it must be noted that the appointment of itself is an indicator of a major conflict of interest. The reported lack of any overt conflict is not necessarily a positive indicator, given that this Senior HSE+ Manager who is responsible to the CEO for assurance of operational compliance, owes his current position to the Operations Executive Manager.

This operational Executive Manager is accountable to the CEO for the performance of the operating division that his own subordinate, the functional Senior HSE+ Manager, has a responsibility for auditing and investigating. Without any examples available of how a conflict between these two major agents has been handled, it is not possible to qualify the integrity of their interactions. However, without reference to unprofessional behaviour or character flaws in either person, the positions alone suggest that compromise is inevitable.



It is highly unlikely that an employee could remain totally unaffected and fully independent of the expectations and priorities of their immediate boss. Diana has a specific concern that an operations manager currently controls the position and functions of her boss in clear contrast to the previous organisational structure in which only the CEO controlled this potential POSS position. Diana feels that their functional team, herself included, are too dependent on and vulnerable to the personal character traits, such as attitude and capabilities, of the individual in the role of Operations Executive Manager of Division A.

Diana substantiates this concern by describing how her own role has shifted away from assurance and proactive "policing" with quite considerable independence from the operating divisions in the previous organisational structure. The example she uses is of her involvement with operating standards.

Previously, her role had involved providing expert advice to the operating departments as they developed and implemented appropriate standard operating procedures and then Diana had ensured that those standards were met through site and facility audits. With the transfer of the HSE+ team's accountability away from the CEO and to Division A's operational Executive Manager, the responsibility for developing and documenting the operating standards is the primary expectation that has now been thrust onto the expert resources of the HSE+ team. Rather than advising on performance requirements and then auditing for compliance, Diana's role has changed to supporting and assisting the operations division to achieve and ensure compliance to their operating standards.

Though this is a subtle shift that is being justified as effective use of specialist resources, the change is significant in that the potential for clearly independent oversight of operations is compromised. The difference is more pronounced because it also reflects the change from the proactive and prominent role that the previous Executive HSE+ Manager and his team had held, in comparison to the current subordinated Senior HSE+ Manager.

#### **4.5.4 ATTITUDES AND APTITUDES OF CEOs**

The most compelling story from Company D is that there was no active decision to specifically limit the previous most-likely POSS role and its associated responsibilities. Instead, through a series of consecutive changes in personnel amongst the executive leadership team, and with seemingly reasonable and justifiable adjustments to the structure, the independence and status of this centralised operational safety function was simply abandoned. Both Diana and David discuss how the personal interest and capabilities of a series of CEOs has gradually eroded the status of the previous POSS role.

As David explains: it was several years ago when the then CEO of Company D (referred to as CEO #1) had become dissatisfied with the approach to safety management within the organisation. CEO#1 did not know what exactly the problem was, but recognised that there was a problem and brought in David to sit on her leadership team and advise her directly on issues that related to operational compliance and risk management. David was a safety professional with considerable specialist expertise and experience and CEO #1 provided him with the status and responsibility associated with any executive management position. David was tasked with addressing the shortcomings of the operations management system as far as it related to safety risks including occupational health, avoidance of personal injury, process control and major accident prevention.

David's understanding of the issues that were then bothering CEO #1 was that the management system was predominantly based on managing behaviour. This addressed only a small fraction of safety management issues and certainly didn't address the technical and organisational complexities that were inherent to Company D's hazardous industry. The operational management system required oversight that also focussed on technical detail to achieve the operational discipline that would prevent loss of control in any number of the complex technological and human processes. With the full support of CEO #1, David began to redefine the parameters by which safety was understood within the organisation. He recruited several technical and safety specialists to form a centralised functional resource for the development of safety initiatives; provision of technical expertise and advice; and assurance of operational compliance.

Unfortunately, this level of support for a highly pro-active executive HSE+ role that was shown by CEO #1 was not maintained when a new CEO was brought into Company D. The new CEO (referred to as CEO #2) was technically competent and had an adequate appreciation of safety management but he was satisfied with only a broad oversight of the various functions as adequate at the corporate level. The specific accountabilities for HSE, operational excellence, risk management and security were shifted to the operating divisions of Company D.

David retained his position on the leadership team and remained somewhat independent of the operations line, however his role and functions were limited by CEO #2. The new vision did not include a centralised approach to the management of operational safety activities and David's new function was limited to the review and monitoring of operational compliance. David's comments on the most significant limitations of this redefined role are discussed further in Section 4.5.5.

The immediate issue of relevance is that of David's frustration when the next new CEO (referred to as CEO #3) was brought into Company D. This CEO #3 also didn't support the centralised operational safety functions that David was originally brought in to develop or the idea of having an Executive HSE+ Manager that answered directly to CEO #3 leaving David with an unacceptable, nominal role. The divisional Executive Managers were given the authority and responsibility of selecting and appointing their own division-based Senior HSE+ Managers to oversee operational compliance, including operational safety.

This latest CEO #3 is not characterised as particularly opposed to a centralised safety function but is described as not having the necessary operational experience and technical credentials to want to be personally responsible for safety initiatives. His background is reported to be business management and not at all technical. He has therefore transferred the safety accountabilities to the operational Executive Managers with the justification that they are far more qualified and capable to appropriately prioritise any necessary issues and operational safety decisions that come up in their own divisions.

The long-term intention of CEO #1, in instituting a proactive centralised operational safety function led by a highly qualified safety and risk specialist, was to challenge the status quo and to ensure direct independent advice on the status and performance of the operating divisions of the organisation. Within two changes of leadership, because of the preferences of CEO #2 and the competencies of CEO #3, this function has been largely circumscribed.

The current small functional team of technical specialists now answers to the operating division and provides advice and support. Their key objective is to ensure that cooperative operational compliance is being implemented and reported to CEO #3 and the Board of Company D. The leadership choices of three consecutive CEOs have quite clearly dictated the status and influence of operational safety experts and specialists in this organisation.

#### **4.5.5 AN IDEAL POSS ROLE IN THE REAL WORLD**

Of specific and significant interest to this research is of course: how and why the ideal hypothesised optimum organisational position for a POSS, that was created by CEO #1, was so quickly abandoned. What were the organisational dynamics at work and what were the critical factors that thwarted the continued development of the centralised specialist functional team that was answerable directly through the POSS to the CEO? The research interview with David, who was in that role as it was gradually but definitively dismantled, addresses these questions. The two critical themes that are identified during these

discussions are: the extension of personal safety management systems to include operational safety; and the domination of a financial paradigm in managing risk mitigation.

In David's opinion, the major issue for Company D was when the organisation adopted a behaviour-based model for dealing with safety. The focus was on appropriate culture and awareness throughout the organisation rather than on specified operational boundaries and performance responsibilities. David notes that Company D had developed a decent enough behaviour-based approach for personal safety and had simply extended it to cover all safety management. This was done without fully appreciating that operational safety management requires technical rigour for major accident prevention, which relies on specific and comprehensive measures to maintain operational discipline and thereby process control of Company D's hazardous activities and core operations.

David identifies the source of this misunderstanding within the company culture as the definition of "responsibility". He asserts that responsibility was treated as a behaviour-based attitude instead of a clearly defined task or procedure within specific, established standards. His main point is perhaps cynical but cogent: that it is easier for companies to believe in basic behaviour-based management as a mature approach than it is for them to develop, implement and sustain comprehensive systems to ensure operational discipline.

The behaviour-based approach is generally cheaper as it simply involves oversight processes that encourage everyone to behave more responsibly. Operational safety management, on the other hand, requires a level of control of technology and processes such that every critical technical constraint and each person's responsibilities are clearly, appropriately and continuously identified, understood, implemented and monitored. Such a process cannot be purely or even predominantly behaviour-based but requires technical expertise and focus as well as investment in complex systems of management, control and continuous review.

The other critical impediment that David describes facing when working under CEO #2 and CEO #3, is that they did not themselves appreciate the value to the organisation of a pro-active and independent advocate for safety. There are limited means of demonstrating such value in the commercial paradigm of a business organisation, so no value was able to be successfully attached. Success in personal safety was fairly visible in terms of incidents and lost time but there were no valid indicators of either occupational or operational safety performance available for David to demonstrate their significance. The standard monetary cost-benefit analysis is not adequately convincing, even when applied by an experienced

specialist to understanding safety risks and appreciating the necessary measures that may be required to avoid either accidents or chronic harm.

As an example of these issues and limitations, David describes an incident several years ago which forced the evacuation of an operating site due to a loss of containment. The site was unmanned until the all-clear was given by site emergency response personnel. It was David's responsibility to investigate the causal factors of the emergency situations. At that time, David was answering to CEO #2. David identified a simple plant modification that would reduce the potential hazard and therefore also the safety risks to personnel that required full evacuation. He was able to present a clear demonstration of both the recommended hazard reduction (based on engineering design factors) and the potential risks (based on the fact of the actual incidence and its observed consequences).

The recommended plant modifications were deemed to be too expensive to implement as the proposal did not have adequate justification compared to the "do-nothing" option. David believes that the issue is in weighing up the cost of another incident requiring evacuation that "could" happen against the cost of modifying the plant which "would" happen if decided upon. There was no real concern that a loss of control could escalate beyond what had already been easily managed. So, instead of addressing the technical and material problem that triggered the site evacuation, reliance was placed on the fact that the site evacuation was well managed and that no one had in fact been harmed. The emphasis was placed on the fact that everything else had gone alright despite the simple fact that something had in fact gone wrong. David did not have the independent authority or enough influence to promote a costly fix to a known risk because the evidence was that when the event had actually happened, it had been managed without significant cost.

David's ideal position was undermined by an inappropriate behaviour-based focus of the operational management system and by inadequate personal support from CEO #2 and then from CEO #3. David's view is that, without regulatory imperatives or a threat to company reputation, a CEO's personal dedication to safety management, such as that shown by CEO #1, would have been necessary for him to have been effective in his position.

It is worth pondering whether a longer time under a supportive CEO would have adequately strengthened David's position and functions to protect against the casual restructuring of the role by new leadership or if more active measures would have been taken by the subsequent to remove that role. The fact that many CEOs do have the ultimate authority to fully restructure their organisations and to redefine their management strategies and business priorities is a key issue for this research.

#### 4.5.6 ORGANISATIONAL DYNAMICS OF OPERATIONAL SAFETY

This is of course the most important theme: that the personal attributes of a series of CEOs were the causal factors in the gradual loss of authority and independence of the HSE+ function. Even though the structure of a high-level safety function was set up to ensure direct accountability to CEO #1 and independence from the operations divisions, subsequent CEOs simply restructured the function to reflect their own business priorities and suit their personal management styles.

So, while it is clear from Diana's interviews that the organisational structure is a highly significant factor, it is also clear from David's interview that the support of the CEO is an equally or even more significant factor. In particular, a CEO has the over-riding authority to simply re-organise the management structure and the management systems either to meet their interpretation of business requirements, satisfy their own management principles, support what they consider to be organisational priorities or reflect their own attitudes.

The ultimate consequence of the change in structure is that the previously independent functional team that reviewed operating standards and monitored operations to ensure compliance are now responsible for cooperatively assisting and supporting operations to be compliant with cooperatively developed operating standards. This is compelling evidence of the difficulty of maintaining an independent oversight when there is no actual independence in the position. In the current structure, the integrity of the work all comes down to personal attributes - focus, interest, capability, credibility and ability to influence.

Diana has seen first-hand the consequences of shifting the accountability of high-level safety management from the CEO to an operations manager. There was no overt, active intent to subordinate the role of senior functional specialists and there was even some effort made to ensure that these positions were occupied by strong enough characters to challenge leadership as required.

However, in Diana's words: "Do I want to make sure that the guy who signs off on my salary increase doesn't get [into] trouble? My word [I do]." Though Diana is herself comfortable that her current boss and his current boss expect her to state her concerns without fear of personal repercussions, she understands that "her primary customer" has changed. The main issue is that, if either of those positions (the Operations Executive Manager or the Senior HSE+ Manager) in Division A are occupied by a person that is not comfortable with being challenged or with different priorities, that would impact on Diana's own position, functions and behaviour.

The material obtained from both Diana and David about the organisational dynamics of Company D include many positive indicators. These are the commitment to safety shown in the interest of the Board and executive leadership team by reviewing safety audits and incident reports; and the inclusion of several functional leaders responsible for operational safety activities in various site and facility leadership teams. There are also negative indicators such as Diana having no defined authorities and having to rely on alternative avenues of influence. There is a clear discontinuity between the broad corporate oversight and the specific operational responsibilities for safety and risk management.

The critical themes that the research identified include:

- a dependence on personal credibility and an ability to influence others to navigate some avenues of influence such as through reporting and input to operating standards;
- a conflict of interest in a senior functional role that is expected to provide assurance of operational compliance but is answerable to an operations manager, which inevitably compromises the integrity of that relationship and leaves governance vulnerable to the personal attributes of the people in those positions; and
- the impact on organisational structure of the personal choices and preferences of executive leadership: in this case the attitude, aptitude and attention of three consecutive CEOs both in creating and dismantling an operational safety function.

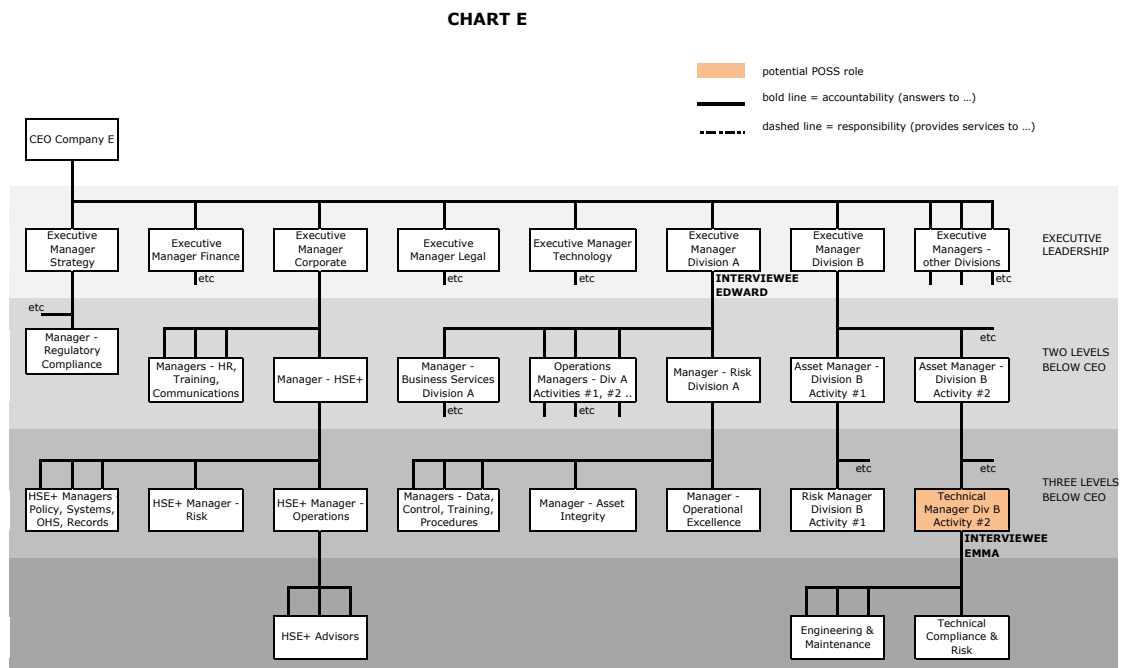
The focus of the research in Company D has been shifted from understanding the dynamics related to the current organisational structure to understanding the dynamics that had led to changes from the organisational structure that had been in place several years ago. The most significant themes highlight the importance of having a well-defined corporate management system that establishes management priorities, executive accountability and detailed standards and procedures for operations. The objective of such a system would be to ensure continuity of responsibilities that are clearly understood and prioritised above commercial imperatives which might otherwise impede or obstruct safety initiatives.

This is as much a reflection of the discussions with Diana as it is a reflection of the research hypothesis. Diana understands the central research hypothesis to mean that structured independence is important to ensure the reliable management of operational safety and risk within hazardous industry. She acknowledges that her opinions are based on how these issues resonate with her own experiences with Company D.

## 4.6 COMPANY E

### 4.6.1 POSITIONS AND FUNCTIONS RELATED TO OPERATIONAL SAFETY

Company E is a moderately sized organisation that is involved in moderately hazardous core activities. The organisation is involved in several different market sectors and is actually structured into divisions based on the different business operations related to each sector. The divisions are identified in Chart E as Division A, Division B and so on and though each division covers a specific market sector, it does so across all of the company's various core activities. These different core activities are identified in Chart E as Activity #1, #2 and so on in each of the operating business divisions. The CEO of Company E has several Executive Managers, each responsible for one of these divisions. There are also several other Executive Managers on the leadership team who are each responsible for a support activity such as Legal Support, Company Finance, Business Strategy and Corporate Functions.



It is of considerable interest to note that regulatory compliance is a corporate responsibility of the Executive Manager of Business Strategy while the Corporate Functions Executive Manager has a separate responsibility for corporate HSE+ (health, safety, environment plus quality). There is no structured functional responsibility for overall operational compliance and assurance. Instead, technical compliance, engineering and maintenance are the responsibilities of various technical teams in Division B. Division A addresses these responsibilities with two roles separately focussed on Asset Integrity and on Operational



Excellence. The position of HSE+ Manager is therefore not a potential POSS, having little involvement with the operational safety activities of the technical teams.

This broad distribution of responsibilities is similar for most of Company E's operational safety activities. Systems and training that are specifically related to HSE+ are managed in the functional group under the Executive Manager of Corporate Functions. The technical procedures and training, which are more closely related to operational safety management, are managed with the operating divisions. Division A has an operational Risk Management team covering off training and procedures for all core activities. Each of the core activities in Division B has a separate manager with different operational safety staff responsible for each: a Risk Manager for Activity #1, a Technical Manager for Activity #2 and so on.

As the various responsibilities for activities related to operational safety are broadly distributed across the leadership team and across the operating divisions, Chart E does not attempt to illustrate the organisation's fully detailed structure to identify these roles. Instead, Chart E identifies the various roles within the organisation that are considered to be related to key operational safety activities to indicate where they sit within the organisational structure of Company E in relation to the executive hierarchy. The different roles identified in Chart E shows the many different ways in which operational safety activities are managed in Company E.

The two interviewees from Company E are both people who have indicated a personal interest in the research project and have made time to be involved. The first interviewee, Emma, is the Technical Manager of the largest operating group which is Activity #2 in Division B. She would qualify as the most-likely POSS by virtue of her technical competence and for leading a specialist functional group involved in the management and assurance of technical compliance and operating risks. Though Emma's actual role is limited to only one of the core activities of Company E, she also holds a senior position on the company's Technical Committee. She is therefore involved in oversight of the whole organisation and her committee role gives her direct access to several Executive Managers as well as to the CEO. The use of formal committees to provide a functional focus and the impact on the associated influence available to Emma are discussed in Section 4.6.2.

The second interviewee, Edward, is the operational Executive Manager of Division A. Edward is able to provide insights into the executive leadership's attitude and attention to operational safety. These include various commitments and programs that promote appropriate awareness of operational safety and risk throughout the organisation. The

implications of these personal, unstructured responsibilities that are established amongst the various Executive Managers are discussed in Section 4.6.3.

#### **4.6.2 FORMAL COMMITTEES**

Emma is the manager of a technical team comprising a variety of engineering professionals responsible for the management and maintenance of Activity #2 assets. Emma describes very clear allocations of authority, based on monetary limits, that are understood by all of the various managers. In any conflict or issue between operational safety and other priorities, Emma is pleased to say that operational safety typically wins - unless the cost is beyond the designated authority of the interested manager, in which case the decision is escalated to a more senior manager. Emma believes that the attitude of the Company E and its leadership is supportive of operational safety initiatives because the inherently high risks of the core activities are well understood. She asserts that it is common for Company E to design processes with high safety margins and to operate according to industry best practice rather than to only satisfy regulatory compliance requirements.

At the time of her research interview, Emma is involved in the restructuring of her team to incorporate several other engineering staff who are about to be relocated from other teams from within Division A. She is trying to write up appropriate position descriptions for the new members of her team. This is not a very major concern to Emma who is used to a “never-ending” cycle of restructuring within the organisation “for at least the last decade”.

The organisational structure that Emma describes is one that is deliberately not expected to be fixed. It is expected to be flexible and fluid in order to allow for resources to be utilised and managed as required by the organisation. Emma describes two other employees (a lead engineer and a risk professional) who are also “transitional” at the time of the interview with their new roles yet to be defined. Apparently, there is always some part of the business that is adjusting itself to suit circumstances: either by small incremental changes or by major realignments of accountabilities and responsibilities assigned to each position. These continual structural changes have been driven by various factors, such as: leadership; regulatory requirements; the market; and the ownership of Company E.

This highly decentralised and fluid structure does not affect the assurance with which Emma speaks of her own functions in Company E. She is the leader of a significant resource with a team of technically qualified professionals responsible for the technical aspects of all assets operated as part of a core business activity in Division B, including engineering, maintenance, compliance and risk management. Also, though Emma is three levels down

from the CEO and her role is dedicated only to Activity #2, her status and influence within Company E is augmented by a position on a formal committee that is directly answerable to the Board of Company E. Her role on the technical safety committee is based on her professional experience and expertise, and not her structured position within the hierarchy.

The technical safety committee that Emma sits on, and sometimes chairs, includes the CEO, several operational Executive Managers, various senior managers and relevant subject matter experts. The committee meets regularly and the Board expects regular reports and updates on various relevant performance and industry benchmarks. It is on these committees, of which there are several, that the various specialists and experts and managers interact and coordinate their operating strategies and corporate policies. The various committees have been established by formal charter, which address issues such as Safety or Risk, and also sub-committees, to focus on specific aspects that are significant to Company E operations. There are also strategic plans to introduce links between these various committees to further coordinate and complement their centralised efforts.

The main objective of the formally established committees is to ensure high-level focus, consistency and collaboration across the organisation in the respective areas of interest. The committees operate outside of the organisational structure of Company E and this allows them to achieve a degree of continuity and centralisation in their policies, strategies and oversight that would otherwise not be possible. These committees also allow for direct interaction between powerful executives and knowledgeable technical experts. This is a direct and open line of communication that bypasses the problems of a constantly evolving, essentially decentralised organisational structure with many distinct and disconnected operational safety roles.

#### **4.6.3 INFORMAL COMMITMENTS**

Both Emma and Edward identify leadership support as a significant factor in dealing with issues of operational safety. This is in addition to the representation that safety specialists and technical experts have on committees that are dedicated to technical integrity, to safety and to risk management. Emma experiences this support as an expectation that, in any internal decision-making processes, priority will be given to those alternatives that promote safety. Emma mentions that there are good working relationships with various Senior Managers as peers, and with several Executive Managers as supporters of operating in the safest practicable way. According to Emma: in her role, the potential for harm or high-consequence incidents might keep her up at night but she has never stayed awake “worrying about the bottom line” for Company E.

This is a sentiment that is echoed by Edward who speaks of his peers on the leadership team as having a heightened awareness of the potential for harm and a shared desire to avoid it. This is explained as a result of past experiences of having lost employees in work-related accidents. Edward believes that, at least amongst the executive leadership, this has created a prevailing sense of personal responsibility to set a high standard and a clear goal for the organisation. The attitude is supported and augmented by safety incentives for the Executive Managers which reinforces that the Board of Company E is also interested in maintaining a proactive approach to managing all forms of safety for the organisation.

Edward describes various programs that are adopted by the leadership team to introduce peer pressure and peer support into executive management. He describes, as an example, that the investigation, review or follow up of various incidents, events and issues would be distributed between all of the leadership team, whether or not they are technically qualified or directly involved in the affected operating division. Edward speaks of having to answer to the Executive Manager of Legal Support on an issue within Edward's own operating division and the positive impact that such interest from a peer had had on his management of the incident. The outcome of this particular program is an increased awareness amongst the functional Executive Managers even of business support functions and an easing of the burden on the operational Executive Managers of those active divisions that are exposed to safety risks. The responsibilities for adequate executive attention to safety issues that are significant to the entire organisation and require strategic decision-making is therefore shared by the full leadership team and not borne only by operational Executive Managers.

It is clear from Emma's discussion that the personal commitment of the CEO and the Executive Managers is felt throughout the organisation as a positive and proactive attitude towards safety issues. There is no doubt in Emma's view that such leadership attention and focus have positive impacts on the influence that is available to the various technical experts and safety professionals involved in operational safety activities.

#### **4.6.4 ORGANISATIONAL DYNAMICS OF OPERATIONAL SAFETY**

As illustrated in Chart E, the organisational dynamics of Company E are not easy to interpret. There is an ongoing adjustment of various roles within the operating divisions of the organisation in an attempt to optimise the utilisation of various skills and expertise that are available. The main operating divisions themselves are not congruent with the different core activities of Company E but are instead based on different aspects of managing the business: commercial activities; asset management activities and so on. These business divisions are then further divided according to operation of different core activities. This

creates a very high degree of decentralisation in the organisational structure with various operational safety responsibilities scattered throughout, with no functional structure.

The first interviewee would be considered to be the closest role to a POSS though the position is three levels below the CEO. The most senior manager of the HSE+ function did not have any involvement at all with compliance to operational standards beyond measures taken for personal safety. His position therefore does not qualify as a potential POSS role, despite having a higher position, a functional leadership role and a specialist focus, because he has no interaction with those who have operational safety responsibilities.

Also, regulatory compliance is managed separately to operational excellence and technical compliance; and risk management is separate from asset integrity and engineering. There are no formal functional interactions amongst these various teams of specialists. The research interviews did not identify any structural component to Company E's management of safe operations. Instead they reveal that various leadership initiatives are the most significant factors in bolstering the influence of their technical experts in maintaining operational discipline and safety.

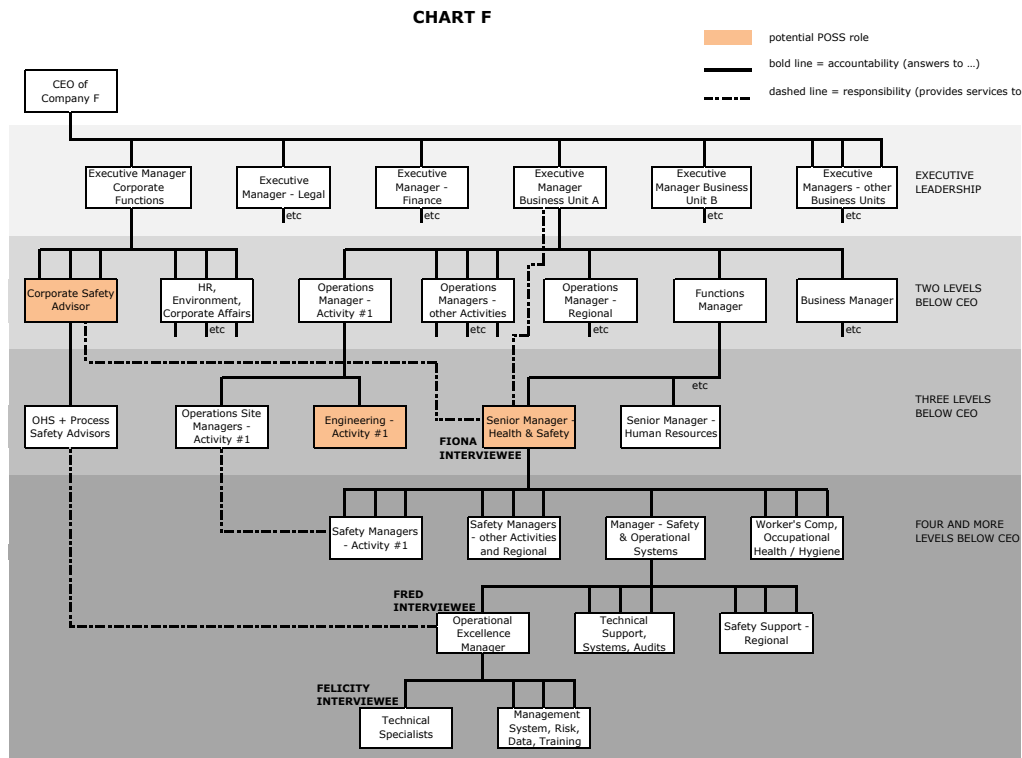
Motivated by incentives from the Board of Company E and by personal experience of losing employees in work-related accidents, the CEO and Executive Managers have instituted over-arching committees to address high-level strategic governance. These committees are each set up with formal charters and are effectively overlaid across the organisational structure gathering together whoever might bring appropriate and relevant expertise and experience to the committee. The direct access that the technical members on these formal committees have to the executives, the CEO and to the Board; and the broader functions that these technical specialists have on these committees elevate their status and influence within the organisation.

The leadership of Company E also involves itself directly with various safety issues across the entire organisation, in ways that are not limited to their own responsibilities. This also provides for direct access to high-level authority within the organisation for those technical experts and safety specialists working on investigating or following up safety incidents. Company E demonstrates that overlaid functional groups (in this case committees formalised by charter) and the direct attention from the leadership are required (and also seem adequate) to counter the limitations of a highly decentralised organisational structure in providing coherence amongst operational safety positions and functions.

## 4.7 COMPANY F

### 4.7.1 POSITIONS AND FUNCTIONS RELATED TO OPERATIONAL SAFETY

Company F is a large organisation with several business units that are involved in a range of hazardous and non-hazardous core activities. The business units in Company F operate quite independently of each other and several of these business units are involved only in core activities that are not in fact classified as hazardous. A large proportion of the sites and facilities that do involve hazardous core activities are related to one particular business unit, identified as Business Unit A in Chart F. All of the interviewees are from Business Unit A.



Company F has recently restructured the business units in response to changing product markets and economies. Adjustments are still being made, during the period of research interviews, to settle into the new configurations of business activities. New organisational charts are not yet available for the latest corporate structure of Company F; for the new operational structures of any of the various business units; or for new functional structures. The accountabilities and responsibilities presented in Chart F and discussed in this section are as described by the three research interviewees from Business Unit A, referred to as: Fiona, Fred and Felicity. Chart F illustrates the hierarchical levels of senior management and the various reporting lines that are known to these three interviewees as being related to operational safety management, including the corporate Safety and the HS functions.

The CEO of Company F has a compact executive leadership team comprising operational Executive Managers for each of the principal business units and three functional Executive Managers responsible for Finance, for Legal matters and for Corporate Functions. The operational Executive Managers are responsible and accountable for all aspects of their independently-run business units, some comprising thousands of employees. Each operational Executive Manager has their own leadership team to manage and support multiple operating sites and facilities within their business unit. The three functional Executive Managers who report directly to the CEO provide governance, support and expertise at the corporate level and have substantially smaller numbers of staff to fulfil their responsibilities.

The Executive Manager for Corporate Functions has several Senior Corporate Advisors as direct reports, one of whom is responsible for Safety, and others to manage Human Resources, Environmental issues and Corporate Affairs. The functions of the Senior Corporate Safety Advisor comprise governance of both occupational health & safety and process safety as separate groups. He has two direct reports to oversee the operational performance of Company F as related to safety and risk management. Functions include: developing corporate policy and strategies; and establishing standards and rules (both to guide safety performance and to report on that performance to the CEO and executive leadership team). The oversight of safety assurance in setting the corporate audit schedule and minimum expectations for compliance are also managed by Corporate Safety.

Though the Senior Corporate Safety Advisor is the most senior person in the organisation with oversight of operational safety and is therefore a potential POSS, he is not considered to be the best candidate for the most-likely POSS because his role is limited to governance and assurance. Each business unit is responsible for the development and implementation of its own operating procedures to comply with corporate safety requirements, including monitoring and reporting of operational data. Therefore, the safety and risk professionals are fully embedded in the business units. The technical expertise and specialist resources to manage operational safety activities are all accountable to operational lines and ultimately to the operational Executive Managers rather than to the Corporate Safety Advisor.

The three research interviewees, who are identified in Chart F, are all safety specialists from the HS function of Business Unit A, which comprises the largest proportion of hazardous core activities undertaken in Company F. The functional HS group is managed by Fiona and comprises all of the dedicated safety professionals within this operational business unit.

The group is responsible for Business Unit A's entire safety management system. So, Fiona's role is considered to be the most-likely POSS in Company F.

Fiona, as the functional manager of this specialist group, is independent of the operations lines in Business Unit A up to the leadership level. Fiona's immediate boss sits on this leadership team and answers directly to the operational Executive Manager of Business Unit A. This leadership team of Business Unit A comprises several senior operational managers (each responsible for an independent operating division of Business Unit A) and one other senior functional manager (who is responsible for Business Affairs). Fiona's boss is the senior functional manager of Support activities and he does not have any production responsibilities related to the business unit's operations. However, unlike Fiona, he has responsibilities for functions such as Human Resources which extend his management role to include some financial imperatives that are quite different to the HS function. Though he is more highly placed in the hierarchy than Fiona, he does not qualify as a potential POSS.

Fiona has responsibility for only the HS function and she also has direct access to the Executive Manager of Business Unit A as shown in Chart F. Her role includes the safety management systems; technical safety support and risk management support related to operational excellence; as well as specialist support for management of occupational HS and hygiene. Fiona has direct authority over the many safety professionals who are embedded in the various operations groups throughout Business Unit A. These site- and facility- based safety specialists work with the operating lines but do not report to their operational Site Manager. Instead, they answer directly to functional site Safety Managers who provide support and assistance to the operational Site or Facility Managers and are typically included on their site or facility leadership teams.

These site- and facility- based Safety Managers had in previously been accountable to their own operational Site or Facility Managers but recent corporate restructuring shifted their accountabilities across to Fiona as their functional HS Manager. The motivations and implications of this significant structural modification are discussed with both Fiona and with Fred, who is two levels below Fiona and is identified in Chart F as the Operational Excellence Manager. These discussions are presented in Section 4.7.2.

The major component of the work done by Fred's Operational Excellence team is to develop, maintain, improve and promote the safety and operations management systems for Business Unit A. Fred has a long history in various capacities within various business configurations of Company F over a period of a couple of decades. His current functions comprise the provision of specialised technical expertise. His functions include the



management of operational procedures, safety critical processes, risk management and mitigation, performance data collation and development of safety training content. Fred and his staff also provide specialist expertise to the Corporate Safety team for their audit program and provide technical support and advice when it is required by other functional groups such as human resources.

Only a few other safety specialists in the HS function have the experience or expertise in operational safety management that is comparable to the competencies in the Operational Excellence team. The majority of technical expertise in operational safety that is available in Business Unit A is still fully embedded in the operations divisions in the various engineering teams. These engineering teams are typically assigned to a particular operating division and sometimes to a single site or facility. Their responsibilities are to provide the necessary technical support and expertise to ensure that operational performance and compliance is maintained. The various engineering team leaders fill potential POSS roles but they do not qualify as most-likely POSSes because they each answer directly to the operations line manager responsible for their site or facility. There is no centralised engineering function nor formal interactions between the various engineering teams within Business Unit A.

Both Fred and a key member of his team, Felicity, who is the third interviewee, have long experience with the process safety and risk professionals on the engineering teams within the organisation. They both have maintained informal but regular contact with these technical colleagues and both feel that much of their influence in promoting operational safety can be credited to these interactions and their personal history with members of the engineering departments. This theme is discussed in Section 4.7.3, which considers Fred's "fundamentalist" approach. Fred's interest in developing a "safety management system that can survive restructures" is shared by Fiona. Their different perspectives on achieving such independent robustness are presented in Section 4.7.4.

#### **4.7.2 CENTRALISING HEALTH AND SAFETY**

Before the recent restructuring, the HS professionals who were based at various facilities operated by Business Unit A were accountable to a local Safety Manager who was part of the site or facility operations management team and answered directly to the operational manager of their site or facility and. This structure was found to create (and sustain) significant differences in the safety management practices, performance and maturity of different operating sites and facilities. Sites and facilities, even those that were within the same operating division, were found to have quite different approaches and attitudes to operational safety management. The principal source of these discrepancies was deemed

to be the lack of any interaction between the various safety groups, each of which was isolated at its own facility. This meant that site- and facility- based Safety Managers and their staff were easily influenced by the expectations of their immediate bosses who had their own operational priorities. The safety team's roles and responsibilities and the priority given to safety therefore differed from facility to facility, even within the same operating division. Each Safety Manager has the specific responsibility of implementing the corporate safety policy and assuring that operations at their site or facility comply with the business unit's safety management system. The previous structure was recognised to have left the Safety Managers disconnected from functional peers and therefore vulnerable to pressure from their operational managers in terms of how corporate standards were interpreted. This had been observed to affect how hazards and risks were recognised and assessed; how procedures were implemented; what risk mitigation strategies were selected; and even what performance data and critical activities were monitored, recorded and reported.

Fred, with the broader perspective of his position as Operations Excellence Manager for the whole of Business Unit A, placed the shortcomings of this variability and vulnerability fully on the organisational structure. "Of course, they would want to do what their own boss wants them to ... there was just no consistency." It was an informed and considered decision by executive leadership that the management of the HS function could be better managed in Business Unit A if the HS function was fully centralised. This was implemented for the functional HS group at the same time that Business Unit A was restructured with a new operational configuration of core activities. The currently centralised HS function is expected to be more effective in promoting HS priorities consistently across the various sites and facilities to meet common best practice standards within Business Unit A.

The implications of the restructuring of the HS function have been felt fairly quickly with several significant benefits to the organisation. First and foremost is the ability to provide consistent advice and support to Facility Operations Managers. There will be ongoing development and tailoring of safety procedures to suit the specific requirements of each facility but the minimum standards that are implemented and the level of priority that is given to safety by any site-based safety professionals has to satisfy only one HS Manager.

A second, and much sought after, outcome is the freedom to use necessary specialist resources wherever they are required. If any facility has need of additional support, safety resources can be reassigned. Facilities that are well advanced in their safety management can be appropriately managed with fewer safety specialists. This frees up specialist safety resources for Facility Operations Managers who are still struggling to establish mature

safety behaviours. These facilities can then be allocated more technical or safety staff; relevantly trained specialists; or more experienced Safety Managers.

Thirdly, the centralised function provides opportunity for overall competency management. This is expected to ultimately be the most valuable outcome. Fiona estimates that only about 10% to 15% of her safety professionals have any clear understanding of operational safety risks and management strategies. They are mostly occupational HS specialists and have not necessarily had any exposure to process safety, risk management or major accident avoidance in their on-site work. The restructuring of the HS professionals into an independent functional group is expected to facilitate the training and ongoing development of all HS professionals both through formal competency assessment and extension programs; and through regular casual interaction with the group's operational safety experts. Fiona is confident that fostering such learning amongst all of the HS team will ensure that both occupational and operational safety issues will be more widely understood and therefore will be better managed.

The new structure enhances Fiona's own influence by greatly increasing her management responsibilities. The new structure also improves the functional influence of site-based safety professionals by providing them independence from their local operations managers with a separate functional manager to support their HS roles and responsibilities. Fiona considers that the greatest benefit is that the new structure allows for competency management and career development to be centralised and for experience and learning opportunities to be shared amongst HS personnel. This is hoped to greatly increase the value and effectiveness of all of the HS professionals in Business Unit A by ensuring that there is a baseline for their understanding of operational safety issues.

#### **4.7.3 FUNDAMENTALS THAT MATTER**

The other theme of considerable interest to this research is the perspective that both Fred and Felicity bring to their roles in the Operational Excellence team, from their personal experience with the engineering teams in Business Unit A. Every facility that is involved in hazardous core activities is supported by process safety expertise with local engineering teams. These departments comprise technically qualified experts with specialist training in risk management who provide support to maintain the operational discipline for core activities. Fred and Felicity are such experts themselves and had previously held positions in such operational engineering teams. Their direct experience with safety critical processes now shape the strategies that are in place for assuring operational safety and discipline across Business Unit A.

Fred's approach to managing operational safety is twofold. Firstly, that the focus has to be on the fundamentals and secondly, that those fundamentals have to matter to the people responsible for them. The value of site-based technical support is presented as a clear example of making the fundamentals matter. Operational safety requires operational discipline and relies on the appropriate control of critical items at all times. When technical expertise is directly available to support operators, the more direct interaction leads to better understanding of the operations.

Fred explains that the operators are not just trained to carry out their tasks according to procedure but are also shown by site-based engineers to recognise how aspects of their work could lead to accident events. They are taught to understand what controls are in place that can manage or mitigate those risks. Such information is fundamental to process engineering but, because it is complex and technical, it often needs to be explained to managers or operators. It is not considered to be adequate that operators simply read up a procedure or attend a training session and are then expected to comprehend the significance of operational discipline.

Though standards are typically documented, Fred believes that a story which connects a person to an event and a location has better impact and reinforces the reality of operational risk and its control. Such learning is effectively delivered as operators go about their tasks of managing and monitoring various operations and equipment. It is continually reinforced through regular and open communication between the people who understand the technology and the people who operate the technology.

A similar synergy is provided by Fred's regular informal interactions with the site-based engineers. These forums are also used to share experiences and stories. Special and interesting projects are presented; common issues and concerns are discussed; and the younger engineers are encouraged to report on their work at casual gatherings. The strong network and professional camaraderie amongst the technical specialists in the organisation provide a sense of community for professionals who would otherwise have very little opportunity to interact with each other. Fred asserts that such familiarity and the regularity of casual interactions with the engineers extends his ability to promote operational safety within Business Unit A.

Fred applies a "bottom-up" approach as much as possible in the development of the management systems for operational excellence, and for risk identification and control. He does not believe that a system for operational safety and discipline should simply be imposed from above. Senior management might set strategy and provide motivation,

support and resources. However, even though such factors greatly facilitate progress, actually maintaining operational control relies on the operators and how much they want to get the fundamentals right. The other benefit that Fred hopes to achieve by grounding operational discipline in the fundamentals of actual operations is that the system is not affected by the constant shuffling of executive management or the restructuring of the business for external or commercial reasons.

#### **4.7.4 HOW A SYSTEM CAN SURVIVE RESTRUCTURING**

During his long career, Fred has seen a lot of corporate restructuring: to meet market conditions; to suit business strategies; and to incorporate new product lines. He has had direct experience of the impact that such changes can have on safety and risk management systems and on staff attitudes to safety at all levels of the organisation. His perspective is that an operational safety management system that is grounded in the actual operations and activities of a business is less likely to be adversely affected by the fluidity of corporate structures. If that system is also designed to be simple and consistent across all operations and activities, senior managers who are shuffled from role to role in the higher echelons, would not need to keep redefining or adjusting protocols and procedures to suit their personal preferences or management styles.

Fiona's experience also leads her to focus on simplicity and consistency in the management of safety and risk, because she has seen oversight and management systems that overwhelm operations groups. Systems that prioritise the documentation of operating standards and performance over the actual management of operations and controls are observed to emphasise the wrong priorities. Her perspective is that an operational safety management system has to reflect the actual priorities within the operating tasks and not waste effort on administration that can be better used on observation and improvement. If the priority of the management system is firstly on ensuring appropriate outcomes of tasks, and secondly on ensuring correct documentation of tasks, more efficiencies will be gained, along with wider recognition of the value of using the system. It is expected that this will consolidate reputation of the operational safety management system across Company F.

As an example, Fiona describes her current project for combining the various audits undertaken at each site or facility. Operating facilities are required to undertake operational audits and also to be audited by environmental, safety and quality specialists at both the business unit and corporate levels. Fiona believes that the amount of time and attention that is demanded of the operations group to satisfy these various management systems is completely unnecessary. She suggests that if the focus is kept on what is actually needed

by Site or Facility Managers for operational compliance to be confirmed and possibly for practices to be improved, then operations would not be burdened by multiple audits without coordination amongst the different functional groups.

Fiona's concern is that corporate oversight functions should not each be judged by its own performance like the independent operating Business Units. If there is common focus on the efficiency of operations, a single co-ordinated audit of each facility would take less time and would also provide the different functional groups a combined forum with each Facility Operations Manager so that various recommendations and follow up actions can be discussed and prioritised – perhaps even be consolidated. Fiona expects that such a process would be both welcomed and appreciated by operations as a productive audit and a valuable tool, rather than the burden that multiple functional audits currently present.

These perspectives are of considerable interest to this research, in that they perceive a vulnerability of operational safety management to structural dynamics that are seen to predominantly affect leadership and senior management. The strategy discussed in order to maintain operational discipline then requires that the operational safety system remains independent of the political or business priorities and variable attitudes of leadership, as much as needs to be independent of the production priorities and commercial limitations of operations. Both Fiona and Fred, with quite different backgrounds and at different levels of the organisational hierarchy, believe that this can be achieved by demonstrating the inherent value of operational safety.

A simple success story is described by Felicity, the third interviewee. A human factors manual has been developed and distributed - but not enforced - by the Operational Excellence group. It was not initially given much attention but after some cost savings were demonstrated it gained a reputation and more and more operational managers themselves took interest. Though this process took several years, the manual is now a common reference document that does not require promotion or enforcement as it is recognised to be of inherent value. All three of the interviewees consider such success to have garnered the Operational Excellence team considerable influence with the operational lines.

Neither Fred nor Fiona dismiss the value of corporate leadership and the support of senior management. Strong leadership is considered by both to be essential to establishing the goal of safe operations as an organisational value with active encouragement of middle management being required to prioritise health and safety in order to ensure that adequate resources are available. However, Fred suggests that the “top-down” motivation tends to predominantly be through the fear of regulatory, commercial and personal consequences

and that this does not - in fact, cannot – be effective for operational safety management. There is too much variability in interpretation and a continuous shift in priorities if individual leaders are relied upon to be the sole motivators of operational safety performance.

A better strategy is therefore to focus on developing operational safety activities and processes that consistently and credibly support the operations groups. Such processes can be designed to help in achieving corporate expectations of operational discipline and control while also demonstrating that this can be done without compromising the common goal of commercial viability.

The costs and demands of safety management systems can be managed if technical specialists are entrusted to maintain critical operational discipline and integrity and to protect both risk mitigation and major accident controls. Technical specialists could and would recognise how to use limited resources most efficiently in the suggested scenario of a business in survival mode instead of profit mode.

The three interviewees from Business Unit A of Company F all believe that the HS function can avoid a conflict between: corporate governance and assurance of operational safety; and the operations priorities of commercial and production goals if the safety management system is dependent on neither but is responsive to both.

#### **4.7.5 ORGANISATIONAL DYNAMICS OF OPERATIONAL SAFETY**

The insights and perspectives shared by the interviewees about organisational structure and the exercise of influence in promoting operational safety in a hazardous industry are thoughtfully considered and coherent. Their opinions are based on many years of experience in the operational safety activities of various operating divisions in several configurations of both Business Unit A and Company F. These three interviewees provide a very positive indication of the conscientious attitudes of the various operating divisions of Business Unit A, at all levels of the hierarchy.

Chart F shows that the positions of the interviewees range from three to six levels of hierarchy below the CEO. None of the interviewees have direct access to the CEO but they all have regular interactions with the higher echelons of the corporate structure: Fiona with the Executive Manager of their own Business Unit A; and Fred and Felicity with the Corporate Safety team. Their influence at these levels is based on their roles and responsibilities within the organisation, which are themselves based on proven technical competence and credibility.

The various discussions clearly showed that these three people are dedicated to operational safety and are committed to developing themselves and educating others in the necessary skill sets for safety and risk management. Their preferred strategies for influencing others is to engage and enlighten, taking advantage of people's natural interests and motivations to build connections and encourage development towards more appropriate operational safety behaviours. They also rely on demonstrating the inherent value of operational discipline and on identifying and promoting a common purpose between senior management, functional teams and operating lines for maintaining commercial viability and promoting business growth by operating safely.

The key themes discussed above are significant to the research issues in that:

- there is a sense that corporate structure is constantly being adjusted to suit commercial priorities and business imperatives, and this can leave the management of operational safety unnecessarily vulnerable to the politics and personalities of executive leadership even though core business activities (and assets) are not changed;
- the decentralised organisational structure is recognised as hindering progress in managing safety and has been rearranged to ensure independence and integration for safety professionals by creating a functional HS group to focus on safety priorities; and
- the principal sources of influence that are recognised are firstly: personal credibility and competence (enhanced by regular interaction with professional peers), and secondly: open communication of knowledge and experience between operators, experts, managers and senior executives with an ultimate objective of engaging and educating all staff to work towards common goals.

It is of considerable significance that the greatest impediment identified by these three interviewees is that too few operators, managers, executives and even safety specialists clearly understand the concepts of operational safety and risk control. They each believe that their influence is greatest with the people who have the background and mindset to imagine, acknowledge and discuss potential hazards. The need for consensus at any level is not raised as an issue. Fiona particularly states that she greatly prefers the outcomes of debating issues with an operational manager who takes an interest, than of advising an operational manager who treats the process “as a box-ticking exercise”. The benefit of engagement with the priorities and problems at hand is greater even though a manager might hold a different viewpoint, than a lack of interest or misunderstanding of the issues.



The insights gained from Company F suggest that several organisational factors affect the influence of technical experts and safety specialists within a large and complex group. Corporate structure is confirmed as the most significant factor but also the most unreliable because experience has shown that organisational design is too readily changed to optimise commercial business objectives and to reflect the attitude of leadership, particularly the CEO. Personal competence, attitude and commitment are also highly significant factors in how much influence is available to technical safety professionals and these are actually established as competency and training goals within the HS function.

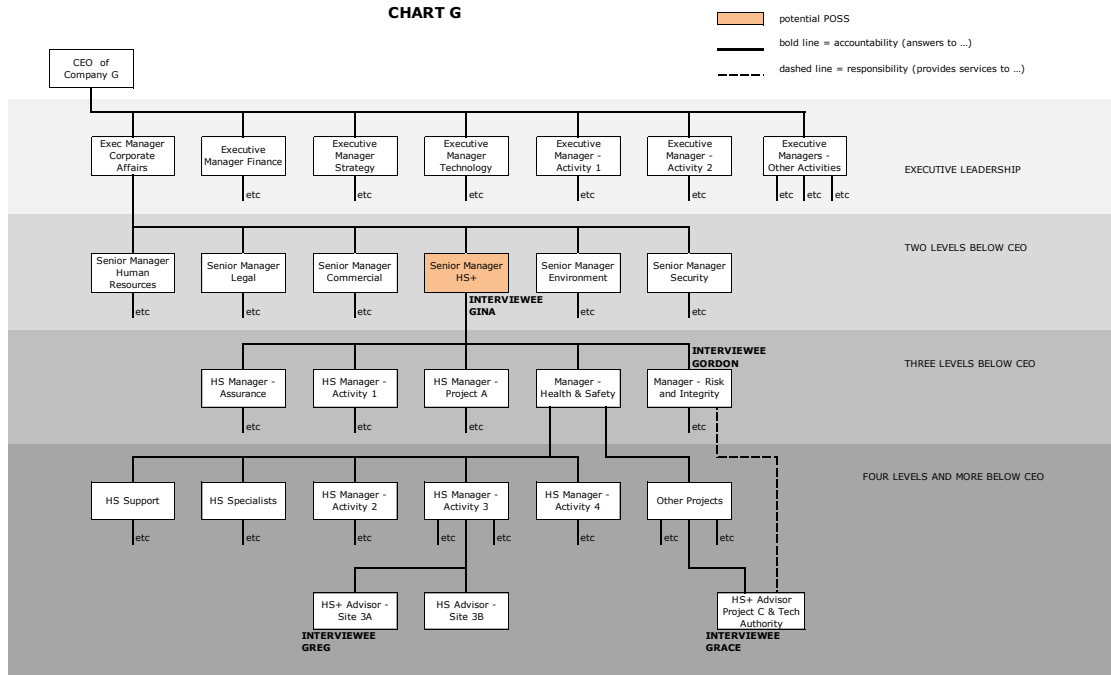
There is considerable interest in the value of a robust but flexible management system that can be independent of operational pressures and remain unaffected by the overwhelming impacts of organisational restructuring and the personal motivations of leaders and managers. Education and engagement are considered to be the most critical aspects of establishing a robust operational safety management system: one that can remain protected from interference by either an executive leadership with no understanding of operational safety; or operational management with production or commercial priorities.

## **4.8 COMPANY G**

### **4.8.1 POSITIONS AND FUNCTIONS RELATED TO OPERATIONAL SAFETY**

Company G is the local division of a large multi-national organisation which is involved in a range of high hazard core activities that involve complex technological processes. The organisational structure of Company G is highly decentralised with major facilities and major projects separately managed on the basis of different core activities. The entirety of the organisational structure of Company G, which is only the Australian branch of a global organisation, is not provided or discussed in any detail as it is simply too large and complex. Chart G simply illustrates the known functional structure of the HS+ group, placing it in relation to the executive leadership, instead of attempting to define and represent the large variety of unspecified relationships within the organisational hierarchy.

The CEO of Company G has several operational Executive Managers, each accountable for sites, facilities and operations related to their particular activity. There are also several functional Executive Managers who are part of the executive leadership team, responsible for each of Technology, Strategy, Finance and Corporate Affairs. As shown in Chart G, the Executive Manager of Corporate Affairs has six direct reports. These Senior functional Managers are responsible for diverse supporting groups, including: HS+, Human Resources, Environmental, Legal, Security and Commercial.



The Senior Manager of HS+ leads a fully centralised functional group and is responsible for Health and Safety, plus Technical Risk and Integrity. The Senior Manager of HS+ is referred to as Gina in Chart G. She holds the most-likely POSS role in Company G because she is the highest placed technically competent safety specialist. Though the Executive Manager of Corporate Affairs is closer to the CEO as his direct report, he does not qualify as a potential POSS due to responsibilities such as Commercial and Legal support, that would introduce potentially competing priorities other than operational safety.

Gina affirms that, though she is directly accountable to the Executive Manager of Corporate Affairs, there is an informal understanding that Gina can bypass her immediate boss and liaise directly with the CEO when required. This is due to existing personal relationships that are also a vestige of the previous structure, in which there was an Executive Manager of HS+ who answered directly to the CEO instead of through an intermediary. While Gina advises that there are valid reasons for reducing the number of direct reports that the CEO should manage, there are broader implications of this change to the executive structure. The potential for impact on the HS+ function is discussed in Section 4.8.2.

Gina herself leads the HS+ function with several senior direct reports. As shown in Chart G, another interviewee from Company G is the Manager of Risk and Integrity, who is referred to as Gordon and is responsible for operational risk and technical integrity. These aspects of safety are clearly differentiated from the occupational health and safety issues that are managed by the HS Manager. There are also several other HS managers at this level of the

functional hierarchy, including for Major Project A and a significant Activity #1. There is also a manager for assurance (dealing solely with compliance to standards and regulations) and an internal auditor. This auditor is embedded in Gina's leadership team but is actually not accountable to Gina, instead reporting beyond Gina to the executive leadership team to provide regular independent review of the performance of the HS+ group.

There are over one hundred or so HS+ professionals, many of whom are embedded in the operating lines and who work with line managers, typically on their leadership teams. These HS+ staff are responsible for their daily activities to their operational managers at various levels of the operational hierarchy. They each report directly to a functional HS+ supervisor and are ultimately accountable to Gina as the Senior Manager of HS+ function. Gina speaks of this as "being hard-wired" back to HS+ for their "pay and rations" meaning that the HS+ staff are employed only by HS+. The functional HS+ leadership therefore: determines their position, performance and priorities; and guides their professional development within the organisation. This is a very strong lateral overlay of HS+ across operations lines, as an alternative accountability that establishes a matrix dynamic, as discussed in Section 4.8.3.

There are a multitude of complex, layered relationships between the operating lines and the operational safety professionals who comprise the small Risk and Integrity group within the HS+ function. The key interactions are with technical experts, who are embedded in operations (predominantly in various engineering teams) and provide specialist advice and support within the operating lines of the organisation. There are many such technical professionals who contribute significantly to operational safety matters though they are not integrated with the HS+ function.

The operations-based technical specialists actually comprise the majority of the Technical Authorities who work on risk and safety within Company G and there is some interaction with the centralised HS+ group of engineers and risk experts in Gordon's Risk and Integrity team. The comprehensive system of Technical and Engineering Authorities, that is being implemented by Company G, utilises the concept of process custodians for technical assets with designated sponsors to whom operational issues can be escalated for the attention of senior safety and risk engineers.

The HS+ professionals also have a specific functional authority to issue a prohibition notice against operating activities and decisions. Though this rarely gets used, the authority itself allows embedded HS+ staff to feel more empowered to engage in difficult conversations about competing priorities with their line managers. The recommendation from Gina is for HS+ staff to remember to use their option to "talk to my boss". HS+ professionals are

encouraged to elevate any issues of doubt or of conflict up along the functional line rather than give way to operational managers on safety priorities. The uses of both the technical and functional authorities is discussed in Section 4.8.4, including a particularly interesting example of the inherent limitations of such authority in operational decision-making.

The critical purpose of the HS+ function, in having the authority to establish the roles and responsibilities of each HS+ member who is embedded in the operating lines, is to ensure that there is no expectation of a “master-servant” relationship. Gina considers that it is crucial that the embedded HS+ professionals have the interpersonal skills to have a peer-to-peer relationship with their line managers and to be able to challenge them. Gina’s greatest concern, developed over many years of safety experience in various roles, is that, for any safety professional role, “you need to do your job like you don’t need it” at every level of the hierarchy including her own senior position. The issues that this attitude addresses and the implications for the POSS role are discussed in Section 4.8.5.

#### **4.8.2 LOSS OF ACCESS AND STATUS**

The structure of the executive leadership in Company G is described by Gina as fairly new, having recently been changed by the CEO. In the previous structure, each of the many senior functional managers were reporting directly to the CEO as executive managers, including an Executive Manager of the HS+ function. The current CEO’s predecessor specifically chose to have an executive leadership position for a HS+ function and had installed a highly experienced professional (reportedly about 30 years in industry) who reported directly to the CEO. This executive role was potentially a POSS role in terms of all three characteristics: technical competence, functional independence and direct access to the CEO’s authority. The HS+ Executive Manager position was filled for almost four years.

Gina recounts that the current CEO, soon after starting at Company G, decided that there were too many direct reports for him to manage effectively. He reorganised the executive structure to reduce the number of Executive Managers. The various functional executives were all bundled up into a Corporate Affairs group headed by a single Executive Manager reporting to the CEO and accountable for all of these groups. These functions range from Human Resources to HS+ and include Commercial and Legal support functions. There is no expectation that the Executive Manager of Corporate Affairs has skills or competencies in all of these specialist functions to be a technically proficient representative.

The critical impact for operational safety management in Company G is that there is no longer a HS+ professional on the executive leadership team who has the appropriate

experience and necessary appreciation of safety issues to advocate for critical safety priorities. The broader implication is an effective demotion of the entire HS+ function. Gina does not expect that the impact of the restructured executive leadership team will be fully understood for some time. Currently, the Executive Manager of Corporate Affairs and the CEO are comfortable with Gina having direct access to the CEO whenever Gina considers that such access is required. Gina is quite comfortable to use this access and to reassure the HS+ team that they still have the attention of the CEO if and when the need arises.

Gina is however also aware that these informal arrangements rely upon the personalities and existing relationships of herself, her immediate boss and the CEO. It should be noted here that Gina does not speak of having, or using, similar access to the other Executive Managers who were the peers of her predecessor on the executive leadership team. Though there may be some disadvantage in having reduced access to the CEO that is addressed by the informal arrangements, Gina has also lost regular access to the operational Executive Managers who are responsible for much of the high-level strategic and operational decision-making in Company G.

Gina expects that there will be a long-term impact of the HS+ function being represented at the leadership level by an executive without HS+ credentials. Gina discusses the benefits and challenges of having technical specialists such as HS+ professionals in executive leadership. She identifies a general lack of effectiveness in using “boardroom language”. While Gina is comfortable with her own ability to interact meaningfully at the executive level and “speak the language” that is necessary to communicate her views, she recognises that she has limitations in business skills. Gina anticipates considerable benefits of a more competent executive being found to fill her role.

It is interesting to note that that Gina clearly supports the inclusion of an executive representative who is well-versed in corporate communication, provided that the executive fairly represents issues based on the technical expertise and advice available to them. She asserts that she is interested to see if HS+ issues are successfully “translated” so that other executives can understand them but is uncertain as to whether or not “translation” will balance the loss of specialist knowledge and appreciation.

Gina considers that it might be worse for HS+ priorities to be poorly represented by a clumsy specialist who has no business acumen than to be well represented by an adept executive who has no HS+ competencies. Gina’s observations are discussed in further detail in Section 4.8.5.

The other aspect of the executive restructuring that is of concern to Gina is how the rest of the organisation interprets the simple fact that the status of the HS+ function (and also perhaps the importance of associated responsibilities) has been demoted from being of direct interest to the CEO to just one of several support functions. There is considerable feedback that is yet to be gathered from HS+ staff but Gina wants to evaluate if the impacts of the lower hierarchical status have affected HS+ influence on decision-making.

#### **4.8.3 NEED FOR VISIBILITY AND ATTENTION**

The role of the HS+ staff who are on operations teams is to ensure compliance to safety standards and corporate expectations. Gina is determined that, in fulfilling their roles, her HS+ staff avoid any sense of subordinate service to their operational managers. The purpose of their independent accountability is to clearly indicate the existence of an authority that is separate from their operational managers'. She considers that her own assessment of HS+ staff performances will be lower if their operational managers are too happy with their agreeability and cooperation. She would prefer to receive some complaints from operating lines that her HS+ staff are intractable or "not team players".

As with other dual obligations, reporting to a separate functional group while embedded in operating lines can have both positive and negative impacts on the day-to-day experience of HS+ staff. On the one hand, there is a sense of separation: from the operations team because accountability is to the functional manager; and from the functional team because responsibility and daily contact is with the operating line. On the other hand, there is also a sense of belonging: to the operations team in being part of their daily communal experience; and to the functional team, by having connections beyond immediate colleagues to a source of professional and independent support.

Greg, who is shown in Chart G as an HS+ Advisor at a particular facility, discusses his HS+ role during the interview and considers his view of operational safety management in Company G. Interestingly, his focus is predominantly local and discussions are mostly about his experiences and observations with the operations managers and on the operating lines in which he is embedded. Greg's main concern with fulfilling his HS+ role is with the continued and persistent lack of understanding of operational safety and risk mitigation activities, even amongst various operational managers and the facility leadership team. A particular problem is how the key performance indicators (or KPI) of operational safety can be misunderstood, mismanaged or manipulated. Incorrect and inaccurate KPI can provide an inappropriate sense of security or complacency and preclude any clear understanding of the underlying risks and their potential for harmful consequences.

Greg describes a particular example to illustrate the gravity of this issue. A critical aspect of operational discipline for pressure vessel integrity is the adequate scheduling of ongoing maintenance. In a recent review of pressure vessels at the site, it had been discovered that some of the pressure vessels (less than 5%) were not actually identified in the principal asset register and were therefore not on the routine maintenance schedule. Greg is concerned that the KPI (over 95%) suggests excellent implementation of the maintenance, when it is actually a major omission and a serious issue that any safety-critical plant and equipment is not appropriately identified within the system and may therefore not be maintained.

The implications of this review are significant. Firstly, an identification mistake of even a small percentage of hundreds and hundreds of any item still equates to a number that have been missed. Greg estimates that a dozen pressure vessels were not recorded on the register. Secondly, if any pressure vessel has not been identified on the asset register, there is no assurance that it has ever been maintained and no record that it has even been checked as rigorously as required for safety critical equipment and plant. In terms of common operational discipline, this review indicates a major failure of the asset integrity management system. The seriousness of this mistake is not conveyed the managers with limited appreciation of operational safety. A KPI of over 95% even suggests excellence.

Greg is even more concerned that operational safety is not properly managed because of the use of KPI. He describes more instances of KPI figures reflecting facts incorrectly and suggests that KPIs are naturally higher if inspections that are meant to identify errors are not in fact planned or carried out. Having the minimum suite of performance standards provides a better outcome for the Site Manager to report on than what may have to be reports if the facility was thoroughly inspected and reviewed. Greg advises that there is a long-standing approval for a major safety review at his site that has been consistently stalled by the Site Manager. When asked about escalation of the issue to more senior levels, Greg explains that the necessary funds for the work have been allocated and approved at the higher levels of the organisation but the Site Manager simply will not sign over the funds. At the site level, no HS+ staff have a budget or even any financial authority.

Greg is dealing with an operational manager who does not heed the authority of his own operational manager's approval of the safety review. So, Greg's concern is less about his influence or access to higher authority, and more about the Site Manager who clearly does not understand operational safety. There is an inability to recognise that the engineering review by Technical Authorities is a means of ensuring that safety critical plant and equipment at this older facility are properly maintained. This is a significant obstacle to the

actual remedial and maintenance work that is necessary. Greg argues that attempting to represent complex issues of operational discipline with simplistic and inappropriately defined KPI. Attempts to explain issues around such KPI become a distraction that diverts attention and resources away from the work that is essential for actual operational safety.

#### **4.8.4 USES OF TECHNICAL AND FUNCTIONAL AUTHORITY**

Another of the interviewees is Grace who is a safety and risk engineer. She is shown in Chart G as a direct report of the Manager of Risk and Integrity within the HS+ function. Grace is also a nominated Technical Authority and has many engineering peers outside the HS+ group. The number of HS+ professionals who are involved in managing operational safety is quite a small group in Risk and Integrity. They are embedded in operating lines and predominantly deal with the many risk engineers and specialists who are themselves accountable to operational managers and scattered throughout Company G.

Grace speaks of the engineering discipline as highly fragmented and not well integrated even though the system for engineering risk management is coherent and well established. This system involves operational managers calling on Technical Authorities to address process and operational safety risks and provide advice and guidance on how work should proceed. The role of Technical Authorities is to review operating processes and recommend appropriate measures that mitigate identified risks.

Grace considers that this system functions well, but works far better when operational managers themselves recognise the potential risks and appreciate the possible severity of the consequences. Such informed operations managers ask for input from Technical Authorities in a timely manner. Grace's experience is that most operational managers will only recognise a problem when it has become an issue that stops or delays work. The Technical Authority response is therefore typically reactive and unplanned, becoming both time-critical and under operational production pressure.

Grace suggests that safety risk engineers have a reputation – or rather a stigma - of causing more problems than they solve because safety recommendations almost inevitably require measures to be implemented before work can proceed, and also generate additional costs. There is evidence of significant savings that have been achieved by safety risk engineers who are able to address risks with appropriately tailored, planned measures for operational safety issues. Such proactive attention can reduce generalised safety requirements that may be unnecessarily costly. However, the Technical Authorities are yet to be recognised as



adding value to operations. Grace looks forward to one day being considered “part of the team” when she is managing and communicating risk and operational safety priorities.

Grace is required to sustain a high degree of self-motivation and purpose to fulfil her role as a Technical Authority and a Risk and Integrity Advisor who is fully embedded in operations. Grace’s view also matches Greg’s experience as an HS+ professional embedded in the operating lines of a large corporation. The experience of the fourth interviewee Gordon, who is Grace’s immediate boss are similar, even though he is quite senior within the HS+ function and reports directly to Gina.

During his interview, Gordon describes an incident where the burden of responsibility for balancing safety and production was handed to him by his operational manager who was insisting that he was open to being guided by Gordon’s technical expertise. Gordon does not understand why he himself did not prioritise safety in this particular situation. This incident related to the discovery of highly advanced CUI (corrosion under insulation) being discovered at a Company G facility. The CUI was identified during routine checks of several sections of pipework and is a significant indicator of a high potential for failure. The elevated risk associated with the discovery is that corrosion is observed to actually be affecting the integrity of the pipework through which hazardous materials flow.

Basic maintenance involves lifting insulating material off sections of pipework to visually confirm that pipework is not corroded. When even minor corrosion is found, there needs to be systematic identification, inspection, monitoring and eventual replacement of affected pipework that must be planned, scheduled and undertaken as a matter of routine practice. In terms of operational safety, discovery of multiple areas of advanced CUI is indicative of an important preventative measure that has not been successfully or reliably implemented.

In accordance with the system of managing risks within the organisation, this matter was addressed by Technical Authorities as a deviation from acceptable practice. Requirements were put in place for “draconian” remedial measures to replace the corroded pipework that had been identified which required areas of the facility to be shut down for several days. The question then became how much of the remaining pipework was to be checked before starting up normal operations again. At the time (which was in the middle of the night) Gordon knew that a comprehensive check for CUI should be carried out throughout the facility before restarting operations. However, when the Facility Manager was asking the incident team to discuss their opinions, Gordon found himself unable to articulate the obvious threat of advanced CUI in the unchecked pipework. He feels that he did not respond as he should have when the Facility Manager assured him that “I’ll keep it shut

down if you tell me to.” Though given a clear opportunity and invited to offer his opinion to affect the decision-making, Gordon did not insist that operations should not restart.

As it happened, Gordon was relieved of having to change this advice because the next day, other engineering specialists that came on site, challenged the decision to restart the plant. Gordon admits that to this day, he does not understand why he himself did not speak up to say “no” when the Facility Manager asked if he could restart operations. Without deeper investigation, it is only possible to speculate. One possibility is that Gordon was actually responding to unspoken pressure. The late-at-night forum of the response team, without recourse to other independent advice, suggests considerable urgency. The other issue is how the Facility Manager’s request was framed: in terms of whether production should remain shut down. If the question had been whether it was safe to continue operations with as yet unknown and unidentified potentially advance CUI, Gordon may have said “no”.

This is an insight into operational decision-making and influence of expertise that is worth some scrutiny. The specific issue of relevance is that operational safety management in this instance is not about whether any technical authority or functional influence is available but is instead about operational safety priorities being impeded despite direct communication. This can be regarded as a lack of appreciation of the potential safety implications of the underlying CUI, as well as a lack of appreciation for the underlying power dynamics in how the discussion was framed. The significant implications are discussed further in Section 6.

#### **4.8.5 FUNDAMENTAL SKILLS FOR A SAFETY PROFESSIONAL**

Of all of the issues facing the HS+ function, Gina’s key concern is that her HS+ professionals lack fundamental skillsets to deal with management. She identifies the flaw as an issue of translation between technical language and business language. Gina considers that this issue creates limitations at both ends: for the embedded HS+ staff dealing with an operations manager and for herself dealing with Executive Managers. Gina believes that the simple resolution of this issue is to have the appropriate people within senior functional leadership and management roles.

Gina recalls the technical competency of the earlier Executive HS+ Manager and remembers his period of leadership as a great time for the HS+ function. She asserts that she herself has little interest in staying in her potential POSS position permanently. Though she is technically competent and confident of her communication skills, she would rather “take off her management hat and put on her professional hat”. Gina believes that it is currently common to the profession that the most senior people don’t last very long because they

can't stand business antics and boardroom nonsense, getting frustrated with the executive level. She describes instances in her own career where she has had to rely on stubborn insistence that a risk is unacceptable at a critical point in decision-making, after being unable to convince an operational manager of an increased likelihood or severity of potential consequences.

This has led to Gina's principle that safety professionals need to be able to put their own jobs and positions at risk to successfully fulfil their roles. They need to be able to clearly and strongly present facts and interpretations that their managers do not want to hear. This suggests that Gina has mostly experienced the potential for conflicts of interest that require a professional commitment beyond the position held. Otherwise, there would be a reference to the types of organisational authority that supported responsibilities. Instead, the observation is that a safety professional ultimately needs to be personally persuasive, even when tasked with presenting technical specialist advice on safety critical issues. This is an issue that elevates the problem of translating technical matters to be meaningful in the boardroom. The need for translation and lack of understanding seems to be a significant impediment at all levels of the functional hierarchy.

Gina expects that it will be necessary to develop her technical specialist competencies to include speaking effectively and persuasively to business and operations managers. In Gina's opinion, the problem is that it is outside the interests of technical professionals (to operate within the business framework) than it is beyond their capacity to communicate within that frame of reference, with practice. A small number of the HS+ staff are known to understand operational safety; others have specialised skills in occupational health; and some have expertise in risk analysis. However, none of her HS+ staff are considered to have any obvious skills in governance or leadership. She proposes that you need to "grow your own safety professional" to fill this perceived gap in the personal competencies of HS+ professionals. The concern for Gina is that HS+ professionals will ultimately need such competencies and will need to develop the ability to personally influence managers for operational safety to be progressed within any organisation.

Gina acknowledges that there is a considerable lack of understanding of operational safety matters, such as hazard identification and risk management, even amongst the HS+ team. Only a small proportion of technical experts are considered to have a good understanding of maintaining operational discipline. The majority of the HS+ function do not have any specific experience with the types of technical issues that operational safety management considers. In Gina's view, this simply increases the need for centralised functional training in

her department. She plans for the development of all of the HS+ staff to at least learn to understand and be aware of operational safety issues relevant to Company G, including professionals who are not involved in technical specialties, such as in risk and integrity.

#### **4.8.6 ORGANISATIONAL DYNAMICS OF OPERATIONAL SAFETY**

The common themes arising in discussion with all four interviewees in Company G suggests that there are fundamental challenges in dealing with operational safety, even though the high-hazard core activities require comprehensive management of operational risks. The most significant aspect of the organisational dynamics is that the HS+ function only has a small group of technical professionals who focus on operational risk, safety and integrity management. The centralised HS+ function is not involved in the majority of the significant operational safety activities that are undertaken within Company G. These are typically carried out by the engineering teams and supported by technical specialists who are fully embedded in the operations lines.

Engineering is recognised, in Company G, as specialised discipline that is also functionally overlaid across operating lines, and there is an entirely separate system of technical integrity management. However, the engineering teams are ultimately responsible to their operational managers. There is also no centralisation of the various engineering teams who have daily operational responsibilities for the performance of a multitude of safety critical systems, processes and equipment. Each group of engineers is separately accountable to the operational manager of their own site, facility or activity, depending on the level of operational hierarchy at which they are positioned. Greg describes the organisational structure for the engineers and technical specialists as “silos that every now and then are changed to different silos”.

There is reported to be inadequate resourcing, with too few Technical Authorities available to manage the known safety critical processes in a proactive, organised and timely manner. Both Greg and Grace speak at length of the management system for the allocation of engineering authority and technical authority across the engineering disciplines, and for safety critical processes and operating systems. They both also speak of how there is little systematic management of technical issues, with the majority of issues typically raised by operational managers after they become problematic. This process typically leads to reactive response by engineering specialists that impact on operations in such a way that the Technical Authorities have a reputation for impeding rather than assisting operations, despite their fundamentally important role.

Greg and Grace each assert that they see a clear improvement in operational safety management when a manager has a good appreciation of risk and sponsors an issue for the attention of a Technical Authority with adequate time to address the matter properly. Meanwhile, Gina observes that process safety engineers need to take more time to get the message across to managers who don't adequately comprehend technical aspects of risk and safety. There is a clear distinction in the skill sets of the OHS specialists who tend to have strong abilities in communicating safety issues to operations crews though this is aided by the more comprehensive standards and simple rules that must be complied with. Operational safety issues tend to be more complex and have fewer set rules requiring greater leadership to enforce standards and better relationships to engage interest, as well as simply being more expensive and therefore typically more contentious.

The majority of the HS+ functional team is focussed on health and safety, rather than on operational safety. This reduces the value to operational safety management of the functional leadership of the potential POSS position that is filled by Gina. However, there are common issues in that the functional group, though substantial, is also under-resourced in relation to the size of the organisation and the extent of inherent risks of the high-hazard core activities. Though, there seem to be far more engineering professionals than HS+ staff within the organisation, the engineers are not functionally organised. It is interesting to wonder why this is the case in an organisation that is fundamentally dependent on technical proficiency with complex technological processes and systems of operation.

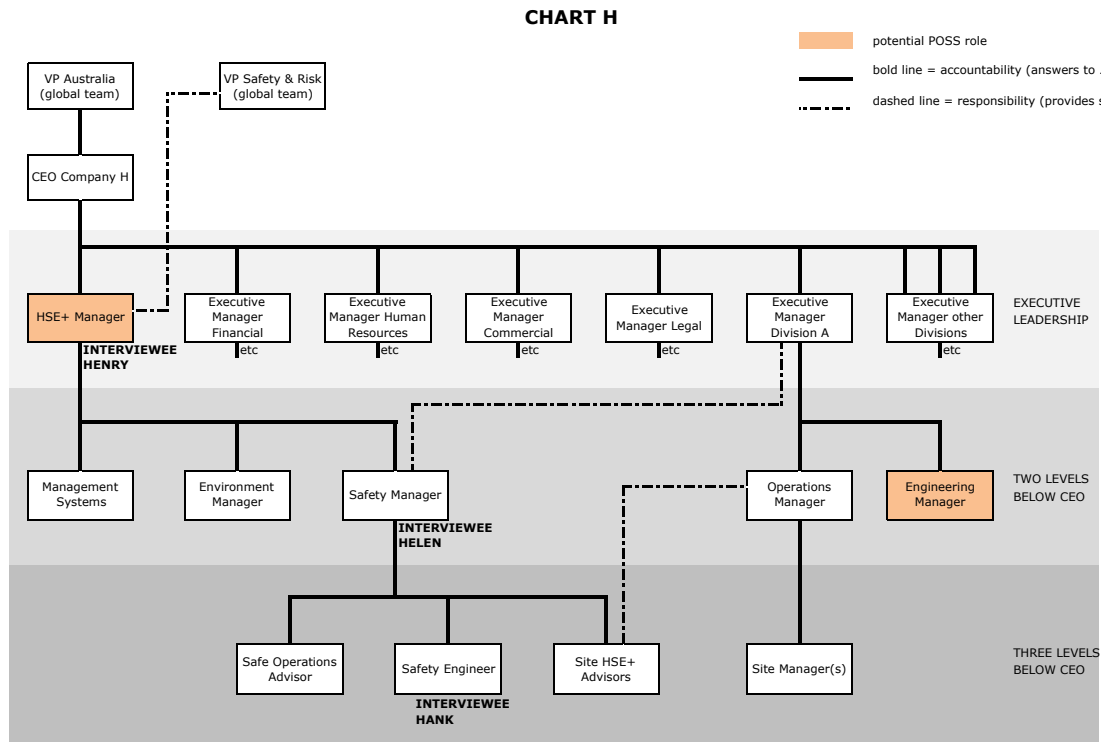
## **4.9 COMPANY H**

### **4.9.1 POSITIONS AND FUNCTIONS RELATED TO OPERATIONAL SAFETY**

Company H is a small local organization involved in several independent and hazardous core operations at various sites. It is a wholly owned subsidiary of a larger global business entity and the CEO of Company H reports to a Senior VP (Vice President) of the global corporation. The Senior VP is responsible for corporate oversight of operations in the Australasian region and reports directly to the global CEO.

There have been substantial modifications made to the organisational design of Company H over many years. There continue to be adjustments to better align corporate cultures and expectations. As a result of these ongoing modifications, the accountabilities and roles of senior management and of the various functional groups, and the overall organisational structure of Company H is discussed by the interviewees as "fairly new" at the time of the research interviews.

The research focus is only on the local business entity, Company H and Chart H illustrates the three major independent business units of the organisational structure. These are distinguished by distinct core activities and the associated technologies. The business units are identified in Chart H as Divisions A, B and C, led by Executive Managers who are responsible for all of the activities undertaken within each of their respective business units. These Executive Managers answer directly to the CEO of Company H.



The other members of the CEO’s leadership team are identified as the Executive Managers of various corporate functions: including Human Resources, Legal Support, Finance, Business and HSE+ which in Company H encompasses health & safety, environment plus security. Several of the Executive Managers of Company H also hold VP positions on the local senior leadership team of the global corporation. This is a common phenomenon in large multi-national corporations, mostly used as a means of fostering tight linkages and high-level exchanges of knowledge, expertise and experience between a global corporate centre and its regional subsidiaries.

Chart H also illustrates the key interactions related to the management of operational safety within Company H, as described by the three interviewees, who are all part of the HSE+ team. They and their positions are identified in Chart H as: Henry (the HSE+ Manager); his direct report Helen (the Safety Manager); and her direct report Hank (the Safety Engineer). The role of the HSE+ function is primarily to provide corporate governance and assurance. This includes developing strategy and policies for ongoing improvement;

establishing management systems to ensure that Company H monitors and maintains safety performance; and auditing and review of performance for verification of compliance.

Additionally, the HSE+ function can be called on by operational managers for specific expertise and advice to assist the three operating divisions in meeting their regulatory obligations and satisfying the corporate expectations of safety management performance. The site HSE+ Advisors, who are shown as accountable to the Safety Manager, are all embedded in the operating divisions. They have a responsibility to provide functional support and assistance to their operational manager in addition to promoting safety awareness and new initiatives at their respective sites, as advocates of the HSE+ function.

Henry speaks of this structure as a relatively recent development and advises that previously, the HSE+ staff reported only to their operational managers and had had no functional accountability. Henry is therefore the first HSE+ Manager in Company H who reports directly to the CEO. Henry himself can advise the CEO of what should be happening within the organisation and the CEO can also request Henry to undertake various activities that require specialist services. The alignment in seniority between the HSE+ function and operational management reflect the dual role of safety advocacy and safety service at all levels down to the site-based HSE+ Advisor. The current site-based HSE+ Advisors are accountable through their functional line to Henry and have a similar status - only slightly lower - to their Site Managers. Henry observes that they all grapple with these relationships but he is confident that the functional HSE+ Advisors are not considered to be subordinates though they may be slightly lower in status than their operational Site Managers.

The discrepancy in status is considered to be fair because the actual and full responsibility for safe operations in Company H lies with the operating line. Ultimately, each Division Manager is directly accountable to the CEO for the safety of all persons, processes and plant involved in the core activities undertaken within their operating business unit. They are required to meet their obligations with respect to operational safety performance and compliance to regulations and corporate standards that have been interpreted and established by the HSE+ team. It is expected that the Division Managers will appropriately utilise the specialist safety resources that are available to them within the HSE+ function.

The Division Managers also have their own groups of technical specialists led by their Engineering Managers who are considered to be of equal status to the Operations Managers of each Division, as shown in Chart H. These engineering groups contain the core technical expertise for each business unit, including specialists with the best understanding and most thorough appreciation of the technologies relevant to the core activities of their

operating division. These technical specialists have the necessary depth of knowledge to comprehensively detail the operating procedures, process controls and minimum performance standards required for their division to operate safely. The specifics of implementation, management, monitoring and reporting on safety-critical processes are therefore developed and maintained by the engineering groups in each Division.

The engineering groups are also responsible for asset maintenance activities including many that are fundamental to operational safety management. In order to ensure the technical integrity of identified safety-critical processes and safety-critical equipment, a comprehensive system of direct stewardship is in place for each of the operating divisions, as appropriate to the technologies in use. The asset maintenance engineers liaise with Hank - the Safety Engineer - whose role is to ensure applicability and compliance. Hank is also the designated custodian of the corporate safety standards which are identified as a key component of the safety-critical management process.

The HSE+ function maintains a fairly high level of technical expertise within the group, which ensures that promotion, reporting and governance are conducted in a manner that is appropriate to the technical constraints of the operating divisions. The in-house expertise allows the HSE+ group to define and refine the systems by which safety is expected to be managed and assured, including streamlined and efficient control requirements for managing safety-critical processes and equipment. The Engineering groups translate these requirements into procedures to be implemented, monitored, maintained, reported and verified in keeping with the standards defined by the HSE+ function.

The technical competencies that are maintained within the HSE+ functional team also allow for productive audit and review processes. Professionally qualified technical safety specialists provide an independent and informed functional perspective. So, the HSE+ function is able to liaise effectively with the division based technical engineering specialists. The other critical operational safety responsibility fulfilled by the HSE+ function is one that Henry, the HSE+ Manager identifies as a fundamental aspect of his role. This is to ensure that the operating businesses maintain an appropriate balance in the attention and priority given to all forms of safety: process safety, personal safety and catastrophic risk mitigation.

The Engineering Managers, with their own functional teams of technical experts would each qualify as a potential POSS based on their technical competence, and on their access to authority: only once removed from the CEO through the Executive Manager of their division. Helen, the Safety Manager, expresses concern that the Engineering Managers are not also functionally independent (because they do not report directly to the CEO). Helen



believes that they are vulnerable to the cost, time and production pressures that affected their immediate bosses, the Division Managers.

Henry, the HSE+ Manager is directly responsible to the CEO and also reports beyond the CEO to his global HSE+ equivalent. He qualifies as a potential (and the most-likely) POSS by virtue of the fully independent functional team that he manages. Though his role includes responsibilities such as security and the environment, he has clear responsibilities only to functional priorities and is not expected to cater to commercial and business priorities. While Henry himself does not have specialised technical qualifications related to operational safety, he is technically competent. He takes care to ensure that he has a strong team of appropriately qualified and skilled professionals who can provide the expertise necessary for the HSE+ function to both support and challenge the operating Divisions on issues of operational safety.

There are strong, centralised and formal accountabilities in place to manage operational safety activities within Company H. A specialised and demonstrably competent functional team is independently and directly accountable to the CEO. This organisational structure is also complemented by well-defined systems and processes for regular interaction with site-based technical specialists.

Four key aspects of organisational design support this strength of purpose and are discussed as particularly significant to the influence that is available to the organisation's operational safety specialists and experts. These are: a highly visible leadership commitment that defines safety as a prerequisite; formalised management of staff competence that adds credibility to roles; systems designed to provide transparency at all levels; and comprehensible systems to establish technical integrity and operational safety.

#### **4.9.2 WHEN LEADERSHIP DEMANDS OPERATIONAL SAFETY**

The CEO of Company H displays a unique, proactive interest in the background to this research project. She makes time to discuss her views and her experiences of both safety management and the development of a corporate safety culture. Though the casual discussion does not constitute formal input to this research process, it does validate repeated references by the three research interviewees to a very high level of leadership commitment to operational safety. It seems that the concept of "support" that has been used previously to qualify the level of leadership commitment, is inadequate to describe the value attached to safety by the CEO of Company H.

In Company H, safety is defined as a priority; a principle; a requirement; a fundamental and substantial aspect of any and all activities and processes in which the organisation is involved. The leadership and particularly the CEO herself do not just support safety but actually demand safety. The HSE+ function is not only responsible for governance and assurance but also for fully and proactively engaging, training and guiding company staff. The objective is to ensure that organisational attitudes and behaviours are appropriately focussed on safe operations as a fundamental aspect of all activities in Company H.

In Company H, the term “safety” is holistically inclusive of personal safety in operations; process safety and technical integrity; and the prevention of all conceivable types of major accident events. The high degree of curiosity about what-safety-was and what-safety-should-be possibly nourishes the first genuine presentation of operational safety as a comprehensive, coherent and cohesive working concept. Henry describes that employees are “hungry” for a more intelligent appreciation of risks and how to deal with them.

The CEO is known to expect that all employees of Company H, particularly senior management, have a role to play in maintaining safety awareness. The importance of safety as a common goal is reinforced by ensuring that the entire organisation understands the “language” and that specific terminology “clicks” to focus everyone’s attention in the same direction. There is an expectation that staff be familiar with the terminology of behaviour-based safety (such as “mindfulness”); with the principles of safety objectives (such as “keeping it in the pipes”); and with common abbreviations (such as “MAE”s = major accident events and “SCE”s = safety critical elements).

There is considerable priority given to assisting all Company H staff to value and recognise the significance of safety to Company H. Relevant training is therefore conscientiously delivered to all employees, including those involved in business support functions who never have direct experience of or involvement in operational processes. A recent example is described to have involved training of the Human Resources team on how safety metrics relate to operations, including the potential consequences of such performance metrics being outside of the range that is specified as acceptable.

The strength of the CEO’s conviction that safety be driven from above is reinforced by the full support of the global corporation for her to promote, establish and maintain a strong safety culture within Company H. She is well-respected by her entire leadership team for leading by example and this is observed by Henry to have “filtered down through the company” and has garnered all the influence that Henry feels that he needs for his own position and that his team needs in order to be effective within the organisation.

Helen also feels that her position as Safety Manager (and her recommendations) are fully endorsed by the CEO to the extent that she feels that she can say anything in any meeting and be confident that she will actually be heard. She knows that her input and advice on safety aspects and priorities have an impact on operational decision-making. There is of course an expectation that the HSE+ group has evidence to support their concerns and their recommendations but it is equally expected that the other party in the deliberation will also present relevant proof and clear assurances for their alternative options. Both Henry and Helen describe discussions with the CEO about “pulling the pin” on high risk activities and of having seen this happen “with no questions asked”.

It is clear that the attitude of the CEO and his leadership of Company H sets a tone that defines operational safety as more like a prerequisite to operations. It is also clear that the CEO is driving this local imperative for assurance with the full support of the overarching global corporation. Safety is being redefined in Company H to be a fundamental aspect of operations by a CEO who requires the HSE+ function to exercise a high level of influence and demands that the operating divisions heed HSE+ inputs and priorities.

#### **4.9.3 CONTROL OF COMPETENCY**

The HSE+ team maintains a high level of expertise in order to manage promotion, reporting and governance of operational safety. Henry insists on having a very specific structure within the HSE+ function in order to complement and support his functional responsibilities. The HSE+ positions are therefore not defined only by a position description that lists associated responsibilities and desired skill sets. Each position is also assigned a comprehensive set of critical competencies with the desired level of performance in each of those competencies clearly stipulated. HSE+ staff are selected on the basis that they already possess - or can easily be taught to improve upon - relevant competencies.

Henry acknowledges that he isn't able to always find the ideal person for every role: but he chooses not to compromise on certain core skills. He gives examples such as: people have to have professional qualifications (as they are more likely to have a natural or trained capacity to learn and to engage easily with new concepts); and people have to have had experience in the functional role even if it was applied in a different industry (as they are more likely to have the capacity to translate functional fundamentals into a new operational context). Those criteria that are compromised are identified and recorded during the recruitment process to be included in a competency development program to close the compromised gaps.

The competency management system includes a comprehensive review process for ongoing assessment of each of the specified criteria relevant to each position. This includes understanding any significant discrepancies between the desired level of competency for the position against the actual competency of the person holding that position that have been identified. These are then discussed, recorded, reported and addressed with targeted training and development of both skills and practical experience. The entire process provides Henry with an objective method of assuring that his team maintains the necessary skills to fulfil their roles; and to ensure that they are given appropriate responsibilities and that they are tasked according to their capabilities.

One of Henry's core expectations is that his staff has to demonstrate the ability to influence managers and operators as the HSE+ roles require them. This may require that they: be persuasive or challenging when circumstances require; be persistent in asking difficult or "stupid" questions to motivate broader discussion and deliberation; and have the ability to maintain expectations even when faced with opposing opinions and. These behavioural attributes are identified and included as competency requirements during the initial recruitment process.

As the competency management system is applied to the entire organisation (with criteria appropriate to each role, whether administrative, technical or management) personal credibility is demonstrable and essentially quantifiable. The competency management system is therefore also a means for Henry to have insight into the capabilities of key operations staff and managers: such as those who are responsible for safety critical processes. Likewise, the site, facility and operations managers in the operating divisions can verify the competence of the HSE+ Advisors who are embedded in their operating teams. As Henry has been careful to put together a very capable team, the HSE+ function has considerable credibility within Company H.

The success of the competency management system in Company H relies heavily on the level of commitment from senior managers to ensure that their processes of selection, assessment and training of employees is comprehensive and rigorous. This has required considerable investment of both time and attention for Henry, even though he does not have as large a team to manage as operational managers would have. Despite initial misgivings, Henry has eventually converted to a being a keen supporter of the system. The team management process is less dependent on personal, subjective responses. The broad application of this system throughout Company H forces all managers to define in great detail both the responsibilities of their staff and appropriate expectations of performance.

Henry believes that Company H is well advanced in addressing issues such as the additional workload on managers and he feels that implementation of the competency management system is going well. He acknowledges that there are still glitches to manage, and refinements will be required as the organisation uses the process. It is expected that it will take several more years: to assess the overall effectiveness of such a formalised and prescriptive system; and to ascertain how performance, reliability and safety are affected. For his own team, Henry is already confident that the additional control and the assurance of the credibility of the HSE+ function across Company H is well worth the effort.

#### **4.9.4 WHAT YOU LOOK AT IS WHAT YOU GET**

One of the most significant operational safety management concerns that is being directly addressed within Company H is the communication of safety-critical information. It is a stated objective of senior management that there be a clear and transparent line of communication throughout the organisational hierarchy all the way up to the CEO. Helen explains that the reporting processes that are already in place allow the CEO to personally select and observe performance on a daily basis if desired and that high-risk activities and safety incidents are expected to be highlighted for the CEO's attention.

There are several recognised issues which are discussed as surmountable obstacles that are just not known to have yet been overcome. These issues challenge the effectiveness and sustainability of communications and are being reviewed and assessed even as they are being addressed. They include: encouragement of employees to report "bad news" not just "good news"; a review of reporting practices as critical components of standard operating procedures; and prevention of information overload that could obscure critical information.

Senior management makes a considered and concerted effort to encourage reporting and discussion of poor performance and operational problems, with public commendation of employees who provide valuable feedback and appropriately communicate their concerns. Henry describes the impact of a "suggestions" box that was not being emptied and was seen to indicate that no-one was attending to staff suggestions. This story illustrates a recognition that reporting processes have to be manageable and managed to be effective.

There is also a process in place, motivated by a corporate fear of complacency, for reviewing communication processes in order to verify ongoing accuracy and consistency. All three interviewees recognise that Company H is not to rely on a well-designed system of reporting. Instead, the HSE+ function undertakes daily verification of data input for safety-critical processes. Helena also explains that there is an audit process undertaken every few

months to test the veracity of reported metrics in case of changes to operations that have not been captured effectively. Both Helen and Hank also discuss how general standard procedures themselves are reviewed (every four years, and safety critical procedures every two years) in order to: ensure that monitoring and reporting by operating lines is still appropriate; confirm that verification and documentation by HSE+ is still effective; and to consider opportunities for improvement of how the metrics themselves should perform.

Henry recognises that the availability of adequate resources will be a limiting factor even in a successfully transparent and accurate system, but believes that refining the procedures and metrics could allow for daily communication to be efficient and sustainable. A reporting system that requires over one hundred dedicated man-hours per day is being gradually streamlined so that it will only take several on-site staff one hour per day to record and report the necessary information. The technical specialists and the HSE+ function have a common goal to work through the safety-critical process controls so that reporting is timely and meaningful rather than simply overwhelming.

It is the policy of the CEO to have input into every high-risk process that is undertaken within the organisation. This means that risk is treated very seriously at all levels of Company H. The effort being put into developing, implementing and improving systems for communication of safety critical activities reinforces to all employees that performance is not only visible but is actually observed and acted upon. Though many decisions are regularly made at lower levels of the hierarchy, it is expected that there will be some issues that need additional knowledge, authority, perspective and strategy from managers at higher levels, up to and including the CEO.

The manner in which Company H ensures that their CEO has access to facility-level decision-making around activities that are identified as high risks provides for a robust system of direct and active oversight. It consequently also provides for a clear line of communication for engineering experts, safety specialists and operations staff to directly engage the attention of senior management and leadership for strategic decision-making.

#### **4.9.5 AN ACTION IS WORTH MANY THOUSAND WORDS**

The other aspect of operational safety management in Company H that seems fundamental to operational safety management is the active interface between the operational and technical integrity systems and the safety management systems. Henry is determined that the HSE+ team maintains a focus on incorporating safety into procedures and behaviours and is “out there” ensuring that safety controls are in place. He prefers this investment of

effort to the development of documented safety requirements with onerous forms for reporting on effectiveness.

An example of such an interface is the asset integrity and maintenance process. The Division Managers in Company H are each independently accountable to the CEO for maintaining and monitoring the reliability and integrity of their own assets. Each division uses different technologies that require technology-specific protocols. The technical integrity systems are typically managed by their engineering groups, with technically competent custodians appointed to each of the safety-critical assets. These custodians are held directly and personally responsible for overseeing scheduled inspections, maintenance routines and standards of performance of their assigned equipment. They also have technical authority over any changes to the function, use or condition of that equipment, including changes to operations that affect or utilise the asset. This system effectively defines a stewardship of significant process systems and equipment, involving oversight, governance, assurance of integrity and technical control.

As the asset management system is essentially decentralised, the HSE+ function simply establishes centralised oversight and control of the assets and processes that affect operational safety. This is achieved by identifying all safety critical elements through the safety management system, which is managed by the HSE+ function. The safety management system is itself identified as a safety critical process with stewardship assigned to Hank, the Safety Engineer.

Hank, as a technical specialist is also a custodian of several other safety critical elements within the operating divisions and works closely with the engineering and maintenance teams to oversee these processes. Hank describes the system of custodianship of safety critical elements as fairly new with “massive gaps” between performance standards and actual implementation and he expresses some frustration with the rate of progress and degree of consensus on various matters. However, Hank is certain that any issues that are significant to operational safety can be readily escalated and resolved through the HSE+ functional hierarchy.

A similar approach is also taken with the continuous improvement of operational safety management. Rather than evaluating only the performance achieved by operations in Company H, the performance of the management system is also scrutinised and assessed. Helen describes the process as “stepping back” from any sense of confidence in the systems that are already in place and challenging the underlying assumptions that the established controls are still fit for purpose. This perspective allows for improvement of the

entire process as it requires verification of the system itself as well as its implementation into operations.

Henry recognises that the additional workload associated with this approach is probably unsustainable and that considerable motivation and focus is required to continually challenge established management systems. However, he proposes to continue to roll out corporate safety procedures with clear encouragement of all personnel to question those procedures. He wants to maintain a significant imbalance between “creating the system” and “using the system” by putting the majority of his team’s efforts into embedding procedures, evaluating feedback and understanding issues that arise during use of those procedures. While endless iterations and revision are understood to be impractical, Henry feels that there is far more value in limiting time spent on system development while extending time for implementation, absorption, consolidation and adjustment. He sets a clear example of this approach within his own functional role and responsibilities.

An annual process of major hazard reviews is undertaken that challenge baseline assumptions so that people can more fully understand the basic controls and test them against both regulatory and corporate expectations. They are not “just bow-ties and safety workshops” Helen explains and this process is randomly applied each year to several hazardous processes and with a cross-section of the workforce. The review group methodically works through management of change; maintenance schedules; asset reliability; audit protocols; and industry advances and considers how each of these affect the risk profile of the activity and what controls should be in place.

Henry also encourages senior managers and technical specialists to adopt this approach. For example, rather than developing and writing up operating standards from a perspective of engineering design, or assuring implementation by reviewing reports, he expects that the engineers should sit through actual start-ups and shut-downs with the operators in the process control rooms. This provides more thorough verification that procedures are being followed in accordance with their design and also gives far more opportunity for the engineers and operators to understand the issues and troubleshoot them together.

The process of oversight can then be seen as a joint challenge to achieve common goals. There are also advantages to senior management of being in the workplace to confirm compliance. If such interactions are common practice, Henry believes that the workforce will not be threatened by the verification process and can treat it as an essential task (rather than as a purely bureaucratic and irrelevant burden).



#### 4.9.6 ORGANISATIONAL DYNAMICS OF OPERATIONAL SAFETY

The organisational design of Company H incorporates several features to ensure that safety specialists and technical experts involved in operational safety management are well supported. In addition to an organisational structure that recognises functional lines for both safety specialists and technical experts, there is strong, attentive support from leadership that informs both the quality and coherence of robust, active systems of oversight and operations management.

The HSE+ group has an independent functional line of accountability with Henry, the HSE+ manager answering directly to the CEO and with a hierarchy that closely matches the operational line of accountability. The status accorded to the HSE+ positions is considered to be almost equivalent to their operational counterparts rather than subordinate in operational decision-making. The one fundamental and crucial difference is that the operational managers are held accountable for safe operations and therefore they ultimately make the actual decisions.

There is no expectation that this should change and considerable emphasis is placed on the dual role of the HSE+ function: to promote the overarching policies and safe behaviours through corporate initiatives and strategies; and to review compliance to operational procedures and performance through regular audits, monitoring and reporting. Henry describes this as HSE+ being responsible for the “front end” and “back end” with the operating lines doing everything in the middle.

It is particularly interesting that the only concern raised about the impact of the organisational structure on safety management is that the engineers are segregated with each division accountable to their operational Division Manager. The Engineering Managers of each operating division are only once removed from direct access to the CEO. However, the HSE+ interviewees consider that if the technical experts of the organisation are not fully independent as separate function to operations, their objectives could be compromised by commercial priorities and production pressures through their Division Managers. Company H is small enough that frequent interaction between divisions and the strong commitment to information flow provide the engineering groups easy access to each other and to the CEO. It is, however, clearly intended by the organisational design that the technical specialists should be accountable to their Division Managers.

This organisational structure can be seen to elevate operational safety to be a higher corporate priority than asset management. There is a clear focus on ensuring that safety-

critical equipment and processes are monitored and maintained through the safety management system, which establishes centralised and formalised governance and assurance of operational and technical integrity oversight through the fully independent HSE+ function.

This is essentially achieved by including technical oversight for management and mitigation of known risks and hazards in the overall definition of safety. Company H has a highly comprehensive definition of “safety” in comparison to the defined research ideal of “operational safety” management. Safety is promoted by the CEO as essential to responsible operations and is considered to incorporate personal protection, process control, risk mitigation as well as major accident prevention.

In and of itself, the attitude of the CEO in demanding the promotion of operational safety as an inherent and fundamental requirement of all activities elevates the HSE+ function. The training of all staff to recognise and appreciate safe practice further reinforces the influence and authority available to the safety specialists and technical experts within the organisation. However, leadership does not focus only on establishing safety behaviours and changing attitudes. The CEO herself observes that “culture can be too strong for even a CEO to shift”. Much of the confidence that the HSE+ function have in their abilities to influence decision-making in Company H is based on comprehensive management systems that have been developed to translate operational safety concepts into standardised and normalised organisational practices.

The competency management system that is implemented across Company H establishes a formalised process of defining position requirements and filling those positions with the right people who have the right skills. This overlaid management system assures that safety specialists are both deserving of and receiving appropriate attention. Tools such as gap analysis and traffic light coding are used to monitor and manage training of individuals and teams. This process is critical in controlling the competency of the HSE+ function as well as demonstrating it to senior managers. However, one of the competencies that is sought and reinforced in HSE+ staff is also their ability to influence others. Inherent courage is also seen as necessary in order to challenge senior managers and to engage with experienced operators. These personal traits are openly acknowledged and relied upon by the HSE+ function to provide credibility and convey authority when interacting with operations staff.

The influence of safety specialists and technical experts is also improved by the attitude to governance and assurance. The key imperative is to ensure that accurate and relevant information is obtained in a timely manner that facilitates a response. Assurance processes

are refined to reduce reporting requirements even while rigour of operating discipline is being increased. There is a clear emphasis on maintaining open lines of communication for both “good news and bad news” throughout the organisational hierarchy. Also, managers and specialists are encouraged to undertake oversight activities as cooperative processes with common goals. This approach seeks to inspire confidence in the workforce that their input will be valued, which in turn is expected to increase operators’ cooperation and attention to matters of operational safety management. The HSE+ function has both credibility and influence in their roles as advocates and advisors. All three interviewees express confidence that their positions are significant and vital to Company H.

#### **4.10 COMPANY J**

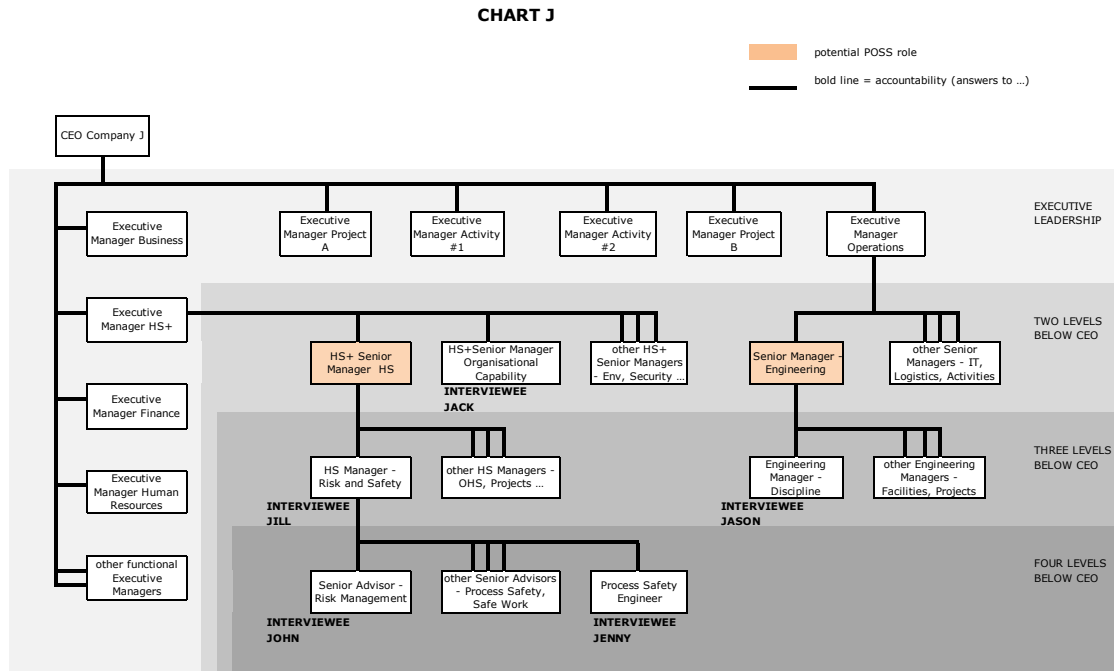
##### **4.10.1 POSITIONS AND FUNCTIONS RELATED TO OPERATIONAL SAFETY**

Company J is the local branch of a large multi-national organisation that is involved in a range of high-hazard core activities that involve complex technological processes. The local organisation’s structure is highly decentralised, hierarchical and specialised, with major facilities and projects managed separately according to both their location and their core activities. The entirety of the organisational structure of Company J (which is only the Australian branch of a global corporation) is not provided or discussed in any detail as it is too large and complex.

Chart J therefore simply illustrates the HS+ group and the Engineering group, both of which are heavily involved in the management of operational safety activities in Company J. There is such a range and specificity in the various position titles in Company J that the simplified, de-identified Chart below attempts only to represent the accountabilities of interviewees and the potential POSS roles within the organisational structure. The many lines of responsibility and reporting are not included as they are too complex to illustrate.

The CEO of Company J has quite a large group of both operational and functional Executive Managers reporting directly to him. The operational Executive Managers include the heads of major projects, of specific core activities and of general operations which includes the management of the organisation’s local facilities. The senior manager of the principal Engineering group answers to the Executive Manager of Operations and leads a strong centrally based team that provides engineering and technical support for daily operations and maintenance activities. The functional Executive Managers include the heads of Business, Finance, Human Resources and the HS+ function.

The HS+ function covers a broad range of support activities including, but not limited to, health and safety, environment, security and operational excellence. The senior manager of health and safety leads a functional team that provides several specialist support services including separate teams for operational risk and safety and for occupational health and safety, as well as HS managers for various major projects.



The principal interviewee from Company J is a HS Manager who is responsible for risk management and process safety, referred to as Jill in Chart J. Recent changes in the company’s local activities had highlighted the need for a process safety management system. It had been observed that there was limited recognition of process safety aspects within the HS+ group. Jill notes that HS+ has been dominated in the last decade by occupational health and safety management, much like in the rest of the industry. Jill was then specifically tasked (only a couple of years ago) to develop and implement a system to manage the change in priority of process safety and increasingly centralised focus on risk management. Jill’s team includes a specialist advisor in risk management, identified as John in Chart J, and a specialist advisor in process safety, identified as Jenny, who are also research interviewees.

In discussing how operational safety is designed into the organisation, it is not a functional group with a common purpose and identity and seems to be fragmented and scattered. There are several references by the five interviewees to operational safety personnel who are embedded in operations and in projects with unidentified structural relationships. There

appears to be little in the way of formalised lines of reporting and accountability of these functional roles in relation to the senior HS+ Manager or Engineering, or to each other and to the executive management. There is reference to a global safety management functional lead who provides advice and support to the Jill and her team. There is also an international team of highly specialised technical consultants who are not part of the local organisational structure but are involved in many aspects of the major projects with some overlap in operational safety issues.

In particular, the engineering function that reports to the Executive Manager of Operations is heavily involved in operational safety management, providing specialist advice and support to facility managers and operators on a daily basis as part of an asset management process. The engineering group also operates within a system of technical authority to manage changes, deviations and non-compliances. The Engineering Manager of various discipline engineers is a research interviewee, identified as Jason in Chart J. Jason notes that there is an active attempt to better define how the operational safety activities are managed between engineering in operations and the centralised functional team in HS+.

As a relatively new area of focus, there is still a great deal of fluidity and ongoing development in the operational safety space. The management systems are described as currently relying far more on personal influence and on relationships than on structured hierarchy or formal authority. Without an actual process safety management process yet in place, various groups across the organisation are reported to be interpreting their own safety requirements without any coordination or consistency.

The current restructuring that is proposed for the HS+ function seeks to address these issues with more formalised work processes and systematic accountabilities, shared with the Engineering group as a principal contributor to daily operational safety management. The new structure, which has been developed in broad consultation with operational and functional managers, is being implemented and overseen by Jack, who is a senior HS+ manager, responsible for managing Organisational Capability.

Jack is an interviewee and he discusses the principal objectives of introducing a centralised functional group to drive technical risk and safety, including human factors. In addition to managing the operational risks on a daily basis with support from the Engineering group at a facility level, a central team to manage safety and to liaise with regulators is desired to guide and police process safety management. Increased and formally defined interactions with the Engineering group are also proposed to ensure that technical specialists within the operations-based Engineering group are exposed to the broader strategic aspects of the

centralised HS+ function for operational safety management. Jack considers that the functional team will have a niche skill in their abilities to comprehend and advocate safety requirements, and a specific responsibility to interface with regulators, while operations have ownership of implementation. It is proposed to have a clear demarcation between the Engineering group, who will provide daily support of operations, and the centralised functional group, who will facilitate and promote operational safety in a strategic manner.

#### **4.10.2 SUPPORT AND AUTHORITY**

One of the most significant problems that is discussed by Jill is the matter of support along the current functional line. Jill differentiates between the need to escalate an issue up the functional line to a more senior manager for resolution and the need for support from a more senior manager in order to resolve the issue at the level at which it was raised. Jill discusses this as a matter of trust within the functional line where a more senior person demonstrates that they trust the judgement of their staff and will support their advice and decisions. Jill considers that such support has been seen to be lacking within the HS+ team and this has created a sense of dissatisfaction within the team. An incident which has “decimated morale” amongst HS personnel is described as an issue of personality traits rather than of unsound or inappropriate specialist advice.

A HS Advisor, who was raising issues of safety with the operations group to whom he was assigned, was considered to be non-persuasive and difficult. The issues that were being raised were technically valid but the HS Advisor reportedly lacked the personal skills to communicate the issues in a diplomatic and effective manner. A conflict arose, reportedly, as the operations line refused to work with this HS Advisor due to his manner and his personality. The HS Advisor’s functional manager, who was brought in to resolve the issue, inexplicably did not support the technically sound recommendations but chose to agree with the operations line about the lack of his HS Advisor’s personal skills. It is perceived within the HS+ function that the HS Advisor lost his position and was moved to a less responsible role only on the basis of personality and character flaws.

The most disappointing aspect for Jill is that the valid safety issues that were raised by this HS Advisor were not resolved. The operations manager evaded work on safety priorities by refusing to accept the personality of a HS Advisor, who was essentially doing his job but received no support from his functional boss. The implication of such a report is far-reaching, whether or not the incident details are accurately portrayed. At a minimum, this story demonstrates that there is a lack of priority for the safety issues raised and there is also a perceived threat to the job security of HS personnel. They do not now know if their

prioritisation of safety will be supported if a senior functional manager has been seen not to trust and support a safety representative. Also, though the safety issues were correctly identified, these valid safety issues remain unresolved. Such a situation could also affect the broader reputation and dynamics between the HS+ group and operations personnel within the broader organisation.

This is a single but significant example that demonstrates the problem of relying on personalities and relationships. The Senior HS Manager seems to prioritise the relationship with operations and not resolve the safety issues raised. The new restructuring and management systems that are proposed within Company J address this issue by formalising the processes for decision-making around safety. The expectation is that, by establishing very clear boundaries of authority that specify the parameters for decision-making, the potential for conflict based on personality or style of advice may be reduced.

Jack describes this solution as the key to making the new system work effectively. If there are formalised systems that dictate who gets to make the decision on an issue, then hopefully such conflicts will be resolved on the basis of clearly defined authorities that are perceived to reflect the formally defined priorities of the organisation.

#### **4.10.3 ENGINEERING FOCUS AND STRATEGIC GOVERNANCE**

The clear differentiation of specific authorities in relation to operational safety is also significant to the strategic objectives of process safety management within Company J. A key component of the proposed system is the centralisation of responsibility for the development and management of the organisation's safety cases. As safety cases are the main focus of regulatory oversight, the strategic objective is to ensure that regulators are interacting with a single functional hub. That centralised hub is proposed to comprise those safety specialists who are focussed on the governance aspects and oversee all of the safety cases associated with ongoing operations within Company J.

There is still considerable debate on the details of how responsibilities should be distributed between the centralised function, the engineering group and operations. Jill, Jack and Jason each have their own views, priorities and concerns with existing processes. The proposed management systems are perceived by these three interviewees to address various issues and do not offer solutions to several key concerns that they each hold.

Jack discusses the proposed structure in terms of gathering and supporting appropriate capabilities and competencies. He makes it clear that the responsibility for performance

and daily implementation must remain with the operations line. The engineering group is to provide specialist skills and technical expertise to assist operations with inspection, testing and maintenance. While Engineering will manage the safety performance standards, they also manage technical codes and process standards for operational discipline and efficiency that are broader and more comprehensive than safety standards. The Engineering group will therefore be dealing with refinements to processes and systems that are considered to be valuable to improve productivity as well as safety.

Jack expects that there will always be a tension between the detailed focus on a specific technical process or problem and the broader operational issues of production that the engineering group will be required to navigate. Jack considers that the proposed formalised work processes will clearly define the deviations and modifications that fall within the purview of the Engineering group and ensure that the implementation of safety performance standards remain the responsibility of operations.

Jack's vision for the strategic governance of safety cases is that they will become the responsibility of the centralised functional team, which will be staffed with specialists who liaise with regulators and oversee the review and update of performance expectations. This centralised team is planned to be expanded considerably to ensure that the technical and strategic competencies that are required are readily available. On this point, there is concern expressed by both Jill and Jason. Jill does not expect that a centralised governance team that manages all of the safety cases will satisfy the needs or expectations of industry regulators in reviewing Company J's. Jill believes that regulators prefer to interact directly with the operators and engineers who are responsible for maintaining the facilities and processes that are defined as parameters of a safety case.

Jason is optimistic but is concerned with the lack of genuine understanding of the different requirements for operational safety management than for HS management. The proposed system continues to fragment the overall management processes, with several different groups holding different responsibilities.

The proposed restructuring will provide better opportunities for the Engineering team to work with the centralised functional team. However, the underlying issue is that not all of the engineers or the HS specialists have the capacity to understand and manage process safety risks and issues. Jill shares this concern as the broader and more fundamental issue of operational safety management. She predicts that keeping engineering focus separate from centralised governance may exacerbate issues rather than resolve them.



The benefit of centralising oversight is considered by Jill to effectively be trying to “add on” a level of maturity. Her stated concern is that if the strategic responsibility for operational safety is considered to be distinct from the inherent responsibility of the operations lines to operate safely, how is it possible for the organisation to actually mature? It is clear that while the proposed changes are welcome, not all of the details of the restructuring of roles and responsibilities are agreed amongst the key stakeholders.

In particular, the continued ownership of the specialised Engineering function by the operations line is expected to continue to limit their interaction with a centralised HS function that remains independent of operations. The crux of the issue seems to be how to systematically ensure centralised strategic oversight of the detailed and technically specific aspects of process safety that contributes to cohesive operational safety management across Company J. The issue of integrating those operational safety aspects related to major projects, which are managed in a completely separate group that is structured to operate independently of both operations and HS, is another complication of this debate.

#### **4.10.4 TRANSITIONAL STRUCTURES**

Company J separates its local projects from local operations at the highest levels, with the Executive Managers who are responsible for Major Projects reporting directly to the CEO. This is primarily done to facilitate and optimise design in keeping with global standards and the experience and expertise of the international organisation. In fact, there is a globally centralised team of technical specialists who provide support to Major Projects and answer to a global lead with no accountability to even the local CEO. There is reportedly very limited interaction between these globally based specialists and the local technical specialists, in either HS or Engineering. This is a barrier to communication around operational safety issues during the design phase and the implementation phase, both of which have implications for how safety is addressed when projects become operational.

As all major projects eventually need to be incorporated into ongoing operations, the transition from design and development requires strong continuity. The projects must ensure and demonstrate safe design; be developed along lines that ensure safe operations; and must effectively demonstrate the safety case. The critical issue for operational safety with the current structure, as seen by Jill, is that such continuity will require far closer collaboration between Operations and Major Projects than is currently established. Jason also indicates his concern that his engineers, while having some insight into how projects are developing, do not have any opportunity to provide input. Instead, a transient team of project engineers and technical specialists are involved in the early stages and they liaise

with the global specialists to consult on specific technical issues. There is inevitably a concern that local compliance requirements are not adequately understood and incorporated in the design phase of major projects.

There is as yet considerable work to be done in addressing this issue, as it is not just a local paradigm that can be corrected or adjusted by local restructuring and the proposed changes that are being implemented by Jack. However, a crucial step towards a solution is the strengthening of the local HS team of risk management and operational safety specialists with better resources and broader competencies. The expansion of Jill's team to better address operational safety management within Company J is hoped to eventually have a positive impact on global standards much like the Australian safety case model currently establishes some of the global performance standards.

The expectation is that eventually members of Jill's team will be able to systematically ensure that Major Projects demonstrate appropriate control in design and specification before handover to Operations. However, this may not eventuate as Major Projects report up along completely separate and independent lines of accountability to Company J's CEO and beyond to various technical centres in the global corporation. The issue with the organisational structures around management of major projects seems to exemplify some of the broader issues within the organisation. There is an expectation that the organisational structure will be changed with each project as it is developed and incorporated into operations. Such transience in the organisational structure reflects a need to focus on constantly changing how things are done within Company J in order to meet transitional needs. This is not the same as evolving or maturing which requires an improvement in how things are done to adapt and meet ongoing variable needs.

There is a stated intent for the new structure and systems to improve and expand process safety management within the organisation, supported by increased resources and capabilities. However, that growth may not translate to mature safety management given the evidence of ongoing changes, which raises a concern of whether there will be adequate time invested in maintaining the new structure and new systems before further change.

The current proposal for restructuring makes broad sweeping changes to the HS function and incorporates systems of management that will establish different relationships and processes to those that are currently established. Jill expresses a sense of disappointment that she is unsure of her own position and that it is possible that her own work in developing certain processes and relationships to better manage risk and process safety in Company J will have to be set aside rather than built upon. Jill is a key stakeholder in

operational safety management and the current head of the risk and process safety team within the centralised HS+ function, but does not know her place in the proposed structure is quite significant. The best interpretation is that there is still uncertainty with how the transition is to be implemented or that formalised systems are not yet developed. The lack of a position may also suggest that Jill's contributions to date are not a component of the proposed management systems and her own position and status may not be secure.

The most telling aspect of these discussions is that process safety management seems to have a clear profile in the organisation and it is now receiving considerable attention to ensure that significant improvements in capability are implemented and sustained. Given that Jill's original functional focus was to promote process safety management within Company J and establish its significance, there should be less doubt as to what her role would be in this improved and expanded system. However, there is a sense that the organisation is so used to dealing with restructuring that the associated change management processes have somehow overtaken and moved beyond Jill and her specific functional responsibilities. While it is made clear that there is a focus on operational risk and safety capabilities, the existing functional team responsible for managing risk and process safety issues is not even acknowledged in the proposed structure.

#### **4.10.5 ORGANISATIONAL DYNAMICS OF OPERATIONAL SAFETY**

There is some difficulty in discussing the organisational dynamics of operational safety in Company J. Not only are the roles and responsibilities widely scattered throughout the organisation, but sweeping changes are also being proposed and are almost ready to be implemented. In addition, each of the research participants from Jill's centralised team discuss quite different processes of managing operational safety. Jill speaks of managing relationships and finding like-minded advocates; John speaks of a global community of specialists and of supported oversight through quantified risk and hazard identification; and Jenny speaks of building awareness and engagement to facilitate compliance. This discussion focusses on the observations of current organisational dynamics with reference to the proposed changes if they are noted to be addressing current issues.

The main centralised function is managed by the Executive Manager of HS+ whose broader organisational responsibilities, including capability development and security, preclude a designation as the potential POSS. Instead, the potential POSS role in Company J is most likely to be assigned to his direct report, the Senior Manager of HS who is only two levels below the CEO and leads a team of functional HS specialists. The Senior Manager of HS is responsible for providing HS and operational safety management services and advice.

It should be noted that there is actually very little reference to local executive leadership, either functional or operational, in discussions with any of the five research participants. The story of the lack of support along the functional line and the current uncertainty around future HS roles suggests that there are not particularly strong connections between hierarchical levels, such as between Jill and the functional Senior Manager of HS+.

The process safety specialists in Jill's team refer to a global head of technical safety and connections with an independent group of subject matter experts beyond the local structure of Company J. This global group does not seem to provide actual authority or accountability. However, they are mentioned as moral support through expert advice on contentious matters or complex issues. The only source of genuine support when it is needed appears to be from various governance boards. These committees are not structured into the organisation but exist as separate, independent entities with specific areas of interest such as process safety and risk management or operational excellence. The practice of providing performance reviews and reports to these oversight boards increases visibility and therefore allows for some influence to be exercised by the associated safety and technical specialists.

The principal barriers to influence within Company J are discussed as the degree of compartmentalisation of both various activities and various responsibilities; and the lack of genuine understanding of risk and operational safety. Jill speaks mostly of managing relationships and selecting appropriate terminology to advance and promote operational safety. For example, Jill avoids referring to safety cases when talking with members of the Major Project teams as this immediately creates a misunderstanding of intent. Instead she deliberately refers to performance expectations, design parameters and demonstration of safe operations, which are essentially how the components of a safety case are defined. Jill and her team ensure that the terminology that they use does not create barriers but instead encourages engagement with concepts of risk management and process control.

Process safety is a focus of corporate attention but is reportedly caught up in the processes by which personal safety was previously addressed. In Jill's opinion, the last decade has seen a clear focus on personal safety and development of maturity in managing HS risks. She expects that this decade will see the focus shift to process safety across the industry and within Company J. However, the same processes of oversight and management may not be appropriate as there are few ways in which to summarise the technical details of operational safety management to reliably and accurately convey implications. There is some concern expressed by both Jill and John that much of the oversight will depend on

how issues are communicated due to this lack of genuine understanding of the differences between personal and process safety. They have observed that this misunderstanding can leave various operational safety parameters open to misinterpretation, misrepresentation and even manipulation, which reduces their value as KPI.

Jason discusses that the Engineering function will use detailed dashboards of facility status to maintain a clear line of sight of operations and critical parameters related to asset integrity. This will provide a clear footprint of the operational situation and ready identification of deviations from optimum performance. The Technical Authority for responding to such situations is proposed to be clearly established in work processes leaving no room for personalities to interfere with decision-making. It is also expected that the legitimacy of Technical Authority is grounded and clearly defined by the management of competency and currency of expertise for engineering. There is no such line of sight or authority discussed for the centralised safety function.

The most significant findings, from Company J, are that:

- even when leadership support for safety initiatives has been obtained along functional lines of the hierarchy, common organisational practices can impede or prevent the implementation of approved works (such when operations managers retain financial authority for budgets and safety managers have no independent process for accessing company funds without the operational manager's approval);
- functional experts who have direct access to senior managers to escalate significant issues may also need actual support and trust from senior managers to reinforce their judgement and influence in issues and conflicts at the lower level; and
- even in organisations that have significant investments in hazardous activities and assets, there can be a lack of appreciation of the significant gap between the detailed technical focus required for operational safety management and the broad strategic oversight and governance that is implemented as a means of "centralising" the functions of safety management, which cannot convey detail or complexities.

## 5.0 DISCUSSION

### 5.1 OVERVIEW OF ISSUES

This research project examines Hopkins' hypothesis that a centralised functional structure for technical experts and safety specialists will increase their influence in prioritising safety issues in operational and strategic decision-making. Participants, from nine corporations that are involved in high- to medium- hazard industry, have described the positions and functions of the technical and safety professionals who manage operational safety. The data gathered from these interviews have been presented as case studies in Section 4 to detail their organisational salience and discuss the organisational dynamics and common practices related to their perceived influence within their own organisations. These aspects, including the most significant themes from each participating company, are summarised in Section 5.2 for easy reference in the following discussions of the research findings.

The key findings are firstly discussed in terms of the differences between the postulated ideal POSS and the identified potential POSS roles in each of the nine organisations. The ideal POSS has been defined as the operational safety specialist role within a postulated ideal structure that adopts Hopkins' hypothesis in its entirety. In such an ideal structure, there is a fully centralised and independent function to integrate and manage operational safety activities with representation on the executive leadership team, answering directly to the CEO. This conceptualisation (detailed in Section 3.2) allows for analysis of highly complex organisational structures to be simplified. Rather than considering possible ways to meaningfully define and determine degrees of centralisation, specialisation, functionality and hierarchy, each potential POSS identified in the research is compared to an ideal POSS with reference to their organisational salience. The three essential and defining attributes of organisational salience are as previously defined: technical competence, functional independence and access to authority; which are discussed in Section 5.3.

The research findings are then discussed in terms of the critical themes that relate to how organisational dynamics and corporate practices, that are associated with a potential POSS' position and functions, are observed to either support or undermine each POSS' influence. Section 5.4 considers the ways in which operational safety professionals are adopting, adapting, challenging or bypassing their defined roles (that seem too broad) and their delegated authorities (that seem too narrow) in order to fulfil their responsibilities. The discussion focusses on the most significant factors identified, amongst the participating organisations, that are seen to modify the POSS' influence (including the organisational

structure). The common factors identified to be of relevance to the central research concern are: personal credibility of individuals, including an “ability to influence”; systems of management, that provide for additional authority or interaction; and the support of leadership, particularly of the CEO, that is seen to reflect and reinforce corporate priorities.

The research findings indicate that Hopkins’ hypothesis can be extended to consider the structured position and defined functions of potential POSSes along with the other three modifying factors when prioritising operational safety. So, the organisational design of operational safety roles; the management systems that co-ordinate activities; and the reliance placed on personal attributes and informal relationships can all be used to establish the intended and actual influence of operational safety professionals. The most critical finding of this research is that organisational structure is seen by many interviewees to reflect corporate intent. Section 5.5 considers if and how Hopkins’ hypothesis could be elaborated based on these findings to guide organisational design and reflect its intent.

## **5.2 SUMMARY OF CASE STUDIES**

### **COMPANY A**

There is no centralised operational safety function in Company A but the operations management system that is implemented across the organisation centralises management of several operational safety activities. There are two roles in Company A that are identified as potential POSSes. The more senior of these roles is the corporate Safety Manager who has direct accountability to the CEO and access to the executive leadership team. She has oversight responsibilities for safety performance and has no operational or commercial responsibilities or priorities. She is potentially a POSS by virtue of access to authority and functional independence. However, this role is not perceived to exercise much influence within the organisation and is seen to be predominantly a reporting function to liaise with the global organisation of which Company A is a subsidiary.

The other potential POSS is also independent of operational accountability, reporting to the functional Executive Manager of Operations Support. This role is the most experienced and senior of the regional Technical Support Managers and has responsibilities to support the operational Executive Manager of his local region. The position requires considerable technical expertise and has some defined authorities based on functions that include the interpretation of regulatory requirements into the operations management system. The influence of this potential POSS is also enhanced by a personal reputation for professional competence and his responsibilities are seen to be both significant and prominent. Both his

technical expertise and long experience are accessed more broadly and informally by other regions as well as his own. He is potentially a POSS by virtue of technical competence, functional independence and access to authority, being only two levels below the CEO.

The most significant findings from Company A are that the:

- hierarchical position of a role can be deprived of influence if the designated responsibilities associated with that position are circumscribed;
- the personal credibility derived from professional competence can expand the degree and extent of influence beyond what is structured in the organisational design; and
- effective systems of operational management can provide considerable influence, though it may be indirect and rely on informal, personal attributes.

## **COMPANY B**

There is no centralised operational safety function in Company B but the centralised HSE+ function provides a genuine example of how organisational design enhances the influence of safety specialists. The project-based safety professionals have autonomy to prioritise their own responsibilities, provided through the HSE+ functional hierarchy which is structured as a matrix across the operational hierarchy. One experienced safety professional at a node of this matrix structure is reported to be able to assess issues independently and respond to pressures from both of the managers to which he is responsible. Such successful delegation is the key advantage achieved by the matrix dynamic which is well-supported in Company B.

The role of Executive Manager of HSE+ is considered to be a potential POSS. She has a position on the organisation's leadership team with direct accountability to the CEO and access to the senior decision-makers of Company B; and also has independent functional responsibility to HSE+, rather than to operational or commercial priorities. She is a potential POSS by virtue of functional independence and direct access to the CEO's authority.

The most significant findings, from Company B, are that:

- structured independence and authority allow the HSE+ function to exercise considerable influence at both the corporate level and the project level;
- strong support by the CEO reduces the level of conflict perceived to exist between operational and HSE+ priorities; and



- a competent individual can successfully utilise delegation of authority down a functional line of hierarchy to enhance both influence and positive interaction in an operational line of hierarchy.

### **COMPANY C**

The most prominent role in the current (soon to be previous) organisational hierarchy of Company C that displays POSS attributes is the Senior Manager of HSE+ by virtue of access to authority, two levels below the CEO, and functional independence. However, this role is limited in both scope and authority. The proposed (newly modified) role of Senior Manager for Safety will comprise the leadership of a centralised functional group of various safety specialists, including technical safety experts, throughout the organisation.

There is currently limited interaction of the many professionals involved in diverse operational safety activities and very weak organisational structures or systems that could support any communication of operational safety issues. The lack of any functional integration has hindered efforts to coordinate activities and share knowledge across the organisation. The lack of appropriate reporting and the comprehensively documented HSE operations management system have jointly given rise to a misleading sense of confidence based on a misconception that “no news is good news”. The reality is that the small centralised HSE+ group has had inadequate resources to ensure the implementation of corporate HSE+ procedures or to verify that corporate HSE+ standards are maintained.

The leadership of Company C has come to realise that active and persistent decentralisation has permitted isolated attempts to address operational safety issues to remain disjointed. A new CEO is motivating and supporting the implementation of a new corporate structure that is planned to centralise functional communication. Fundamental systemic failings of operational safety management are now being identified and addressed in many of the routine practices of the organisation, such as with competency management.

The most significant findings, in Company C, are that:

- inadequately resourced corporate oversight does not provide genuine governance or assurance, regardless of comprehensively documented HSE+ policies and standards;
- a highly placed POSS cannot exert influence on operations without any structured authority or lines of communication to other operational safety professionals; and
- leadership actions will establish and reinforce what skills and behaviours are valued.

## COMPANY D

The senior manager of HSE+ of Division A is the most-likely POSS position in Company D by virtue of both access to authority, only two levels below the CEO, and some technical competence. His focus is to promote operational best practice with no direct commercial responsibilities related to the role. However, his accountability is to the Executive Manager of Operations in Division A which is seen to adversely impact the scope of his role and to limit his responsibilities. His actual functions, and associated authority, are dependent on the priorities of a direct manager whose own responsibilities are focussed on commercial success and production issues.

There is also a senior manager for operational compliance in Division B who is lower in the organisational hierarchy but also qualifies as a potential POSS. The role comprises the functional leadership of a team of specialists in a range of operational safety activities. There is no centralisation of operational safety activities or personnel in Company D and each of these two roles is limited to their own Division. They have little interaction or communication with each other, either within or outside their established functions.

Company D has recently moved away from a more centralised and independent safety function that reported directly to the CEO. This change is observed to have directly affected the influence and status of operational safety specialists and safety professionals. The consequences of the loss of independent authority are apparent in a demotion from the previously proactive policing of operations to the current responsive on-call delivery of services to operations. There are also subtle but significant changes such as that now the corporate group only write up the operational performance standards instead of actually interpreting regulatory compliance requirements as they previously used to do.

The most significant findings, from Company D, are that:

- without structured authority, operational safety specialists have to rely on the attention and interest of authorised decision-makers to exercise any influence;
- the conflict of interest when operational safety is not independent of the operational hierarchy can have an impact on the perception of influence even if only once removed from the CEO in the structure; and
- personal attributes, such as an ability to influence others; a capacity to challenge your boss; and a reputation for integrity, are actually being considered as adequate alternatives to formally structured authority as principal sources of influence.

## COMPANY E

Operational safety responsibilities are recognised in Company E as very important but the organisational structure is highly decentralised to suit commercial demands. There is no structured interaction between various operational safety activities such as regulatory compliance, operational excellence, asset integrity, risk management and engineering. The leadership has established formal, corporate committees that are overlaid across the organisational hierarchy to overcome structural limitations. These committees emphasise regular and open lines of communication between the authority of senior management and the expertise of the structurally disconnected operational safety specialists.

The overlaid committees allow Company E to achieve both continuity and centralised oversight despite a decentralised and impermanent operating structure that is designed and modified around business interests. The motivation for safety prioritisation is reported to be high, and is attributed to the personal attitudes of executive leaders. The impact of attentive support from the Executive Managers, the CEO and the Board is seen to enhance the influence available to safety specialists with direct access to senior decision-makers.

The organisational structure is too fluid and decentralised for the postulated POSS concept to be used as a meaningful measure. However, there is a system, of formal committees, that elevates the senior technical manager to a safety committee position providing direct access to the CEO and several executive managers. In this capacity, he is a valued technical expert addressing operational safety matters as a central concern for the organisation – effectively possessing attributes of a POSS though not in the position of a POSS.

The most significant findings from Company E are that:

- overlaid systems of interaction are established outside the organisational structure to be utilised to coordinate operational safety and provide centralised informed oversight;
- direct involvement of a motivated leadership team can reinforce the priority given to safety at lower levels of the hierarchy and establish direct lines of communication to address incidents and issues of significance; and
- basing organisational design on aspects of business creates a high degree of structural fluidity and there is an associated sense of impermanence that suggests that transient roles and transient responsibilities are accepted as inevitable.

## COMPANY F

The most likely POSS is identified as the HS+ Manager in the largest business unit of Company F, by virtue of functional independence and access to authority, being only two levels below the CEO. The corporate Safety Advisor is the most highly placed person, answering to the CEO, with responsibility for oversight of safety performance, including operational safety, and can be considered a potential POSS. Despite seniority, she is not the most likely POSS as her functions are specifically governance and assurance. There are also several other potential POSS roles amongst various engineering team leaders who manage functional groups and have local technical responsibilities. Also, the largest business unit has a Manager of Operational Excellence who leads a functional team of specialists, with operational safety management responsibilities who answers to the most likely POSS.

Organisational structure is discussed by interviewees as “easily the most significant” factor affecting the influence of operational safety professionals in Company F, with corporate restructuring having only recently centralised many safety accountabilities. The old structure was recognised to have created and sustained significant disparities between business units; between sites within the same business unit; and even between facilities on the same site. The three HS interviewees observed clear benefits of both functional independence and influence within the newly structured hierarchy. There is an expectation that best practice standards can be achieved more effectively and maintained more consistently with this configuration of accountabilities than with the previous structure that had isolated the various safety professionals.

The most significant findings from Company F are that:

- consistency and reliability of operational safety discipline relies upon the continuous engagement of executive managers and operational managers with the technical experts and safety specialists;
- the conflict with business priorities is reduced if the inherent value of operational safety management can be demonstrated by ensuring that management systems focus on observation and improvement as priorities instead of on documentation and reports;
- operational safety management has to be “grounded below” (as well as “driven from above”) to avoid being overwhelmed by corporate restructuring or being vulnerable to the “constant shuffling” of executive leadership and the associated politics; and
- technical credibility and a professional community can extend personal influence.

## COMPANY G

There is no centralised operational safety function in Company G but the Senior Manager of HS+ leads a fully centralised functional group, responsible for health, safety, technical risk and integrity. She is the highest placed local safety specialist, being accountable to the Executive Manager of Corporate Affairs, and is considered to be the most likely POSS by virtue of functional independence, access to authority and technical competence. Her role predominantly involves the management of a large functional group of about one hundred HS+ staff, whose positions, performance, priorities and professional development are dictated by the HS+ function. This is a strong lateral overlay that approaches a matrix structure in terms of dual accountabilities.

Apart from the small group of engineers and experts within the HS+ group, there are various other technical experts, predominantly in engineering teams, that are embedded within the operating lines. They contribute significantly to operational safety activities. Though they are not part of the centralised HS+ group, they comprise the majority of the Technical Authorities and risk specialists who work on risk and safety management.

There is a comprehensive system of technical and engineering authority implemented across Company G with custodians and sponsors to escalate operational issues to the attention of senior technical professionals and managers. HS+ professionals also have authority to issue prohibition notices against operating activities and decisions.

The most significant findings from Company G are that:

- the perceived status of a functional group is altered even when an administrative intermediary with no conflicts of interest is introduced between the CEO and a POSS role and diminishes the self-perceived influence of all members of the function;
- misunderstanding of the complexities of operational safety management and misrepresentation of details through inadequate or inappropriate KPI is of significant concern in reliably communicating information up the organisational hierarchy;
- direct access to reliable specialist advice can be confused with casual discussion of high-level decision-making without appropriate and formal systems and consideration of clearly specified accountabilities and clearly delegated responsibilities; and
- personal and professional competencies greatly impact on available opportunities for strategic responsibilities and positions of executive status.

## COMPANY H

The Executive Manager of HSE+ in Company H is identified as the most likely POSS with direct accountability to the local CEO and reporting access to the HSE+ global counterpart. He has an independent functional team with only HSE+ priorities. This role approaches the ideal POSS role in terms of both functional independence and access to authority but is held by a safety specialist.

The Engineering Managers, of each of the organisation's three operating Divisions, provide technical expertise for operational safety management as a separate function but are accountable to the operational Division Managers. They are also potential POSS roles by virtue of their technical competence and access to authority, only once removed from the CEO. They are each a distinct function but have operational as well as safety responsibilities and are directly accountable to their own separate operational managers, who have commercial and production priorities.

The organisational structure of Company H is quite deliberately designed to ensure that influence and authority are available to specialists and experts involved in operational safety management. There is a strong functional line of accountability for HSE+ specialists that is established outside of the operational hierarchy and reports directly to the CEO, validating operational safety as a fundamental corporate priority.

The HSE+ interviewees confirm that they have influence as both advocates and advisors and they express confidence that their positions are both significant and vital to Company H. The structural issue of most concern is that the majority of technical experts involved in operational safety activities are led by the division-based Engineering Managers who answer to operations.

The other most significant findings, from Company H, are that:

- highly visible leadership commitment can define safety as a prerequisite to operations;
- formalised management of competency can elevate credibility of specialist's roles;
- comprehensive and comprehensible systems link technical integrity to safe operations and provide transparency of all levels, right to the top.

## COMPANY J

The Senior Manager of HS+ leads a functional team that provides several specialist support services. He qualifies as a potential POSS by virtue of functional independence and access to authority. However, technical competence is another level down the structural hierarchy, associated with his direct report who leads a specialised team focusing on operational safety and risk. The principal Engineering Manager is also a potential POSS by virtue of technical competence, access to authority and leadership of a distinct function. However, the role is accountable to an operational Executive Manager who has various responsibilities that may be in conflict with operational safety priorities.

The organisational structure of Company J is highly decentralised and interactions between operational and functional groups are complex and variable. The ultimate responsibility and authority for operational safety resides with the operations managers and major project managers. There are several centres of technical excellence within the broader organisation that can be accessed at the discretion of these managers. There is no single operational management system or process currently implemented, though there are concrete plans to restructure HS+ to provide technical services and develop a focus on operational safety.

The various operational safety professionals who were interviewed have widely different experiences related to their own roles and their managers. In particular, they rely on different forms of influence, including: personal persuasion and relationships; specified and limited technical authorities; interpretation of regulatory requirements; and formalised corporate performance standards.

The most significant findings, from Company J, are that:

- the established approval and support from higher levels of management cannot penetrate middle management without financial authority for resourcing safety programs when operational managers are solely responsible for approving funds;
- there is a difference between access to senior managers for escalating issues and actual support from senior managers to bolster the judgement and influence of site-based specialists to manage and resolve operational issues and conflicts; and
- there is an ongoing lack of appreciation of the significant gap between the detailed technical focus required for operational safety management and the broad strategic systems that are implemented for oversight and governance, which cannot necessarily identify or communicate technical complexities.

## 5.3 CONSIDERING ORGANISATIONAL SALIENCE

### 5.3.1 COMMON FINDINGS

The search for the most-likely POSS based on their organisational salience has revealed significant discrepancies between the understanding of best practice that is acknowledged by interviewees and the actual organisational design. In the context of operational safety management as a necessary function of hazardous industry, there are no positions or functional structures that centralise and integrate associated roles and responsibilities. Of the nine participating organisations, there are only two in which there are indications of operational safety management being treated as one functional responsibility.

Though all nine companies have some form of centralised group addressing broader HS+ issues, these do not include many of the operational safety experts who are typically in the engineering or technical support groups. In Company C, a new CEO is restructuring the safety function to integrate a broad range of technical experts and specialists, including those engineers involved in operational risk and process safety. In Company H, the centralised safety function includes several engineers and technical specialists with adequate competence to maintain a focus on risk and integrity and to liaise with the operations-based engineers.

The fundamental operational safety activities of: equipment and plant maintenance; process and performance monitoring; and safety-critical-process control and optimisation, are also typically distributed amongst several operations groups, amplifying the issues of decentralisation. Commonly, oversight activities are the only ones that are included in centralised functions with other similar activities for HSE+: such as corporate governance and assurance; and operations support. These activities include strategy and policy development related to standards and management systems; review and reporting of safety performance; targeted safety audits and change management processes; and provision of specialist advice and support for regulatory compliance.

The most significant finding, with regard to how structure addresses operational safety, is that: amongst all nine of the participating organisations, there are no examples of any senior safety management roles that could be considered to approximate an ideal POSS role. The potential POSS roles that are identified are rarely occupied by safety professionals with technical expertise in operational safety. It is an unambiguous and universal concern that the more technical, detailed and focused operational safety activities that are fundamental to operational discipline are consistently and unequivocally in the control of



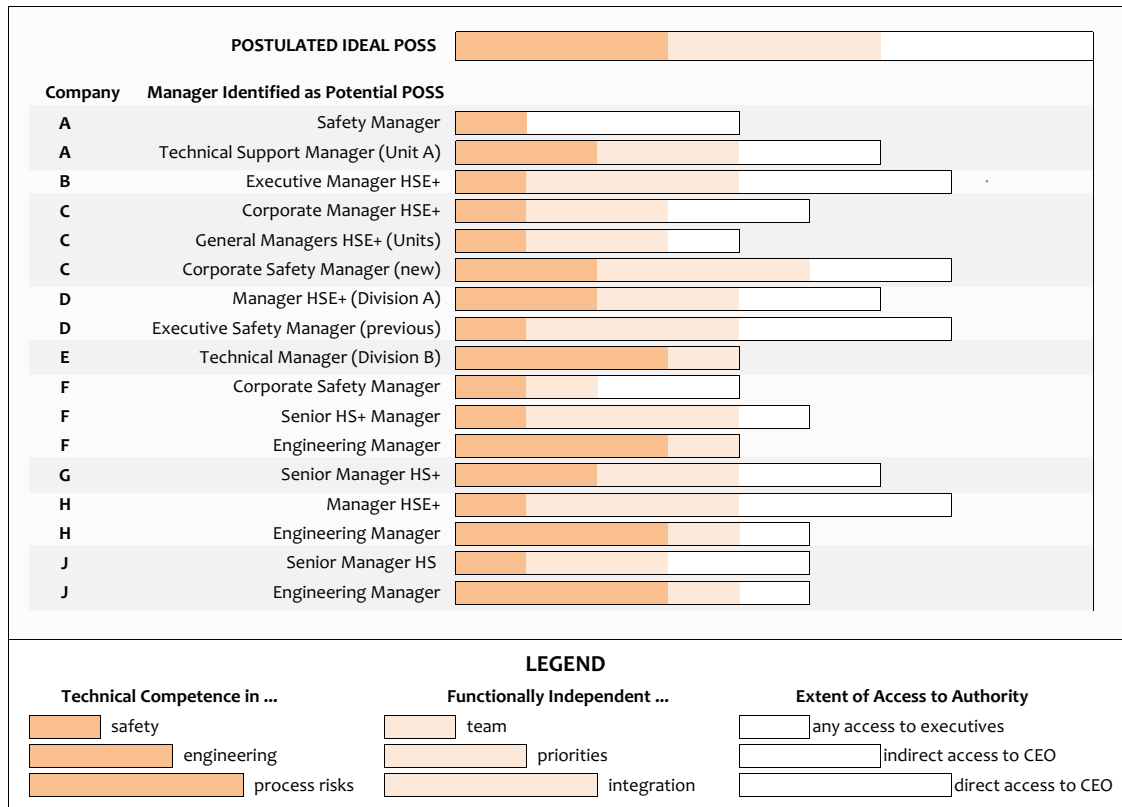
operational managers. The operational managers may be at the executive level; senior divisional or regional managers; site and facility managers; or operating line supervisors.

The central research question considers the impacts of organisational structure on senior functional roles with access to leadership. So, deliberate selective attention is given to interviewees with adequate status for a strategic perspective. A customary lack of status has considerably reduced the research attention that is given to those technical experts involved in operational discipline who are the most relevant safety professionals in the context of operational safety. Even those who lead specialist functional teams are found to report to operations managers. Their functions are found to be clearly demarcated with quite specific responsibilities for particular processes or aspects of operations. These are constraints that preclude their involvement in determining broader organisational priorities and limit their influence on strategic and operational decision-making.

Of the various potential POSS roles that are identified by the interviewees from the nine participating organisations, those who are most like an ideal POSS are the highly placed managers of independent HS+ functional groups. These HS+ roles may answer directly to the CEO or to executive managers with no operational accountabilities. Such roles have more strategic perspectives of operational safety and more ready access to the most senior decision-makers in the organisation. There are a few potential POSS roles identified as Engineering Managers, who are technical specialists and lead functional groups. They are managed independently of the operating lines except that they ultimately answer to operational executive managers.

Figure 5.1 presents a summary of the potential POSS roles identified in this research, qualified in terms of the three defined characteristics of the postulated ideal POSS. Technical competence is illustrated as: only safety expertise, such as HS+ managers; actual technical expertise such as engineering managers; or the process risk and safety expertise of operational discipline that would be expected in an ideal POSS role. The aspect of functional independence distinguishes between: leading a functionally independent team, such as corporate HS+; having functionally independent priorities, such as a technical support group; and having functionally independent integration of all of the technical experts within the organisation who manage operational safety activities. Access to authority qualifies whether a potential POSS has any access to executives or if they actually have either indirect or direct access to the CEO. It should be noted that there is no suggestion that any quantifiable value is assigned to any of these characteristics, including each of the indicated qualifiers. The research in fact shows that there are obvious

dependencies between the three different traits which precludes simplification to a cumulative total. Therefore, neither Figure 5.1 nor discussion of its implications, is intended to suggest that there is a specific or common standard. Instead, the purpose is to provide a visual aid for a comparison of the traits that are observed to be associated with the structurally defined positions of each potential POSS.



**Figure 5.1 Characteristics of the Organisational Salience of the Identified Potential POSS roles in participating organisations compared to Characteristics of the Postulated Ideal POSS role**

It must also be emphasised that this graph is a qualitative summary of the organisational salience of each potential POSS role for comparison against the postulated ideal POSS role shown at the top. It is appropriate to compare those within the same company but there are many structural differences between the nine companies that limit interpretations between the roles in different organisations. Each of the three critical characteristics is discussed in terms of the illustrated traits in following sections.

**5.3.2 TECHNICAL COMPETENCE**

In the majority of the participating companies, technical expertise is found several levels below the CEO and typically in various engineering support roles. The engineers and specialists have the core technical skill base for activities such as operating discipline,

process control, risk management, asset maintenance and hazard identification. They are not typically included in any centralised group for the integrated oversight of safety management. It is also common to find that the technical experts and the safety specialists that directly impact on operational safety performance do not interact with each other, or with the safety professionals who have strategic functions. This is observed in structures that are highly decentralised without even a strong functional corporate team as well as in structures that have an integrated functional group to address overall safety or HS+.

In identifying the most likely POSS roles by virtue of technical competence in operational safety, the most qualified would be highly recognised subject matter experts who are acknowledged for their experiences and mastery of their specialised discipline. They typically hold positions that: are isolated from other operational safety specialists; are not highly placed in the operational hierarchy; and may not even be formally recognised as having any defined authority. Their roles are limited to providing specialist advice to operations and their focus is typically quite narrow. There are engineering managers with technical competence to appreciate operational safety issues, but more than half of the potential POSS roles only had some safety expertise. Several highly placed functional managers are not included as POSS roles because they have no safety experience at all.

A crucial function for technically competent professionals that is encountered in all of the nine organisations is the responsibility for interpreting industry regulations and setting performance standards that operations managers must comply with. In many cases such technical input includes oversight responsibilities for assurance, such as audits of operating sites and facilities with audit findings and recommendations presented as reports on operations performance to executive leadership. This function seems to be the most relevant to operational safety of those POSSes who are identified as technically competent.

The term “Technical Authority” is predominantly used to identify a qualified professional with specific responsibility and delegation of approval around issues such as modifications to, and deviations from, standard operations. These Technical Authorities have specialist expertise but their purview is quite limited, often to only a few specific processes or items of plant. Their authority over the operations line is not only limited to a designated process or asset, but it may also be triggered only by notification from the operating lines and be restricted to tightly controlled management systems. These technical professionals themselves are not often recognised as having authority to impose decisions themselves. In many cases, a sponsor is nominated to bolster a Technical Authority’s recommendations

and stipulated requirements for compliance. It is clearly expected for conflicts to arise that will inevitably need to be resolved at higher levels of the organisational hierarchy.

Several organisations recognise the technical expertise of engineers as a functional resource and the chief engineers are treated as functional managers who are not limited to operational or production priorities. Those that answer only to the executive managers of operating divisions, or to functional support managers are identified in this research as having a potential POSS role because they are functionally independent and have direct access to senior decision-makers. However, as most of these roles are quite limited in interactions with other engineering groups or corporate oversight functions, they have little influence beyond specified operational processes. They are unlike the ideal POSS role because they have responsibilities that are distinct from the more strategic functions that are associated with fully centralised and integrated operational safety management

Some of the centralised integrated functions (based around HS+ and operational excellence) include oversight elements of operational safety such as process safety management systems and asset integrity processes. This functional grouping still does not allow for integration of all such critical operational safety aspects: plant maintenance; process control; operating parameters; and instrumentation. Instead, the focus is on providing for reporting on overall safety performance. The most significant concern with this practice is that highly technical details and complex parameters are summarised as KPI (key performance indicators). Without a high level of technical competence, even the most-likely POSS in an organisation could be communicating inappropriate and even misleading KPI that will not provide a reliable or accurate depiction of potential for safety problems.

Several of the engineering and technical support groups use systems such as operational dashboards that can allow for oversight of the many details and parameters that relate to operational safety management. However, there seems to be a crucial misunderstanding that centralised governance activities that comprise two- or five-yearly facility audits or review of self-reported operational data are appropriate. The continuous focus on verifiable, safety-critical details that is fundamental to operational safety management and a valuable tool for engineering groups is not part of the reporting processes of any of the POSS roles identified in this research.

The centralised functions instead focus on strategy, policy and setting performance standards with an emphasis on engaging and educating senior operations managers or corporate executives on various safety matters. A critical finding amongst the safety professionals interviewed, is the widely-held opinion that a senior safety role requires

leadership, management and communications skills more than technical competence. Those specialists who may be responsible for crucial tasks that require technical experience and expertise confront a universal perception that precludes their access to an ideal POSS role. Some of the interviewees even discuss this view as related to engineers themselves not having much interest in the “soft stuff” that executives and senior managers deal with. So, the technical competence that is associated with a comprehensive understanding of the complex processes and systems that can promote safe operations is not an established trait amongst the centralised and high-level potential POSS roles that have been identified.

### **5.3.3 FUNCTIONAL INDEPENDENCE**

The attribute of full functional independence is found to also be a rare trait of the three definitive characteristics of the postulated ideal POSS. None of the organisations encountered integrate all operational safety activities or professionals in one coherent function. There are several POSS roles shown with functional integration, however: Company B includes only HS+; Company C is still developing their safety function; Company D’s previous safety function has been dispersed amongst its divisions; and neither Company F nor Company H have formal integration or interaction with their engineering groups.

So, there is not a single example, from this sample of organisations and at the time of fieldwork, in which all of the various activities that relate to operational safety management are gathered together in a functional grouping. In all cases, the majority of the technical experts, who are involved in operational discipline and are separate from the safety functions which centralise only the safety oversight activities, remain decentralised and accountable to operations. Roles that relate to engineering, design, maintenance, asset integrity and daily technical support are generally embedded in operations rather than in the centralised independent functional lines. Two of the participating companies – Company C and Company J – have plans to address the obvious imbalance with proposed new structures that integrate more of these responsibilities and communication processes. However, by the end of the fieldwork, a fully independent function that integrated the most significant operational safety activities had not yet been encountered.

It is apparent, from the many discussions with research interviewees, that structured functional independence is recognised as an option but is not considered to be a solution. Alternatives are being sought and trialled in many organisations. Various approaches, other than formally structured accountability to an independent functional manager, include risk and safety committees and technical specialist teams. These groups are created to pull together the most appropriate experts for oversight and governance of overall

performance, or to define the operating parameters and develop the operating standards and systems for specific complex technologies and processes. Though there may be formal processes established for how these groups operate, they are informal in that the members are not actually recognised as a structured group within the organisational hierarchy.

There is another significant concern with the functional groups identified, even those who answer to executives without operational accountabilities. The centralised HS+ functions that have been encountered are most often considered to be providing advice and services to support operations, whether or not they are accountable to operations. Amongst all of the participating organisations, the functions that are structured to be independent of the operations lines are associated with other corporate activities. These typically include functions responsible for: occupational health and safety; environment and sustainability; social responsibility and community; security; quality; and operational excellence. The majority of the research participants are therefore from such centralised functional groups that predominantly have governance and oversight responsibilities, with the expectation of also providing specialist advice and guidance.

Most of the research participants indicate that they are well aware of the conflicts of interests that arise when specialists who have functional roles are positioned within the operational hierarchy. It is widely understood that such roles are then subject to the expectations of the operating managers to whom they are accountable. This is observed to introduce operational priorities such as production, cost and timing pressures that may then outweigh or diminish safety priorities. One of the interviewees, echoing other similar statements, suggests that the fundamental paradox that has to be navigated by all safety professionals is “to do your job right, you have to be ready to lose your job.” It is needless to say that this is an extraordinary attitude to have to adopt to fulfil any responsibilities, let alone those related to actually keeping operations within safe parameters and avoiding catastrophic failures. The most troubling aspect is that this notion is articulated by unrelated interviewees from different organisations suggesting that it is not unusual. There is no consensus on how this common conflict of interest should best be addressed.

In Company D, an attempt had been made to establish a genuinely independent function. A CEO had instituted a proactive centralised operational safety function led by a highly qualified safety specialist. The long-term objective was to intentionally challenge the status quo and to ensure that leadership had direct, independent and reliable advice on safety issues and the performance of the operating divisions of the organisation. However, this structure did not last very long and as leadership changed, what was once characterised as

a centralised, integrated function of all safety professionals in Company D, is now reduced to decentralised, separate teams of specialists answering to their own operational division managers. The functions have reverted from policing compliance (and providing assurance of operations that meet corporate performance standards) to supporting compliance (and providing assistance and advice to operating lines on how to meet performance standards).

Whether or not there are independent accountabilities and priorities, the activities that are described within these functional groups are often referred to as subordinate to operations as a service resource and are responsive to operational demands. Various functions include assurance activities, such as audits, that identify issues of operational performance and report findings and recommendations to address potential issues and non-compliance. These are not strongly enforced with functional response often having to be reactive to operational performance problems that threaten production due to potential regulatory breaches or actual plant stoppages.

The most independent function that has been encountered provides for certain HS+ staff to issue violation notices, though it is reported that the threat is used to coerce action and notices are rarely issued. The majority of safety professionals are discussed as assisting operations to comply with various standards – regulatory, corporate or industry practice – rather than challenging operations to comply. In this sense, though functional priorities for safety may be independent of operational control, they are not considered as fully independent of overarching operational priorities.

To be effective, genuine functional independence requires that the operational safety specialists frame the discussion for decision-making, otherwise alternative priorities and biases will impact the options that are put forward for consideration. Simply establishing interaction of operational safety professionals is a first step that most of the participant organisations have yet to take. Gathering together these specialists in a centralised and integrated operational safety function is a much larger second step.

Most organisations are not choosing to take the direction of fully independent functions that shift conflicts to higher levels of the organisational hierarchy up to decision-makers who can comfortably challenge core commercial imperatives. In identifying the most likely POSS by functional independence, the most common are those whose staff have clear functional lines of accountability and enough organisational support for functional priority that operational safety can be promoted to gain the attention of operations managers.

#### 5.3.4 ACCESS TO AUTHORITY

Consideration of a potential POSS' access to authority is related to having the most direct access to those who can make strategic decisions on the priority of operational safety activities. Such access increases the ability to reliably communicate the context, details and complexities of issues or incidents; and to advocate for prioritisation of long-sighted safety considerations over immediate production pressures. Ideally direct access to the CEO will ensure that a potential POSS can influence strategic and operational decision-making. The interviewees in all of the participating organisations advise that leadership is well aware of this as a best-practice concept.

It is also recognised that the objective of having such an advocate amongst leadership is to ensure that policies and decisions consider factors other than purely operational and commercial goals. The input of accurate and relevant safety information is also understood to be essential to a corporate governance process that ensures executive leadership is appropriately informed for decisions on significant issues.

All of the participating organisations include such a representative for safety at either the executive level with direct access to the CEO and leadership, or the senior level with indirect access to leadership through accountability to their own functional executive manager, or direct access and functional responsibilities to other executives. The general finding is that such functional representatives are typically responsible for several subsidiary functions related to corporate affairs, such as HSE+ and that these typically do not include technical aspects of operational safety.

There are various issues that have been identified in these roles, particularly that functional executive managers are typically not of comparable status to the operational executive managers on the leadership team. Functional independence may provide access to authority and still include service and support of operations as well as - and sometimes instead of - assurance of compliance to performance standards.

The metaphorical description of one research interviewee characterises the distinction of the potential POSS roles (even those with access to the Board or corporate centres above their CEO) as being more like the postman (responsible for the timely delivery of small packets of information) than the policeman (responsible for making value judgements and with sufficient authority to ensure compliance).



The point of having direct access to powerful decision-makers in terms of the ideal POSS role is to ensure that there is a forum at the highest level for discussion and debate of operational safety priorities and performance. For such a process to be successful amongst the executive leadership team, there needs to be adequate authority for functional executives to be influential. It is a critical finding of this research that the status of highly-positioned HS+ representatives is affected by the limited responsibilities associated with their role, particularly when interacting with other executives who may manage thousands of operations staff and be responsible for major corporate assets. The status of safety executives is also diminished by the fact that ensuring safe operations has to remain a fundamental responsibility of the operational executives.

In many cases, the most highly-placed safety representatives have limited staff and no authority beyond reporting on specific performance indicators. When the POSS roles comprise only the processing of KPI; audits and recommendations; conduct of incident investigations; and reviewing of data that is provided by operating divisions, organisational stature is considerably reduced. Structured access to leadership clearly will increase the opportunities to exercise high-level influence, but it does not necessarily guarantee that such influence is then either adequate or effective.

There is another significant problem with what is only ostensibly centralisation reflected by a high-level position of a corporate safety manager with limited status and authority: in that it can lead to blind or blinkered complacency. If there is no direct accountability and limited interaction with the technical specialists embedded in operations who can actually recognise potential safety problems, those problems cannot be brought to the attention of either the functional or operational managers.

The filters introduced at each intervening level of hierarchy, particularly the operational levels, can lead to a self-defeating cycle based on a lack of transparency. If executive leadership has no access to relevant and accurate details or is protected from negative feedback, the limited and inadequate corporate oversight can be mistaken as effective. If there is a perception of excellence in maintaining appropriate safety performance, because contrary advice is not available, less attention is given when the reality is that more attention is required.

Though the purpose of organisational status and high-level access is widely recognised in all organisations, the formal authorities associated with such positions are impacted by the limited functional responsibilities. The most likely POSS roles identified by virtue of access to authority are those that are highly placed in the hierarchy and have (at most) all

functional responsibilities and (at least) no commercial priorities. In the majority of cases, the most highly placed potential POSS roles indicate that structured access does not equate to actual impact, equal status or adequate influence in decision-making. Instead, there are alternative approaches outside of the organisational hierarchy - such as special committees and reporting processes - that provide technical experts and safety specialists with unstructured but organised access to authority. These are discussed in detail in Section 5.4.

## **5.4 CONSIDERING PERCEIVED INFLUENCE**

### **5.4.1 COMMON FINDINGS**

Discussions with all of the research participants indicates that the hierarchical status associated with each of their specific roles in their organisational structures is universally perceived to affect their available influence. The predominant interpretation of the causal link is that organisational structure is considered to be based on the deliberate and intentional choices of the executive leadership.

The lines of accountability, of responsibility and of communication that are formally established for any position are therefore seen to reflect how that particular position is valued within the company. The specific functions and tasks that are associated with any specific role are viewed as definitions of the scope and range of authority and therefore implicit indicators of the role's expected influence on decision-making within the organisation. The most voiced concern is that organisational structure typically impedes rather than promotes operational safety professionals.

The most significant finding about structured influence, arising from this research, is that operational safety professionals are afforded very few formalised authorities. The most common examples of influence that are related to functional responsibilities as discussed by the interviewees include:

- technical authority to review and approve or prohibit operational modifications or deviations such as new equipment or changes to processes;
- procedural authority related to interpreting regulatory compliance requirements into the standards and procedures for operations to follow;
- authority to conduct audits of operations with various ways of addressing non-compliances generally based on reporting on the urgency of issues and recommendations to leadership; and

- regular reporting to leadership on operational KPI related to safety parameters.

These formal authorities are limited, even when associated with fairly senior positions, and are also found to be predominantly reactive. The ability to garner leadership attention by reporting on audit findings and recommendations is only available after the fact of the non-compliant behaviour. The ability to withhold technical approval of proposed modifications until they include recommended safety factors relies on the input of operational managers. Not only does operations raise the request for approval of a modification but must also comprehensively identify the scope of the issues.

The responsibility for implementing the recommended safety measures for both audit findings and modifications also remains with operations. The regular reporting of safety performance to leadership often focus on KPI that can be misinterpreted, misrepresented or manipulated. Even the raw data for KPI may not involve regular or direct communication with safety professionals but instead rely on self-monitoring and self-reporting by operations personnel.

Interestingly there is a clear discrepancy between the organisational sources of influence that are typically associated with a structured and defined role and those that safety professionals seem to hold. The organisational sphere of activity, as discussed in Section 2, is formally defined by position, functions, interactions, information, qualification, access to resources and access to authority. There is a significant and pervasive trend for these to be quite limited for functional positions. As already discussed, position can be superficial; functions can be restricted; interactions can be limited; information can be second-hand; qualifications can be lacking; resources can be withheld and authority can be circumscribed.

Even those safety professionals who hold fairly senior positions and have authority to promote safety activities can be obstructed by simple and common corporate practices that reduce or limit available influence. The fact that there is rarely any financial authority or budget control assigned to operational safety functions and roles is a particularly significant example. In one particular situation described by an interviewee, a facility operations manager is able to neglect operational safety initiatives and avoid implementing measures that have been formally authorised at higher levels of the organisation.

Even though the facility safety manager has functional support and formal authority to undertake several projects, the facility operations manager, who has different priorities, controls the budget and simply does not allow for the funds to be allocated. Similar

examples of obstructions to circumvent safety priorities are found in all of the nine participating companies.

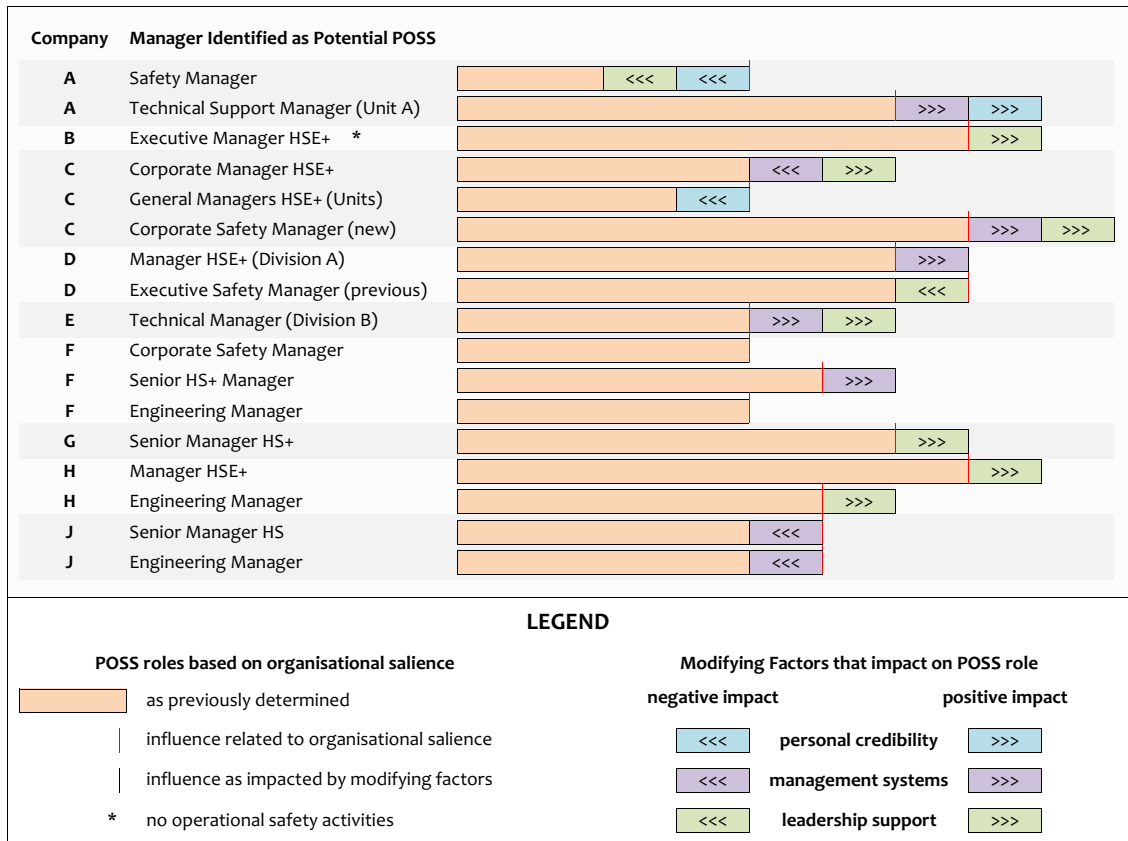
All of the thirty professionals who have been interviewed describe many alternative sources of influence that are needed for them to bolster their limited legitimate sources of influence in order to fulfil their operational safety responsibilities:

- In Company H, the CEO asks for daily reports on operational safety issues so that they can be personally followed up to ensure corrective actions are implemented;
- In Company E, safety committees that include executives and are chaired by technical specialists, provide both the reliable information and the appropriate authority for effective discussions and recommendations;
- In Company F, the operational excellence team liaises with the engineering teams in operations and with operations managers to demonstrate financial benefits or production advantages of safety measures to garner interest and support; and
- In Company J, one interviewee relies on building strong personal relationships with critical people to keep abreast of and perhaps strategically influence decision-making.

It is clear from the case studies that many aspects of organisational behaviour other than those parameters that are related to designed structure and formally defined role are seen to modify available influence. Like organisational structure, these factors can also be: inhibiting and obstructive; or elevating and supportive to operational safety prioritisation.

Company A provides the clearest example, where the organisational salience of the Safety Manager and Technical Support Manager is effectively the same. However, due to differences in reputation, attitude and their spheres of activity, the latter is perceived to have greatly increased safety prioritisation while the other is perceived to have very limited impact. There are several common corporate practices and attributes, amongst the experiences discussed by the research interviewees, that are perceived as critical.

These have been collated from the various themes of significance identified in each case study and categorised as relating to one of three distinct modifying factors: leadership support; management systems and personal credibility. The impact that they have on influence is illustrated as either positively or negatively impacting on the organisational salience of each potential POSS as illustrated in Figure 5.2.



**Figure 5.2 How other organisational parameters modify the Influence of Potential POSS roles**

Each of the three modifying factors is discussed respectively in each of the following three sub-sections with reference to Figure 5.2 as well as to key findings from the case studies. Each is evaluated as an additional consideration to structure in affecting the influence exercised by operational safety specialists. The inter-relationships establish a broader context for the central research hypothesis and this expansion of Hopkins’ hypothesis is presented in Section 5.5.

**5.4.2 LEADERSHIP SUPPORT**

The research found that the attitude and understanding of operational safety issues by senior management plays a critical role in determining the influence of technical specialists. In several of the participating companies, the strong and open support of leaders is clearly recognised as directly strengthening the available influence of operational safety professionals. Those interviewees who believe that their executive leadership takes operational safety very seriously also report that the broader organisation tends follow that lead. In Company C, the potential POSS is supported by an experienced operational executive manager who understands the importance of safety metrics and a new CEO is not only supportive of the POSS, but is restructuring the entire organisation to create a

stronger safety function. In Company G, the CEO encourages the potential POSS to bypass the intermediary executive and inform him directly of issues that require his attention.

In those companies where the leadership team is not perceived to have a strong focus on operational safety management, interviewees have ready examples of facing conflict and opposition when promoting operational safety priorities. In Company D where one CEO had instituted a strong safety function, the POSS role has since been gradually diminished by subsequent CEOs, the latest reportedly asserting that his operational managers would understand safety priorities better than he could. Most of the interview accounts of safety advice and recommendations being openly dismissed or neglected by operations are from companies without clear, strong leadership support of operational safety priorities.

From the various discussions of organisational leadership, it is apparent that there are several underlying issues with leadership support that are somewhat layered. Firstly, there is personal commitment: how responsible and accountable does leadership hold itself for operational safety outcomes? Secondly, there is personal interest: how much time and effort does leadership invest in monitoring operational safety performance and promoting operational safety priorities? Thirdly, there is actual aptitude: how well does leadership understand the complexities of operational safety concepts? All of these aspects contribute to leadership attitude and impact on the effectiveness of leadership support.

These aspects also apply to the representative leadership of the function. If the function reports to a representative on the leadership team who has no experience or expertise in operational risk and process integrity, related issues are not necessarily understood well enough to be communicated and prioritised. In some of the participant organisations, the executives are all individuals with a background in management and related support functions, such as finance and law, rather than a background in the core activities of the business itself. In Company C, such an individual is even given leadership of a divisional safety function, extending the lack of knowledge further down the hierarchy. The safety professionals within that group reasonably conclude that their technical expertise is not valued by leadership and believe that this is reflected to the broader organisation.

The problem with having no one who understands the complexities of operational discipline on the leadership team is that the onus for communicating information, that is both technically complex and potentially unwelcome, then drops down the hierarchy. Several interviewees report that executive and senior managers speak in a different language, which one interviewee refers to as “business speak”. This “boardroom language” is observed to preclude any productive discussion of details and data that are

required to explain operational safety issues. There is a need for translation of technical recommendations because the “business heads” expect their agenda items to be neatly summarised. The discussions at the higher levels rely on specific indicators or broad safety performance outcomes for easy reference and comparison, with a focus on trends and KPI.

It is common for concepts such as “traffic lights” to be used to present risk factors so that probability based, quantified risk information is “digestible” facilitating strategic discussion. In Company G, a safety manager is required to collate raw data from all of the facilities within his operational division for regular reporting. For one KPI, there is single “red” site with a specific and critical safety issue that is continually merged with several “green” sites to prepare these reports. The resulting “amber” classification that is part of the metrics reported up the hierarchy indicates only the potential for an issue within the division. Several attempts have reportedly been made to argue for presentation of the data for each site as separate traffic lights so that there is clear communication that a critical issue at a single “red” site requires actual attention. However, summarised information shows “amber” which calls for vigilance at all of the sites but no action at any.

It is easy to see, if ever the issue at the “red” site leads to an accident, how these same executives might be genuinely astonished that their “amber” KPI had given no indication of an imminent failure. The interviewee is both frustrated and resigned that the lack of understanding (of risk quantification and assessment criteria) allows for the ongoing misrepresentation along this reporting line and continues to filter out a clear warning. It is also easy to see how the employees at the “red” site – whether safety or operations – will perceive the lack of leadership attention to a glaring safety issue as an indication that safety is not a priority. Discerning attention is required to avoid fostering such false impressions.

It is reported by several interviewees that communication failures are mostly attributed to the limited personal skills of technical experts and safety professionals. It is of significance however that those managers who are reported to understand technical concepts do not have the same problems. It has not gone unnoticed by operational safety professionals, or some CEOs, that leaders must actively encourage communication and seek out details, not just rely on a summary, to improve context and possibly outcomes of reported KPI.

In Company H, the CEO makes a point of regularly following up on all of the details of any safety incident that catches his attention. This allows him to better understand what aspects of operations or management might have contributed to an accident. All of his executives and senior managers know that they must be prepared to explain and discuss such matters within days of such incidents – or hours if it is serious or of immediate concern

to him. This encourages the operational managers within Company H to actively seek the analysis and advice of their safety specialists and technical experts. In Company D, where even formal audit reports are rarely followed up by leadership, staff had several years to respond to and follow up on audit recommendations. After a change in CEOs, the direct instruction to a facility manager by the new visiting CEO, ensured that a ten-year old safety audit action was finally included in the facility budget and implemented within the year.

Manipulating data and parameters, in order to create a digestible presentation of facts for leaders who lack interest or appreciation of operational safety, compromises information. The significance of complex issues can more easily be lost in subsequent translations. The additional disadvantage to having a lack of understanding of operational safety concepts amongst leadership is that information can also be quite deliberately manipulated. Without intending to be deliberately malicious, a site manager could regularly and deliberately neglect to undertake thorough safety reviews. He thereby avoids identifying problems, that may reflect badly on his site management when reported up the hierarchy, but is effectively misinforming leadership. While specific critical issues might be diluted by data collation process, or in error, there may also be tampering of data that genuine oversight along the organisational hierarchy has to capture and correct.

A lack of commitment, interest or competency along reporting lines up the hierarchy to leadership can permit translation distortion, careless mistakes and even deliberate misrepresentation of operational safety issues. Such anomalies require active leadership support to be recognised, followed up and corrected at all levels of the hierarchy.

### **5.4.3 MANAGEMENT SYSTEMS**

The organisation's management systems are also observed have considerable impact on the influence available to and exercised by operational safety professionals. There are various functional systems of management that are required to coordinate the activities of an organisation and dictate how tasks and responsibilities are controlled and monitored throughout the organisation. The fundamental aspects of financial control, legislative compliance and human resourcing are all guided by formalised systems and procedures. All of the participating companies have documented safety management systems to establish corporate expectations of how safety will be managed, coordinated, communicated and recorded. These systems range from corporate policy statements, that promote awareness and attention, to specific and detailed operating protocols, that establish minimum requirements for various operational and functional activities.



The research findings clearly indicate that such safety management is still predominantly non-technical and considered to be a provision of services to the main operations of the business. Historically, safety has been seen as an issue that is strongly aligned to the human resources function. Matters of personal safety, such as issues of workers compensation and management of return to work following an injury, require organisations to clearly define systems for managing individuals and their employment relationships.

It is common for safety management to be integrated with other functions such as health and environment in a management system addressing all three issues as separate from core operational activity. Whilst there are clearly advantages to highlighting organisational functions that support excellence in safety, this governance approach effectively isolates safety objectives from operational practices. This is especially the case where the safety management system is treated as the responsibility of safety professionals and is viewed as an imposition of a value system that is different to the values that drive operations. The system itself can become about reporting and documentation: guided by requirements for oversight, assurance, insurance claims and the like. This approach does not allow for effective operational safety management, which inherently requires ongoing operational diligence and process control, as well as continuous monitoring and performance analysis.

Half of the potential POSS roles identified in this research are shown in Figure 5.2 to either utilise or contend with the impacts of organisational management systems. Additionally, several of the other interviewees described various corporate policies and procedures, as well as the common business practices in the organisation, that impacted on their ability to prioritise operational safety issues. The stories that are detailed in the case studies include accounts of various management systems that either presented opportunities to expand influence or created obstacles that impeded influence.

The most successful management systems that are described by interviewees seem to be those in which the safety requirements are integrated into the operating standards and operational practices and procedures and even the management of the business. These safety requirements can be specifically managed at the operational level as a necessary function and consequence of the broader management systems that provide governance and assurance at executive level. Modifying the operating requirements in this way can be clearly seen to expand the available influence of operational safety professionals, enabling them to affect behaviours throughout the organisation. Those who control systems of management have considerable influence through the interpretation of procedures and standards to which operational activities are expected to comply. Figure 5.2 shows that

these positive impacts are found in Company A, in Company B, in Company F and in Company H. These benefits seem to correlate with organisations in which technically competent safety professionals have a strong involvement in either or both the operations and safety management systems.

In Company A, technical support managers without actual oversight authority are able to strengthen their influence by integrating safety priorities within operations management systems because they are responsible for incorporating regulatory requirements into the operating standards. In Company H, a corporate competency management system is utilised to demonstrate the expertise and experience of safety professionals and provide support for their credibility and for their advice. In contrast, Company C has systems in place that limit the corporate auditing process to reviewing and reporting on operating performance data and the findings of in-house audits. This system limits the safety team's ability to verify the information or to enforce audit recommendations, even those that address identified non-compliance. In Company G, there is a Technical Authority system that is utilised to involve technical specialist for advice to guide operational modifications or deviations. However, the system does not empower the designated Technical Authorities to initiate such involvement, instead relying on the operational managers to call on expert input reactively, when potential issues have escalated to actual problems.

The two most significant aspects of management systems, as an organisational factor that modifies the influence of operational safety professionals, are that they can be both too formalised and too informal. There are problems with the system if it is perceived to be burdensome and overly documented that can lead to a box-ticking paperwork process that is not integrated with actual practices. However, if it lacks the details and specifics that relate the system to the actual practices, it can also be perceived as too vague and casual to warrant strict attention. The vulnerability and opportunity of management systems is that they must be developed, implemented, monitored and updated to both control and reflect operating conditions. The findings suggest that input by the safety function can be a source of considerable influence – detrimental if mishandled but significant and profound if based on technically sound and operationally effective principles.

#### **5.4.4 PERSONAL CREDIBILITY**

The most significant research finding is that an individual's attributes - such as professional reputation, commitment and communication skills - are heavily relied upon to provide the personal credibility that garners enough influence to fulfil safety roles. In particular, those with any responsibility for the promotion of operational safety priorities are expected to

already have an “ability to influence others”. Persuasion and encouragement may be useful for promoting greater attention to those patent hazards that are related to personal safety, but such risks are easier to recognise. Operational safety considers latent hazards and such risks are technically difficult to detect, let alone encourage others to diagnose.

All of the interviewees discussed their own perceived influence as highly reliant on their attitude and personality. Every interviewee also discussed the perceived influence of other safety professionals in terms of their manifest credibility: not professional competence alone, but also their presentation as personable, reliable and endowed with authority. Several of the experienced, senior interviewees echo the sentiment that to be an effective safety professional, one’s commitment to safety has to be seen to be worth risking one’s employment. The unquestioned expectation is that the exercise of influence is ultimately an extension of a personal ability to motivate and persuade others to comprehend and consider safety priorities, whether or not there is any actual organisational support.

In Company A, a senior technical specialist takes advantage of the responsibility of interpreting regulations to include safety requirements in standard operating procedures. His expertise and experience are such that it extends his influence beyond his own designated regional division and his advice is sought by managers from other regions. In Company F, informal relationships with the technical community create opportunities for communication and interaction that facilitate discussion and development of safety priorities. In Company G, the most-likely POSS believes that his personal lack of interest in corporate politics and “boardroom antics” reduces his effectiveness and he hopes to be replaced soon by a more skilled executive. In Company D, the most senior safety manager relies on a personal relationship with the operations manager and is apprehensive of the impact that a change in personnel will have on corporate safety management.

The other consequential research finding related to personal credibility is that there is a clear distinction made between technical specialists and safety specialists, as two distinct archetypes of safety professionals. This reflects a tendency in industry to treat operational safety as similar to occupational safety, despite the lack of common features. It is fairly obvious to safety professionals that the technical complexities of hazard and risk management processes require a fundamentally different skill set to the educational and adult engagement skills that are used to promote personal safety practices. Yet, these archetypes have pervaded discussions with almost all interviewees in this research project.

The technical specialists tend to be those with long professional backgrounds as qualified engineers with a deep understanding of operational matters, such as process control and

plant integrity, or as experts in safety analysis, such as consequence modelling and quantitative risk assessment. They may be highly competent and knowledgeable in their specific areas of expertise but are perceived to often lack the management skills or experience to effectively coordinate operational safety activities or lead a functional team.

Technical competence can greatly impact on the influence of operational safety specialists as can be seen when considering such individuals as in Company F. The operational excellence staff in Company F have developed personal reputations based on technical credibility that extend their influence within their organisations beyond the limited authority of their operational support roles. It is more common for such technical competence to remain within engineering groups that support operating discipline and control of safety critical processes. As interpersonal skills are a priority for oversight and strategic management, such technical specialists, regardless of expertise, are typically seen to lack credibility in that forum.

On the other hand, one manager explains that “safety specialists know that they’re expected to ask the stupid questions”. If such an expectation is considered to be common knowledge, it carries with it an acceptance that safety specialists have inferior technical competencies and that, regardless of their interpersonal skills, they are seen to lack the credibility associated with operational experience.

These archetypal safety specialists tend to be those with skills and experience in non-operational matters, such as personal safety issues, emergency response planning or training and leadership. They could have long operational backgrounds, building up valuable familiarity and confidence with various work and safety processes, but they could also have only short dynamic careers with a focus on adult training, systems, strategy or leadership. While safety specialists may be very effective communicators or capable managers, they often lack the necessary knowledge and complex understanding to reliably recognise and address operational safety issues as they arise.

It is typical to observe that the competence and long experience that are fundamental requirements for technical experts are considered to be a bonus if found in a safety specialist. Meanwhile, the interpersonal skills that are fundamental requirements for safety specialists are considered to be a rare gift in technical experts. This distinction seems to reflect an underlying bias in corporate attitudes and organisational practices that may have serious implications for the management of operational safety priorities .

As previously noted, the observed trend amongst all of the participating organisations is that safety specialists should have an “ability to influence others” as a basic competency. This widespread expectation suggests that it is quite common for safety management roles to lack any formal authority and that this is a mostly unquestioned bias within the industry. Instead of treating the lack of specific structured or designated authority as an obstacle to safety management that needs to be challenged and surmounted, safety and operations and executive managers seemingly accept this as a part of the corporate landscape. The bias is “worked around” by recruiting safety staff with the appropriate personal skillsets to promote safety when no actual authority is available.

Several of the interviewees consider that bridging this great divide is the most fundamental challenge for operational safety management as well as general safety management. They propose to ensure that young technical professionals are trained in interpersonal skillsets and that health and safety professionals are exposed to the highly technical concepts of operational safety. However, this approach does not address the more fundamental issue with operational safety problems: that mitigation and control typically require both the comprehensive understanding of production processes and the resources to analyse and design modifications to operating equipment and management systems. Such work would require impetus: justifications must extend beyond a single personal interaction.

One could say that prioritising operational safety requires that the technical specialist has to become a crusader or activist, not just the safety specialist role of teacher or advocate. Of greatest concern is that the notion is so ubiquitous: that the engineers and technical specialists lack interpersonal skills. Only one interviewee (of thirty professionals including several engineers) suggests that it really should not be necessary for safety roles to be so heavily dependent on such skills and an individual’s personal credibility to get the job done.

## **5.5 ELABORATING ON HOPKINS’ HYPOTHESIS**

There are two interpretations of these research findings to consider with regard to the central question of Hopkins’ hypothesis. The hypothesis recommends alternative structures to counter the impacts of a decentralised hierarchy on the ability of technical experts and safety specialists to exercise influence. The underlying concern is with how operational safety can be prioritised against commercial motivations within a corporate environment.

Firstly, Section 5.5.1 presents what the search for potential POSS roles reveals about the independent variable of organisational salience, with reference to Figure 5.1. Interview accounts about the dependent variable – the perceived influence of such roles – are

considered, with reference to Figure 5.2 to identify potential correlations. Then, in Section 5.5.2, a discussion of the sources of influence considers what organisational factors are observed to be useful for operational safety professionals in hazardous industry, to both detect operational safety problems and promote operational safety priorities. Hopkin's hypothesis is expanded to accommodate those parameters, other than structure, that have been identified as also modifying the influence of operational safety professionals.

Section 5.5.3 considers whether the intent of organisational design can be adequately interpreted from an assessment of organisational structures to determine how operational safety priorities are supported and if such intent could define commitment to performance.

### 5.5.1 POSSINESS

The degree of centralisation of a functionally integrated group of technical experts and safety specialists, and the extent of their independence from the operational hierarchy, are referred to as the organisational salience of the most likely POSS role that is identified. As previously defined, the ideal POSS is postulated to be the Principal Operational Safety Specialist role in a structure that adopts the underlying argument of Hopkins' hypothesis in its entirety. The defining characteristics are: technical competence in operational safety; functional independence from commercial priorities; and access to the CEO's authority.

Those roles that have been identified as potential POSSes in all of the nine participating organisations have been summarised in Figure 5.1 to illustrate the independent variable of organisational salience in terms of these three characteristics. The relationship of each potential POSS is shown against the ideal POSS role and each of the three defining characteristics is qualified in comparison to the postulated ideal. The central research question is whether the dependent variable of the perceived influence of each role as discussed in interviews reflects organisational salience as Hopkins' hypothesis suggests.

It is clear in Figure 5.1 that a role with characteristics reflecting the postulated ideal POSS is not found in any participating organisation. Of the four POSS roles that are closest to the ideal (seven of nine traits), Company B's Executive HSE+ Manager is limited to occupational safety with no operational safety considerations; Company C's Safety Manager is yet to develop the functional group; and Company D's previous Executive Safety Manager is a role that no longer exists due to gradual restructuring.

Only Company H's HSE+ Manager provides a current example of a role that represents Hopkins' recommendations. Interestingly three of these roles have the same distribution of

traits, with direct access to the CEO and integration of technically competent safety professionals. They also lack the technical expertise that would allow for comprehensive appreciation of complex operational safety issues. It is notable that these three potential POSS roles – on the leadership teams with direct access to the CEO – are safety specialists rather than technical experts.

Conversely, three of the four roles that indicate operational safety expertise only have indirect access to the executive level of the organisation with reporting functions to leadership. The fourth role does not even have reporting access as a key functional responsibility. All four of these roles also only have functional staff rather than functional priorities or functional integration. They are all engineering management roles, with the functional leaders being accountable to operations managers and responsible for providing technical support rather than for maintaining safety. Though operational discipline maintains both safety and efficiency, the priorities of these engineering groups are set by managers with operational imperatives that may conflict with safety priorities.

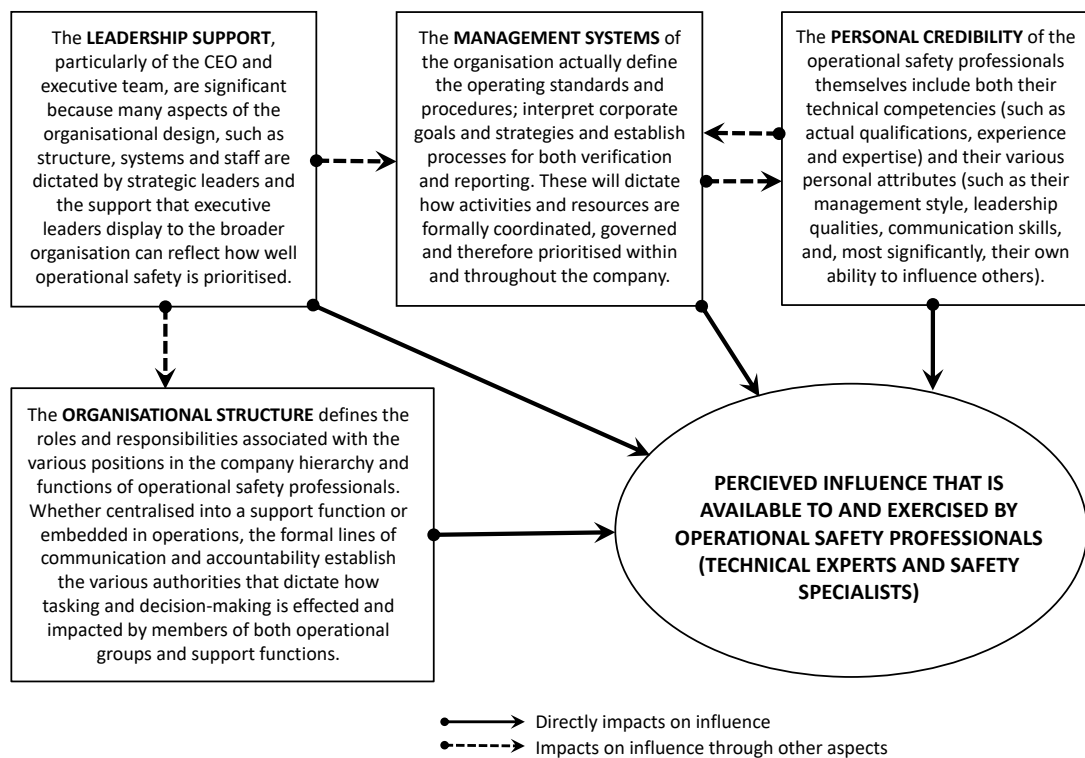
A clear conclusion can be drawn from this sample group of organisations in high hazard industry that: the characteristics of organisational salience – as the independent variable that reflects Hopkins' recommendations for a centralised, independent function with operational safety expertise - are not complementary traits. The apparent issue is that operational safety is not at all integrated (with few accountabilities to a functionally independent manager limited to oversight activities). Even functional coherence is rarely encountered (with limited responsibilities and communication between technical safety specialists). These findings highlight that there are fundamental issues regarding how organisations are structured that need to be addressed. Why are core operational safety activities in these hazardous industries not coordinated and managed as a single function?

Hopkins' argument is based predominantly on securing independent lines of information flow to influence decision-making at strategic levels. As discussed in Section 2, the research has focussed on the underlying concerns that Hopkins raises: of the conflicts between functional and operational priorities. These organisational dynamics can be clearly distinguished through the lens of the dependent variable of perceived influence. There has been no opportunity to gather observations and insights from any existing centralised operational safety functions. However, discussions about centralised HS+ functions have provided some perspective on organisational dynamics. Also, the experiences of safety professionals with decentralised hierarchies clearly indicate an impact on their influence.

Ten of the seventeen potential POSS roles reflect limited organisational salience of five or less of the nine traits. All of these roles were discussed in interviews as diminished in influence by structurally defined aspects of the positions and functions. Decentralisation of safety accountabilities is recognised as the key problem in Company C and in Company J; and both Company E and F are discussed as continually changing their structures to suit market conditions, rather than functional imperatives. Company G’s Senior HS+ Manager answers to a corporate executive without a safety background and feels that influence has been lost with status. All of the four Engineering Managers with operational safety expertise are perceived to be subordinate to the priorities of their operational managers.

**5.5.2 OTHER MODIFYING FACTORS**

As summarised in Figure 5.2, there are several other key organisational parameters that can support or impede safety professionals in prioritising operational safety. Over half of the identified POSS roles are affected by leadership support and almost half were affected by the systems of management that are implemented for governance, assurance and operations. Personal credibility is also a factor that is apparently defined as a key skillset of safety professionals at any level of the organisation in terms of an “ability to influence others”. The interdependencies of the four variables are illustrated below in Figure 5.3.



**Figure 5.3 How Organisational Structure and Other Modifying Factors Can Impact on Influence**



Organisational structure is identified as a direct impact and is also shown as itself impacted by leadership support. In addition to direct impact on influence by example and direction, CEOs can have the most significant impact on the manner in which the organisation is coordinated. Leadership attitudes and approaches also dictate the corporate management systems which formally establish how tasks, authorities and information are managed throughout the organisation. Every single participating company is described as either having recently been restructured or currently being restructured to suit the business vision and strategic expectations of their CEO. As discussed in Chapter 3, this has affected the research methodology by providing opportunities to directly discuss the purpose and intent of structural changes that relate to operational safety positions and functions.

All of the research interviewees consider that their status and the priority given to safety is affected by the leadership priorities that are reflected in the organisational hierarchy and the systems of management adopted within the company. The structured position and function of individuals is interpreted as the CEO putting them in their designated place with intentionally specified authorities. The positions of functional specialists within the organisational structure therefore provides an indication of the importance of those specialists' functions to executive leadership.

The perception can be encapsulated as a statement of intent. If the CEO appreciates the importance of operational safety, then the organisational design will reflect that by providing interaction and communication between senior leaders and operational safety specialists. Alternatively, if this area is not seen as significant, then it will be buried further down the organisational hierarchy with limited systems of governance and management available to promote operational safety priorities.

As illustrated in Figure 5.3, the management systems can also be affected by the competence of those individuals who develop or interpret standards and procedures for governance, assurance and operational discipline that must be implemented. In Company E, the executive managers are closely involved in a committee-based system that provides for communication and accountability beyond the organisational structure. In Company F, the operational excellence system is used by technical safety specialists to present safety initiatives as advantages to operational priorities. In contrast, Company J, has safety performance reporting processes that discourage the communication of the complex details required to inform effective decision-making. The management systems that formalise the behaviours within an organisation can therefore be observed to significantly enhance or obstruct the influence of operational safety professionals.

### 5.5.3 RECOGNISING INTENT IN ORGANISATIONAL DESIGN

The most significant organisational factor that has been encountered in this research is the unexpected fluidity of defined formal organisational structures. The expectation of a “structure” is that it is somehow a foundation that implies solidity or rigidity, undoubtedly related to the common-usage and experience of built structures. Organisational structures seem to be far more closely related to the definition of “structure” as the arrangement or ordering of various components and complex relationships.

This fluidity is a common finding amongst all nine participating organisations. Company A and Company H have both been acquired by larger business entities and restructured to suit. Company B maintains a small core of staff whose responsibilities and accountabilities vary according to the projects that they are managing, populated by contracted staff. Company C and Company J are both in the process of global restructuring of functional lines to address systemic problems with safety management. Company G has been restructured to suit the preferences of its new CEO and Company D expects every new CEO to institute changes to organisational structure. Company E deliberately ensures that its organisational structures can be adjusted to meet market demands, while Company F has been forced by the economic environment to restructure core operations.

It is clear that advances in information processing and technology and associated evolution of business practices and legal processes are just a few of the pressures that modern organisations are facing, that require greater adaptability. The organisational dynamics are even more important to understand because organisational structure is itself more flexible. This has been an opportunity rather than a limitation to the examination of Hopkins’ hypothesis. The discussions of centralised lines of functional accountability have been more direct and comprehensive because the interviewees have direct observations and opinions of the structural changes that have affected their own positions and functions.

The first implication to the central research hypothesis of such fluidity is that it becomes all the more important to secure the basic function of operational safety and the activities required to maintain operational discipline in hazardous industry. If operational lines are more dynamic to keep up with external commercial drivers, there is even less focus and attention available to prioritise operational safety. The second implication for this research is that if structure is readily and easily adjusted to cater to commercial demands of the market or the personal visions of their CEO, what is stopping such adjustments to cater to operational safety requirements? Employees (and researchers) can now observe structurally defined accountabilities as a direct reflection of corporate intent.

It would be a valuable process to merge the principles of organisational design with those of operational safety, if only to provide a context for judging how and why authority is delegated along operational or functional lines. If it is meaningful to assign intent to the subordination of functional management of operational safety to operational lines, it is possible to seek justification. Most of the interviewees spoke with conviction that their roles were prescribed exactly as desired by management. They perceive that everyone is put in their place as is desired and required in order to promote the actual priorities of the organisation.

The resigned acceptance of structured subordination of operational safety professionals to operational managers could then at least be challenged. Unless corporate statements are changed to “safety straight after we’ve made money” or “no gain without some pain” the demonstration of discrepancy between designed intent and stated intent could motivate some attention. Structural status and defined authorities could perhaps be obliged to reflect more realistic and accurate claims than the corporate policy statements of “safety first” or “zero harm”, which tend to obscure the risks inherent to hazardous industry.

## 5.6 THEORY AND PRACTICE

This research set out to examine Hopkins’ hypothesis on the impact of decentralised structures with a focus on three central questions:

- The application of safety theories: how can concepts of organisational design and of power and influence contribute to understanding and establishing whether appropriate structures are in place to advance the effective utilisation of technical expertise?
- The investigation of corporate practices: how do organisations, that are developed around essentially unsafe materials, processes and environments, structure themselves to manage the inherent hazards and risks of their core activities?
- The examination of industry practices: how do those safety professionals, who comprehend inherent hazards and risks, perceive that they influence and contribute to strategic and operational decision-making and prioritise operational safety issues?

In terms of industry practices:

- It is clear from the observed roles of all of the engineering managers interviewed or discussed that they are foundational specialists. Their technical expertise is utilised to improve operational processes and to ensure operational excellence with the objective

being operational discipline in order to optimise processes. In other words, their designated functions are based on motivations that must be fundamentally commercial (efficiency, return on asset investments, loss control) within constraints of operating safety margins.

- It may not be necessary for technical experts and specialists to be positioned on the basis of status in the operational hierarchy if their professional authority in their various disciplines is appropriately acknowledged. Substantial functional responsibilities could include the necessary authorities to fulfil them. It is of concern that when “independent authority” was once recognised as an organisational recommendation, this research addresses how to ensure that even “independent advice” has any influence.
- The preference for the ability to influence others as a key competency of a typical safety professional relies on acceptance of conflicting priorities with organisations treating influence as a personal skill instead of providing adequate authority with the role. These skill sets are not likely to attract technically competent professionals who have no particular interest in interpersonal skills. Even the technically expert research participants who are functional leaders are consistent in recognising that there are far more technically capable people and experienced experts within their organisations.

In terms of corporate practices:

- The unexpected fluidity in the structural hierarchies of the upper echelons of these organisations that are involved in high hazard industry is somewhat ominous. Due to the high level of asset investment for core operations in this industry sector, the core activities should be quite fixed and require stable systems to maintain operating processes. The level of change that is encountered indicates a significant degree of disconnection between these fundamental activities and those executive and senior managers who are ultimately responsible for their conduct and management.
- There is a fundamental difference between the top down pressure of safety culture and mindfulness and the bottom-up pressure of prescriptive operational procedures and rules. The many, readily available examples of conflict suggest that behavioural programs that aim to nurture safety awareness and a cooperative, collaborative safety culture ignore the natural tensions between sub-cultures that include at least operators, engineers, managers and support staff. Clearly defined structures that are flexible should perhaps establish cultural hierarchies that acknowledge different levels of responsibility and authority, rather a single homogenous safety culture.

In terms of safety theory, the research findings demonstrate a clear recognition that the organisational design factors discussed can be simplified to a single issue: how independent are operational safety professionals encouraged to be (from the commercial priorities that drive corporate industry practices)? This specific concept has been explicitly affirmed and highlighted within safety science for several decades.

Both social and technical models recognise that “a better mitigation of organisational risks is dependent on managerial will” (M. Bourrier 2005, p103). Both social and technical models also acknowledge the conflict with corporate values: “though actors directly involved in the management of dangerous activities often acknowledge the necessity to change the paradigm ... they usually highlight the ‘risks’ of such a change” (Gilbert, et al. 2007, p971-972). “Operational risk” is unapologetically defined by commercial, rather than human, parameters within the corporate environment.

In conclusion, there is significant potential for closer collaboration between safety theorists and safety practitioners, as exemplified by not only the interest in Hopkins’ work but the fact that the issues addressed by his hypothesis resonate with the expressed concerns of the interviewees. It may be of significant value for safety theorists and practitioners to consider referencing organisational design factors such as structured accountability and formal authority as possible indicators of actual corporate goals. Where, concepts such as mindfulness may allow for broad cultural changes to be seen as new and progressive, direct reference to fundamental engineering principles may highlight the underlying expectation of operational discipline and encourage a greater attention to technical details.

## BIBLIOGRAPHY

- Antonsen, Stian. 2009. "Safety culture and the issue of power." *Safety Science* (Elsevier) (47): 183 - 191.
- Baker Panel. 2007. *The Report of the BP US Refineries Independent Safety Review Panel*. Washington: US Chemical Safety and Hazard Investigation Board.
- Baybutt, Paul. 2016. "Insights into process safety incidents from an analysis of CSB investigations." *Journal of Loss Prevention in the Process Industries* 43 537-548.
- Bazeley, Pat. 2013. *Qualitative Data Analysis: Practical Strategies*. Sage Publications Ltd.
- Boin, A., and P. Schulman. 2008. "Assessing NASA's Safety Culture: The limits and possibilities of High-Reliability Theory." *Public Administration Review* 1050-1062.
- Bourrier, M. 2005. "The Contribution of Organisational Design to Safety." *European Management Journal* (Elsevier) 23 (1): pp 98 - 104.
- Bourrier, M. 2005. "The Contribution of Organisational Design to Safety." *European Management Journal Vol 23 No 1* 98-104.
- Bourrier, Mathilde. 2005. "An interview with Karlene Roberts." *European Management Journal Vol 23 No 1* 93-97.
- Bourrier, Mathilde. 2011. "The Legacy of the High Reliability Organization Project." *Journal of Contingencies and Crisis Management Vol 19 Number 1* 9-13.
- BP. 2010. *Bly Report - Deepwater Horizon*. Accident Investigation Report, BP.
- Broughton, E. 2005. "The Bhopal disaster and its aftermath: a review." *Environmental Health: A Global Access Science Resource*.
- Bureau of Meteorology. 2013. *Service Level Specification for Flood Forecasting*. Melbourne: Bureau of Meteorology.
- Centre for Chemical Process Safety. 2007. *A summary of risk based process safety (RBPS) management approach as detailed in Guidelines for Risk Based Process Safety*. Wiley.
- Committee on Science and Technology. 1986. *Investigation of the Challenger Accident*. Investigation Report, Washington: US Government Printing Office.
- Committee on Shuttle Criticality Review and Hazard Analysis Audit, Space Applications Board, and Commission on Engineering and Technical Systems. 1987. *Post-Challenger Evaluation of Space Shuttle Risk Assessment and Management*. Washington: National Academies Press.
- Flyvberg, B. 2004. "Five misunderstandings about case-study research." *Qualitative Research Practice* 420-434.
- Forest, Jerry J. 2012. "How to Evaluate Process Safety Culture." *Process Safety Progress Vol 31 No 2* 195-197.

- Frank, W.L. 2007. "Process Safety Culture in the CCPS Risk Based Process Safety Model." *Process Safety Progress* Vol 26 No 3 203-208.
- Gilbert, Claude, Rene Amalberti, Herve Laroche, and Jean Paries. 2007. "Errors and Failures: Towards a New Safety Paradigm." *Journal of Risk Research* Vol 10 No 7 959-975.
- Harrison, E.Frank. 1993. "Challenger: the anatomy of a flawed decision." *Technology in Society* (Elsevier) 15 (2): 161-183.
- Hendershot, D. 2015. "Texas City - Ten years later." *Journal of Chemical Health & Safety* 38-39.
- Hollangel, Erik. 2008. "Risk + barriers = safety?" *Safety Science* 46 221-229.
- Hopkins, A. 2007. *Lessons from Gretley: Mindful Leadership and the Law*. CCH Australia Limited.
- Hopkins, A. 2014. "Issues in Safety Science." *Safety Science* 67 6-14.
- Hopkins, A. 2006. "Studying organisational cultures and their effects on safety." *Safety Science* 44 875-889.
- Hopkins, A. 1999. "The limits of normal accident theory." *Safety Science* 32 93-102.
- Hopkins, A. 2001. "Was Three Mile Island a "Normal Accident"?" *Journal of Contingencies and Crisis Management* Vol9 No 2 65-72.
- Hopkins, Andrew. 2006. "A corporate dilemma: to be a learning organisation or to minimise liability." *Journal of Occupational Health and Safety Australia and New Zealand* 22(3) 251-259.
- Hopkins, Andrew. 2012. *Disastrous Decisions: The Human and Organisational Causes of the Gulf of Mexico Blowout*. Sydney: CCH Australia Limited.
- Hopkins, Andrew. 2008. *Failure to Learn: BP Texas City Refinery Disaster*. Sydney: CCH Australia Limited.
- Hopkins, Andrew. 1999. "For whom does safety pay? The case of major accidents." *Safety Science* 32 143-153.
- Hopkins, Andrew. 2002. "Special Issue: Lessons from Longford: the trial." *Journal of Occupational Health and Safety* (CCH).
- Hopkins, Andrew. 2006. "What are we to make of safe behaviour programs?" *Safety Science* 44 583-597.
- Hopkins, A., and H. Tillman. 2016. *Quiet Outrage: the way of a sociologist*. Wolters Kluwer.
- Huber, Stefanie, Ivette van Wijgerden, Arjan de Witt, and Sidney W.A. Dekker. 2009. "Learning From Organizational Incidents: Resilience Engineering for High-Risk Process Environments." *Process Safety Progress* Vol 28 No 1 90-95.
- Kletz. 2003. *Still going wrong!* Elsevier.

- Klien, James A. 2009. "Two Centuries of Process Safety at DuPont." *Process Safety Progress* Vol 28 No 2 114-122.
- Kontogiannis, Tom, and Stathis Malakis. 2012. "A systematic analysis of patterns of organisational breakdowns: A case from HEMS operations." *Reliability Engineering and System Safety* 193-208.
- Le Coze, Jean-christophe. 2008. "Disasters and organisations: From lessons learnt to theorising." *Safety Science* 46 132-149.
- Leveson, N., N. Dulac, B. Barrett, J. Carroll, J. Cuthcher-Gershenfeld, and S. Friedenthal. 2005. *Risk Analysis of NASA Independent Technical Authority*. Research, Massachusetts Institute of Technology.
- Lukes, Steven. 1974. *Power, a radical view*. London: Macmillan.
- Mannan, M.S. 2012. "Trevor Kletz's impact on process safety and a plea for good science - an academic and research perspective." *Process Safety and Environmental Protection* 90 343-348.
- Marshall, Eliot. 1986. "Feynman Issues His Own Shuttle Report, Attacking NASA's Risk Estimates." *Science* 232, no. 4758 1596.
- Murphy, J.F., D. Hendershot, S. Berger, A.E. Summers, and R.J. Wiley. 2014. "Bhopal Revisited." *Process Safety Progress* Vol 33 No 4 310-313.
- Murphy, Raymond. 2018. "Uncertainty and claims of uncertainty as impediments to risk management." In *Handbook of Social and Environmental Change*, 221- 230. Routledge International.
- Pasman, Hans J., William J. Rogers, and M. Sam Mannan. 2018. "How can we improve process hazard identification? What can accident investigation methods contribute and what other recent developments? A brief historical survey and a sketch of how to advance." *Journal of Loss Prevention in the Process Industries* 55 80-106.
- Reiman, Teemu, and Carl Rollenhagen. 2011. "Human and organisational biases affecting the management of safety." *Reliability Engineering and System Safety* 96 1263-1274.
- Rodriguez, J.M., S.C. Payne, M.E. Bergman, and J.M. Beus. 2011. "Journal of Safety Research." *Journal of Safety Research* 42 215-222.
- Rogers Commission. 1986. "Report of the Presidential Commission on the Space Shuttle Challenger Accident." Investigation Report.
- Sarshar, Sizarta, Stein Haugen, and Ann Britt Skjerve. 2015. "Factors in offshore planning that affect the risk for major accidents." *Journal of Loss Prevention in the Process Industries* 33 188-199 .
- Sriramachari, S. 2005. "Bhopal gas tragedy: scientific challenges and lessons for future." *Journal of Loss Prevention in the Process Industries* 18 264-267.



- Varma, R, and D.R. Varma. 2005. "The Bhopal Disaster of 1984." *Bulletin of Science, Technology & Society* Vol 25 No 1 (Sage Publications) 25: 37-45.
- Vaughen, B.K. 2015. "Three Decades after Bhopal: What we have learned about effectively managing process safety risks." *Process Safety Progress* Vol 34 No 4 345-354.
- Vaughen, B.K., and J.A. Klein. 2012. "What you don't manage will leak: a tribute to Trevor Kletz." *Process Safety and Environmental Protection* 90 411-418.
- Vaughen, Bruce K. 2012. "A tribute to Trevor Kletz: What we are doing and why we are doing it." *Journal of Loss Prevention in the Process Industries* 25 770-774.
- Vaughen, Bruce K., and Trevor A. Kletz. 2012. "Continuing Our Process Safety Management Journey." *Online - Process Safety Progress* Vol 00 No 0 1-6.
- Vaughen, D. 2004. "Theorising disaster: Analogy, historical ethnography, and the Challenger accident." *Ethnography* 315-347.
- Vaughn, Diane. 1996. *The Challenger Launch Decision: risky technology, culture and deviance at NASA*. Chicago: University of Chicago Press.